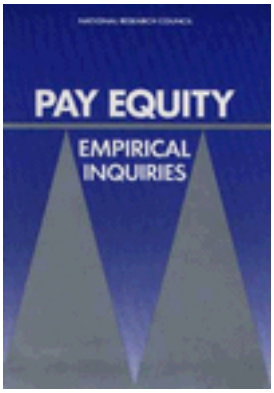

Pay Equity: Empirical Inquiries

Panel on Pay Equity Research, Committee on Women's Employment and Related Social Issues, National Research Council
ISBN: 0-309-54297-9, 272 pages, 7 x 10, (1989)

Pay Equity

Empirical Inquiries

Robert T. Michael, Heidi I. Hartmann, and Brigid O'Farrell, Editors

Panel on Pay Equity Research
Committee on Women's Employment and Related Social Issues
Commission on Behavioral and Social Sciences and Education
National Research Council

NATIONAL ACADEMY PRESS
Washington, D.C. 1989

NATIONAL ACADEMY PRESS 2101 Constitution Avenue, NW Washington, DC 20418

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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This project has been supported by funding from the Ford Foundation and the Rockefeller Foundation.

Library of Congress Cataloging-in-Publication Data

Pay equity: empirical inquiries/Robert Michael, Heidi Hartmann, and Brigid O'Farrell, editors; Panel on Pay Equity Research, Committee on Women's Employment and Related Social Issues, Commission on Behavioral and Social Sciences and Education, National Research Council.

p. cm.
Selected papers of a workshop held in Sept. 1987.
Bibliography: p.
Includes index.

ISBN 0-309-03981-9: $37.95.—ISBN 0-309-03978-9 (pbk.): $27.95

1. Pay equity—Congresses. I. Michael, Robert T. II. Hartmann, Heidi I. III. O'Farrell, Brigid. IV. National Research Council (U.S.). Committee on Women's Employment and Related Social Issues.
Panel on Pay Equity Research.
HD6061.P35 1989
331.2'1—dc19 89-20726

CIP

Printed in the United States of America

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PREFACE

There has been considerable effort and much progress in recent years in economic analyses of wage determination and in sociological studies of the marketplace and occupational structure. Despite the improved understanding that flows from this process, however, there exist sizable and systematic wage differences between women and men that cannot be explained by measured differences in skill, experience, effort, job commitment, or most any other attribute of workers that has been studied. Some argue that the unexplained differences constitute a serious inequity that should be addressed by public and private policy.

As a prescription for relieving the inequity, "comparable worth" or "pay equity" has been proposed—a controversial strategy for using some objective criterion for setting wages in a way that eliminates gender as a possible determinant of wages. Substantial public activity and applied research have been undertaken related to comparable worth. To stimulate research on wage determination processes and their relationship to the implementation and consequences of comparable worth strategies, the Committee on Women's Employment and Related Social Issues established the Panel on Pay Equity Research in 1985.

The establishment of the panel was an outgrowth of several previous National Research Council activities that addressed the issue of wage differentials between men and women. In 1981, in a National Research Council report, *Women, Work, and Wages: Equal Pay for Jobs of Equal Value*, the Committee on Occupational Classification and Analysis reported that relatively little research had been done on methods of comparing jobs since job evaluation systems were first developed in the 1930s and 1940s. That report contended that determining whether and how much discrimination affects wage rates is difficult and required further research.

Two years after publication of *Women, Work, and Wages*, the National Research Council's Committee on Women's Employment and Related Social Issues held a seminar on comparable worth research, which gathered a diverse group of scholars to develop an agenda of needed research. The committee concluded that the largest gap in the base of knowledge was not a gap in theory nor a gap in policy measures, but

rather a gap in the facts about how the labor market functions, how wages are set, how firms operate in structuring their remuneration schemes, how decisions about promotions and new hiring are made, and for the several instances in which comparable worth legislation has been implemented, how comparable worth worked, and how it was accepted.

The Panel on Pay Equity Research was established with a twofold purpose: (1) to stimulate and support empirical research that examines wage differentials and wage setting practices and that assesses the economic, social, and organizational consequences of comparable worth relative to alternative equal employment opportunity strategies and (2) to inform and advance the policy debate by disseminating the results of this research.

The panel was supported 'in its work by the Ford Foundation and the Rockefeller Foundation. Its members were selected to represent a range of disciplines in the behavioral and social sciences, strong expertise in research methodology, and knowledge of management and labor issues. An effort was also made to identify individuals who held differing perspectives on pay equity issues and who also had a strong interest in encouraging high-quality research on the topic.

In early 1986, the panel announced the availability of $150,000 in research funds, to be distributed through small research grants of approximately: $15,000 each. The solicitation for proposals was widely distributed to the research community. In response, the panel received over 220 proposals for empirical studies on various aspects of the comparable worth debate. After review by the panel members and a group of outside experts, the panel selected eleven studies for funding. In February 1987 the selected researchers met with the panel to discuss their research while in its initial stages. Results of the completed research projects were presented to the panel and other experts at a workshop in September 1987. The papers presented in this volume are the final results of a number of the studies.

This volume presents new and, in some instances, contradictory findings on male and female wage differences and the comparable worth solution. In the introductory essay, Heidi Hartmann and I provide the context for this volume by summarizing the major conclusions of the research, highlighting the areas of consensus and disagreement among the studies, and discussing issues that are not addressed and need to be addressed and, therefore, provide promising directions for further research. The papers themselves span the various topics of research the panel wanted to encourage.

The relationships of gender, job classification, and the wage determination process are analyzed at the individual level by Gerhart and Milkovich, Sorensen, Nakamura and Nakamura, and Subich, Barrett, Doverspike, and Alexander. Race-and gender-based wage differences by occupation are addressed by Baron and Newman, Parcel, and Filer. The effects of the implementation of comparable worth plans in the private and public sectors are measured at the state level by Orazem and Mattila for Iowa and by Evans and Nelson for Minnesota. Gregory, Anstie, Daly, and Ho assess the effects on an international level for Australia, Great Britain, and the United States.

Comments by the discussants who participated in the September 1987 workshop provide yet another perspective on the facts, their interpretation, and their policy implications. Ronald Ehrenberg, Jean Ross, James Smith, and Christopher Winship, among others, enhanced the discussions of the panel and the work of the researchers through very practical suggestions and questions regarding data, methods, and findings, as well as by raising the overarching substantive issues on which there is agreement and those on which the debate continues.

The purpose of this panel was not to draw conclusions and make recommendations for policy. Rather, the goal of the Panel on Pay Equity Research was to stimulate research and to encourage new researchers to study difficult empirical questions underlying the current debates on the complex issues surrounding comparable worth. The activities of our panel over the past two years have been to that end. The discussions with panel members, researchers, and discussants in meetings and workshops were informative, thoughtful, and lively. We present the introductory essay and selected research papers, with their differing points of view, in the hope that they will stimulate further discussion and research and thus accomplish our objective.

ROBERT T. MICHAEL, CHAIR
PANEL ON PAY EQUITY RESEARCH

ACKNOWLEDGMENTS

A volume such as this reflects the time and effort of a great many people, and it is my pleasure to thank those I have had the opportunity to work with on this endeavor. The Panel on Pay Equity Research consists of academic scholars from different disciplines and leaders from business and labor, all with expertise in research methods. Panel members often held differing views and voiced differences of opinion, but our meetings were uniformly congenial and constructive in the process of selecting studies, monitoring grantees, and reviewing written products. I wish to express my personal thanks to each member of the panel for the effort and enthusiasm that have yielded a fine product.

The fifteen researchers who received grants expended a great deal of time and effort in carrying out the work they proposed—far in excess, I suspect, of the time budgeted in their proposals. We greatly appreciate their substantive contributions, their responsiveness to suggestions and criticisms, and their attention to deadlines and details. We would also like to thank the discussants at our September 1987 workshop, as well as the many experts who assisted us in the review and evaluation of the 220 initial proposals we received.

I would like to express my appreciation to the panel's staff. The original study director and my co-editor, Heidi Hartmann, had major responsibility for the initial formulation of the project and for coordinating the process of announcing, reviewing, selecting, and monitoring the grants. She made an invaluable contribution, both substantively and administratively, to the work of this panel and we sincerely thank her. We also thank Cynthia Costello, interim study director, who coordinated the first workshop for the grantees, and Brigid O'Farrell, the current study director, who saw us through the grantees' second workshop and the final review and editing of this volume. She also organized the conference to disseminate the research findings to the wider research, policy, business, and labor communities.

We also thank Lucile DiGirolamo, staff associate, who ably organized and carried out the many and varied processes involved in a project of this type. Suzanne Donovan, consultant to the panel, provided excellent technical expertise to the panel during the proposal review and selection process, and

to the selected researchers during the first workshop. We would also like to express our appreciation to Victoria Threlfall, who assisted the panel staff in announcing the availability of research funds; Karan Ford, who assisted with the organization of the September 1987 workshop; and Margaret Drewes, Alison Foley, and Jill Coogan for their work on the final manuscript.

We thank the Committee on Women's Employment and Related Social Issues for their support of the work of this panel. Jean Shirhall, editor for the Press, worked with authors, staff, and the Press to make this production possible. David Goslin, former executive director, Brett Hammond, acting executive director, Robert Caplan, current executive director, and Eugenia Grohman, director for reports, Commission on Behavioral and Social Sciences and Education, all have our appreciation for their continued support of the work of the committee and its panel.

Several organizations made the work of our panel and this volume possible through their financial support. We sincerely thank both the organizations and their representatives, in particular, Phoebe Cottingham, program officer at the Rockefeller Foundation, and June Zeitlin, program officer at the Ford Foundation. We would also like to express our appreciation to Amy Vance, who while at the Ford Foundation was most supportive of this project during its initial stages.

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September 14–15, 1987

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PAY EQUITY: ASSESSING THE ISSUES

Robert T. Michael and Heidi I. Hartmann

Despite the progress economists and sociologists have made in recent years in understanding wage determination and the occupational structure of the labor market, large unexplained differences in wages between women and men remain. Differences in skill, experience, effort, labor force attachment, and many other variables that have been studied do not account for all the earnings differences observed. On the face of it, the unexplained gender differences in wages are consistent with the widely held belief that there is substantial discrimination against women in the labor market—a systematic bias in wage payment that favors men over women. The inability of social accountants to "explain" the gender gap in wages is often joined with the widespread social suspicion of sex bias, and the former is viewed, at least indirectly, as evidence of the latter.

"Comparable worth" or "pay equity" has been proposed, along with equal employment opportunity and affirmative action, as a strategy to eliminate gender bias from the labor market, particularly in the determination of wages. Comparable worth or pay equity strategies generally rely on the use of objective criteria to value the content and requirements of jobs (job evaluation) in a way that eliminates gender as a compensable factor.

One's assessment of comparable worth as a prescription for social ill depends partially on one's understanding of the reasons for the observed gender difference. If that difference in wages is attributed to legitimate market forces just not yet well understood or not yet well measured in studies, then the prescription is probably viewed as a poor one: It imposes restrictions and bias on a world that is working fine, albeit not well understood. In this view there is no social ill, so there is no rationale for any medicine. If, on the other hand, the gender difference is attributed to systematic bias in the labor market, then there is a social ill, and a need for some medicine. In this case, if that prescription is comparable worth policy, it becomes necessary to employ "objective criteria" for setting wages in a way that eliminates gender bias. If comparable worth is prescribed, there is a need to assess its side effects as well as its potency.

Extending the metaphor of illness and a proper prescription one step further, com-

parable worth is not designed to cure all possible labor market discrimination against women. It is a prescription for a specific illness that has to do with certain jobs being undervalued. In particular, if jobs held disproportionately by women are undervalued according to some objective criteria partly because they are held disproportionately by women, then comparable worth is a medication a wise doctor would consider prescribing. If instead a different illness exists, one that is related to limited access to certain jobs for women, or to limited opportunity for advancement by women, or to lower pay to women for the *same* work (as distinct from *comparable* work), then other medication, such as equal employment opportunity legislation, remedial affirmative action, or traditional equal pay remedies, would be more appropriate.

In sum, the logic that would lead one to conclude that comparable worth is a wise social policy requires the following: (1) there is a gender difference in wages that is not explained by legitimate market forces; (2) the gender difference is linked to the undervaluation of jobs held disproportionately by women; (3) the jobs can be objectively evaluated such that an appropriate level of compensation can be determined by some mechanism other than competitive labor market forces (or that removes the effects of gender bias from market forces); and (4) performing the evaluation and implementing the implied appropriate wage structure is on balance preferred both to eliminating that wage difference by any other means and to not eliminating it (i.e., any adverse side effects from its implementation are overcome by the benefits of implementation).

These are the issues addressed by the papers contained in this volume. They are empirical studies 'by a wide spectrum of social scientists. The researchers were selected for funding by the Panel on Pay Equity Research because each study addresses key issues of fact that are important to assessing the appropriateness of comparable worth strategies: What determines individual and occupational wages? How are wages set and how do' firms and agencies structure their pay plans? How are decisions about promotions and new hiring made? How have workers fared as a result of comparable worth implementation and how did they react? Careful descriptive studies can contribute to our understanding of many of these issues, and more analytic studies can address issues of causation. Nevertheless, the difficulties of drawing causal inferences from the nonexperimental. data used in the social sciences must be noted here. The simultaneous operation of many factors in the real world and the inability to devise perfect measures and controls make it very difficult to identify causes with much certainty.

As described in the preface, our Panel on Pay Equity Research selected eleven empirical studies of aspects of the comparable worth debate through a competitive proposal process. Several additional experts. were asked to comment on these papers at a workshop. The papers and selected discussant comments in this volume address three questions of fact:

1. To what extent is the gender difference in wages in the United States today explained by personal differences in skill, effort, experience, and other characteristics that might be legitimate' determinants of wages? Although essentially a factual issue, there are many ways to measure that fact, so it is not a trivial task to answer this question. The papers by Gerhart and Milkovich, by Sorensen, and by Nakamura and Nakamura address this question using data on *earnings of individuals*. The essay by Subich, Barrett, Doverspike, and Alexander adds psychological perspective by reviewing the literature that considers gender differences in socialization and their potential impact on individual life outcomes.
2. Since job or occupational difference appears to be so intricately related to gender

differences in wages in the United States today, how should job or occupational segregation by gender and differences in the average wages of female and male workers in occupations be understood? The papers by Baron and Newman, by Parcel, and by Filer address this question, with *the job or the occupation* as the basic unit of their analyses.

3. Since there are examples of the implementation of "comparable worth" plans, what is the evidence regarding their impact? Are such side effects as job loss or structural change significant? These are the questions addressed by the three papers by Orazem and Mattila, by Evans and Nelson, and by Gregory, Anstie, Daly, and Ho.

THE EMPERICAL INQUIRIES

Gender Differences in Wages: Wage Determination for Individuals

Male-Female Salaries and Promotions in a Large, Private Firm

The Gerhart and Milkovich paper investigates gender differences in wages and labor market treatment controlling for personal characteristics. The strategy in this paper is to study one large, private, unnamed, highly diversified firm and investigate details of salary and employment dynamics (promotions and salary adjustments). The authors study workers in administrative and professional jobs, examining patterns of wages and wage changes for employees who were with the firm continuously from 1980 through 1986. The primary data set includes 5,550 men and 840 women.

The strengths of this study include the following: (1) much is "held constant" in an investigation of behavior within a single firm, (2) the study has an unusually good independent measure of each employee's job performance (a 4-point scale), on which the firm's compensation policy is explicitly based, and (3) the measures include job tenure *on that job*, an especially important factor for an investigation of gender differences in wages. Two problems with the study, discussed by Winship, are (1) a study of only one firm cannot yield generalized findings—we do not know whether the findings here apply to other firms or other periods of time, and (2) the focus on employees who were continuously employed by this firm over the 6-year period under scrutiny imposes a censoring of the data—employees who left the firm may have had systematically different characteristics or experiences in the firm. A section of this paper does compare findings for the censored set of workers with an uncensored set.

A specific question addressed by Gerhart and Milkovich is what, if any, is the salary disadvantage for women compared with men in this firm? In 1980, overall, the answer is that a woman received a salary that was only .84 of a man's salary, before adjusting for human capital differences, and was about .88 after adjusting for schooling, job tenure, tenure with the firm, and a measure of other potential labor market experience. (The main influence here is job tenure—the men had been at their specific jobs a good while longer than the women.) The salary differential was not much affected by including in the analysis the 4-point job performance scale, but if "job level" is accounted for, the women's pay increased to about .96 of the men's pay. (Job level is defined in terms of status and authority within the firm, which was measured by a 7-point scale.) So we learn, that in this firm, in 1980, for these categories of employees, adjusting for all these skill measures and job assignments, there remained a 4 percentage point disadvantage for women within job level, but a large 12 percentage point difference related to job level. It is not obvious what we should make of the finding that within job level the sex differences in salaries are as small as 4 percentage points, while across job categories the differentials are far greater.

Interpreting the 4 percent residual remains a dilemma that is a plague of a re-

search strategy that leaves the crucial element in the residual: If we can remove the differential we might attribute it to the variable that achieved its removal, but if we cannot remove it from the residual all we can say is that it is still there. Interpreting the larger differential across job levels requires an answer to another question. Why are the women disproportionately in the lower salaried jobs? Gerhart and Milkovich's data cannot tell us. If it is because of choices men and women make about the type of jobs they want, we would not want to think of it as discrimination by this firm. If, however, it is because of restrictions imposed on women, then we would want to attribute it to discrimination—or put more cautiously, we could not rule out the possibility that it is attributable to discrimination.

For a small subset of men and women in their sample who worked in job titles with 10 or more incumbents, Gerhart and Milkovich find that the higher the percentage who are female in that job, the lower is the salary of the men, but not women, in that job. They conclude that this subset of their sample "does not really provide support for the idea that percentage female is an important structural property that negatively affects women's (and perhaps men's) attainment."

A second important finding in Gerhart and Milkovich's study is that the wage disadvantage of women declined slightly between 1980 and 1986—the overall relative wage of women to men rose from .84 (in 1980) to .88 (in 1986), and adjusted for skill, performance, and job level, it rose trivially and surely insignificantly (statistically) from .96 to .97. Gerhart and Milkovich suggest that the firm may now be compensating women for past inequalities.

Gerhart and Milkovich address two other questions in their paper: Do men and women receive equal salary increases? Do they receive the same promotion opportunities over time? The answer to each of these questions is no—women fare better than men. Women's salaries rose more rapidly than men's, and over the period 1980–1986, women "had a distinct promotion advantage," say Gerhart and Milkovich. Men had, on average, .9 promotions while women had 1.3. Moreover, the advantage women had in terms of promotions did not decline at higher job levels. For men, their greater experience in the labor market appears to be a major factor that helps explain their lower level of job promotion, because promotions come more frequently early in one's career.

To respond to the concern about censoring in their sample, Gerhart and Milkovich also looked at salaries for all women and men employed in 1980 or in 1984 without conditioning for continuous employment. They then compared the average salary growth for the two separate groups with salary growth for the subset who were employed in both 1980 and 1984. They found that the relative growth rate of women compared with men was the same in the two cases: Women's salaries grew by 114 percent of the growth of men's salaries. Apparently, focusing only on those with continuous employment in this firm did not create a biased picture.

In his critique of the paper, Winship stresses two additional points: (1) the results are potentially sensitive to the functional form of the equation used to adjust for skill and job level, and a less restrictive functional form might have been better and (2) many interpretations can be given to the findings in this paper. Winship elaborates several alternative stories—based on women's childbearing behavior and the employer's screening devices—that could explain the findings.

Occupational Segregation and Earnings

Sorensen uses micro-level data from the May and June 1983 Current Population Survey to investigate the influence of oc-

cupational segregation by sex and race on hourly earnings. She estimates regression equations on hourly earnings separately for white men, white women, minority men, and minority women, where minority includes blacks and Hispanics (other minority groups are excluded from her study). The data contain information about tenure on the current job, but other job market experience is measured by the convenient and frequently used device of age minus years of schooling minus six, approximating the number of years since the person left school. We call this the potential experience index. The measure may be a better indicator of labor market experience for white men than for white women, because women traditionally have spent more of their adult lifetime outside the labor market.

After controlling for personal characteristics and attributes of the occupation and industry, Sorensen focuses on the proportion of the occupation that is female, a variable discussant Smith called the comparable worth variable. That variable is systematically related to lower wages for all four of the groups Sorensen studies. For each of the four groups—white men, white women, minority men, and minority women—the wage is about 2 percent lower for someone working in an occupation with a 10 percentage point higher proportion of women. The finding seems to hold up when various alternative ways of estimating the equations are compared.

For white men and women, Sorensen looks separately at three sectors: public, manufacturing, and nonmanufacturing (mainly the service sector plus construction and mining). The proportion female in the occupation lowered the wages of men and women in the public sector relatively strongly (by about 4 percent for white men and 2 percent for white women for each 10 percentage point increase in the proportion female). In the nonmanufacturing sector, the effect was less strong (by 3 percent for white men and 2 percent for white women), and in the manufacturing sector it was least strong (by 2 percent for white men and insignificantly for white women). In her discussion of Sorensen's paper at the workshop, Malveaux noted that the lack of importance in manufacturing could be due to the importance of industrial or firm segregation within manufacturing (e.g., men work in durable goods manufacturing and women in nondurable goods).

Sorensen also investigates the impact of the percentage of the occupation that is minority (black and Hispanic) and finds a statistically significant impact only for white men—a 10 percentage point increase in the proportion minority is associated with a 4.9 percent lower wage for the white men in the occupation. That effect is substantially smaller (-.8 percent) for white men in another specification of the model, and it appears to be present only in the nonmanufacturing sector of the economy.

Comparing the wages of white men and white women, Sorensen concludes that differences in jobs and personal productivity account for about 25 percent of the observed difference in wages overall ($3.32), and industrial and regional differences account for another 15 percent. Occupational segregation by sex accounts for an additional 20 percent on average, which leaves about 40 percent unexplained by any of the measurable factors. For minority men compared with white men, the job and personal skill variables account for about half of the observed difference in wages overall ($2.11), but the other half is unexplained—that is, the occupational segregation by sex or race and the industrial and regional differences in jobs held do not explain any of the observed differences between white and minority men.

Malveaux raised the issue of whether personal productivity characteristics really are related to productivity (or are simply inexpensive screening devices) and whether they are free of race and gender bias. Differences in educational attainment or in

courses of study, for example, can result from "tracking" or other factors. The unexplained residual might then understate the extent of discrimination, Malveaux contends.

Overall, Sorensen concludes that as much as 20 percent of the national female-male earnings disparity could in principle be eliminated by a policy that eliminated occupational sex-based differences in wages, ignoring all the other complications that might arise. The wage ratio for women to men could be increased, say, from about 64 percent to 72 percent, which would reduce the size of the wage gap from $3.32 to $2.66. As Malveaux pointed out, this means comparable worth is a limited strategy, though by no means an insignificant one.

Labor Market Crowding and Earnings of Women

Nakamura and Nakamura provide a rather different study of individual wage determination. They argue that it is important to understand how wages are determined in female labor markets, and they refer to a substantial empirical literature that suggests that there are distinct male and female labor markets. The Nakamuras use data from the 1980 U. S. census to investigate the wages of employed women 20 to 24 years of age. That data set is one of the few with sufficient numbers of observations to permit examination by occupation and other subgroups of interest. The authors focus on crowding in the labor market, by which they mean a relative abundance of women offering their labor in a particular market. They measure crowding by the number of women in the entry age bracket (20 to 24) compared with another age (25 to 29) and by the employment rate of women of that age compared with the other age.

Nakamura and Nakamura suggest that there are two reasons why we should expect women with relatively low levels of education, those who are black, and those with children to be especially vulnerable to labor market crowding: (1) barriers to entry to better jobs (such as schooling requirements) may protect the more educated women but not the less educated and (2) effective labor bargaining can secure concessions from employers through contractual agreements that rely on seniority and promotions from within the firm, so that those already employed can protect themselves from crowding. This suggests that crowding would have an adverse effect on the wages of lower skilled and black women and on those who are mothers, but not on the wages of higher skilled and white women.

This indeed is what Nakamura and Nakamura find tentative evidence of in their regressions of the log of wages on personal characteristics and state-level measures of crowding and unemployment. The relative population size and employment rate of women aged 20 to 24 tend to depress wages of women in occupations that have fewer well-educated women—personal service, other clerical, secretarial, and sales—but not so in occupations requiring more schooling—managerial, health, and professional/technical occupations. Similarly, the crowding effects are discernible for women in the sample sorted by less education, by the presence of children, and by race (black), but not so for women with more than 12 years of education, with no children, and who are nonblack.

In his comments on the Nakamura and Nakamura paper at the workshop, Ehrenberg raised two cautionary notes. First, he suggested that the evidence of crowding is clouded by inadequate control for job experience and by a mismeasurement of the crowding variable. Census data do not reveal how much labor market experience the women have, and the conventional measure, years of potential experience (age minus years of schooling minus six), probably overstates the experience for blacks, mothers, and the less educated, for reasons he

articulated. The crowding measures, Ehrenberg thinks, would be better suited if they were occupation specific instead of state specific. He further cautions that if the crowding is the product of voluntary choice by women, the case for public policy intervention is not strong. He urges subsequent research looking into the process by which women make their occupational choices.

The studies of individual earnings by the Nakamuras, Gerhart and Milkovich, and Sorensen substantiate that the pay received by a woman is less than the pay received by a man, when skill and other relevant factors are accounted for. Of the three papers, perhaps Sorensen's paints the bleakest picture since a substantial gender gap remains in the Current Population Survey data after adjustment for measured characteristics. One of the important variables negatively affecting earnings, she finds, is the proportion of an occupation which is female. Although Gerhart and Milkovich's data on one firm exhibit large gender differences in job assignment, the proportion female of a job does not seem to affect wages, salary growth, or promotion. The evidence over the 6 years following 1980 indicates that women who had less initial experience have had more promotions and raises and that the gender gap in wages was smaller, although not eliminated, by 1986. Nakamura and Nakamura's paper looks to the national job process and identifies three subsets of women who, they believe, are easily vulnerable to labor market crowding.

Sex-Role, Occupational Choice, and Salary

A very different orientation to individual wage determination is represented by Subich, Barrett, Doverspike, and Alexander. Their paper discusses a set of issues about psychological differences in men and women and whether those differences might partially be responsible for observed wage differences. This paper provides a survey of literature on psychological research on factors identified as related to occupational behavior and its outcomes. The factors include male-female differences in knowledge of salaries in various occupations, in self-confidence and personal expectations in the marketplace, and in risk-taking behavior.

Subich and her colleagues indicate, for example, that the literature supports the notion that risk taking is a masculine attribute, that men are bolder than women and more venturesome physically and with financial decisions. This gender-role difference, we are told, may carry over to men being more likely to gamble by asking for a raise.

Subich and colleagues conducted two pilot studies with college students, the results of which are reported in their paper as illustrative of psychological gender differences. The studies found that when asked about salaries in their intended occupations, both genders overestimated salaries substantially, but men did so to a greater extent than women. There was, they report, no clear evidence of a gender difference in confidence about one's own occupational success. Men, however, did seem to be more prone to risk taking. Both findings might contribute to salary differences between women and men.

Subich and colleagues remind us that there are subtle personal factors that affect expectations and performance in the labor market. These factors suggest alternative remedies to reduce male-female differences. At the workshop, discussant Hudis suggested a future research strategy to identify some of these factors. Though, as she noted, the subjects in the pilot studies were college seniors with, presumably, some interest in the job market, data from workers would be more fruitful to analyze. Risk-taking behavior by female and male employees—taking a risky overseas assignment, for example—could be directly examined in a large firm, where actual salary

data, including salary history, would be available. Hudis further suggests that within a firm equal employment opportunity policy could be influenced by knowledge of women's and men's risk-taking behavior. If risk taking pays off, then women should be encouraged to try it, and information about the rewards of various career opportunities should be more widely shared.

Jobs and Occupations as the Unit of Analysis

Three papers in this volume study the relationship among occupation-based wage rates (average wages for women and men in an occupation), gender, and various factors that could explain how and why occupational wage rates differ. The interest in *jobs and occupations* as the unit of analysis in comparable worth studies has several bases. Most important, perhaps, is the comparable worth claim itself. Female-dominated jobs and occupations are undervalued—not individual nurses, but the nursing profession itself is paid less than it is worth.

A theoretical framework for evaluating the reasonableness of the comparable worth claim had already been established in sociology and economics with the study of institutional labor markets and occupational structure. That body of literature has also contributed to the comparable worth studies. Given that employers do treat holders of particular types of jobs similarly (as group members rather than as individuals) and given that many occupational groups exhibit stable relationships with each other, it follows that female-dominated occupations may exhibit some differentiating characteristics. Thus, the "percent female" of a job or occupation has become a variable of note. In the papers that use the job as the unit of analysis, Baron and Newman find that both female dominance and minority dominance of jobs in the California civil service system lower the wage rate for those jobs; Parcel also finds negative effects for percent female for male, but not for female, employees; and Filer finds the effect small and insignificant for both genders.

Effects of Demographic Composition on Pay Rates for Jobs

Baron and Newman study how the pay rates for specific jobs are affected by the demographic characteristics of the people who hold those jobs. They consider the state of California's civil service system—over 3, 000 separate jobs and nearly 125,000 incumbents. The time period they consider is 1979 through 1985; some of the analysis considers the annual cross sections and some considers changes over the 6 years. Their dependent variable is the prescribed starting pay for a job, not the earnings of those in the job, so their measure is not directly affected by any sex or race differences in skill, seniority, or productivity. They study how that authorized starting salary is affected by factors like percent female or percent black, and they hold constant in various levels of detail the job's content as measured by educational and experience requirements or by occupational classifications that purport to reflect the difficulty, or value, of the job.

Their results are striking. No matter how many controls they introduce to take account of the job characteristics, significant and sizable effects of sex composition and race composition on those starting pay rates remain. "Jobs dominated by men pay considerably more than otherwise comparable jobs dominated by women, they conclude. Their Table 5-4 shows that the regression-estimated penalties apparent in female-and minority-dominated jobs are dramatic. Consider a nonsupervisory clerical job in "office or allied services," for instance, a job requiring 13 or more years of schooling and no more than 4 years of experience. If it had the demographic composition of the average full-time white male's job (which is 61 percent white male, 13 percent white

female, 5 percent black male, 3 percent black female, etc.), the starting 1985 monthly salary would be $2,230. If it had the demographic composition of the average full-time white female's job (which is 18 percent white male, 47 percent white female, 3 percent black male, 9 percent black female, etc.), the starting 1985 monthly salary would be only $1,860.

Baron and Newman also compare jobs in 1979 and 1985 and investigate whether the changes in the composition of incumbents are related to changes in starting salaries. They estimate that over the 6 years studied, the penalty on the starting salary associated with the presence of blacks and male Hispanics increased. Typical of this finding is the estimate that a 10 percent increase in the percentage of black males lowered the starting salary of the job by 2.6 percent in 1979 but by 3.9 percent in 1985. The adverse effect on the starting salary of white and Hispanic females, on the other hand, seemed to be reduced: a 10 percent increase in white females lowered the salary by 3.3 percent in 1979, an effect that was weakened to 2.7 percent by 1685. They also find that more recently created jobs—ones that were not in the system in 1979—have less severe penalties than older jobs for female-and minority-dominated jobs. This, they contend, is related to the fact that a disproportionate number of the new jobs were in high-skill, high-paying occupations, not to an across-the-board increase in equity in starting salaries.

Overall, Baron and Newman conclude that their results show that "the entry of females and minorities into positions devalues them." The penalties against female and minority-dominated jobs appear severe, and the underpayment associated with these workers is greatest in jobs that have many incumbents.

Baron and Newman's careful analysis of the job and pay structure of a single large employer is useful. Because they study starting salaries of jobs (rather than actual wages of male or female incumbents), the "residual" problem is less severe. With individuals, there might always be some unmeasured characteristic, such as motivation, that might have an effect. With jobs, the important requirements are more likely to be stated and therefore known to the researchers. As Ross points out in her comment, Baron and Newman's study could be replicated at many public agencies (and possibly private firms as well). Of course, a study that is not about actual wages received leaves certain questions unanswered. The effect of this gender-and race-biased structure of job salaries on actual salaries received by women, men, and minorities is not explored here. Also, as with most statistical studies, the wage setting *process* and the employer's *intent* are unexplored. Did the employer lower job salaries when women and minorities entered them? Were women and minorities recruited because of a shortage of white men and/or because job requirements were changing? Baron and Newman's analysis controls for skill changes in the stated job requirements, but those skill requirements may lag or lead changes in actual practice.

Occupational Differences and Earnings

Both Parcel and Filer use the detailed occupation (1980 census) as the unit of analysis and study the occupation's average earnings. Parcel adjusts the earnings of all workers to a full-time equivalent level, while Filer uses data on only full-time, full-year workers. Parcel augments the census data with information from the *Dictionary of Occupational Titles* (DOT) and has 503 occupations in her study. Filer merges data from several ancillary sources, including the DOT, and, in order to obtain appropriate matching, uses 430 occupations.

Using factor analysis based on the DOT, Parcel identifies five distinct attributes of the occupations: the "substantive complex-

ity" of the occupation, the "physical dexterity/perceptual ability" required in the occupation, its "physical activity/working conditions," and two others. Parcel imbeds these attributes of the occupation in a theoretical context combining supply and demand variables with measures of social organization. She has measures of the average educational and experience levels of the occupations' incumbents, the labor market conditions of the occupation (e. g., the reserve labor pool), and characteristics of the incumbents (e.g., the percentage of females, blacks, Hispanics, and Asians, and the percentage of men and women who are married). Mindful of the deficiencies in the traditional measure of potential experience for women, Parcel attempts to improve the measure by adjusting for race and marital status, as described in her paper.

Typical of occupational-level analyses when estimated for men and women combined, the percent female in an occupation is found by Parcel to have a sizable negative effect on the annualized earnings in the occupation—a 10 percentage point increase in the proportion female is associated with a $710 reduction in the average earnings in the occupation. Many of the other factors also display their usual effects. Parcel summarizes, "female-dominated occupations are low in earnings, experience, percent males married, unionization, and the job content measures of physical activities. They have high reserve labor pools, are urbanized, and have high black and Asian concentrations."

When Parcel estimates the effect of percent female separately for men and women, however, she finds a significant negative effect for men, but no effect for women. She argues that "percent female is but one aspect of occupational market social organization" that affects female earnings. Other social dimensions of labor market organization that affect earnings include minority concentrations, extent of unionization, and proportions of males and females married.

Smith finds Parcel's work skillful and sensible, but he questions the whole line of inquiry that includes as an explanatory variable the occupation's percent female. He argues that such a variable does not add to our knowledge about *how* wages are set in labor markets or whether there is or is not discrimination. He thinks it does no more than verify that the wage distributions for men and women differ; it does not help us understand why they differ. If the negative coefficient on percent female offers evidence of discrimination against women, he asks, then does Parcel's positive coefficient on "percent Asian" imply the existence of discrimination in favor of Asians? Or are there other unmeasured factors?

Filer's analysis considers numerous factors from a variety of data sets. Although he also uses DOT information, he uses a wide array of very specific occupational descriptors rather than a condensed and synthesized (factor analyzed) set of five features of each occupation. At one level, Filer confirms Parcel's finding. His Table 7-1 reports results on hourly wages for a change of 100 percentage points in the percent female. If we reduce the impact to a change of 10 percentage points and express it in annual earnings, we find his estimate of the decrease in earnings (due to a 10 percentage point increase in the proportion of the workers who are female) to be between $626 (=$3.13 × 0.1 × 2,000 hours), controlled only for demographic and skill factors and unionization, and $270 (=$1.35 × 0.1 × 2,000 hours), controlled in addition for effort, responsibility, and working conditions. Parcel's finding was $710 relatively uncontrolled, and $500 to $574 with various controls. Smith, in his comment, points out that Table 7-1 also suggests that 20 percent of the wage gap is attributable to the "comparable worth variable" (the proportion female), a figure identical to Sorensen's.

But Filer argues that these figures are misleading, because they are "inherently incapable of addressing comparable worth issues," defined by Filer'to be a concern for raising wages in jobs or in occupations heavily filled by women. His argument has

similarities to the point made by Smith in his discussion of the Parcel paper. If women are paid, say 75 percent as much as men, for any reason, then the average wage in an occupation will automatically be lower the higher the proportion of women in that occupation, even though the "percent female in the occupation" has no effect whatever on any individual's wage. The correlation between the average wage and the percent female is just a reflection of one wage schedule being below the other. It tells us nothing about why those schedules differ.

Filer, therefore, argues that one should investigate separately men's and women's wages across occupations if one is interested in seeing whether the proportion female in an occupation has any effect per se on wages. (Note that Sorensen did this in her individual-level analysis and that Baron and Newman's study of starting salaries in jobs does not suffer from this problem. Both authors found large, significant differences in earnings due to differences in occupational gender composition.)

When Filer conducts an inquiry on men's and women's average occupational earnings separately, he reports perhaps the most controversial finding in this volume. When a large number of controls are used, reflecting demographic characteristics, individual productivity factors (aggregated to the level of the occupation), unionization, and the usual job content factors used to assess comparability (effort, responsibility, and working conditions), there is no evidence that the percent female in the occupation has an influence on either the wages of women or the wages of men. What appears to be an effect in other formulations, "results from the lower wages for women within each occupation," which Filer contends can be corrected, if desired, by application of the equal employment laws, and would be "immune to comparable worth remedies."

Smith expresses reservations about Filer's approach, claiming that the inclusion of so many separate variables (over 225) makes interpretation of the coefficient of each nearly impossible and leads to questioning "the believability of the entire exercise." Another factor related to having a large number of variables, as Filer does, may also be of more substantive importance. As panel member Blau pointed out during the workshop, some of Filer's variables may be proxies for gender itself rather than indicators of substantive factors that could reasonably be linked to productivity differences.

Summarizing these findings at the job or occupational level of analysis, the authors find that all three papers confirm that women's wages are less than men's wages at the occupational level. Baron and Newman's strategy does not suffer from the compositional effect about which Filer and Smith warn, and Baron and Newman do find a systematic tendency for jobs held disproportionately by women to have lower starting pay than apparently comparable jobs held disproportionately by men.

Filer's strategy for adjusting for average productivity differences between the occupations and the universe from which his data are drawn are very different from Baron and Newman's, and his conclusion is different as well. He finds *no* evidence of a systematic tendency for occupations held disproportionately by women to have lower average full-time salaries than comparable occupations held disproportionately by men. Filer does confirm that within an occupation women earn less, but not because it is an occupation dominated by women. This distinction may be subtle, but the potential validity of a comparable worth policy may hinge on it.

Filer's findings, however, are weakened by the weak rationales for some of the many variables in his analysis (some of which may be correlated with percent female rather than with compensable job factors). Parcel has employed a technique (factor analysis) that is designed to reduce a large number of variables to a few theoretically. coherent and more easily interpretable major factors.

When her regressions are run separately for men and women, she, like Filer, finds no effect for percent female on the earnings of women, but unlike Filer, she finds a significant and sizable negative effect of percent female on the earnings of men in the occupation.

Implementation of Comparable Worth Policies

Comparable worth policies have been implemented in some private firms and governmental jurisdictions of various sizes. Three papers in this volume address the effect such policies have had. Two of the papers investigate the impact of state-imposed comparable worth legislation on the state-wide government pay schedules in Iowa (introduced in 1985) and in Minnesota (passed in 1982). The third studies the effects of a national policy of pay equity introduced in Australia and Britain in 1975.

Iowa's Comparable Worth Plan

Orazem and Mattila study the case of Iowa, a state that hired a consulting firm to evaluate the 800 job classifications in the state employment system and, according to the authors, instructed the firm to "ignore market wages in conducting its analysis" and in making its recommendations about changes in wage structure. The firm used a point system to evaluate the attributes of the job or its requirements, using skill level, effort, responsibility, and working conditions to determine the "worth" of the job. As Orazem and Mattila describe it, the recommendations of the firm were modified in the political process of implementation, in which the employee unions and state political leaders figured prominently. In early 1985 the new system went into effect, at an estimated wage-bill cost to the state of about $19 million annually—roughly $1,000 per employee.

Orazem and Mattila take the state pay schedule of December 1983 (before comparable worth) as the benchmark for their study. They use a 20 percent sample of the personnel files of the state's employees, gathering information on the individual's personal characteristics and experiences as well as his or her job and pay. For the 3,734 persons on whom 1983 actual biweekly earnings are known, Orazem and Mattila calculate two additional earnings figures: (1) the earnings associated with the consulting firm's pay recommendations, based on the comparable worth study (the "recommended" earnings), and (2) the earnings associated with the compromise plan actually implemented in 1985 (the "compromise" earnings). These latter two biweekly earnings figures are counterfactual estimates, not the actual earnings of employees. Orazem and Mattila contend that this estimation scheme gives them a clearer picture of the effect of the new scheme, without confusing it with the many other factors that may also have affected wages between December 1983 and the introduction of the actual plan some 15 months later.

Orazem and Mattila then perform several regression analyses of the log of biweekly earnings, using each of the three earnings figures separately. The authors compare the effects of personal characteristics and job attributes on the wages actually paid in 1983 to their effects on the recommended wages and to their effects on the compromise wages.

Nearly half the employees in the state's wage system were women, and Orazem and Mattila found that the biweekly wage of the women initially was about 78 percent that of the men, unstandardized for anything. By comparison, the recommended plan would have raised that raw proportion to 86 percent, and the compromise plan that was actually implemented Would have raised that proportion to 82 percent of the males' wages. After adjusting for human capital variables, Orazem and Mattila estimate, by one technique, that the women's biweekly

wage initially was 94 percent that of the men's wage, and that the recommended plan would have raised that proportion to complete parity (100 percent); the compromise plan would have raised the proportion only to 96 percent. (Other techniques of estimating these figures yielded somewhat different results, but the qualitative conclusions here are robust.) They suggest that the women's biweekly wage was raised through the compromise plan by about $50 and the men's wage was raised by about $30, for an average increase of about $40, which translates into a $1,000 annual earnings increase.

Orazem and Mattila detail in their paper the major factors determining the actual 1983 wages and discuss the changes in the effects of those factors implied by the recommended and compromise plans. The compromise plan resulted in a tiny reduction in the dispersion of biweekly earnings, compared with the 1983 actual distribution. It is interesting to note that the recommended plan did in fact completely eliminate the statistical significance of the variable "percent female" as a determinant of the wage, thus eliminating a strong negative 14.6 percent effect on the actual 1983 wages. The compromise plan, by contrast, restored (or retained) a small gender differential of 5.8 percentage points. The recommended plan would have involved pay cuts for 7,300 workers and increases for 10,750, but one element in the compromise was that no one's wage would be lowered.

Regarding the factors determining wages, Orazem and Mattila point out that from a human capital perspective, the "measured discrimination against women is very slight" in the sense that measures of skill and market conditions appear to explain nearly all of the variation in wages (R^2 = .815 in their Table 8-3, including the human capital variables but excluding the proportion female of a job). But they also point out that from the perspective of a comparable worth advocate, their comparable worth model implies that "large discrepancies in pay exist between men and women because women are concentrated in jobs that are paid below the value placed on comparable male jobs." (i.e., R^2 = .769 in their Table 8-4, the model including percent female on a job.) As so often is the case, one's perspective on the finding can dramatically influence the interpretation it seems to support.

In her discussion at the authors' workshop, panel member Schoen pointed out that readers of the paper could more adequately form their own interpretations if the authors had provided more description of the institutional factors at play in Iowa. From her own experience with job evaluations, unions, and comparable worth, Schoen believes outcomes will vary substantially from state to state. Although protection against lower wages is a common outcome, she stressed that wage protection is often not accomplished by altering factors and weights in the job evaluation scheme, but by protecting current workers. An understanding of the particular economic and political situation the unions and state leaders faced would help the reader evaluate the reasonableness of the outcome.

Pay Equity in Minnesota

Evans and Nelson study the case of Minnesota, which passed pay equity legislation in 1982 for its state employees. The new policy was implemented over 4 years beginning in 1983. Minnesota had since 1979 had a job evaluation system based on a point factor scheme. The pay equity legislation of 1982 built on that scheme, requiring a single job evaluation system for all job classifications in the state employment system. The evaluation measured the skill, effort, responsibility, and working conditions of each job and yielded a composite score for each job. All job classifications with the same score were then considered to have equal value and, hence, to command equal pay. Evans and Nelson stress that con-

verting this score into pay level was undertaken in Minnesota using the white male's wage as the norm.

The vast majority (86 percent) of Minnesota state employees are represented by unions, including a large majority of women working for the state. Neither the unions nor the state government aggressively advertised or notified employees of the impact of the pay equity legislation. "Changes in one's paycheck formed the major 'notification' of pay equity, a notification that did not distinguish between regular pay raises of approximately 3 to 4.5 percent per year and the additional increment due to pay equity raises." Over the 4 years of implementation (1983–1986), Evans and Nelson report, about 8,500 of the state's 34,000 employees received pay equity raises, and of those 90 percent were women. The raises added about 3.7 percent to the state's wage bill.

Evans and Nelson report findings from a telephone survey in June 1985 of about 500 state employees. The survey asked the respondent about his or her "support for, knowledge about, receipt of, and reactions to pay equity." The employees were relatively well educated (e.g., 37 percent had a bachelor's degree or more), and a majority had worked for the state for more than 7 years. The average salary of state employees in 1984 was $22,500. While Orazem and Mattila consider the economic impact of the pay equity legislation in Iowa, Evans and Nelson focus on the psychological effects in Minnesota in terms of the attitudes and knowledge of state workers about the new scheme.

The survey indicates that the employees overwhelmingly supported the concept of pay equity; support for the concept appeared to be strong at both ends of the political spectrum and both ends of the occupational ladder. Likewise, the survey indicates the actual policy of pay equity was well known to the respondents: 82 percent of them had heard of pay equity or comparable worth legislation. Evans and Nelson characterize the specific understanding of the details of pay equity as "quite knowledgeable," based on the respondents' answers to the questions in the survey.

The most intriguing findings in the survey, as Evans and Nelson stress, involve a comparison of whether the respondent *thought* he or she received a pay equity raise compared with whether he or she actually received one. The authors had information on actual raises from the state employment records and could compare those facts against the telephone responses to questions about whether a raise was received. Recall that, for reasons the authors describe in their paper, neither the unions nor the state employment office made a major effort to inform the employee about his or her pay equity raise. The finding is striking: Of those who actually received a pay equity raise (nearly one-third of the survey sample had received a raise), 56.9 percent knew they received one, 21.6 percent reported not receiving one, and 21.6 percent never had heard of the pay equity policy. As Evans and Nelson say, "the social movement potential of pay equity is certainly unfulfilled if 43.2 percent of the people who benefit from the policy are unaware of their benefits." About half the sample correctly reported that they received no pay equity raise. The accuracy of the reporting was greater at higher levels of education and salary.

Evans and Nelson discuss the role of the union in supporting the implementation of pay equity and its strategy of avoiding publicity about its implementation. They conclude that the strategy dampened both opposition to and support for the pay equity policy. In fact, of those surveyed 36 percent reported that they believed that pay equity policy caused many problems in the work-place, despite the overwhelming support of it as a concept.

In commenting on the Evans and Nelson paper at the authors' workshop, panel mem-

ber Waite noted that a single cross-sectional telephone survey cannot elicit information about how the change in wages changed job satisfaction or attitudes toward pay equity. The survey offers only a static view, as the authors acknowledge. Waite also commented on one of the unique factors at play in the Minnesota case, as described by Evans and Nelson: The job evaluation had been done prior to the adoption and implementation of the comparable worth policy. Thus, the general realignment of jobs and pay that often results from a new pay plan was not part of the comparable worth process. The comparable worth realignment was allowed to be a more specific, limited event. Waite suggested that the strong consensus in favor of comparable worth in Minnesota may not be easily achieved in other states, where the job evaluations and resulting wage realignments are more directly occasioned by the comparable worth policy itself.

Women's Pay in Australia, Great Britain, and the United States

Gregory, Anstie, Daly, and Ho provide a very different empirical inquiry from others in this volume. Their study provides a two-decade perspective on the relative earnings and employment of women in three nations. They point out that Australia and Britain have experienced substantial increases in the female-male earnings ratio over the past 20 years but that same experience has not been shared by workers in the United States. In their paper, Gregory and his colleagues address three questions about that experience and attempt to synthesize the evidence from the three countries.

In Australia, wages, or minimum wage rates, are awarded by an official network of governmental "tribunals" for every occupation in the nation, for both the private and public sectors. For the period from 1950 to 1969, Gregory and colleagues tell us that the official wage setting boards explicitly marked down the wage in all occupations dominated by women to 75 percent of the wage received by men. The wage levels set were explicitly lower for female occupations than for male occupations. Over the 6 years from 1969 to 1975 that official practice was eliminated and the average wage ratio of awarded female to male wages rose accordingly from 72 percent to 92 percent, a dramatic change in a very short time span. That historic experience, mirrored in somewhat muted form in Britain, makes the three-country comparison quite informative.

The first question addressed by Gregory and colleagues is why the relative earnings of women compared with men are so different in the three countries. In 1981 in Australia full-time average earnings of women were 79 percent as much as men, while in the United States and Britain women earned only about 60 percent and 64 percent as much as men, respectively. The authors use a conventional human capital model approach to attempt to provide an explanation. Their data consist of weekly fall-time wage and salary earnings from household survey data from each of the three countries—a 1981 survey in Australia and in Britain, and the March 1982 Current Population Survey in the United States.

A standard decomposition analysis is performed to see if the observed differences in weekly earnings of full-time workers are attributable to differences in the human capital endowments of men and women, that is, to differences in schooling, job experience, marital status, and the presence of children. Although the statistical model for each country performs "reasonably well, and to a similar degree, as an explanation of the variation in earnings among men and women," it does not explain why women earn so much more relative to men in Australia. They conclude that "the human capital endowments of women relative to those of men, seem to be much the same in each

of these countries." Since large differences do not exist between women and men in one country compared with another, those human capital differences cannot explain the differences in relative earnings.

The second question Gregory and colleagues consider is why the pay ratios have changed so dramatically in Australia and in Britain but not in the United States in recent years. The answer, they argue, lies in institutional considerations. In Australia, the governmental tribunals simply changed the acceptable relative wage from one that was substantially lower for women than for men to one that reflected "equal pay for work of equal value" without regard to the sex of the employee. In Britain, too, the authors describe a predominantly regulated wage structure in which national agreements involving large unions set rates of pay for a wide range of workers. Explicit discrimination against women in pay rates characterized the British labor market, say Gregory and his colleagues, until the Equal Pay Act of 1970, which became effective in December 1975. Table 10-3 in their paper shows the dramatic rise in the relative wages of women between the passage of that act and its implementation.

In Australia and in Britain, Gregory and colleagues contend, "it was relatively easy to remove that which was identified as pay discrimination and, as a result, to affect dramatically the pay relativities between the sexes." In the United States, the federal legislation designed to achieve "equal pay for equal work" was passed earlier than in the other two countries—as early as 1963 or 1964. Its effect, however, is not nearly so evident in the aggregate time series data on relative wages, and the authors offer several conjectures about why that is so. They note that the large-scale institutions in the Australian and British labor markets (the minimum wage tribunals and collective bargaining agreements) had made the discrimination implicit in market wages explicit; the same large-scale institutions could correct the explicit discrimination. In the United States there are no comparable large-scale institutions, and wage changes thus depend on the decisions of many actors in the labor market.

The third question addressed by the authors has to do with potential side effects from the comparable worth medicine, specifically potential employment loss. They ask how the dramatic change in female earnings rates in Australia and Britain has affected the employment rate and the unemployment rate of women. The answer is a surprising one: The effect seems to be very slight. The female share of total hours worked rose over the period 1970–1984 in all three countries (by 25 percent in Australia, by 27 percent in Britain, and by 31 percent in the United States), but the relative wage of women rose substantially more in Australia relative to the other two countries. The small employment responses to the sharp changes in relative wages of women in Australia and in Britain are surprising; they imply, the authors contend, a very low substitutability of men for women in the productive processes of the country. Their "cursory glance" at unemployment rates also suggests only a slight impact in the relative demand for female workers in Australia.

Ehrenberg, in his comment, calls attention to the virtues of bringing an international comparative perspective into the debate about the policy of comparable worth in the United States. He argues, however, that the authors have not "pushed their empirical analyses as hard as they might have," and consequently, they may have drawn some inappropriate conclusions. For example, Ehrenberg notes that the coefficients on human capital variables differ from country to country, but that insufficient explanation is offered. Both Ehrenberg and the authors note that such differences could be attributable to either real phenomena, such as differing labor market structure, or measurement errors. The reasons need to be further explored. Ehrenberg would also

like to see a more thorough analysis of the relationship between changes in the relative wage of women and changes in employment and unemployment levels.

One of the more intriguing implications of the paper by Gregory and his colleagues, as Ehrenberg notes, is that it may be easier to raise the relative wage of women in a country where wages are centrally set and where there has been explicit discrimination. In the United States, where the labor market is highly decentralized and where discrimination in wage setting is unlikely to take such an overt form, the circumstances may prove more difficult to change.

CONCLUSION

No single paper or volume can resolve major social issues like the one addressed here. The papers collected in this volume contribute to a better understanding of several dimensions of wage differentials and the comparable worth remedy. First, they substantiate differences in wages between women and men, even after measurable productivity-related variables are taken into account. Second, they explore the role of occupation in the wage determination process, investigating the particular role played by the female dominance (percent female) of an occupation. Third, they examine empirically the results of implementing comparable worth or comparable worth type policies in several real world situations. In none of these areas are long-standing debates resolved, but the papers do contribute to consensus on several important issues.

Research Consensus

The papers substantiate the fact that women earn less than men after adjusting for measurable factors that might affect labor productivity. Several of the papers focus on estimating the components of these wage differences (Sorensen and Gerhart and Milkovich at the individual level, and Parcel and Filer at the level of average occupational wages). Others investigate mechanisms by which that fact comes about (Nakamura and Nakamura, Subich and colleagues, Baron and Newman, and Gerhart and Milkovich). None of the studies disputes the existence of a difference in wages for men and women, although Filer contends it is not related to the female dominance of a given occupation.

The role of percentage female is not resolved, though consensus has emerged on the proper way to assess its effects. A relationship between percentage female and average wages of an occupation (the weighted average of the male and female wages) could simply reflect a compositional effect of more or fewer women if women are paid less than men in each occupation. To identify an effect on wages of the female dominance of an occupation per se, all other things being equal, the wages of women and men must be examined separately (or normative wages rather than actual wages can be used, as in the Baron and Newman study). Except for Filer (using 1980 census data) and Gerhart and Milkovich (in a single firm), the studies reported here do find a significant net effect on wages of percent female in an occupation, when other factors, such as productivity differences and job requirements are taken into account. The Baron and Newman study of listed starting salaries of jobs in the California civil service provides perhaps the most dramatic results: When women or minorities enter occupations the starting salaries fall, everything else, including job requirements, being equal. Such a finding suggests that jobs may be devalued by employers when women and minorities do them—supporting a premise that lies behind the comparable worth remedy. Alternative explanations, however, are also possible—for example, that wages fall in response to changed conditions and then women and minorities take jobs that white men no longer find attractive.

Consensus also emerged on the effects of comparable worth policies. The dramatic

turnabout in the nationally administered or regulated wage setting environments in Britain and, especially, in Australia have had little negative impact while moving the wage structure dramatically closer to gender equality. In Australia, the actual wage ratio increased from 59 to 74 percent and in Britain from 60 to 71 percent between 1964 and 1979; comparable worth type policies in the two countries eliminated 37 and 28 percent of the 'wage gap, respectively. In the United States, Sorensen estimated the maximum proportion of the national wage gap that could be eliminated by comparable worth at 20 percent, and in the two actual cases reported here (Iowa and Minnesota)—both, not surprisingly, involving plans that resulted from political compromise, the reductions amounted to 18 percent and 15 percent of the respective wage gaps. Although the size of these effects suggests that comparable worth policy is not as revolutionary as some might have hoped, it nevertheless amounts to a substantial improvement for women workers, without apparently causing negative side effects.

Though the outcomes of comparable worth policies have varied according to the locale, positive effects—and minimal negative side effects—have generally been reported in the three cases presented here. The three papers on comparable worth implementation taken together attest to the significant impact public policy can have on wages. The impact was large in Australia, where labor market institutions are centralized, and smaller in the United States, where labor markets are far more decentralized.

Research Needs

While there is consensus on some issues, many questions remain unanswered. The studies reported here suggest several new directions for research. Nakamura and Nakamura's investigation of the crowding process finds that in states where there are more young women, relative to others, their wages are lower and that women with fewer years of education and more children are more affected by crowding than others. Their study could be replicated for occupations (rather than states) to see which occupations are more susceptible to crowding. The paper by Subich and her colleagues reports pilot studies of students that investigate whether their attitudes and expectations might contribute to lower earnings for women. The pilot studies suggest that risk-taking behavior of employees in firms, where salary history data exist, might be a fruitful area for further research.

Several of the studies report evidence of improvement in the relative position of women in the past few years: Gerhart and Milkovich, in their single-firm analysis, find that in recent years women have received more salary increases and promotions than men. Baron and Newman, despite their generally negative findings, do find that starting salaries in new jobs are less affected by gender and race/ethnicity bias than are starting salaries in older jobs. Further investigation of the extent of change and the reasons for the change would be useful.

The introduction of comparable worth legislation in the states of Iowa and Minnesota has improved the relative economic position of women civil service workers without having had major adverse effects on the state budgets or having engendered political tensions, as reported by Orazem and Mattila and by Evans and Nelson. In neither state, however, was the relative wage of women to men raised by more than 8 percentage points (in Iowa, the relative wage went from 78 percent to 82 percent and in Minnesota from 74 percent to 82 percent). Neither of these papers addresses effects beyond the civil service labor market within each state. It would be of interest to know if any effects are felt by private employers or local governments, and whether they are positive or negative.

Further research on the mechanisms through which the earnings of women and

men are made to differ also seems warranted. The papers in this volume provide evidence of the salience of gender in the labor market, both in terms of wage differences and sex segregation. Many, but not all, of the papers find that the proportion female of an occupation lowers its wages. Several of the papers also find that percent female has a negative effect on wages for men, but not for women, within an occupation. The interpretation and policy implications that follow from these findings deserve more attention. Whether women choose female-dominated jobs, perhaps because there are compensating non-wage differentials or because women's preferences differ, on average, from men's; whether they are tracked into them; whether women are discriminated against whatever their choices; whether men are discriminated against within female occupations; or whether other (as yet unmeasured) factors are important, we still do not know.

Several of the papers suggest research directions that may be especially promising. Filer's results suggest that the more significant portion of discrimination may occur within occupations rather than between them. This in turn suggests that differences between firms or industries in their "treatment" of occupations might be important and that the practices of individual employers should be examined further. Gerhart and Milkovich's finding that job assignment "explains" sex differences in wages suggests that the process of job assignment within the firm should be examined. What motivates individuals, both employers and employees, in job assignment, pay setting, job selection, and wage acceptance is suggested as a useful area of study by several of the papers, especially the one by Subich and colleagues. Further historical and institutional studies of how things "came to be" are also warranted. The papers taken together also suggest that further research on measurement issues is important, including research on the variables that belong in the list of legitimate contributors to explaining the wage gap. As we suggested above, further research on the general equilibrium consequences of comparable worth implementation is also warranted. Both the potential spill-over effects from one sector of the economy to another and the general influence on the labor market have not been adequately explored.

There are numerous labor market—and comparable worth—studies that will be useful in answering the basic questions "why are women paid less than men" and "what should be done about it, "but we [the editors of this volume, although not necessarily the members of the full panel] suggest that an additional fruitful line of inquiry in the near future may be investigation of the relationship between gender and social behavior more generally. How do the social expectations of men and women generally—in and out of the labor force—affect their earnings and opportunities? How are female earnings and the distribution of family income related? Differences in the roles of women and men in regard to the important social responsibility of raising children may have significant labor market implications. The expectations for the genders in the conduct of familial and household duties and in political, religious, and sexual behavior are examples of some of the areas that n eed to be better studied for their impact on labor market outcomes.

The economic realm and labor earnings in particular do not exist in isolation from other aspects of the gendered division of social life more generally. Both research and policy intervention will be more successful if they are pursued in this broader context.

PART I

GENDER DIFFERENCES IN WAGES: WAGE DETERMINATION FOR INDIVIDUALS

1

Salaries, Salary Growth, and Promotions of Men and Women in a Large, Private Firm

Barry A. Gerhart and George T. Milkovich

Studies of differences in earnings between men and women have sought to adjust the raw differential for gender-related differences in factors thought to reflect individual differences in productivity. In practice, these studies have examined differences in pay between men and women controlling for (1) supply-side factors, such as investment in human capital (e.g., general and firm-specific work experience, education) and (2) demand-side factors intended to represent the relative scarcity of specific types of labor in specific markets (e.g., occupation, industry, geographic region). In most instances, this research has used national survey data on individuals working in many different (and unknown) firms.

In reviewing this research, Treiman and Hartmann (1981:19) concluded that "worker characteristics account for very, little of the difference in earnings [between men and women]." Gender-related differences in demand-side factors, mainly occupational distribution, were found to explain a larger part of the earnings gap. Nevertheless, after adjusting for both supply-and demand-side factors, a substantial portion of the earnings differential between men and women remains. This remaining portion is taken as evidence of labor market discrimination against women and as being indicative of researchers' inability to identify, measure, and control for all aspects of worker productivity.

At least two problems exist with pay discrimination research of the type described above. First, some variables frequently included on the right-hand side of the wage equation may themselves be endogenous to the process of discrimination (Blinder, 1973; Cain, 1986; Oaxaca, 1973). Thus, for example, women may have less experience in the labor market than men because their work opportunities in the market have been less favorable than those available to men having similar productive abilities. As another example, it may be that gender-based occupational (and firm) segregation (see Reskin and Hartmann, 1985) reflects not only different aspirations and work values of men and women,[1] but also

[1] Differences that exist between men and women in terms of preferences for different types of occupations may also reflect discrimination, whether its source is differential socialization in families, schools, and other premarket institutions, or is market based.

unequal access to firms, occupations, and jobs. Fuchs (1971), in fact, contended that virtually the entire earnings gap between men and women could be explained if an occupational classification scheme having sufficient detail were used, but he noted that the question of why men and women had different occupational distributions then had to be resolved (see also Sanborn, 1964). Although it is clear that access to jobs and occupations is an important determinant of earnings, little research has examined the question of *why* such attainments differ according to gender.[2]

A second problem with marketwide studies of gender-based discrimination is that they provide no direct information on worker productivity at the level of the firm. As one consequence, previous research has had to rely on indirect measures of productivity (e.g., experience, tenure, and education). Some evidence indicates, however, that such measures may converge poorly with measures of productivity at the level of the firm (e.g., Brown, 1982; Medoff and Abraham, 1981).

All firms attempt to assess the productivity of their workers in one way or another. Many firms formalize this process by, for example, regularly conducting performance appraisals of employees. In these firms, compensation and internal-staffing decisions (e.g., promotion) are often explicitly based on such productivity measures.[3] These measures have a number of desirable characteristics. First, they are designed to assess worker productivity in a specific job in a specific firm. Second, such measures are influenced by human capital characteristics only insofar as the latter are useful in performing the particular job in question. In other words, firm-level productivity measures potentially carry information on the quality of the match between the worker's abilities and what the job requires. Third, these job-specific productivity measures reflect differences in worker motivation, which, together with the ability-job requirements match, affect actual individual performance levels.

Given the discussion above, three avenues of research on labor market discrimination would appear to be especially useful. First, firm-level research is needed that examines differences in men and women's salaries adjusted for possible differences in job-specific productivity measures. Second, research on the determinants of occupational and job attainments would also be helpful. Some evidence indicates that substantial gender-based, within-firm job segregation may exist (Bielby and Baron, 1986), which suggests that job level may be an important determinant of gender-based salary differences within firms. Although within-firm analyses have been rare in the literature, they have indeed found the effect of job level on earnings differences to be quite large, especially relative to within-job differences (Halaby, 1979; Malkiel and Malkiel, 1973; Rosenbaum, 1985). Third, longitudinal data would permit study of changes in salary. Further, such data would aid in assessing the extent to which firms' promotion practices contribute to job-level differences. Again, it would also be useful to know what role job-specific performance measures play in decisions on promotion and salary increases.

In this paper we examine possible gender-based differences in attainment in a large, private firm. Specifically, we focus on three general issues. First, controlling for job level, performance ratings, and individual characteristics, is there a salary disadvantage for women? Second, given longitudinal data,

[2] This issue of differential attainment due to possible unequal access to firms, occupations, and jobs is sometimes referred to as *employment* discrimination.

[3] Based on a survey of personnel and industrial relations executives, the Bureau of National Affairs (1983) concluded that performance appraisal results are used by 86 percent of firms for making salary increase decisions and by 79 percent of firms for making promotion decisions concerning their white-collar workers.

we can move beyond cross-sectional analyses and examine models of salary change over time, addressing questions of the following type: Do women's salaries grow at the same rate as men's? Do men and women receive equal salary increases for a given level of performance? Do men and women receive equal salary returns from promotions within the firm? Third, controlling for initial job level, performance, and individual characteristics, do men and women receive different numbers of promotions over time? Unlike much previous research, we measure not only whether a promotion has occurred, but also the number of promotions over time. In other words, are women, for example, held to higher promotion standards (Olson and Becker, 1983)?

The Firm

The data for this analysis are from the personnel information system of a firm that produces a highly diversified set of industrial and consumer products. The firm has roughly 100 manufacturing operations in more than 30 states. It enjoyed general financial success during the period of the study, as evidenced by revenues that grew faster than the Consumer Price Index and a return on equity that comfortably exceeded the median for the *Fortune* 500.

Exempt jobs are the focus of this study. Professional, managerial, sales, and technical jobs are the major broad categories. Examples of some of the most common job titles include engineer, senior engineer, sales representative, area sales manager, administrative assistant, technologist, supervisor, and maintenance supervisor.

Compensation policies and practices of the firm are typical of those in the *Fortune* 500. The firm participates, for example, in over six annual salary surveys for jobs included in this study. The focus of these surveys varies—some focus on a selected group of perhaps 10 to 15 product market competitors and others focus on labor market competitors that employ persons with similar skills or have similar occupations. Statistical methods are used to combine the results of the surveys. Considerable judgment is also exercised, however, because different degrees of confidence are placed on the results of the various surveys. This is consistent with Rynes and Milkovich's (1986) argument that ad hoc judgments are typically made throughout the process.

Strategy also plays an important role in determining pay level. During the time period of the study, a policy of "paying with the leaders" was followed for the jobs we examined. In practice, this policy meant establishing the pay policy line at the fiftieth percentile of the group of pay leaders.

The pay structure of the jobs included in this study was maintained with the help of a single, national job evaluation system. The structure is defined by 15 job classes, or levels, each with minimum and maximum rates of pay roughly 20 percent below and above the midpoint. A Conference Board (1984) survey of 557 major U.S. firms found that the median number of levels in exempt pay structures for all industries was 19. The compensable factors used in the job evaluation system are education/knowledge required, experience required, complexity of duties, working conditions, and responsibility. Of the 491 firms using formal job evaluation in the Conference Board study, 90 percent used a formal plan. Of this group, approximately 20 percent used a plan of the general type used by the firm we studied.

An explicit pay-for-performance policy exists for the determination of individual pay increases. The policy is implemented through the use of annual merit increase guides (see Milkovich and Newman, 1987, for examples). These guides are designed to control the cost of annual pay increases, as well as to encourage a distribution of increases to employees. According to the Conference Board survey, 83 percent of firms used such guides. In the firm we studied, recommended salary increase ranges were a func-

tion of (1) merit rating on one axis and (2) current position in the salary range on the other axis. Higher ratings and less penetration into the salary range at a particular level were associated with both larger and more frequent salary increases.[4]

Promotions are based on performance as well, and additional consideration is given to years of experience with the firm. A salary increase goes with promotions. Again, the corporate compensation department issues yearly guidelines that specify the size of promotional increases. The importance of examining the firm's promotion system is increased by the fact that the firm engages in a fairly strong practice of promotion from within. Thus, women's access to higher level jobs is most often governed by decisions made while they are current employees. Direct access from the external labor market is limited.

Performance is assessed through a formal, annual performance appraisal process.[5] The immediate supervisor rates each employee on a 4-point scale, with 4 being the highest performance level. Raters are instructed to consider not only how well job requirements were satisfied, but also the difficulty of the job requirements and the appropriateness of methods used to satisfy the job requirements. The numerical rating given is supplemented by a written description of the subordinate's performance during the year. The complete appraisal is typically reviewed by a higher level manager.

The method of appraisal, as well as its central role in making promotion and salary increase decisions, is consistent with the way firms typically operate with respect to their exempt employees. The review system is also a common feature of performance appraisal plans.[6]

In regard to equal employment opportunity (EEO), the firm's standard training for its managers includes materials on EEO compliance with respect to staffing, access to training, compensation, and performance appraisal. The inclusion of EEO issues in training programs is typical of large firms.[7] Corporate personnel in monitor managers' actions in these areas and encourage improvement in those displaying subpar performance.

Several external events may have also had an effect on the firm's human resource practices. First, as with many large firms, it faced EEO litigation during the 1970s. The major case involved a class-action suit filed by female hourly employees in a very small number of the approximately 100 plants. This suit was eventually settled out of court for a substantial sum of money. As part of the settlement, the firm stated that it would also develop a plan to enhance the hiring and promotion of female salaried employees. The litigation, however, did not involve female salaried employees. Further, no formal or numerical goals for salaried women came about as a result of the litigation activity.

A second external influence was the recession of the early 1980s. Again, as with many other large firms, the firm we studied re-

[4] According to The Hay Group, the actual median increase nationally for 1982 ranged from 9 percent for "average performers" to 14.3 percent for "outstanding performers." By 1986, the corresponding figures were approximately 6 percent and 9 percent, respectively (The Hay Group, 1986). The corresponding figures for the salary guides used in the firm were similar.

[5] Cain (1986) has argued that supervisory ratings of performance are not "admissible" because they "might reflect discrimination," The empirical evidence does not support this hypothesis, however, despite the fact that a large amount of both laboratory and field research has been devoted to this question (see! Dipboye, 1985, for a review).

[6] See the survey results reported in footnote 3 on promotion and salary increases. The same survey also indicates that rating scales and essays are & most commonly used methods of appraisal. Further, 97 percent of firms review appraisals at a higher level.

[7] A Bureau of National Affairs (1985) survey found that among firms with over 1,000 employees, over 60 percent included EEO issues in their manager training programs. Further, EEO was the fourth (of 19) most commonly included issue in such programs.

duced the size of its white-collar work force during this period. Much of this reduction came about through early retirement. As a result, the number of men in exempt jobs actually declined slightly over the course of the study. In contrast, the number of women in exempt jobs grew by over 50 percent during the same period.

Method

Sample and Measures

This study involves two samples: exempt employees in job levels 1 through 7 (1) present in 1986 (the cross-sectional sample) and (2) present in both 1980 and 1986 (the longitudinal sample). The majority of exempt employees are employed in these levels (approximately 84 percent of men, 97 percent of women).[8] The cross-sectional sample comprises 2,412 women and 9,647 men. The longitudinal sample comprises 840 women and 5,550 men.

The dependent variables are annual salary, salary growth, and promotions. [9] The first set of independent variables, referred to as human capital (HC) variables in this study, are firm tenure,[10] job tenure (years at a particular job level), potential experience (age minus years of schooling minus six), and education dummies for highest degree. Squared terms for job tenure, firm tenure, and potential experience are also included. In the cross-sectional analyses, the most recent performance rating prior to the most recent salary change is used. In the longitudinal analyses, the average performance rating over the 1980–1986 time frame is used. The variables used are summarized in Appendix A.

Analyses

The following salary equation is estimated separately for the years 1980 and 1986:

$$\ln(S_{it}) = X_{it}B_t, + e_{it} \quad (1)$$

where $\ln(S_{it})$ is a vector of the natural logarithm of salaries for i persons during time period t; X_{it} is a matrix of observations on the exogenous variables contained in Appendix A; B is a coefficient vector; and e is a disturbance term composed of all unmeasured causes of salaries.

Given the availability of longitudinal data, we also estimate the following salary growth equation:

$$\ln(S_{i1986}/S_{i1980}) = X_{i1980}B + e_{i1980}. \quad (2)$$

Thus, salary growth is defined as the natural logarithm of the ratio of 1986 salary divided by 1980 salary.

Finally, we estimate a similar equation for the number of promotions received during the 1980–1986 period:

$$\text{PROM} = X_{i1980}B + e_{i1980}. \quad (3)$$

[8] The firm did not provide data on former employees or on active employees in levels 8 through 15.

[9] The number of promotions is defined using salary increase codes, which indicate the reason for an increase (e.g., merit or promotion). The number of promotional increases between 1980 and 1986 is used as the definition. A promotion can occur without a change in job level. Similarly, job level can change in the absence of a promotion. Thus, the correlation between changes in job levels and the number of promotions is high but not perfect (r = .73). Although some evidence suggests that women receive more within-level promotions (Flanders and Anderson, 1973; Stewart and Gudykunst, 1982), this correlation did not differ by gender, which suggests that changes in job level and the number of promotions, as defined by the firm were related in a similar manner for both men and women. Moreover, the female/male ratio of change in job levels was virtually identical to the female/male ratio of the number of promotions (1.33 and 1.38, respectively). Thus, we chose to use the firm's definition of a promotion rather than attempt to draw inferences from changes in job level.

[10] Firm tenure is based on the date used for calculating benefits. It is important to note that this date can differ from the original hiring date. Therefore, this measure should give an accurate indication of the amount of actual time spent with the firm even for persons not continuously employed with the firm.

The salary growth and promotion equations provide a unique opportunity to study the attainment of men and women over time. These analyses may help explain the process by which men and women reach the differential levels of attainment so widely observed in cross-sectional research.[11]

Estimates of the three equations were obtained separately for men and women and used to decompose salary, salary growth, and promotion differences into two components (Blinder, 1973; Jones, 1983): (1) differences in mean levels of endowments and (2) differences in coefficients or prices received for those endowments. Because the result of a decomposition varies as a function of which group is used as the standard (Cain, 1986), we report decompositions using both the advantaged and disadvantaged group as the' standard. In addition, we report corresponding "adjusted ratios" (Cain, 1986:746).

As discussed by Blinder (1973), Cain (1986), Oaxaca (1973), and others, such decompositions assume that the variables on the right side of the equation are exogenous to gender. If not, additional equations for these right-side variables can, in theory, be added to the model. In the present context, for example, an equation for job level might be warranted. As Blinder argued, however, implementing this latter strategy is often difficult in practice because of identification problems. Consistent with this point, we found the determination of job level and salary to be so closely intertwined that identification of a two-equation model was not possible.

As an alternative, we follow the Blinder and Oaxaca approach of estimating a series of equations, introducing variables of more questionable endogeneity in steps to the *X* vector. Thus, in the cross-sectional salary analyses, for example, we introduce job level last. This strategy permits an examination of how the decomposition results change in response to different model specifications.

Results

Table 1-1 reports mean salaries for all employees active in 1986 and for employees active in both 1980 and 1986. The female/male salary ratio is somewhat higher based on employees active in both 1986 and 1986. One explanation may be the fact that this latter group does not include new entrants to the jobs. New entrants are more likely to begin in lower job levels and have less time accumulated at each level. Both factors contribute to lower pay relative to higher tenure employees. The larger growth of women's employment in the firm's exempt jobs relative to that of men suggests that most new entrants were women.

Table 1–2 reports mean 1980 and 1986 salaries and their ratio as a function of gender and 1980 job level. These results allow comparisons between men and women starting at the same level in 1980 (but not necessarily at the same level as of 1986). Overall, the ratio of women's salary to men's salary is .84 in 1980 and rises to .88 in 1986,

[11] The inclusion of individual-specific intercepts in Equations (2) and (3) could be used to eliminate bias due to any lack of independence between *X* time-invariant components of *e* (Mundlak, 1978). Given data at two points in time, the use of individual-specific intercepts is equivalent to a first-differencing model. There are at least two problems with this model, however. First, variables that do not change over time (e.g., firm tenure) must be excluded. Second, the model exacerbates any unreliability problems. As a result, differences in parameter estimates may stem from unreliability rather than elimination of the effects of nonindependence of *X* and *e*. In this analysis, for example, performance rating is a key variable. King et al. (1980) have estimated the upper-bound reliability of supervisory ratings to be approximately .60. In our analysis, the correlation between performance ratings in 1980 and 1986 is approximately .20. Using a formula given by Guilford (1954:394), the resulting reliability of the change in performance rating would then be approximately .50. Across adjacent years, the correlation between performance ratings his closer to .40, which results in a difference score reliability of .33. By averaging performance ratings and counting promotions over time, the reliability problem is reduced.

thus eliminating 25 percent of the salary differential. Consistent with this narrowing differential, the mean salary for women increased by a greater percentage (61 percent) between 1980 and 1986 than did the mean salary for men (54 percent).

TABLE 1-1 1986 Salaries of Men and Women, by 1986 Job Level

	1986 Cross-Sectional Sample					1986 Longitudinal Sample				
	Women		Men			Women		Men		
1986 Job Level	N	Mean Salary	N	Mean Salary	W/M[a]	N	Mean Salary	N	Mean Salary	W/M[a]
All	2,412	$35,503	9,647	$42,049	.84	840	$40,004	5,550	$45,620	.88
1	859	29,451	1,777	31,875	.92	114	31,092	386	32,519	.96
2	412	32,870	896	35,222	.93	156	34,675	325	35,869	.97
3	521	36,209	2,151	37,795	.96	174	37,697	1,032	38,789	.97
4	162	40,745	641	42,935	.95	88	41,589	468	43,584	.95
5	286	43,925	2,184	46,307	.95	182	44,274	1,617	46,819	.95
6	158	50,568	1,859	53,410	.95	109	51,067	1,607	53,557	.95
7	14	55,415	138	59,002	.94	17	55,805	114	58,968	.95

[a] W/M = women/men ratio.

Within 1980 job levels, similar trends emerge, although the salary differentials are much narrower. The ratios of women's mean salaries to those of men range from .93 to .95 in 1980. In all cases, these ratios increased between 1980 and 1986. Again, the decreasing salary differentials are consistent with the greater salary growth of women observed at each 1980 job level. A cursory examination of the 1980 job levels having sufficient numbers of both men and women (1 through 3) reveals no obvious relationship between job level and gender differences in salary or salary growth.

One possible concern with the numbers in Tables 1-1 and 1–2 is that there may be a selection process related to gender and salary because the longitudinal sample includes only employees still active in 1986. For example, one scenario is that men were observed to receive lower salary increases because men experiencing larger salary growth were more likely to have left the firm. Alternatively, discrimination against women could have resulted in all but the "cream of the crop" quitting, leaving us to

TABLE 1-2 1980 and 1986 Salaries of Men and Women, by 1980 Job Level

	Women				Men				Women/Men		
1980 Job Level	N	1980	1986	1986[a] / 1980	N	1980	1986	1986[a] / 1980	1980	1986	1986[b] / 1980
All	840	$24,786	$40,004	1.61	5,550	$29,606	$45,620	1.54	.84	.88	1.14
1	348	21,954	35,762	1.63	872	23,516	36,479	1.55	.93	.98	1.14
2	177	24,014	38,862	1.62	774	25,171	40,009	1.59	.95	.97	1.05
3	195	26,635	43,048	1.62	1,515	28,220	44,229	1.57	.94	.97	1.09
4	48	28,881	46,760	1.62	485	30,848	47,661	1.55	.94	.98	1.14
5	58	31,894	50,042	1.57	1,307	33,801	51,346	1.52	.94	.97	1.10
6	14	35,717	52,768	1.48	571	37,705	55,225	1.46	.95	.96	1.03
7	0				26	36,840	54,321	1.47			

[a] 1986 salary/1980 salary.
[b] Women [salary 1986/salary 1980]-1/men [salary 1986/salary 1980]-1.

observe only the latter group, which received relatively large increases.

Supplementary data suggest, however, that these are not likely problems. First, the voluntary quit rate averaged only about 2 percent per year over the course of the study. Second, and more important, we examined salary data on all men and women active in 1980 or 1984. The average salary of men and women grew by 35 percent and 40 percent, respectively, during this period. Restricting the sample to only employees active in both 1980 and 1984 yielded growth rates for men and women of 46 percent and 53 percent, respectively. The key point is that the female/male ratio of growth rates was approximately 1.14 in both cases, which suggests that focusing only on employees active in both years does not influence the observed relative salary growth of men and women. Finally, note that the ratio of 1.14 is identical to that found in the first row, last column of Table 1–2.

Decomposition of Salary Differences

As Table 1–3 indicates, human capital variables alone explain up to 32 percent of the salary advantage of men in the cross section. Adding job level and performance rating to the model raises the explained percentage to between 68 and 77 percent, which suggests that most of the gap is due to the fact that men tend to hold higher level jobs. The corresponding adjusted salary ratios (A_M and A_w) suggest that equalizing human capital would raise the salary ratio to .86 to .90. Equalizing job level and performance rating as well would raise it to .95 to .97.[12]

Note that adding performance rating actually results in a slight decrease in the explained percentage of the salary differential. Although not shown here, this finding was even stronger in analyses of specific job levels. The reasons are twofold. First, the mean performance rating of women is slightly higher than that of men (2.59 versus 2.52 overall in 1980). Second, although women receive a slightly greater return for a given performance rating, including performance rating in the model changes some of the other coefficients.[13]

In summary, the cross-sectional results suggest that men, in general, receive greater returns to explanatory variables. These results are consistent with previous cross-sectional analyses of male-female salary differentials (Cain, 1986).

Decomposition of Salary Growth Differences

Although women's salary levels fell short of men's, women, as noted earlier, experienced greater salary growth in percentage terms. Moreover, as the decompositions reported in Table 1-4 demonstrate, this salary growth advantage cannot be entirely explained by the models. The parentheses in Table 1-4 indicate instances in which differences in coefficients favor women. Appendix B reports the regression results.

In the overall analyses, 40 to 49 percent of women's greater salary growth can be explained by differences in human capital. Adding average performance rating raises the explained part to 50 to 62 percent. Finally, the inclusion of job level and number of promotions raises this figure to 72 to 74 percent. Within specific job levels, there is a good deal of variance in the extent to which human capital, average performance rating, and promotions can explain the salary growth advantage of women.

Table 1-5 shows the contribution of specific factors to the salary growth differential

[12] Within levels, very little of the pay gap could be explained. Because, however, the raw ratios were high (see Tables 1-1 and 1-2), the adjusted ratios were also high.

[13] For example, adding performance rating to the equation having human capital variables increased the advantage realized by men in returns to job tenure.

in the model containing only human capital variables. An important factor accounting for women's advantage is potential experience. Because potential experience has a negative impact on salary increases, women benefit from having lower levels of potential experience and having a less negative coefficient.[14] Similarly with respect to job level, women benefited from having a lower mean and a less negative return. The addition of promotion to the model sharply reduces the importance of potential experience and job level in accounting for the differential.

TABLE 1-3 Decomposition of Salary Differences

	Decomposition Standard								
	R^2		Men		Women		Differential		
Variables in Equation	Women	Men	Coeff.[a]	Endow.[b]	Coeff.[a]	Endow.[b]	Raw	A_M[c]	A_W[d]
1980 Longitudinal Sample									
Human capital (HC)	.19	.29	.73	.27	.86	.14	.84	.88	.86
HC, perf. rating '80 (PA80)	.21	.33	.76	.24	.88	.12		.88	.86
HC, job level	.58	.71	.28	.72	.31	.69		.96	.95
HC, job level, PA80	.62	.73	.31	.69	.32	.68		.95	.95
N =	840	5,550							
1986 Longitudinal Sample									
HC	.29	.21	.80	.20	1.00	.00	.88	.90	.88
HC, PA86	.32	.28	.82	.18	1.01	-.01		.90	.88
HC, job level	.79	.80	.21	.79	.29	.71		.97	.97
HC, job level, PA86	.82	.83	.23	.77	.30	.70		.97	.96
N =	840	5,550							
1986 Cross-Sectional Sample									
HC	.30	.31	.68	.32	.73	.27	.84	.89	.88
HC, PA86	.33	.37	.70	.30	.75	.25		.89	.88
HC, job level	.81	.83	.25	.75	.22	.78		.96	.96
HC, job level, PA86	.83	.85	.27	.73	.24	.76		.96	.96
N =	2,412	9,647							

[a] Proportion of salary differential due to unequal coefficients or returns.
[b] Proportion of salary differential due to unequal endowments.
[c] Adjusted salary ratio using men's coefficients as standard.
[d] Adjusted salary ratio using women's coefficients as standard.

Another important factor is job tenure.[15] Women received larger percentage salary increase returns to job tenure. Recall that the firm's salary increase guide recommends smaller percentage increases as employees progress within the salary range at a given level. Because this position in the salary range is not likely to be a perfect function of job tenure, the latter may not completely capture the effect of current position in the salary range. If men tend to be higher in the salary range than women, we would expect men to receive smaller increases than women.

Women's higher salary growth was also

[14] The use of potential experience (age minus schooling minus six), rather than actual experience, is problematic for persons with intermittent labor force participation. Thus, the role of potential experience in explaining salary growth differences in our study may be partly artifactual. As an indirect test, we restricted the sample of women to unmarried women only. The resulting decomposition (of the full model) actually *increased* the importance of potential experience in explaining women's faster salary growth.

[15] A more flexible functional form (dummy variables for each year of job tenure) did not change this conclusion.

partly a function of their higher average performance ratings. Nevertheless, the coefficient on average performance rating was smaller for women, which indicates they received a smaller payoff for performance. On the other hand, adding promotion to the model eliminated this disadvantage.

TABLE 1-4 Decomposition of Salary Growth Differences, by 1980 Job Level

	Decomposition Standard								
	R^2		Men		Women		Differential		
Variables in Equation	Women	Men	Coeff.[a]	Endow.[b]	Coeff.[a]	Endow.[b]	Raw	A_W[c]	A_W[d]
All Levels									
Human capital (HC)	.14	.21	(.51)[e]	.49	(.60)	.40	1.14	1.07	1.06
HC, avg. perf. rating (AVGPA)	.23	.30	(.38)	.62	(.50)	.50		1.09	1.07
HC, job level	.15	.21	(.46)	.54	(.53)	.47		1.08	1.07
HC, job level, AVGPA	.24	.31	(.25)	.75	(.42)	.58		1.11	1.08
HC, job level, AVGPA, promotion (PROM)	.39	.43	(.26)	.74	(.28)	.72		1.10	1.10
Level 1									
HC	.16	.29	(1.14)	-.14	(1.02)	-.02	1.14	.98	1.00
HC, AVGPA	.23	.43	(.51)	.49	(.80)	.20		1.07	1.03
HC, AVGPA, PROM	.35	.57	(.67)	.33	(.77)	.23		1.05	1.03
Level 2									
HC	.26	.30	(.50)	.50	(1.10)	-.10	1.05	1.03	1.00
HC, AVGPA	.37	.34	-.13	1.13	(.46)	.54		1.06	1.03
HC, AVGPA, PROM	.56	.45	-.28	1.28	(.10)	.90		1.06	1.05
Level 3									
HC	.14	.18	(.32)	.68	(.52)	.48	1.09	1.06	1.04
HC, AVGPA	.31	.31	(.30)	.70	(.58)	.42		1.06	1.04
HC, AVGPA, PROM	.53	.44	(.14)	.76	(.41)	.59		1.08	1.05

NOTE: N = 840 for women, 5,550 for men.
[a] Proportion of salary differential due to unequal coefficients or returns.
[b] Proportion of salary differential due to unequal endowments.
[c] Adjusted salary ratio using women's coefficients as standard.
[d] Adjusted salary ratio using men's coefficients as standard.
[e] Parentheses indicate that coefficients favor women.

Decomposition of Promotion Differences

Table 1-6 reports the mean number of promotions received by men and women between 1980 and 1986 overall and as a function of 1980 job level. As in the case of salary increases, women had a distinct promotion advantage. Of further interest, this advantage, like the women's salary growth advantage, does not decline at higher job levels. In fact, these simple descriptive statistics suggest that the advantage may be larger at higher job levels.

Table 1-7 presents the results of the decomposition of the promotion differential under different model specifications. (Appendix B presents the regression results.) A key finding is that the conclusion regarding the final model depends on which coefficients are used as the standard. When men's coefficients are used as the standard, the promotion advantage of women is completely explained by the variables in the final model. Table 1-8 presents results of the decomposition into specific factors. In the model containing human capital variables, the main advantage of women is again

TABLE 1-5 Decomposition of Salary Growth Difference Between Men and Women as a Function of Model Specification

		Women[a]		Men			Women		Men			Women		Men	
Variable	Total	Percent Endow.	Percent Coeff.	Percent Endow.	Percent Coeff.	Total	Percent Endow.	Percent Coeff.	Percent Endow.	Percent Coeff.	Total	Percent Endow.	Percent Coeff.	Percent Endow.	Percent Coeff.
Intercept	-208		-208		-208	-147		-147		-147	-192		-192		-192
Education	6	4	3	5	0	-2	1	-1	3	-3	-2	0	2	2	-4
Tenure	-62	15	-76	6	-68	-70	18	-88	6	-76	-30	15	-45	7	-38
Job tenure	121	7	113	3	113	120	0	120	8	112	179	-11	190	-3	182
Nonwhite	-4	-2	-3	-1	-4	-3	-1	-2	0	-3	-1	-1	0	0	0
Experience	247	16	232	30	217	181	14	167	13	158	85	8	76	13	71
Job level						31	10	20	18	13	-9	-1	-8	-4	-5
Avg. perf. rating						-12	16	-29	17	-29	13	13	0	13	0
Promotion											59	49	10	46	13
Total[b]	100	40	60	45	55	100	58	42	75	25	100	72	28	74	26

[a] Group used as decomposition standard.

[b] Because of rounding, column sums may not equal totals.

their combination of lower potential experience and a less negative promotion return to potential experience.[16]

TABLE 1-6 Mean Promotions for Men and Women, 1980-1986

1980	Women		Men		
Job Level	N	Mean	N	Mean	Women/Men
All	840	1.29	5,550	.94	1.37
1	348	1.29	872	1.21	1.08
2	177	1.38	774	1.22	1.14
3	195	1.34	1,515	1.05	1.26
4	48	1.34	485	.94	1.47
5	58	.98	1,307	.75	1.31
6	14	.57	571	.32	1.78
7	0		26	.34	

Perhaps the most interesting finding, however, is that women receive a much smaller promotion payoff for average performance rating. Specifically, an increase of 1 point in average performance rating is associated with an additional. .45 promotions for men and .33 promotions for women.

Effect of Percentage Female

In addition to characteristics of employees, characteristics of jobs, such as percentage of female incumbents, may contribute to pay and promotion differences. For these analyses, we included persons employed in job title groups having 10 or more incumbents. Although information on job title groups was available for both 1980 and 1986, the 1986 information was more complete and of better quality than that available for 1980. Nevertheless, we were able to develop a sample of 171 women and. 1,697 men present in both 1980 and 1986 in fairly homogeneous job title groups.

In 1980, 91 job title groups had 10 or more incumbents. Of these 91 groups, 5 had 50 percent or more female incumbents. Of the 171 women, 43 (25 percent) were employed in those 5 groups in 1980. Of the 5 predominantly female groups, 2 had no male incumbents. These 2 groups (administrative assistant and secretary) employed 17 percent of all women in the sample. Of the remaining 86 job groups, which were predominantly male, 35 had no female incumbents. These 35 completely segregated groups employed 662 (39 percent) of the total 1,697 men. Examples of some of the larger completely male groups are technologist, maintenance supervisor, designer, and senior engineer.

Models of the type used earlier were estimated separately for men and women. Rather than performing a decomposition, however, we added a measure of the percentage of female incumbents in each job title group to each equation. As Table 1-9 indicates, among women, the impact of percentage female on 1980 salary is not statistically significant in any model. In the 1986 salary equation containing only human capital variables, the percentage female coefficient is negative and not statistically significant. However, the addition of job level (and performance rating) results in the coefficient being statistically significant and changes the sign such that percentage female has a positive impact on women's salaries in the final equation. Specifically, for each increase of 10 percentage points, salary is .7 percent higher. Thus, a change from a completely male to a completely female job title group would be associated with a 7 percent higher 1986 salary.

In sharp contrast, men realized a salary penalty in both 1980 and 1986 for being in job title groups that had higher percentages of women. In both years, the penalty was much larger without controls for job level. In the final models, each 10-point increase in the percentage female is associated with a .8 percent decrease in 1980 salary and a .5 percent decrease in 1986 salary. Thus, a change from a com-

[16] We again restricted the sample of women to those who were unmarried. In this case, the importance of potential experience was diminished somewhat, but remained important.

pletely male to a completely female job would be associated with an 8 percent lower salary in 1980 and a 5 percent lower salary in 1986. Parenthetically, we note that the similarity of results obtained in the 1980 and 1986 cross sections may reduce concerns regarding the quality of job title information in 1980.

TABLE 1-7 Decomposition of Promotion Differences, 1980–1986

	Decomposition Standard								
	R^2		Men		Women		Differential		
Variables in Equation	Women	Men	Coeff.	Endow.	Coeff.	Endow.	Raw	A_W[a]	A_M[b]
All Levels									
Human capital (HC)	.26	.27	(.38)[c]	.62	(.49)	.51	1.37	1.23	1.19
HC, avg. perf. rating (AVGPA)	.28	.30	(.32)	.68	(.47)	.53		1.25	1.20
HC, job level	.26	.30	(.09)	.91	(.30)	.70		1.34	1.26
HC, AVGPA, job level	.28	.34	-.02	1.02	(.27)	.73		1.38	1.27
Level 1									
HC	.27	.32	(.34)	.66	(.42)	.58	1.08	1.05	1.05
HC, AVGPA	.27	.38	-1.15	2.15	(.22)	.78		1.17	1.06
Level 2									
HC	.40	.32	(.47)	.53	(.66)	.34	1.14	1.07	1.05
HC, AVGPA	.43	.35	(.21)	.79	(.43)	.57		1.11	1.08
Level 3									
HC	.27	.25	(.29)	.71	(.23)	.77	1.26	1.18	1.20
HC, AVGPA	.33	.30	(.28)	.72	(.26)	.74		1.19	1.19

NOTE: N = 840 for women, 5,550 for men.

[a] Adjusted salary ratio using women's coefficients as standard.

[b] Adjusted salary ratio using men's coefficients as standard.

[c] Parentheses indicate that coefficients favor women.

Results for the salary growth and promotion equations are also reported in Table 1-9. For women, percentage female appears to have no impact on either salary growth or promotions. In contrast, men's salary growth and promotion chances increase as percentage female increases. Recall that earlier decompositions indicated that women had an advantage over men in terms of promotions and salary growth. These results suggest the possibility that part of that advantage may be due to the gender composition of the job. It is possible that men receive some of the benefit that may be attached to predominantly female jobs.

Discussion

We found that the ratio of female/male salaries rose from .84 to .88 over a 6-year period. Within job levels, salary ratios were higher (.93 to .95), but also increased over the period (.96 to .98 by 1986). Consistent with the narrowing differentials, women received a greater number of promotions and larger percentage increases in salary between 1980 and 1986.

As in numerous other cross-sectional studies, the salary advantage of men could not be completely explained by higher levels of endowments, even using a relatively complete model that included job level and performance rating. More detailed analyses at specific job levels resulted in still less of the salary differential being explained, although adjusted salary ratios were similar.

Nevertheless, using only human capital variables, the adjusted salary ratios are among the highest in the literature (see Cain, 1986). Further, the adjusted salary ratios for the

TABLE 1-8 Decomposition of Promotion Difference Between Men and Women

		Women[a]		Men			Women		Men	
Variable	Total	Percent Endow.	Percent Coeff.	Percent Endow.	Percent Coeff.	Total	Percent Endow.	Percent Coeff.	Percent Endow.	Percent Coeff.
Intercept	-70		-70		-70	58		58		58
Education	28	4	24	8	20	2	2	0	2	0
Tenure	-60	7	-67	2	-61	-80	8	-88	-2	-78
Job tenure	-122	25	-147	20	-142	-107	23	-130	24	-131
Nonwhite	-5	-1	-4	1	-6	-4	-1	-3	1	-5
Experience	329	14	315	32	297	216	12	204	21	195
Job level						90	23	67	47	43
Avg. perf. rating						-74	7	-80	9	-83
Total[b]	100	51	49	62	38	100	73	27	102	-2

[a] Group used as decomposition standard.

[b] Because of rounding, column sums may not equal totals.

models including job level exceed all such ratios summarized by Cain. Our estimates, however, may be somewhat inflated because of the exclusion of higher job levels (held mostly by men) and the use of salary rather than earnings.

TABLE 1-9 Regression Coefficients for Percentage Female

	Women			Men		
Variables in Equation	B	S.E.	R^2	B	S.E.	R^2
1980 Salary						
Human capital (HC)	-.0078	.0046	.30	-.0384**	.0040	.34
HC, job level	.0049	.0041	.53	-.0097**	.0027	.72
HC, job level, perf. rating '80 (PA80)	.0023	.0044	.54	-.0084*	.0026	.75
1986 Salary						
HC	-.0049	.0040	.40	-.0434**	.0044	.30
HC, job level	.0123**	.0023	.83	-.0054*	.0024	.81
HC, job level, PA86	.0072**	.0023	.86	-.0050*	.0023	.83
1986/1980 Salary						
HC	.0058	.0045	.23	.0102**	.0026	.23
HC, job level	.0039	.0048	.24	.0089**	.0026	.23
HC, job level, avg. ped. rating (AVGPA)	-.0025	.0053	.27	.0100**	.0024	.35
HC, job level, AVGPA, promotion (PROM)	-.0017	.0049	.37	.0039	.0022	.47
Promotion						
HC	.0293	.0259	.40	.1443**	.0199	.33
HC, job level	.0008	.0271	.44	.1075**	.0200	.36
HC, job level, AVGPA	-.0134	.0303	.44	.1124**	.0194	.39

NOTE: N = 171 for women, 1,697 for men. Percentage female is measured in units of 10 percent.
* p <.05.
** p <.01.

In contrast to men's cross-sectional salary advantage, women received both greater numbers of promotions and larger salary increases over a 6-year period. Other studies have found similar results with respect to unadjusted differences in both promotions (Hartmann, 1987; Lewis, 1986; Stewart and Gudykunst, 1982; Tsui and Gutek, 1984) and salary increases (Megdal and Ransom, 1985; Tsui and Gutek, 1984).

Although the promotion advantage could be largely explained by differences in mean endowment levels, the same did not hold true for the salary increase advantage. Thus, if one chooses to interpret the cross-sectional results as showing salary discrimination against women, one may be obliged to interpret the salary increase results as suggesting discrimination in favor of women.

The decomposition results were very sensitive to model specification. Human capital variables alone explained anywhere from 0 to 32 percent of men's cross-sectional salary advantage. Adding job level and performance rating raised this range to 68 to 77 percent. Human capital variables were better able to account for differences in salary growth (40 to 49 percent) and promotions (51 to 62 percent). Again, however, adding job level and (average) performance rating increased this figure substantially (58 to 75 percent for salary increases; 73 to 102 percent for promotions). Of course, in the case of promotions and salary increases, the advantage to be explained belonged to women.

Cain (1986) pointed out that the typical effect of including additional variables in a salary equation was to increase the adjusted female/male salary ratio. Consistent with this general finding, Hildebrand (1980), Milkovich (1980), and Milkovich and Newman

(1987), among others, have argued that the adjusted female/male salary ratio might be closer to unity if unmeasured differences between men and women and relevant labor markets could be better incorporated in salary equations. We were able to move in this direction by including, for example, several experience measures, job level, and performance rating in our models.

Our results, however, indicate that at least in the case of performance rating, its inclusion actually led to a slight reduction in the adjusted female/male salary ratio. In the promotion and salary growth equations, in which the unadjusted ratios exceeded unity, the inclusion of average performance rating led to sometimes sizable increases in adjusted ratios. Thus, the common thread is that inclusion of performance rating does not help explain the raw salary advantage of men, but it does explain some of the raw advantage of women with respect to salary growth and promotions.

Although women had an overall advantage in the salary increase and promotion process, they received a smaller payoff for their performance ratings. Based on the full promotion equation, for example, men received an average of .45 additional promotions for each additional point in average performance rating between 1980 and 1986. In contrast, women received an additional .33 promotions for each additional point. This finding is consistent with Olson and Becker's (1983) suggestion that women may be held to higher promotion standards than men.

The fact that women experienced a lower salary disadvantage in the cross-sectional analysis yet received better salary increases and more promotions over time offers an interesting contrast. One implication may be that because men are not favored in the salary increase and promotion process, the explanation for women's salary level disadvantage must be sought elsewhere. If so, one alternative avenue of investigation should perhaps be the recruitment and initial placement of men and women.

Aside from possible differences in initial placement, it may be that women have not always been favored in terms of salary increases and promotions. In fact, the greater number of promotions and larger salary increases of women may reflect an attempt by the firm to reduce what was perceived to be an inequitable salary and job level structure. Rosenbaum (1985), for example, found a reduction in the negative impact of percentage female on salary between 1965 and 1975. Further, he found that the impact of percentage female on promotions changed from negative to positive over the same period. In the case of the Rosenbaum study, the firm had implemented a "serious" affirmative action program during the period of the study.

The firm that we studied had an ongoing affirmative action plan. It also covered EEO issues in its management training. Further, although EEO litigation pertaining to these issues among exempt employees does not appear to have been important, the firm did settle a case pertaining to such practices vis-à-vis hourly employees for a substantial amount. Although no formal goals or new practices resulted, one might speculate that this event enhanced or at least reinforced the vigilance with which progress toward affirmative action and EEO goals was monitored.

Any progress in the affirmative action area may have been facilitated by the general financial success of the company during the period of our study. Research by Rosenbaum (1979) suggests that promotion opportunities may be greater during periods of organizational (defined as employment) growth. The general financial success and growth of the firm we studied may have facilitated affirmative action progress of female employees. It is interesting to note, however, that the bulk of employment growth in exempt jobs seems to have been among

women rather than men.[17] As discussed earlier, this appears to have been partly due to a brief period of reductions in force during the early 1980s.

The promotion and salary growth advantage of women implies that the salary gap would eventually remedy itself if past trends were to continue. Note, however, that even a small initial salary disadvantage can take many years to be eliminated. As an example, a projection of salary growth rates over the 6-year period into the future indicates that the 1980 female/male salary ratio would not equal unity until the year 2003. Within job levels 1, 2, and 3, 1980 salaries would equalize in 1989, 1996, and 1992, respectively. Of course, as this equalization process works to its conclusion, women continue to receive lower salaries.

In addition to our focus on human capital, job level, and performance ratings, we also examined the possibility that percentage female in a job group was a structural factor contributing to attainment differences. Consistent with Rosenbaum (1985), controlling job level generally reduced the impact of percentage female by a substantial amount. Consistent with Hartmann (1987), percentage female had a small, positive effect on women's salaries (in 1986). Unlike Hartmann's results, however, percentage female had a negative impact on salaries of men. With respect to salary growth, the lack of a negative impact of percentage female for both men and women was consistent with Hartmann's findings. Regarding promotion, although Hartmann found a negative impact of percentage female for women, Rosenbaum found a positive impact by the end of his study period. Our results suggest no stable impact of percentage female on women's promotion rates. In contrast, a positive effect was found for men.

The preceding discussion does not really provide support for the idea that percentage female' is an important structural property that negatively affects women's (and perhaps men's) attainments. A better research strategy would be to examine its impact controlling for other characteristics of jobs or occupations that may be related to percentage female. This strategy was demonstrated by Treiman and Hartmann (1981) using national survey data at the occupational level. A stronger test, however, would make use of firm-level data wherein similarity of occupational titles is more likely to correspond to actual similarity of work content. The effect of percentage female in different firms is another possible avenue of investigation (Pfeffer and Davis-Blake, 1987): in cases in which job content is standardized.

Given our use of data from a single firm, the study has a disadvantage relative to the coverage and external validity possible with marketwide or national surveys. Along these lines, replication studies would be necessary before attempting to answer the question of how typical our results are of other large firms' relative treatment of men and women. Nevertheless, the better coverage obtained using national survey data comes at the expense of not being able to measure productivity in the way that many firms actually measure it. Finally, recall that the policies and practices of the firm we studied tended to be consistent with those reported in surveys of other large firms.

Besides the job-specific productivity measures, the results of our study were strengthened by the following. First, the use of longitudinal data should have reduced the impact of any unobserved, constant individual differences in productivity. Second, firm-specific differences in determinants of salaries (e.g., pay policies and practices) are obviously not an issue. Finally, the use of

[17] This is not to say that there were not also a substantial number of newly entering men as well. The net growth in the number of women seems to have been higher because there were fewer women in exempt jobs at retirement age, for example.

data from personnel records rather than self-reports typical of national surveys may have reduced the potential for reporting errors (Duncan and Hill, 1985).

In their agenda for basic research on comparable worth, Hartmann et al. (1985:7) emphasized that "we need to understand better how wages are set within enterprises and how they are affected by other employer practices, such as job assignment...." They stressed the importance, especially in large firms, of internal labor markets and promotion from within as aspects of job assignment. We hope that our research contributes to a better understanding of these processes.

Acknowledgments

We would like to thank Donald Schwab, the other members of the Panel, the other authors, and our colleagues at Cornell University for their helpful comments on earlier drafts of this chapter.

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Appendixes A and B follow.

APPENDIX A Summary and Means of Independent Variables

	Longitudinal Analysis				Cross-Sectional Analysis	
	1980		1986		1986	
Variable	Women	Men	Women	Men	Women	Men
Human capital						
Highest degree						
High school (or missing)	.473	.424	.473	.424	.515	.461
Associate	.033	.034	.033	.034	.040	.033
Bachelor of arts	.162	.100	. 162	.100	.122	.084
Bachelor of science	.248	.352	.248	.352	.243	.323
Master of science	.048	.053	.048	.053	.041	.050
Master of arts	.020	.007	.020	.007	.012	.006
Master of business adm.	.004	.005	.004	.005	.006	.004
Doctor of philosophy	.013	.026	.013	.026	.020	.038
Experience						
Potential experience[a]	16.306	18.656	22.306	24.656	18.630	21.552
Potential experience, sq.	364.875	435.740	596.546	695.606	454.968	572.402
Firm tenure	9.040	11.376	15.040	17.376	10.839	14.043
Firm tenure, sq.	126.955	186.459	271.435	358.972	170.645	273.685
Job tenure	3.008	3.812	5.336	6.218	3.852	5.096
Job tenure, sq.	11.765	18.352	37.382	51.181	20.634	36.138
Race (nonwhite = 1)	.075	.050	.075	.050	.027	.021
Gender (male = 1)	—	—	—	—	—	—
Job level	2.206	3.434	3.515	4.421	2.641	3.694
Performance rating	2.593	2.519	2.620	2.566	2.607	2.548
Avg. perf. rating, 1980–1986 (AVGPA)	—	—	2.587	.516	—	—
N =	840	5,550	840	5,550	2,412	9,647

[a] Age minus years of schooling minus six.

APPENDIX B Salary Growth and Promotion Regressions

	Salary Growth				Promotion					
Variable	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Intercept	0.639**	0.540**	0.350**	0.285**	0.254**	0.170**	2.578**	2.745**	1.418**	1.925**
Associate	-0.017*	0.054*	-0.014	0.046*	-0.013	0.042	-0.063	0.076	-0.013	0.074
B.A.	0.009	-0.006	0.026**	0.007	0.009	-0.009	0.085*	0.165	0.297**	0.266**
B.S.	-0.015*	-0.011	0.004	0.007	-0.005	-0.004	-0.113**	0.061	0.155**	0.177
M.S.	-0.026*	-0.054*	-0.002	-0.033	-0.006	-0.029	-0.300**	-0.258	0.074	-0.063
M.A.	-0.047*	-0.022	-0.026	-0.001	-0.039*	-0.017	-0.058	0.103	0.222	0.260
M.B.A.	0.021	0.030	0.039*	0.041	0.040*	-0.025	-0.296	0.979	-0.012	1.081*
Ph.D.	-0.070**	-0.065	-0.031**	-0.039	-0.021*	-0.017	-0.774**	-0.650	-0.182*	-0.369
Tenure (× 00)	-0.396**	-0.939**	-0.391**	-0.944**	-0.399*	-0.646**	-0.960	-5.221	0.143	-4.900**
Tenure, sq. (× 00)	0.011**	0.026**	0.106**	0.024**	0.010**	0.015*	0.029	0.162**	0.007	0.147**
Job tenure	-0.003	0.029*	-0.004*	0.023	0.008**	0.054**	-0.182**	-0.484**	-0.212**	-0.515**
Job tenure, sq.	0.000	-0.004*	0.000	-0.003	-0.001**	-0.006**	0.011**	0.046**	0.013**	0.051**
Nonwhite	-0.009	-0.032	-0.002	-0.018	-0.007	-0.009	0.077	0.200	0.099	-0.140
Experience (× 00)	-0.829**	-0.179	-0.648**	-0.141	-0.352*	-0.146	-8.073**	-0.582	-5.262**	-0.083
Experience, sq. (× 00)	0.009**	-0.004	0.007**	-0.004	0.003**	0.000	0.108**	-0.052	0.068**	-0.064*
Job level			-0.006**	-0.004	0.001	0.000			-0.135**	-0.066**
Avg. perf. rating			0.106**	0.101**	0.081**	0.081**			0.447**	0.334**
Promotion					0.056**	0.061**				
R^2	.21	.14	.31	.24	.43	.39	.27	.26	.34	.28

* p < .05.
** p < .01.

COMMENTARY

Christopher Winship

Gerhart and Milkovich provide an analysis of sex differentials in salaries, raises, and promotions in a large, diversified firm. Their sample is confined to employees in the 7 lowest of 15 job levels for exempt personnel. The sample is further restricted to individuals working in the firm in 1980 who were still working with the firm in 1986. Their basic strategy is to estimate a large variety of regression models, almost exclusively of the single-equation type, with the aim of assessing what factors account for sex differences in salaries, raises, and promotions. The analyses here are quite straightforward. They carry out the usual decomposition procedures for determining how much of the sex difference in the dependent variable, that is, salaries, raises, or promotions, can be explained by male-female differences in the independent variables and how much can be explained by differences across sex in the effects of these variables on the dependent variable.

A number of Gerhart and Milkovich's findings are of interest. The firm they study is unusual in that sex differences in salaries are relatively small. In 1980 the ratio of female to male salaries was .84. In 1986 the ratio was .88. As they point out, these ratios are among the highest in literature. They also find that over the 6-year period, women, on average, received higher raises, at least on a percentage basis, than men. Overall, female salaries increased 61 percent over the 6-year period whereas males' increased 54 percent. Promotions show a similar sex difference. From 1980 to 1986, women received an average of 1.29 promotions and men an average of .94. Put in other words, women received, on average, nearly 40 percent more promotions than men.

Gerhart and Milkovich also carry out breakdowns by job level. As one might expect, within job level the female/male salary differences are much smaller. For instance, in 1980 they range from .93 to .95. The overall differences between women and men in size of raises and number of promotions hold within levels as well as across the population. An important implication of this is that differences in the distribution of men and women across levels does not appear to explain the larger raises

The author benefited from a conversation with Dale Mortensen in prepearing these comments.

and higher rates of promotion for women. Gerhart and Milkovich also examine the effect of sex composition of jobs on salaries. In many of their models they find that the effect of percentage female on the salaries of women is statistically insignificant. The sign of the effect also changes across models. In sharp contrast, however, men are penalized in both 1980 and 1986 for holding jobs that are predominantly held by women. For example, in 1980, they estimate that for a man, a change from a completely male to a completely female job would be associated with an 8 percent lower salary.

It seems to me that one of the advantages of studying a single firm is that it provides the opportunity to think in detail about what kinds of processes affect salaries, raises, and promotions. It gives us a chance to bring our general knowledge about how the world works in a specific situation to our statistical analyses.

The authors, however, tell us almost nothing about the firm they are examining. In evaluating the analyses, I would have found it quite useful to know about the kinds of jobs in the sample and, in particular, the kinds of jobs that were associated with the seven job levels they analyze. It would also be quite useful to know something about the organization of the personnel system within the firm. Job level is a variable frequently used in the analysis, but at the end of the paper I was not quite sure what it meant. I was particularly puzzled when I read a footnote that an individual can be promoted without changing job level and also can change job level without being promoted. It would also be valuable to know something about the structure of the firm. Do the jobs in the sample fall into different divisions or departments? Are men and women differentially distributed across these units and does this have any effect on salary?

These considerations might also refocus the analysis a bit. One major factor in determining sex differences in salaries is differences in the type of jobs men and women hold, but this paper offers only a very partial analysis of this factor. Gerhart and Milkovich do examine the effects of the sex composition of jobs on salaries, but they go no further than that.

Perhaps the most serious variable that is not even discussed is differences in hours worked, or how demanding a job is. The analysis here is in terms of salaries, not wages. The sample includes only exempt employees. As such, one might guess they are all expected to work a full week and that their weekly salary does not change even if they work more or less in a particular week. One would expect that, on average, some jobs have fuller work weeks than others or that some have more variability in hours worked in a week and that this would be reflected in salary differences. If this is in fact the case, it would not be surprising to find that women were disproportionately in jobs with fewer hours and with less variable hours and that this explained part of the sex difference in salaries. Other types of job differences might also be important for salary differences and correlated with sex.

Let me turn to a different issue—the sample. Gerhart and Milkovich have selected their sample so that only individuals who were working with the firm in 1980 and were still working with the firm in 1986 are included in their analysis. As such, they excluded individuals who were working with the firm in 1980 but left before 1986. It may well be that the exclusion of individuals who have left the firm has only a negligible effect on the analysis. The question is not whether women or men are more or less likely to leave the firm, but rather what the interaction is among sex, exiting, and the dependent variable, that is, salaries, raises, or promotions. It is easy to tell stories about how inclusion of former employees could change the sex differential in raises and promotions. If men who left the firm were individuals who would or did receive multiple promotions and large raises and women

who left would or did receive no promotions and small raises, then the sex differential in raises and promotions could disappear by controlling for this differential selection.

My other criticism' of the sample is the authors' decision not to include more than averages of variables from the years between 1980 and 1986. One's salary at a particular time and the degree to which it has changed over the years is a result of year-to-year changes. A better model, for instance, would be one in which performance rating, and perhaps changes in performance rating, affected one's raise and one's chance of promotion in each particular year. It is the history of one's performance that is probably most important. The inclusion of average performance rating in predicting raises and promotions over the 6-year period strikes me as a misspecification of the model.

This paper could perhaps make its greatest contribution in terms of the analysis of the performance variable. Most research does not include a measure of productivity, but they would need to consider a richer data structure in order to include performance in their models appropriately. With a richer set of data, lagged values of performance might also be appropriate. As they acknowledge in a footnote, their performance variable probably contains a considerable amount of measurement error. If measurement error in the performance variable was corrected, performance might have a much larger effect. This would be important in analyzing the sex differences given that women have somewhat higher performance measures than men.

Of considerable interest in the paper is the observation that women received higher raises and more promotions than men in this firm. As the authors note, other researchers have also reported this finding. Gerhart and Milkovich's findings indicate that nearly half of these differences can be explained by the lower levels of experience and job tenure of women. This, however, leaves a sizable unexplained portion. Gerhart and Milkovich offer one explanation—that the firm has seen the light and is trying to make up for past inequities. The economics literature suggests five other possible interpretations. All of them potentially have to do with childbearing, and several also have to do with the employer's inability to discern which women will stay with the firm long-term and which will not.

First, there is a very simple supply-side story. As women have children, their reservation wage may rise over time. As a result, women in the lower paying jobs, women who expect to receive small raises and few promotions, will leave the firm. Those with better prospects remain in the firm and make other arrangements for child care. As a result, women's salaries rise faster than they would have if the lower paid women had not left the firm.

A second selection story works with constant reservation wages, and has to do with learning about the quality of the match of the job and the employee. (For a formal model of this nature, see the matching models developed by Jovanovic, 1979). All that is needed is for women to have higher reservation wages than men. This might be true because of their greater productivity in the home. Here, neither workers nor firms know how well they are matched. As time goes on, they learn how good the match is and the poor matches dissolve. As in the first example, this selection process increases the raises and promotions of women by selecting women who have higher values on their reservation wages.

With respect to both selection stories, it is unclear whether enough women leave the firm to explain the residual sex difference in raises and promotions. Recent analyses by Topel (1986) and by Altonji and Shakotko (1987) have found that selection due to matching in the above sense explains most of the growth in wages with job tenure for men.

There are also a set of demand-side stories. A straight human capital story would be that firms anticipate a higher quit rate for women than for men. As such, they might be leery of investing in female employees for fear the would not recover their investment. As a result, they might adopt a salary schedule whereby women are paid less early on and more later.

A related story is that firms cannot tell the difference between women who will stay with the firm and those who will leave after several years. They may adopt a salary schedule that pays women below their marginal product initially and above their marginal product later, so that only women who intend to stay with the firm will take jobs there. This is the adverse selection model of Salop and Salop (1976). Here, what happens is that firms specialize. Firms with low turnover costs end up hiring women who are likely to move in and out of the labor force, and firms with high turnover costs hire only those women who are likely to remain with them. The hypothesis here is that Gerhart and Milkovich's firm is a firm with high turnover costs. This model is consistent with Gerhart and Milkovich's observation that women are no more likely to leave the firm than men.

There are also stories based on nonlinearities due either to risk aversion or nonlinearities in the production process. If there is more ex ante unobserved variability for women than for men in their productivity, firms, if they are risk averse, will initially pay women less than men until those productivity differences are revealed. This idea is presented in an early paper by Aigner and Cain (1977). A related idea of Rothschild and Stiglitz's (1970) is that if firms are worse at matching women to jobs than men, both in that they are likely to err by putting women in jobs that they are overqualified for as well as in jobs they are underqualified for, then as a result, women will be less productive than men and will be paid less.

Finally, there is the possibility that women may be more likely to shirk on the job than men. Perhaps this might be the case because child-care responsibilities are more of a distraction for women. As a result, firms may want to offer women contracts in which they are paid below their marginal product early on and above it later.

Considerably more about the institutional structure of Gerhart and Milkovich's firm would have to be known to evaluate the appropriateness of these different stories. Each of these stories implies some amount of job segregation, since it would probably be difficult for an employer to pay men and women different wages for the same jobs. These hypotheses could be studied using firm-level data. More than two periods of data would be needed, however, preferably a panel of yearly data. In addition, single-equation regression models would probably not be adequate. Selection out of the firm and unobserved heterogeneity would have to be accounted for.

There are now a considerable number of sophisticated models of wage growth in the economics literature. I would encourage the authors to examine them and to consider adopting a more structural model for their subsequent analysis. Doing so could create a greater understanding of why they see the empirical relations that they do and would enable them to interpret their results in terms of a conceptual model. Their work would help us all move forward in understanding why men and women are paid differently.

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2

Measuring the Effect of Occupational Sex and Race Composition on Earnings

Elaine Sorensen

During the past 20 years, the federal government has instituted laws and regulations to combat economic discrimination against women and minorities. Despite these efforts, women and minorities still earn considerably less than white men. Because progress toward greater equality has been slow, many policymakers are directing their interest toward a strategy of equal pay for comparable worth, or pay equity.

Proponents of comparable worth strategies believe that such an approach addresses a substantial portion of sex-and race-based pay disparities (National Committee on Pay Equity, 1987). They argue that a principal factor contributing to these pay differentials is the persistence of occupational segregation in the U.S. labor market. According to this view, occupational segregation allows firms to pay lower wages to workers in jobs with an overrepresentation of women or minorities. The purpose of a comparable worth policy is to eliminate the effect of occupational segregation on earnings within a firm once legitimate factors that influence earnings have been taken into account.

Opponents of comparable worth argue that occupational segregation within a firm is not a major factor contributing to earnings disparities. Instead, they argue, differences in productivity-related characteristics (e.g., men have, on average, more work experience than women) are the major factors contributing to the persistence of the earnings differentials (Polachek, 1987). Others claim that a significant portion of the earnings differentials is explained by industrial differences (e.g., men are more likely to work in manufacturing, and women are more likely to work in services, Johnson and Solon, 1986). Comparable worth policies thus cannot effectively reduce the national sex-or race-based earnings disparities.

The purpose of this research is to measure the extent to which occupational segregation by sex and race contributes to the national earnings disparities between different sex/race groups. Other factors contributing to the national earnings disparities are also examined, such as industrial and productivity-related characteristics. These estimates indicate the magnitude of the phenomenon that a national comparable worth policy would attempt to remedy.

Research Method

This section develops an appropriate method for analyzing the effect of occupational segregation on earnings. It builds on the basic design applied in comparable worth studies in the public sector and extends that approach to the national economy.

Comparable worth studies in the public sector have measured the extent to which occupational segregation affects earnings in two steps. First, they conduct a job evaluation of all occupations, typically employing an a priori factor-point job evaluation plan. These plans consist of a set of factors and weights that are expected to reflect the requirements of a job. The factors usually fall into four broad categories: skill, effort, responsibility, and working conditions. The weights are applied to each factor and indicate its relative importance. An evaluation team evaluates jobs in terms of each factor and assigns points commensurate with the amount of the factor required on the job. These factor scores are summed for each job to produce a total point score, or job evaluation score. Employers often conduct job evaluations without reference to the issue of comparable worth. In such cases, the results from the preexisting job evaluation plan are typically used in the comparable worth study.

Once the job evaluation plan is completed, an earnings equation is estimated with the occupational salary as the dependent variable and an occupation's job evaluation score and a variable indicating the sex composition of the occupation as the independent variables. The latter variable can be measured by the proportion of women in an occupation. It varies from 0 to 1, with 0 indicating that none of the employees in the occupation is a woman and 1 indicating that all are women.

The dependent variable, the occupational salary, is defined as one of the salary levels within an occupation to which workers may be assigned. Thus, an occupational salary is not the same as an individual salary; rather, it represents one of the salaries that an individual could receive if employed in that job. Comparable worth studies have tended to examine occupational salaries and job requirements rather than individual salaries and individual productivity-related characteristics because in the public sector, where these studies have been conducted, occupational salaries and job requirements are well specified. Moreover, it is the contention of most civil service systems that occupational salaries reflect the requirements of the job and not the characteristics of the individuals who hold the job.

The functional form of the occupational earnings equation has varied among comparable worth studies in the public sector, but the following equation typifies the approach:

$$w_o = a_0 + a_1 J_o + a_2 PF_o + u_0 \quad (1)$$

where, the subscript *o* indicates the set of occupations; w is the occupational salary; *J* is the occupational job evaluation score; *PF* is the proportion of women in an occupation; and *u* is the random error term.

It is expected that the coefficient on the variable measuring the proportion of women in an occupation will be negative. In other words, occupational earnings are expected to be lower in female-dominated jobs even after controlling for differences in the requirements of the job. The goal of comparable worth initiatives is to eliminate this negative effect on occupational salaries. One approach for eliminating it is to subtract $\hat{a}_2 PF_o$ from each occupational salary. Once a comparable worth policy is implemented in this manner, occupational salaries would reflect the requirements of the job and not the predominant sex of the workers employed in the occupation.

Occupational segregation by race has been examined in some comparable worth studies in the public sector, most notably in the state of New York. These studies typically add another independent variable to the

earnings equation to reflect the race composition of the occupation (National Committee on Pay Equity, 1987). In this analysis, an independent variable that measures the proportion of minority workers in an occupation is added to the earnings equation. Thus, the race composition of an occupation is treated in the same manner as the sex composition of an occupation. It is expected that the coefficient on this variable will be negative, indicating that earnings decline as the proportion of minority workers in an occupation increases. A comparable worth policy might then eliminate the negative effect of both variables from the earnings equation.

This analysis can be extended to individual earnings if we make an assumption regarding the relationship between individual and occupational earnings. Let us assume that individual earnings within a firm are a function of the entry-level occupational wage, an individual's tenure on the job, the sex and race of the employee, and any education or previous experience that the employee may have that is greater than the amount required on the job.[1] Then, individual earnings can be written in the following manner:

$$w_i = w_o + b_0 t_i + b_1(ed_i\text{-}ed_o) + b_2(x_i\text{-}x_o) + b_3 S_i + b_4 R_i + b_5 SR_i + u_i \quad (2)$$

where, w_i is the individual's wage; t_i is the individual's tenure on the job; ed_i is the individual's educational attainment; ed_o is the level of education required for the job; x_i is the individual's experience level; x_o is the level of experience required for the job; S_i is I if the worker is a woman and 0 if not; F_i is 1 if the worker is a minority and 0 if not; SR_i is 1 if the worker is a minority woman and 0 if not.

Substituting Equation (1) into Equation (2), adding the race composition of the occupation as an independent variable into Equation (1), separating the job evaluation score into its factor scores, and rearranging terms yield the following equation:

$$w_i = a_0 + c_1 J_o + a_2 PF_o + a_3 PM_o + c_4 I_i + b_3 S_i + b_4 R_i + b_5 SR_i + v_i \quad (3)$$

where, J equals a vector of job characteristics (i.e., educational and experience requirements as well as other job characteristics, such as working conditions); PF equals the proportion of women in an occupation; PM equals the proportion of minorities in an occupation; I equals a vector of individual characteristics (i.e., educational attainment, work experience, and tenure); S, R, and SR are defined as above; and v is the random error term.

Thus, individual earnings within a firm are assumed to be a function of the characteristics of the job, the productivity characteristics of the individual, the sex and race composition of the occupation, and the sex and race of the individual. It is expected that the estimated coefficients on the job characteristics that have individual counterparts (i.e., education and experience) will be different in the individual earnings equation than in the occupational earnings equation. But the estimated coefficients on the variables measuring the proportion of women and minorities are expected to be unchanged. Similarly, it is anticipated that the estimated coefficients on the sex and race of the individual will be unchanged between Equations (2) and (3).

It is expected that a_2 and a_3 are negative.

[1] The job evaluation score is separated into its constituent factor scores in this model. This allows a comparison between actual and required levels of education and experience. Using factor scores rather than the overall job evaluation score is a basic difference between policy-capturing and a priori job evaluation plans. Policy-capturing plans use regression analysis to determine the appropriate weights for each factor score. In contrast, a priori plans apply previously determined weights to each factor and sum those scores to produce a total factor score. An earnings regression is then estimated using the total factor score as an independent variable. Thus, we are assuming that a policy-capturing approach is used to estimate the occupational earnings equation.

A comparable worth policy could eliminate this negative effect by subtracting $a_2 PF_o$ and $\hat{a}3\ PM_o$ from each occupational salary. If this is done, a comparable worth policy eliminates the effect of the variables measuring the proportion of women and minorities in an occupation from individual earnings and controls for differences in productivity-related characteristics and the sex and race of the individual workers involved.

Scholars have noted that different sex/race groups have significantly different estimated earnings equations. Thus, it would be more appropriate to estimate separate earnings equations for each sex/race group. In addition, I would like to estimate the effect of occupational segregation on earnings within firms, since comparable worth policies address intrafirm effects of occupational segregation. Unfortunately, national data samples do not identify an individual's firm. Thus, the analysis includes variables that approximate the firm, such as region, Standard Metropolitan Statistical Area (SMSA), union status, employer size, and major industrial categories. Taking these issues into account, Equation (3) can be rewritten for each sex/race group. The following equations are for white males and white females:

$$w_{wm} = d_0 + d_1 J_{wm} + d_2 PF_{wm} + d_3 PM_{wm} + d_4 I_{wm} + d_5 Z_{wm} + v_{wm} \quad (4)$$

and

$$w_{wf} = e_0 + e_1 J_{wf} + e_2 PF_{wf} + e_3 PM_{wf} + e_4 I_{wf} + e_5 Z_{wf} + v_{wf} \quad (5)$$

where, Z equals a vector of industrial/regional characteristics.

Consequently, with a national data set, it is assumed that the individual earnings of each sex/race group are a function of job-related productivity characteristics, the sex and race composition of the occupation, individual-related productivity characteristics, and industrial/regional characteristics (i.e., region, SMSA, major industrial categories, union status, and employer size).

These earnings equations are different from those in most previous economic research on sex-and race-based earnings differentials. First, they include the sex and race composition of an occupation as independent variables. These variables are included to measure the extent to which occupational segregation affects earnings. Although most research has not addressed this issue, a few studies have included these variables to measure the effect of occupational crowding on earnings (see Treiman and Hartmann, 1981).

The second atypical characteristic of these earnings equations is that they include both human capital variables and job characteristics. Most previous models of wage determination have focused on either human capital or job characteristics, not both. This analysis includes both types of variables because of the' assumptions made above about the relationship between occupational earnings and individual earnings. Those assumptions imply that an adequate assessment of the effect of a comparable worth policy on individual earnings cannot be made without both types of variables in the equation.

Finally, these equations include detailed variables representing industrial categories and employer size. These variables are included to control for the type of firm as closely as possible given that the data are national in scope. Since comparable worth initiatives are intrafirm policies, such control is important.

Discussion of the Data

Earnings equations are estimated using the Current Population Survey (CPS) from May and June 1983 (data tapes available from Bureau of the Census). The sample refers to all nonagricultural civilian wage and salary workers who are at least 16 years old. Four sex/race groups are distinguished:

white males, white females, minority males, and minority females. White males and females consist of all whites who are not Hispanic. Minority males and females include all blacks and Hispanics. Other minority groups are excluded from the analysis.

The CPS is particularly well suited for this analysis because it has detailed occupational information on a large national sample (approximately 17,000 individuals). Other surveys have a much smaller sample and/or no detailed occupational information. The May and June 1983 matched sample has particular advantages over other: CPS data because the survey included questions regarding job tenure and employer size, in addition to the usual questions concerning employment status. Thus, the data provide better estimates of a worker's human capital and more detailed information on the employer than most CPS data. In addition, the survey was conducted while the economy was experiencing relatively normal unemployment.

The CPS provides the dependent variable in the analysis, which is the logarithm of the ratio of usual weekly earnings to usual weekly hours, referred to as "earnings." The data used to construct the proportion of women in an occupation and the proportion of blacks and Hispanics in an occupation are from the 1980 census. The three-digit census occupational categories are used to define occupations in this analysis. There are 503 such occupations. Job characteristics are proxied by the following variables from the *Dictionary of Occupational Titles*, as reported by Miller et al. (1980): general educational development, specific vocational preparation, strength, physical demands, and undesirable environmental conditions. The CPS provides the variables for individual characteristics and industrial setting. Complete definitions of the variables are given in Appendix A. Appendix B reports the means of the variables for each sex/race group.

Empirical Results

First, simple earnings regressions are estimated for each sex/race group that include the proportion of women and the proportion of minorities in an occupation as the only independent variables. These estimates describe the gross relationship between earnings and the sex and race composition of occupations. The first line of Table 2-1 reports the estimated coefficients from these regressions. For white men, the estimated coefficients for the proportion of women and the proportion of minorities in an occupation are-.332 and-2.498, respectively. This implies that white male earnings decline by 3.3 percent for each 10 percentage point increase in the percentage of women in an occupation. In addition, white male earnings decline by 25 percent for each 10 percentage point increase in the percentage of minorities in an occupation. The estimated coefficients for the other sex/race groups are smaller than for white men, but the magnitudes are similar.

These coefficients do not take into account differences in worker or industrial characteristics. The second row of Table 2-1 reports the estimated coefficients for the sex and race composition variables from the full regression model. The most striking result is the dramatic decline in the estimated coefficients for the proportion of minorities in an occupation after other independent variables are accounted for in the model. Indeed, these estimated coefficients decline by 80 to 113 percent after controlling for other factors. The estimated coefficients for this variable in the full model are-.490 for white men; .012 for white women;-.077 for minority men; and .166 for minority women. In other words, white male earnings decline by 4.9 percent for each 10 percentage point increase in the percentage of minorities in an occupation. For the other sex/race groups, however, earnings do not significantly decline as the percentage of minorities in an occupation increases in the

TABLE 2-1 Summary of the Effect of Sex and Race Composition of an Occupation on Earnings

	White Male Regressions		White Female Regressions		Minority Male Regressions		Minority Female Regressions	
Effect	PF	PM	PF	PM	PF	PM	PF	PM
Gross effect of PF and PM on earnings (1)—simple model	-.332 (.031)	-2.498 (.092)	-.330 (.027)	-1.232 (.094)	-.205 (.066)	-1.894 (.193)	-.258 (.059)	-1.262 (.165)
Net effect of PF and PM on earnings (2) full model	-.272 (.034)	-.490 (.133)	-.151 (.029)	.012 (.123)	-.269 (.075)	-.077 (.280)	-.209 (.069)	.166 (.236)
Percentage change in effect of PF and PM (3)(1)-(2)/(1)	-18.1	-80.4	-54.2	-101.0	31.2	-95.9	-19.0	-113.2
Percentage change in wage rate per 10 percentage point increase in PF and PM (4)—from (2)	-2.7	-4.9	-1.5	.1	-2.7	-.8	-2.1	1.7

NOTES: Standard errors are in parentheses. See Appendix C for full regression results. PF = proportion female; PM = proportion minority.

SOURCES: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983); *Dictionary of Occupational Titles* as reported in Miller et al. (1980).

full model. Thus, the negative relationship between earnings and the concentration of minorities in an occupation is eliminated for all sex/race groups except white men when other factors are taken into account.

In contrast, controlling for other independent factors does not dramatically reduce the estimated coefficients for the proportion of women in an occupation, except in the earnings equation for white women. This estimated coefficient declines by 55 percent for white women, but it declines by only 18 percent for white men and by 19 percent for minority women, and it actually increases by 31 percent for minority men. Thus, the negative relationship between earnings and the concentration of women in an occupation remains significantly negative for all sex/race groups even after accounting for other explanatory factors. The actual estimated coefficients for this variable are the following. -.272 for white men; -.151 for white women; -.269 for minority men; and-.209 for minority women. According to these results, white and minority men earn an average 2.7 percent less per 10 percentage point increase in the percentage of women in an occupation. For white women, wages decrease by 1.5 percent per 10 percentage point increase in the percentage of women in an occupation. Minority women's wages decrease by 2.1 percent for a similar increase in the percentage of women in an occupation. [2]

The estimated coefficients for the other variables in the analysis are reported in Appendix C. These estimated coefficients are similar to those found in other research on wage determination. For example, earnings increase as education and job tenure increase for all sex/race groups. On the other hand, only white male earnings significantly increase with potential experience. In addition, the earnings of white and minority men increase as the number of undesirable working conditions increases (such as noise and cold temperature), but the earnings of white and minority women are not affected by the existence of such conditions. Oddly enough, increasing requirements of strength on the job decrease male earnings and have no significant effect on female earnings. Living in a SMSA increases earnings for all sex/race groups, except minority males. Earnings tend to be higher for individuals working in such industries as mining, construction, certain durable goods industries, transportation, communications, public utilities, and the federal government than in personal services. Finally, union membership significantly increases earnings for all sex/race groups.

Using the full regression model, the sex-and race-based earnings differentials can be divided into four components. The first component measures the effect of sex-and race-based occupational segregation. The second component measures the effects of industrial and regional differences (i.e., two-digit

[2] Variables indicating the marital status and the presence of children in the home were also included as explanatory factors in preliminary earnings regressions. They were not included, however, in the final versions of the equations because they are difficult to classify as legitimate factors for differentiating salaries. Nonetheless, the estimated coefficients for the proportion of women in an occupation in the white and minority female earnings equations were not affected by the inclusion of these variables. White (minority) women still earned an average 1.5 percent (2.1 percent) less per 10 percentage point increase in the percentage of women in their occupation. In the white female earnings equation, the estimated coefficients (and their standard errors) for the dummy variables—married, divorced, and the presence of children in the home—were .062, (.016), .113 (.019), and-.020 (.014), respectively. In other words, married and divorced white women earned 6 and 11 percent more, respectively, than single white women. White women with children earned 2 percent less than white women without children. Similarly, the estimated coefficients (and their standard errors) for minority women were .061 (.033), .135 (.036),-.052 (.028). Thus, married and divorced minority women earned 6 and 14 percent more, respectively, than single minority women. Further, minority women with children earned 5 percent less than minority women without children.

Standard Industrial Classification [SIC] categories, SMSA, region, union status, and employer size). The third component consists of differences in job characteristics and individual productivity-related characteristics (i.e., education, work experience, tenure, and part-time status). The final component measures the amount of the earnings gaps that is unexplained by these factors.

There are two methods for estimating the extent to which each component contributes to the national earnings differentials. For instance, when decomposing the earnings differential between white women and white men, the coefficients from either the white male earnings equation or the white female earnings equation can be used as weights in the difference equation. These difference equations are reported below, first using white male coefficients as the weights and then using white female coefficients as the weights. Since there is no clear reason for selecting one set of weights over another, both are used to estimate the decomposition of the earnings gaps. The average of these two estimates is then calculated and reported in Table 2-2.

$$\ln w_{wm} - \ln w_{wf} = D(X_{wm} - X_{wf}) + X_{wf}(D - E) \quad (6)$$

and

$$\ln w_{wm} - \ln w_{wf} = E(X_{wm} - X_{wf}) + X_{wm}(D - E) \quad (7)$$

where, X_{wm} (X_{wf}) is a vector of mean values for white males (white females) for the independent variables in the earnings equation and D (E) is a vector of coefficients in the white male (female) earnings equation.

Allocating the national earnings differentials for different sex/race groups into four components is particularly useful because it separates the effect of occupational segregation from other factors that are frequently cited as more important explanations for these earnings differences. As stated before, the goal of a comparable worth policy is to eliminate the effect of occupational segregation, which is measured by the first component described above. The second and third components measure the extent to which differences in industrial segregation and productivity contribute to the earnings differentials. These are the variables that are frequently cited as more important than occupational segregation.

Table 2-2 reports the extent to which each component contributes to the national earnings differentials. A substantial amount of the sex-and race-based earnings disparities is explained by the sex and race composition of an occupation. In particular, the proportion of women and the proportion of minorities in an occupation account for 21 percent of the earnings' disparity between white women and white men; 20 percent is due to the sex composition, and 1 percent is due to the race composition of occupations. These two variables explain 23 percent of the earnings differential between minority women and white men (21 percent is due to the sex composition; 2 percent is due to the race composition). For minority men, however, both the sex and race composition of an occupation play a less important role in maintaining low relative earnings. They explain 9 percent of the earnings gap between minority and white men (3 percent is due to the sex composition; 6 percent is due to the race composition).

In contrast, Table 2-2 shows that differences in the variables measuring industrial and regional characteristics (i.e., union status, size of employer, two-digit SIC code, region, and SMSA) account for much less of the earnings disparities between different sex/race groups. These variables explain 16 percent of the earnings disparity between white women and white men and 6 percent of the earnings disparity between minority women and white men. They actually increase the earnings of minority men, reducing their earnings gap by 4 percent.

Table 2-2 also shows that variables measuring productivity characteristics (i.e., schooling, potential experience, tenure, job characteristics, and part-time status) explain a large portion of the national earnings dis-

parities. These variables explain 26 percent of the white female/white male earnings gap and 23 percent of the minority female/white male earnings gap. Forty-nine percent of the earnings disparity between minority and white men is due to these variables.

TABLE 2-2 Percentage of Earnings Disparities Accounted for by Different Factors

Factors	White Female/White Male Earnings Gap	Minority Male/White Male Earnings Gap	Minority Female/White Male Earnings Gap
Total	$3.32	$2.11	$3.53
Occupational segregation by sex (race)	20% (1%)	3% (6%)	21% (2%)
Industrial and regional differences	16%	-4%	6%
Differences in job and productivity characteristics	26%	49%	23%
Unexplained residual	39%	46%	48%

NOTES: Variables included as productivity characteristics are schooling, potential work experience, job tenure, job characteristics, and part-time status. Variables included as industrial and regional characteristics are 42 two-digit SIC industrial categories, union status, employer size, region, and SMSA. Percentages may not add to 100 because of rounding.
SOURCES: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983); *Dictionary of Occupational Titles* as reported in Miller et al. (1980).

Although these earnings equations include an extensive array of explanatory variables, Table 2-2 shows that differences in these variables explain only 52 to 61 percent of the earnings disparities between different sex/race groups, which leaves large unexplained residuals.

In summary, these findings suggest that even though differences between women and men in productivity and industrial characteristics explain about 40 percent of the national earnings disparity between women and men, another 20 percent is due to occupational segregation by sex, the portion of the earnings disparity that a comparable worth policy seeks to eliminate. Thus, this study finds that a national comparable worth policy would address a sizable component of the national sex-based earnings differential.

Jobs with a Disproportionate Number of Women and Minorities

In this section of the paper, alternative measures of the independent variables measuring the sex and race composition of an occupation are examined. Many comparable worth studies use dummy variables that indicate the predominant sex or race in an occupation as explanatory factors in their earnings equations, rather than the proportion of women or minorities in an occupation. These dummy variables are discontinuous; they equal 1 if there is a disproportionate number of women or minorities in an occupation and 0 otherwise. Most of these studies use the 70 percent rule to define female (male)-dominated jobs, which states that any occupation in which 70 percent or more of the employees are female (male) is a female (male)-dominated job. As others have pointed out, this rule is arbitrary. Moreover, there is no customary rule for defining jobs with an overrepresentation of minorities, or minority-dominated jobs. Despite these limitations, I estimate earnings equations for each sex/race group using the customary 70 percent rule for defining female-dominated jobs and a definition developed for minority-dominated jobs (described below).

Histograms of the variables measuring the percentage of women and the percentage of minorities in an occupation were examined (see Figures 2-1 and 2-2). They are based on the CPS sample, which identifies the three-digit census occupational code for each individual. This code is then matched to data from the 1980 census indicating the percentage of women and minor-

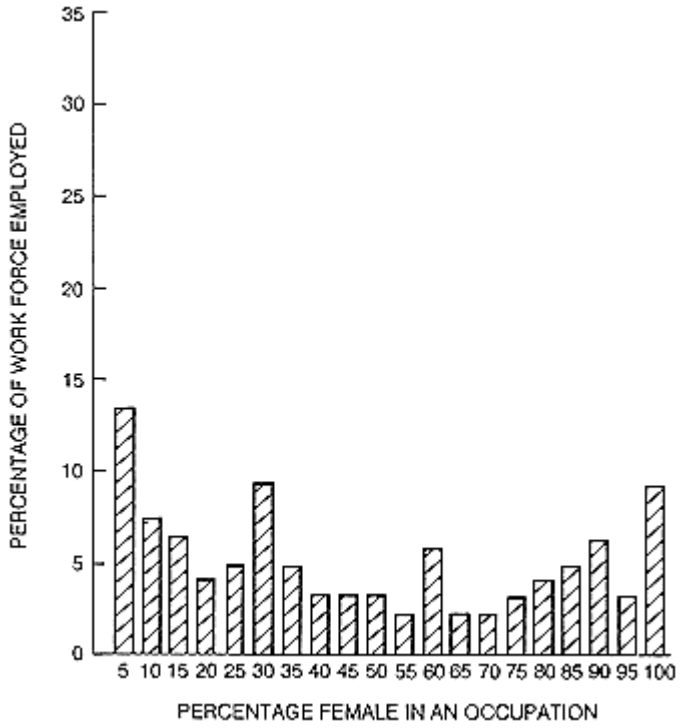

Figure 2-1
Percentage of work force employed, by percentage female in an occupation. Source: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983).

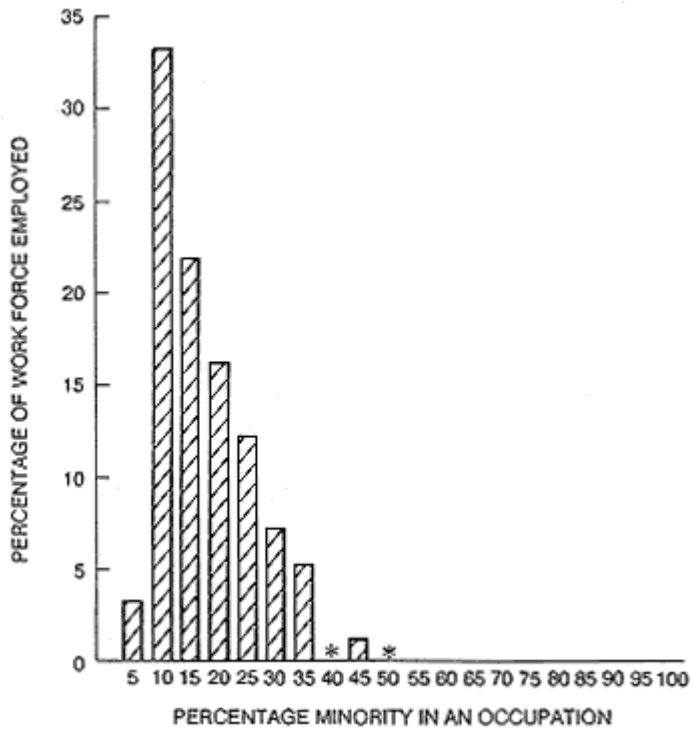

Figure 2-2
Percentage of work force employed, by percentage of minorities in an occupation. Note: "*" indicates values less than .05 percent.
Source: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983).

ities in that occupational category. Figures 2-1 and 2-2 show the percentage of the work force that is employed in each 5 percent interval of the variables measuring the percentage of women or minorities in an occupation. For example, Figure 2-1 reports that 13.5 percent of the work force is employed in occupations in which, at most, 5 percent of the employees are women. At the same time, Figure 2-2 reports that 33 percent of the work force is employed in occupations in which between 5 and 10 percent of the employees are minorities. As Figures 2-1 and 2-2 show, the histograms of the percentage of women and the percentage of minorities in an occupation are quite different. The histogram in Figure 2-1 is almost U-shaped, with two peaks, one at 5 percent and one at 100 percent female. The histogram in Figure 2-2 has a skewed distribution with one peak at 10 percent minority.

Since the histograms of these two variables are so different, the definitions developed for minority-and white-dominated jobs are not patterned after the 70 percent rule used in defining female-and male-dominated jobs. In the sample, minorities make up 15 percent of the work force. Thus, a minority (white)-dominated job is defined as one in which the percentage of minorities in that occupation is greater (less) than 20 percent (10 percent). Any job that employs 10 to 20 percent minority workers is considered a minority-integrated job.

Table 2-3 reports the hourly wage that the average member of each sex/race group can expect to earn given employment in different types of occupations. It shows that hourly earnings for all sex/race groups are substantially affected by employment in jobs that have a disproportionate number of women or minorities. For instance, Table 2-3 shows that an average white man can expect to earn $ 9.52 if he is employed in a white male dominated job. In contrast, if he is employed in a job that has a disproportionate number of minority female workers he can expect to earn $ 7.57, 20 percent less than the salary received in a white male dominated job. Similarly, an average minority woman can expect to earn $ 5.02 if she is employed in a job that has a disproportionate number of minority female workers, but she can expect to earn $ 6.31 if she is employed in a job held predominantly by white men. (The full regression results for these earnings equations are available from the author.)

Empirical Results by Industrial Sector

Finally, separate earnings equations are estimated for white men and white women within each of the following major industrial sectors: manufacturing, public sector, and nonmanufacturing industries. These equations use the proportion of women and minorities in the worker's occupation as the measure of occupational segregation. The results are reported in Appendix D. From these results, comparisons can be made across different sectors. Other researchers have argued, for example, that the variable measuring the proportion of women in an occupation affects earnings in the public sector more than in the private sector and that this explains, in part, why the public sector has taken the initiative in this area (see Johnson and Solon, 1986).

The results show that both the sex and race composition of an occupation strongly affect white male and white female earnings in the nonmanufacturing private sector. White male (female) earnings decline 2.7 (2.1) percent for each 10 percentage point increase in the percentage of women in an occupation. Moreover, if the percentage of minorities in an occupation increases 10 percentage points, white male (female) earnings decline 9.7 (3.5) percent. In this sector, the ratio of white female to white male earnings expressed in percentage terms is 63 percent, which leaves an earnings disparity between white women and white men of 37 percentage points. Approximately 26 percent of this earnings disparity is attributable to the sex and race composition of the occupation.

TABLE 2-3 Predicted Hourly Earnings for Each Sex/Race Group by Type of Occupation

Group	White Male Dominated Job	White Female Dominated Job	Minority Male Dominated Job	Minority Female Dominated Job
White males	$9.52	$8.19	$8.80	$7.57
White females	6.11	5.51	6.03	5.45
Minority males	7.60	6.44	6.92	5.86
Minority females	6.31	5.52	5.74	5.02

NOTES: Definitions for the different types of occupations are the following: a white male dominated job is any job in which 90 percent or more of the employees are white and not Hispanic and 70 percent or more are male; a white female dominated job is any job in which 90 percent or more of the employees are white and not Hispanic and 70 percent or more are female; a minority male dominated job is any job in which 20 percent or more of the employees are Hispanic or black and 70 percent or more are male; a minority female dominated job is any job in which 20 percent or more of the employees are Hispanic or black and 70 percent or more are female. Predicted hourly earnings are calculated from earnings regressions that are available from the author on request.
SOURCES: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983); *Dictionary of Occupational Titles* as reported in Miller et al. (1980).

In the public sector, white male and white female earnings are significantly influenced by the proportion of women in an occupation, but the proportion of minorities in an occupation has no significant effect. White male (female) earnings decline 4.2 (1.8) percent for each 10 percentage point increase in the percentage of women in an occupation. The female/male earnings ratio in this sector is 71 percent, a much higher figure than in the nonmanufacturing and manufacturing sectors. Although the earnings disparity is smaller in the public sector, one-third of it is explained by the sex composition of an occupation. As a result, this variable has its largest impact in the public sector.

In the manufacturing sector, only white male earnings are significantly affected by the sex composition of an occupation, declining 1.8 percent for each 10 percentage point increase in the percentage of women in an occupation. The race composition of an occupation does not significantly influence white male or white female earnings. The white female/male earnings ratio in this sector is 63 percent, the same as in the nonmanufacturing sector, which leaves an earnings disparity of 37 percentage points. Only 6 percent of this earnings disparity can be explained by the sex composition of an occupation.

In brief, these results show that the sex composition of an occupation is an important factor in determining wages in the public and nonmanufacturing sectors—it explains one-third of the earnings gap between white women and white men in the government sector and one-quarter in the nonmanufacturing sector. It does not appear to be as influential in the manufacturing sector—it explains only 6 percent of this earnings disparity. For white women and white men, the race composition of an occupation was significant only in the nonmanufacturing sector, reducing earnings by 9.7 and 3.5 percent, respectively, for each 10 percentage point increase in the proportion of minorities in an occupation.

Summary and Conclusion

This study argues that the purpose of a comparable worth policy is to eliminate the effect of occupational segregation by sex and race from earnings within firms. It then estimates this effect as closely as possible using a national data set, the Current Population Survey. It finds that occupational segregation by sex significantly affects the earnings of all sex/race groups, even after controlling for differences in productivity and industrial characteristics. It accounts for 20 percent of the earnings disparity between white women and

white men, 21 percent of the earnings disparity between minority women and white men, and 3 percent of the earnings disparity between minority and white men. At the same time, occupational segregation by race is not a significant factor influencing earnings once other factors are accounted for, except for white men. It does, however, explain 6 percent of the earnings disparity between minority and white men and 2 percent of the earnings disparity between minority women and white men.

Contrary to earlier studies (Johnson and Solon, 1986), this research finds that industrial and regional differences explain considerably less of the national earnings disparities between different sex/race groups than do both the sex and race composition of an occupation. These factors accounted for only 16 percent of the white female/male earnings gap and 6 percent of the minority female/white male earnings gap, and they increased the earnings of minority males, reducing their earnings gap by 4 percent. In contrast, productivity-related differences explained considerably more of the earnings disparities than industrial and regional differences; the former explained 26 percent of the earnings gap between white women and white men, 23 percent of the gap between minority women and white men, and 49 percent of the gap between minority and white men.

Finally, the study finds that the effect of occupational segregation on earnings depends on the industrial sector. In particular, occupational segregation by sex explains one-third of the earnings disparity between white women and white men in the public sector and one-fourth of this earnings gap in the nonmanufacturing private sector. But, in the manufacturing sector, it explains only 6 percent of this earnings differential. This suggests that a national comparable worth policy would address a larger phenomenon in the public and nonmanufacturing private sectors than in the manufacturing sector.

In conclusion, the study suggests that a national comparable worth policy would seek to eliminate approximately 20 percent of the white female/male earnings disparity. Moreover, such a policy would address more of the earnings disparity between minority women and white men than between any other sex/race groups. On the other hand, this policy approach would affect only about 10 percent of the earnings gap between minority and white men. If a comparable worth policy is implemented on a smaller scale, of course, its ability to remedy these national earnings disparities would be reduced. Further, the initial gains of a national comparable worth policy could be attenuated by secondary effects caused by the policy.

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APPENDIX A Variable Definitions

Variable Names	Definitions
Log wage	Logarithm of usual weekly earnings divided by usual weekly hours
Occupational variables	
Proportion female	Proportion of women in a three-digit census occupational category
Proportion minority	Proportion of blacks and Hispanics in a three-digit census occupational category
Human capital variables	
Schooling	Number of years of schooling completed
Experience (potential)	Potential years of experience, computed as age minus education minus 6
Experience squared	Potential experience squared
Tenure	Number of years worked for current employer
Tenure squared	Tenure squared
Voluntary part time	1 if voluntarily employed part time, 0 otherwise
Involuntary part time	1 if involuntarily employed part time, 0 otherwise
Job characteristics	
G.E.D.	Formal and informal education required to perform the job (ranges from 1 to 6)
S.V.P.	Specific vocational training required to perform the job (ranges from 1 to 9)
Strength	Strength involved in performing the job (ranges from 1 [sedentary] to 5 (very heavy work])
Physical demands	Number of physical demands required on the job (e.g., climbing, stooping, kneeling, and reaching; ranges from 0 to 4)
Environment	Number of environmental conditions existing on the job (e.g., extreme cold or heat, noise, or hazards; ranges from 0 to 6)
Industrial/regional variables	
Northest	1 if lives in Northeast region, 0 otherwise
North Central	1 if lives in North Central region, 0 otherwise
West	1 if lives in West region, 0 otherwise
Large SMSA	1 if lives in a Standard Metropolitan Statistical Area (SMSA) with a population of at least 3 million people, 0 otherwise
Medium SMSA	1 if lives in an SMSA with a population of at least 1 million people, but less than 3 million people, 0 otherwise
Small SMSA	1 if lives in an SMSA with a population of less than 1 million people, 0 otherwise
Mining through forestry	Dummy variables that equal I if employed in the relevant two-digit SIC industrial category, 0 otherwise
Local government	1 if employed in local government, 0 otherwise
State government	1 if employed in state government, 0 otherwise
Federal government	1 if employed in federal government, 0 otherwise
Small firm	1 if employed in a location with 25 to 99 employees, 0 otherwise
Medium firm	1 if employed in a location with 100 to 499 employees, 0 otherwise
Large firm	1 if employed in a location with 500 to 999 employees, 0 otherwise
Very large firm	1 if employed in a location with 1,000 or more employees, 0 otherwise
Union member	1 if a union member, 0 otherwise

NOTES: G.E.D. = General Educational Development; S.V.P. = Specific Vocational Preparation.
SOURCES: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983); *Dictionary of Occupational Titles* as reported in Miller et al. (1980).

APPENDIX B Means of Variables in Log Wage Equations

Variable Names	White Males	White Females	Minority Males	Minority Females
Log wage	2.1955	1.7349	1.9284	1.6970
Constant	1.0000	1.0000	1.0000	1.0000
Proportion female	0.2415	0.6782	0.2681	0,6762
Proportion minority	0.1354	0.1486	0.1886	0.1944
Female-dominated job	0.0564	0.5696	0.0881	0,5626
Female-integrated job	0.2342	0.2834	0.2576	0.3078
Minority-dom. job	0.1990	0.2300	0.4320	0.4478
Min.-integ. job	0.4005	0.3757	0.3960	0.3452
Schooling	14.2052	14.0560	12.5319	13.1374
Experience (potential)	16.8770	17.7282	18.0763	17.6478
Experience squared	459.0151	500.2187	502.8012	478.4948
Tenure	8.1440	5.7788	6.7563	6.0026
Tenure squared	141.3462	77.2591	99.9474	73.7422
G.E.D.	3.8316	3.7799	3.2781	3.4656
S.V.P.	5.6754	5.1133	4.7283	4.6418
Strength	2.3372	1.8947	2.6721	2.0817
Physical demands	1.7245	1.4806	2 .0371	1.6112
Environment	0.6049	0.1973	0.7700	0.3435
Northeast	0.2328	0.2336	0.1628	0.1365
North Central	0.2944	0.2935	0.1208	0.1365
West	0.1679	0.1753	0.2424	0.2070
Large SMSA	0.1251	0.1245	0.2609	0.2104
Medium SMSA	0.2456	0.2503	0.2710	0.2826
Small SMSA	0.3022	0.2839	0.2517	0.2896
Mining	0.0188	0.0043	0.0109	0.0026
Construction	0.0741	0.0097	0.0839	0.0043
Lumber	0.0072	0.0018	0.0193	0.0017
Furniture	0.0070	0.0042	0.0050	0.0026
Stone	0.0085	0.0039	0.0109	0,0078
Primary metals	0,0148	0.0028	0.0117	0.0035
Fabricated metals	0.0214	0.0091	0,0252	0.0070
Machinery, exc. elect. equip.	0.0438	0.0145	0.0294	0.0087
Electrical equipment	0.0254	0.0204	0.0134	0.0235
Automobiles	0.0171	0.0027	0.0185	0.0078
Aircraft	0.0091	0.0042	0.0059	0.0026
Other transport equip.	0.0093	0.0015	0.0042	0.0043
Professional equip.	0.0102	0.0078	0 .0042	0.0043
Toys	0.0009	0.0012	0.0008	0.0035
Miscellaneous	0.0033	0.0036	0.0025	0.0035
Food	0.0209	0.0124	0.0268	0.0209
Tobacco	0.0013	0.0004	0.0008	0.0009
Textiles	0.0055	0.0070	0.0076	0.0165
Apparel	0.0039	0.0162	0.0067	0.0443
Paper	0.0097	0.0054	0.0059	0.0052
Printing	0,0242	0.0168	0.0151	0,0070
Chemicals	0.0182	0.0090	0.0117	0.0087
Petroleum	0.0040	0.0007	0.0034	0.0026
Rubber and plastics	0.0102	0.0057	0.0185	0.0052
Leather	0.0012	0.0036	0.0050	0.0070
Transportation	0.0379	0.0141	0.0436	0.0070
Communications	0.0153	0.0159	0.0134	0.0322
Utilities	0.0169	0.0048	0.0159	0.0017
Wholesale trade	0.0640	0.0300	0.0411	0.0157

Variable Names	White Males	White Females	Minority Males	Minority Females
Retail trade	0.1418	0.2019	0.1409	0.1565
Banking	0.0191	0.0464	0.0159	0.0357
Insurance	0.0256	0.0387	0.0336	0.0348
Business	0.0289	0.0262	0.0210	0.0235
Repair	0.0179	0.0054	0.0227	0.0043
Entertainment	0.0111	0.0087	0.0101	0.0035
Hospitals	0.0130	0.0631	0.0243	0.0617
Medical, exc. hosp.,	0.0057	0.0584	0.0042	0.0504
Educational	0.0119	0.0246	0.0126	0.0174
Social	0.0030	0.0145	0.0067	0.0296
Professional services	0.0338	0.0428	0.0151	0.0183
Forestry	0.0008	0.0003	0.0000	0.0000
Local government	0.0876	0.1260	0.1049	0.1565
State government	0.0411	0.0499	0.0302	0.0496
Federal government	0.0428	0.0306	0.0721	0.0530
Small firm	0.2376	0.2517	0.2584	0.2687
Medium firm	0.2059	0.2090	0.2030	0.2443
Large firm	0.0598	0.0640	0.0663	0.0800
Very large firm	0.1318	0.0969	0.1158	0.1209
Voluntary part time	0.0688	0.1996	0.0587	0.1078
Involuntary part time	0.0348	0.0604	0.0705	0.0843
Union member	0.2796	0.1894	0.3532	0.2765

NOTES: G.E.D. = General Educational Development; S.V.P. = Specific Vocational Preparation.
SOURCES: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983); *Dictionary of Occupational Titles* as reported in Miller et al. (1980).

APPENDIX C Estimated Coefficients (and Standard Errors) in Log Wage Equations

Variable Names	White Males	White Females	Minority Males	Minority Females
Constant	1.3010*	0.3426*	1.0356*	0.8256*
	(0.0960)	(0.0828)	(0.2066)	(0.1703)
Proportion female	-0.2716*	-0.1511*	-0. 2695*	-0.2089*
	(0.0342)	(0.0291)	(0.0751)	(0.695)
Proportion minority	-0. 4902*	0.0125	-0.0771	0.1659
	(0.1326)	(0.1233)	(0.2801)	(0.2357)
Schooling	0.0415*	0.0457*	0.0266*	0.0264*
	(0.0029)	(0.0034)	(0.0054)	(0.0059)
Experience (potential)	0.0076*	-0.0030*	0.0040	-0.0086*
	(0.0015)	(0.0014)	(0.0035)	(0.0032)
Experience squared	-0.0002*	0.0001	-0.0001	0.0001
	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Tenure	0.0292*	0.0324*	0.0396*	0.0369*
	(0.0021)	(0.0023)	(0.0052)	(0.0054)
Tenure squared	-0.0006*	-0.0007*	-0.0009*	-0.0009*
	(0.0001)	(0.0001)	(0.0002)	(0.0002)

Variable Names	White Males	White Females	Minority Males	Minority Females
G.E.D.	-0.0351	0.0729*	0.0918	0.1086*
	(0.0190)	(0.0203)	(0.0482)	(0.0462)
S.V.P.	0.0452*	0.0386*	-0.0021	0.0011
	(0.0084)	(0.0098)	(0.0201)	(0.0228)
Strength	-0.0727*	-0.0021	-0.0777*	-0.0104
	(0.0174)	(0.0131)	(0.0391)	(0.0311)
Physical demands	-0.0122*	0.0497*	-0.0027	-0.0016
	(0.0100)	(0.0114)	(0.0263)	(0.0261)
Environment	0.0350	0.0029	0.0539*	-0.0343
	(0.0127)	(0.0194)	(0.0245)	(0.0309)
Northeast	0.0148	-0.0001	0.1023*	0.0936*
	(0.0160)	(0.0164)	(0.0461)	(0.0442)
North Central	0.0208	-0.0184	0.1244*	0.1554*
	(0.0150)	(0.0153)	(0.0480)	(0.0421)
West	0.1366*	0.1390*	0.2293*	0.1454*
	(0.0175)	(0.0178)	(0.0382)	(0.0369)
Large SMSA	0.0941*	0.1440*	0.0203	0.1343*
	(0.0196)	(0.0200)	(0.0464)	(0.0457)
Medium SMSA	0.0877*	0.1271*	0.0667	0.2004*
	(0.0154)	(0.0155)	(0.0414)	(0.0377)
Small SMSA	0.0374*	0.0479*	-0.0122	0.0899*
	(0.0143)	(0.0147)	(0.0414)	(0.0367)
Mining	0.3739*	0.4655*	0.5578*	0.1428
	(0.0658)	(0.0928)	(0.1580)	(0.2507)
Construction	0.3331*	0.2928*	0.2234*	0.0866
	(0.0560)	(0.0673)	(0.1037)	(0.1991)
Lumber	0.1193	0.0970	-0.0561	-0.1047
	(0.0833)	(0.1381)	(0.1330)	(0.3030)
Furniture	0.0730	0.3622*	0.3884	-0.2860
	(0.0842)	(0.0943)	(0.2040)	(0.2498)
Stone	0.0592	0.2203*	-0.0719	0.1222
	(0.0795)	(0.0974)	(0.1541)	(0.1539)
Primary metals	0.2229*	0.1984	0.2686	0.2654
	(0.0696)	(0.1120)	(0.1528)	(0.2225)
Fabricated metals	0.1555*	0.3044*	0.1396	0.0984
	(0.0642)	(0.0691)	(0.1208)	(0.1650)
Machinery, exc. elect. equip.	0.2482*	0.2902*	0.0915	0.1311
	(0.0582)	(0.0590)	(0.1174)	(0.1488)
Electrical equipment	0.1877*	0.2268*	0.1971	0.1446
	(0.0625)	(0.0535)	(0.1446)	(0.1054)
Automobiles	0.2692*	0.3413*	0.0916	0.3880*
	(0.0684)	(0.1147)	(0.1328)	(0.1584)
Aircraft	0.2006*	0.3358*	0.3849*	-0.2570
	(0.0785)	(0.0954)	(0.1955)	(0.2503)
Other transport equip.	0.1339	0.2262	0.2117	0.0048
	(0.0782)	(0.1509)	(0.2242)	(0.2008)
Professional equip.	0.1510*	0.1676*	0.0846	0.1433
	(0.0757)	(0.0733)	(0.2203)	(0.1985)
Toys	0.0544	0.3142	0.0232	-0.0145
	(0.1919)	(0.1676)	(0.4662)	(0.2202)
Miscellaneous	-0.0710	0.0811	0.0241	-0.0649
	(0.1086)	(0.1007)	(0.2767)	(0.2203)

Variable Names	White Males	White Females	Minority Males	Minority Females
Food	0.1295*	0.2303*	0.2673*	0.1870
	(0.0645)	(0.0618)	(0.1198)	(0.1100)
Tobacco	0.2635	0.2316	0.5054	-0.1910
	(0.1634)	(0.2692)	(0.4638)	(0.4228)
Textiles	0.0427	0.1562*	0.1676	0.2023
	(0.0910)	(0.0768)	(0.1760)	(0.1179)
Apparel	0.0709	0.0893	-0.2527	-0.0205
	(0.1031)	(0.0572)	(0.1831)	(0.0870)
Paper	0.1849*	0.2561*	0.1338	0.2202
	(0.0770)	(0.0847)	(0.1927)	(0.1820)
Printing	0.0592	0.1201*	0.2550	-0.1211
	(0.0624)	(0.0558)	(0.1386)	(0.1608)
Chemicals	0.3101*	0.2902*	0.3076*	0.2541
	(0.0665)	(0.0698)	(0.1500)	(0.1502)
Petroleum	0.3341*	0.4492*	0.5412*	-0.0892
	(0.1020)	(0.2103)	(0.2443)	(0.2507)
Rubber and plastics	0.1751*	0.1557	0.0840	0.1528
	(0.0757)	(0.0831)	(0.1299)	(0.1828)
Leather	-0.1311	0.1805	-0.0913	0.1675
	(0.1708)	(0.1014)	(0.2044)	(0.1627)
Transportation	0.2523*	0.3919*	0.2839*	0.1652
	(0.0591)	(0.0592)	(0.1095)	(0.1610)
Communications	0.2899*	0.3522*	0.3104*	0.2742*
	(0.0691)	(0.0577)	(0.1458)	(0.0977)
Utilities	0.2641*	0.2955*	0.2608	0.2347
	(0.0673)	(0.0892)	(0.1361)	(0.3027)
Wholesale trade	0.1581*	0.1785*	0.0257	-0.0176
	(0.0562)	(0.0476)	(0.1096)	(0.1183)
Retail trade	-0.0336	-0.0282	0.0251	-0.0887
	(0.0530)	(0.0372)	(0.0944)	(0.0727)
Banking	0.2366*	0.1691*	0.1799	0.0280
	(0.0652)	(0.0436)	(0.1358)	(0.0944)
Insurance	0.2228*	0.1761*	-0.0491	0.0791
	(0.0618)	(0.0451)	(0.1132)	(0.0950)
Business	0.1589*	0.2774*	0.0317	-0.0228
	(0.0606)	(0.0490)	(0.1272)	(0.1033)
Repair	0.0894	-0.0403	0.2425	0.0126
	(0.0663)	(0.0844)	(0.1257)	(0.1978)
Entertainment	-0.0767	-0.1511*	0.2121	-0.0514
	(0.0733)	(0.0696)	(0.1582)	(0.2171)
Hospitals	0.0729	0.1567*	0.1658	0.1041
	(0.0718)	(0.0435)	(0.1233)	(0.0850)
Medical, exc. hosp.	0.1241	0.1587*	0.0194	0.0011
	(0.0900)	(0.0416)	(0.2242)	(0.0848)
Educational	-0.1080	0.0120	0.1480	-0.0569
	(0.0730)	(0.0504)	(0.1471)	(0.1162)
Social	-0.2371*	-0.0952	0.3112	-0.0715
	(0.1142)	(0.0585)	(0.1836)	(0.0967)
Professional services	0.0130	0.2067*	0.1365	0.1006
	(0.0605)	(0.0442)	(0.1397)	(0.1129)
Forestry	-0.1783	0.4155	0.0000	0.0000
	(0.2063)	(0.3285)	(0.0000)	(0.0000)

Variable Names	White Males	White Females	Minority Males	Minority Females
Local government	0.0378	0.1082*	0.0424	-0.0157
	(0.0553)	(0.0397)	(0.0974)	(0.0731)
State government	0.0287	0.1414*	0.1469	0.0259
	(0.0590)	(0.0438)	(0.1177)	(0.0855)
Federal government	0.2646*	0.2431*	0.2402*	0.1471
	(0.0589)	(0.0485)	(0.1023)	(0.0857)
Small firm	0.0768*	0.0388*	0.0413	0.0876*
	(0.0153)	(0.0154)	(0.0363)	(0.0353)
Medium firm	0.1127*	0.0889*	0.1396*	0.0547
	(0.0172)	(0.0172)	(0.0420)	(0.0384)
Large firm	0.1699*	0.1559*	0.2458*	0.1213*
(0.0262)	(0.0268)	(0.0624)	(0.0557)	
Very large firm	0.1991*	0.1607*	0.1599*	0.1001*
	(0.0216)	(0.0237)	(0.0538)	(0.0504)
Voluntary part time	-0.4939*	-0.3224*	-0.4461*	-0.3139*
	(0.0247)	(0.0155)	(0.0604)	(0.0432)
Involuntary part time	-0.2747*	-0.2939*	-0.2154*	-0.3051*
	(0.0314)	(0.0250)	(0.0540)	(0.0485)
Union member	0.1183*	0.0971*	0.1078*	0.1017*
	(0.0144)	(0.0167)	(0.0322)	(0.0324)
Adj. R^2	0.4131	0.4168	0.4096	0.4124
N =	7,762	6,675	1,150	1,192

NOTES. G.E.D. = General Educational Development; S.V.P. = Specific Vocational Preparation.
* $p < .05$.
SOURCES: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983), *Dictionary of Occupational Titles* as reported in Miller et al. (1980).

APPENDIX D Estimated Coefficients (and Standard Errors) in Log Wage Equations, by Industrial Sector

	Public Sector		Nonmanufacturing		Manufacturing	
Variable Names	White Males	White Females	White Males	White Females	White Males	White Females
Constant	1.5040*	0.3224*	1.5926*	0.5880*	0.7828*	0.4926*
	(0.1802)	(0.1537)	(0.1137)	(0.0982)	(0.1979)	(0.2406)
Proportion female	-0.4241*	-0.1826*	-0.2725*	-0.2166*	-0.1837*	0.0235
	(0.0746)	(0.0564)	(0.0451)	(0.0372)	(0.0780)	(0.0882)
Proportion minority	0.0209	0.2009	0.3541*	-0.3541*	0.2095	-0.2637
	(0.2989)	(0.2407)	(0.1827)	(0.1681)	(0.2840)	(0.2934)
Schooling	0.0376*	0.0546*	0.0411*	0.0418*	0.0467*	0.0454*
	(0.0068)	(0.0071)	(0.0041)	(0.0045)	(0.0050)	(0.0074)
Experience (potential)	0.0018	0.0004	0.0112*	-0.0024	0.0017	-0.0078*
	(0.0039)	(0.0030)	(0.0020)	(0.0018)	(0.0030)	(0.0032)
Experience squared	-0.0001	0.0000	-0.0002*	0.00005	-0.00004	0.0002*
	(0.0001)	(0.0001)	(0.00004)	(0.00004)	(0.0001)	(0.0001)

	Public Sector		Nonmanufacturing		Manufacturing	
Variable Names	White Males	White Females	White Males	White Females	White Males	White Females
Tenure	0.0325*	0.0320*	0.0320*	0.0337*	0.0265*	0.0258*
	(0.0054)	(0.0048)	(0.0030)	(0.0031)	(0.0035)	(0.0047)
Tenure squared	-0.0007*	-0.0007*	-0.0007*	-0.0007*	0.0005*	0.0006*
	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
G.E.D.	0.0297	0.0923*	-0.0863*	0.0615*	0.0796	0.1025
	(0.0388)	(0.0425)	(0.0259)	(0.0267)	(0.0435)	(0.0540)
S.V.P.	0.0100	0.0321	0.0556*	0.0433*	0.0351	0.0089
	(0.0204)	(0.0228)	(0.0110)	(0.0123)	(0.0181)	(0.0248)
Strength	-0.0661	0.0187	-0.1143*	-0.0422*	0.0832*	0.0845
	(0.0366)	(0.0254)	(0.0238)	(0.0162)	(0.0409)	(0.0446)
Physical demands	-0.0719*	0.0364	0.0131	0.1119*	-0.0932*	-0.0595
	(0.0261)	(0.0221)	(0.0132)	(0.0154)	(0.0219)	(0.0306)
Environment	0.0605*	0.0096	0.0506*	0.0382	-0.0005	-0.0098
	(0.0257)	(0.0408)	(0.0183)	(0.0267)	(0.0258)	(0.0369)
Northeast	0.0394	0.0404	0.0008	-0.0249	0.0326	0.0768*
	(0.0396)	(0.0356)	(0.0224)	(0.0217)	(0.0282)	(0.0339)
North Central	0.0009	-0.0563	0.0251	-0.0220	0.0508	0.0577
	(0.0347)	(0.0315)	(0.0211)	(0.0202)	(0.0264)	(0.0322)
West	0.1691*	0.1464*	0.1282*	0.1401*	0.1401*	0.1213*
	(0.0388)	(0.0354)	(0.0236)	(0.0233)	(0.0365)	(0.0420)
Large SMSA	0.1300*	0.0493	0.0970*	0.1824*	0.0872*	0.1485*
	(0.0456)	(0.0432)	(0.0277)	(0.0262)	(0.0347)	(0.0423)
Medium SMSA	0.1369*	0.0913*	0.0938*	0.1481*	0.0412	0.1265*
	(0.0372)	(0.0329)	(0.0213)	(0.0203)	(0.0284)	(0.0342)
Small SMSA	0.0378	0.0542	0.0413*	0.0509*	0.0341	0.0365
	(0.0325)	(0.0296)	(0.0204)	(0.0197)	(0.0249)	(0.0307)
Mining	—	—	0.2462*	0.2972*	—	—
		(0.0468)	(0.0924)			
Construction	—	—	0.2056*	0.1115	—	—
			(0.0308)	(0.0628)		
Transportation	—	—	0.1195*	0.2293*	—	—
			(0.0360)	(0.0524)		
Communications	—	—	0.1346*	0.1880*	—	—
		(0.0514)	(0.0516)			
Utilities	—	—	0.1286*	0.1222	—	—
		(0.0488)	(0.0882)			
Wholesale trade	—	—	0.0642*	0.0256	—	—
		(0.0293)	(0.0369)			
Retail trade	—	—	-0.1304*	-0.1424*	—	—
		(0.0232)	(0.0210)			
State government	0.0079	0.0590	—	—	—	—
	(0.0349)	(0.0319)				
Federal government	0.2514*	0.1843*	—	—	—	—
	(0.0363)	(0.0403)				
Durable manufacturing	—	—	—	—	0.0260	0.0788*
					(0.0211)	(0.0249)
Small firm	-0.0202	-0.0483	0.0876*	0.0561*	0.0484	0.0940*
	(0.0372)	(0.0327)	(0.0197)	(0.0194)	(0.0349)	(0.0437)
Medium firm	0.0326	-0.0281	0.1440*	0.1386*	0.0695*	0.1460*
	(0.0397)	(0.0364)	(0.0245)	(0.0224)	(0.0327)	(0.0407)
Large firm	0.0314	-0.0209	0.2442*	0.2246*	0.1488*	0.2540*
	(0.0580)	(0.0563)	(0.0436)	(0.0353)	(0.0417)	(0.0513)

	Public Sector		Nonmanufacturing		Manufacturing	
Variable Names	White Males	White Females	White Males	White Females	White Males	White Females
Very large firm	0.0611	0.0051	0.2232*	0.2149*	0.2429*	0.2907*
	(0.0452)	(0.0427)	(0.0375)	(0.0334)	(0.0353)	(0.0474)
Voluntary part time	-0.5652*	-0.3105*	-0.4322*	-0.3247*	-0.8767*	-0.3587*
	(0.0640)	(0.0356)	(0.0300)	(0.0187)	(0.0759)	(0.0566)
Involuntary part time	-0.4105*	-0.3899*	-0.2835*	-0.2991*	-0.1307	-0.2565*
	(0.1206)	(0.0752)	(0.0369)	(0.0306)	(0.0795)	(0.0534)
Union member	0.0366	0.0867*	0.1830*	0.0933*	0.0685*	0.0785*
	(0.0292)	(0.0266)	(0.0228)	(0.0277)	(0.0243)	(0.0310)
Adj. R^2	0.3693	0.3723	0.3411	0.3711	0.4240	0.3896
N=	1,331	1,378	2,150	1,035	4,281	4,262

NOTES: G.E.D. = General Educational Development; S.V.P. = Specific Vocational Preparation.
* $p < .05$.
SOURCES: Current Population Survey data tapes, May and June 1983; Bureau of the Census (1983); *Dictionary of Occupational Titles* as reported in Miller et al. (1980).

3

Effects of Excess Supply on the Wage Rates of Young Women

Alice Nakamura and Masao Nakamura

In this paper we begin with the premise that wages are determined over time by the interaction of supply and demand forces within labor markets. It is assumed that excess labor supply conditions will tend to lower wage rates. Thus, we would expect wages to be lower in a relative sense in labor markets in which the supply of labor is more abundant than the demand. Bergmann (1974, 1986) argues that excess supply pressures of this sort have been particularly severe in female labor markets and that this crowding is one important reason why women's wages are as low as they are. In this paper we address the related question of whether the severity of crowding pressures on wage rates differs among various groups of working women. Reasons for expecting this to be the case are advanced, and supporting empirical evidence is presented and discussed.

Pay equity programs can be thought of as one type of measure for making female wage rates in jobs covered by these programs less vulnerable to crowding effects originating in female labor markets. We end the paper with a discussion of pay equity programs viewed from this perspective.

Investigating Crowding Effects

In the language of economists, what is being set by the interaction of supply and demand forces in labor markets are rates of remuneration for the years of schooling and work experience of individuals with different occupational specializations and other productivity-related characteristics (Polachek, 1976, 1981). The expectation is that the rates of return on human capital resources will be lower, and hence wage rates will be lower after controlling for years of schooling and work experience, in occupational labor markets in which the supply of labor is more abundant relative to the demand. This will be the case because market forces permit, or even compel, employers to pay relatively less for labor in slack occupational employment markets. It will also be the case because would-be employees in these slack markets must often settle for jobs that do not fully utilize their accumulated human capital.

Everyone understands these relative supply concepts of wage determination on an intuitive level. When recruiting for aca-

demic staff, for instance, business schools usually find larger numbers of well-qualified applicants for the business economics and quantitative methods positions than for the accounting positions, and it is understood by all concerned that that is why the accountants receive higher salary offers. Moreover, some of those who have trained for academic jobs in business economics or quantitative methods end up having to take other sorts of jobs in business or government that do not fully utilize their research training and teaching skills. Excess supply pressures on the wages of aspiring artists (musicians, dancers, painters, and so forth) are even more severe. When artistic work can be found, the wages typically provide a paltry return on the investment in artistic training and experience. When artistic work cannot be found, aspiring artists end up supporting themselves waiting on tables or doing other jobs that make little or no use of, and hence provide little or no return on, their accumulated artistic human capital.

Nevertheless, crowding effects on wage rates cannot be easily observed Or measured in a direct sense. For most occupations there are no direct measures of labor supply or demand; only those who were or are actually working in an occupation can be identified. Thus, researchers investigating possible excess supply effects on wage rates have typically proceeded by attempting to demonstrate that conditions that might be expected to cause labor market crowding accompany observed wage rates that are lower than would otherwise be expected. Several researchers, for example, have presented evidence that men born in large cohorts generally have lower earnings profiles than men born in relatively small cohorts (see, for instance, Easterlin, 1980; Freeman, 1979; Welch, 1979).

Differences in Female Labor Markets

Bergmann's assertions about the relative severity of crowding effects in female labor markets hinge on the following empirical observations. First, female labor force participation rates have risen dramatically since World War II. Largely as a consequence of this, the growth rate for the female labor force has been much higher than for the male labor force. Second, female employment is concentrated in a narrower array of occupations than is male employment (Blau, 1977; Blau and Hendricks, 1979; Treiman and Hartmann, 1981). Moreover, there is little overlap between female and male labor markets. Even within narrow occupational classifications that appear from the numbers of female and male workers to be sex integrated, women and men often have different job titles or work in separate establishments. Based on their study of 400 California business establishments employing nearly 47,000 men and over 14,000 women, Bielby and Baron (1984:50–51) conclude that

> in most establishments, few job classifications are staffed by both men and women. Indeed, complete segregation was the norm in establishments studied ... and segregation levels were virtually constant in these organizations during the late 1960s and 1970s.

This occupational segregation by sex presumably limits the potential for a more general diffusion of crowding effects originating from excess supply in female labor markets. Corresponding to these conditions that presumably have resulted in crowding in female labor markets is the empirical evidence that women have been and continue to be paid less for their market work than men are (see, for instance, Nakamura and Nakamura, 1985; Oi, 1982; and O'Neill, 1985).

In the empirical portion of this study, we attempt to examine crowding effects in female labor markets by relating conditions deemed likely to result in excess labor supply to observed female wage rates. A study of this sort cannot yield precise estimates of the downward impact on wages resulting

from various degrees of excess labor supply. Nor is it easy to see how circumstantial evidence of this nature can illuminate the question of *how much* more severe the crowding effects are in female compared with male labor markets. For one thing, some of the conditions that can readily be identified as likely causes of labor market crowding probably affect female labor markets differently from the way they affect male labor markets. For instance, prime-aged men who are laid off due to a downturn in some sector of the economy are likely to remain in the labor force as unemployed workers until they locate new jobs. On the other hand, a substantial proportion of prime-aged women who lose their jobs are likely to simply drop out of the labor force. Also young men are more likely than their female counterparts to migrate for job-related reasons. In this study we address the more limited question of whether there is any evidence that some segments of the female work force are more vulnerable than others to crowding-related wage erosion. To our knowledge, there have been no previous empirical investigations of this question.

Differences by Occupation

Our reasons for expecting wages to be more vulnerable to crowding effects in some occupations, and in some positions within occupations, than in others include the following. First, barriers to entry, such as training requirements, appear to stem the flow of job seekers into some occupational labor markets, making it less likely that excess supply pressures will develop. The potential magnitude of these effects can be seen from the numbers presented in Table 3-1. The numbers in the first two columns indicate a dramatic surge in medical school applications following the end of World War II and the return to civilian life of large numbers of young men whose educations had been interrupted by the war and who were now eligible for GI education benefits. Because of constraints on medical school capacity, acceptance rates dipped for both men and women as the numbers of applicants rose (see columns 3 and 4). Thus, as can be seen from the last column of Table 3-1, the numbers actually admitted to U.S. medical schools (and hence the numbers graduating from those schools) rose only modestly over the 16-year period from 1939 through 1956. In general, higher educational requirements probably act as a barrier to entry into an occupation even in the absence of binding limitations on the capacities of the relevant training programs. This is a consequence of the time and monetary costs required to obtain this training.

Second, more educated and also relatively more scarce types of workers may be more successful in securing concessions from employers that protect their wages against excess supply pressures when they do develop. These concessions may include long-term contractual agreements, job ladders requiring employers to promote from within to fill most positions, wage scales virtually guaranteeing rising levels of pay with increases in seniority, and the institutionalization of powerful collective bargaining units that can push the workers' point of view in disagreements with employers. Thus, in general, we expect to find that the returns to education and work experience (that is, the expected wage increases associated with each additional year of education and each additional year of work experience) are lower and crowding effects on wage rates are more severe for women working in occupations with lower educational requirements.

Within occupations, we would also expect wage rates to be more vulnerable to crowding effects for some jobs than for others. Moreover, even after controlling for general measures of human capital, such as years of schooling, women with certain characteristics might be more likely than other women to end up in those jobs within an occupation for which wage rates are more

adversely affected by excess labor supply pressures. This might be the case, for instance, for women belonging to racial, ethnic, or religious groups that are discriminated against in the labor market; for women having relatively little work experience due to child-related withdrawals from the work force; and for recent entrants or reentrants to the work force.

TABLE 3-1 Applicants and Admissions to U.S. Medical Schools, 1939–1956

	Number of Applicants		Percentage of Applicants Admitted		
Year	Women	Men	Women	Men	Total Number Admitted
1939–1940	632	11,168	50	51	6,012
1940–1941	585	11,269	53	52	6,170
1941–1942	636	11,304	57	51	6,128
1942–1943	810	13,233	49	46	6,484
1949–1950	1,390	23,044	29	29	7,086
1950–1951	1,231	21,049	33	31	6,931
1951–1952	1,109	18,811	38	38	7,570
1952–1953	1,021	15,742	47	43	7,249
1953–1954	972	13,706	53	49	7,231
1955–1956	1,002	13,935	54	50	7,508

SOURCE: Cole (1986:Table 1).

Methods

We estimate log wage equations using microdata from the 1980 census (5 percent A public-use sample) for individual working women 20 to 24 years of age. Separate results are presented for eight broad occupational groups: personal service, other clerical, secretarial, sales, managerial, health professional/technical, and teaching (defined in Appendix A). Results are also presented for women (working in all occupations) in various demographic groups. We do not show equations for women sorted by both occupation and demographic characteristics because the sample sizes are too small for many occupational-demographic categories.

We focus on the wage rates of women ages 20 to 24 for two reasons. First, the younger cohorts of working women are larger in number, which leads to larger sample sizes for empirical analysis. Second, the careers of these younger women have been less affected by any discriminatory training or labor market practices that were, in fact, reduced as a result of the equal opportunity rulings that came into effect in the 1960s and early 1970s.

General Labor Market Variables

Our choice of explanatory variables was motivated not only by the objectives of this study, but also by the limitations of our data source.

Unemployment rates are sometimes used as indices of general excess labor supply conditions in macroeconometric models. We include state-specific unemployment rate variables for women and men ages 20 to 29 in our log wage equations. We have included those ages 25 to 29 along with those ages 20 to 24 in the computation of these state-specific unemployment rates because that leads to more reliable estimates of the unemployment rates due to the larger sample sizes and also because employers may regard those ages 25 to 29 as potential substitutes for workers who are 20 to 24 years old.

The unemployment rate for women and for men in each state was computed as the number who were unemployed in the census reference week divided by the number who participated in the civilian labor force in that week. Unfortunately, the interpretation of the coefficients of these variables is not straightforward. High male unemployment rates, for instance, may be indicative of more male competition for jobs usually held by women, which results in downward supply pressure on' female wages. But high male unemployment rates may also cause some married women to be more serious about finding and holding on to jobs that pay relatively well because of the higher degree of uncertainty associated with their husbands' earnings. High male unemployment rates could even be indicative of a substitution of cheaper female labor for higher priced male labor.

The state-specific effects on labor markets of general changes in the demand for goods and services, as well as differences among states in other relevant factors, such as the cost of living, should be reflected in the average earnings of prime-aged men (who still make up the largest share of the work force). In our log wage equations, we include a state-specific variable for the log of the average earnings of men ages 25 to 45, working in all occupations. The coefficient of this variable is expected to be positive. That is, it is expected that the effects of general labor market conditions on the wage rates of young women will be in the same direction as the effects on the earnings of prime-aged men.

After controlling for more general labor market conditions, we wish to determine whether there are any *additional* effects on female wage rates due to crowding in female labor markets. In an attempt to identify additional effects, we include in our log wage equations the logarithm of the number of women ages 20 to 24 in each state divided by the corresponding number of women 25 to 29 years of age. We refer to this state-specific variable as the *log population ratio*. When the female population is growing, the number of women ages 20 to 24 will exceed the number who are ages 25 to 29. In this case, the ratio of these two numbers will be greater than unity and the log of the ratio will be positive. Our expectation is that positive values of the log population ratio will be associated with increases in labor supply in those occupations in which women seek employment.

In some occupations, of course, increases in the log population ratio may also be specifically associated with increases in the demand for female labor. Increases in the number of women ages 20 to 24, for instance, may lead to increases in the demand for primary schoolteachers as well as day-care and other service workers to care for the children of these young women. In general, however, there are no obvious reasons why the number of jobs for young women will expand as quickly as the number of potential jobholders with increases in the population of young women. Excess supply conditions in female labor markets will result when the number of women seeking jobs rises more rapidly than does the number of jobs. If there are crowding effects on the wage rates of young women after more general, state-specific labor market conditions have been controlled for by the unemployment and male earnings variables, we expect the coefficient of the log population ratio in our log wage equations to be negative.

For similar reasons, increases over time in female employment rates might be expected to lead to excess supply conditions in female labor markets. Thus, we include the logarithm of the state employment rate for women ages 20 to 24 divided by the state employment rate for women ages 25 to 29 as an explanatory variable. We refer to this variable as the *log employment ratio*. Our presumption is that the more positive

the value of this variable is, the more likely that there is crowding pressure in female labor markets. Values of the state-specific variables (before taking the logarithms) are shown in Appendix B.

Key Explanatory Variables

The explanatory variables of key interest are the state-specific log population ratio and log employment ratio variables, the log of the state average for the earnings of men ages 25 to 45, and individual-specific variables for the number of years of schooling and potential labor market experience (age minus years of schooling minus six). Our expectation is that groups of women with more negative values for the coefficients of the log population ratio and log employment ratio variables will also have smaller coefficients for the years of schooling and potential work experience variables and for the state-specific average male earnings variable.

Unfortunately, the relationship between the potential work experience variable in this study and work experience of the sort that might be reflected in higher wages is tenuous. For any given woman, suppose we denote the value of the potential experience variable by *PEXP* and the actual number of previous years in which the woman worked by *EXP*. Then,

$$EXP = PEXP - L$$

where, L denotes the number of years in which the woman was not employed or in school (plus any discrepancy between completed years of schooling and the number of years required to reach that level of educational attainment). Our data source contains no information concerning the values of *EXP* or *L*. That is why we use the potential experience variable.

To the extent that the average values of L differ across the different occupational and demographic groups of working women, there will be systematic differences in the estimated constant terms for the log wage equations for the different groups of women. Because the estimated constant terms play no role in our subsequent analysis, this is not a serious problem. Within the groups of women, however, there may also be correlations between the individual values of the omitted variable L and the values of the potential experience variable. Correlations of this sort could contribute to estimates of the effects of an additional year of work experience on a woman's wage rate that are systematically too high or too low. Moreover, these biases could differ systematically among the various groups of women. As a consequence, results obtained in this study concerning the return to years of work experience await confirmation from further research based on a data source containing information about actual past work experience.

In addition to the variables discussed, we include several other explanatory variables in our log wage equations. To capture industry-specific demand effects on each working woman's wages, we include an industry-specific demand index defined as the log of the earnings of female workers ages 20 to 24 in the woman's industrial group divided by the average earnings of all women ages 20 to 24. (Values for this variable are shown in Appendix C.) We include an individual-specific variable for the number of children ever born (except in the equation for women with no children), as well as dummy variables for race (black or nonblack, except in the equations for black women and for nonblack women), for whether a woman has ever been married, and for whether a woman was working 5 years ago (except in the equations for women who were working 5 years earlier and for those who were not). Finally, in the log wage equations for the separate demographic groups, we also include a set of dummy variables for the eight occupational cate-

gories developed from the census codes (see Appendix A for the definitions of these occupations).

Empirical Results

The main estimation results of this study are displayed in Tables 3-2 through 3-4. We present descriptive statistics and regression results for log wage equations for working women ages 20 to 24 classified by occupation and personal characteristics.

Occupation

The mean years of education and of potential labor market experience for women ages 20 to 24 in each of the eight occupational categories are shown in the first two rows in Table 3-2, with the occupations ordered from lowest to highest in terms of mean years of schooling. From the mean wage figures shown in the third row, women in; the top four occupations in terms of educational qualifications (managerial; health, excluding doctor's and dentists; professional/technical, including doctors, dentists, and university teachers; and teaching, excluding university teachers) are better paid, on average, than women working in the personal service, other clerical, secretarial, and sales occupations.

From the next two rows of the top panel, women working in the four occupations with the highest educational requirements are less likely to have wage rates below $2.50 (approximately the mean wage rate for a secretary) than women working in the four other occupations, and they are less likely to have wage rates below $4.50 than women working in the personal service, other clerical, and sales occupations. On human capital grounds, one would expect the wage rates to be higher for the occupations with higher educational qualifications even if workers in all occupations received the *same* returns, on average, to *additional* education. As expected, however, the top two rows of coefficient estimates in the middle panel of Table 3-2 show that returns to both additional years of schooling and additional years of labor market exposure are also generally higher for the four occupations in which the average educational levels of the work forces are higher.

Ignoring the teaching occupation, the coefficient estimates for the log population ratio and the log employment ratio are not significantly different from zero for the occupations with higher educational requirements, but one or the other of these two coefficient estimates *is* statistically significant and negative for each of the four occupations with lower educational requirements. These findings are in line with a priori expectations that crowding effects on wage rates will tend to be more severe in occupations in which the educational level of the workers is lower. The results for the teaching occupation seem to confirm that our method for identifying crowding effects will not work for those few occupations for which changes in the size of the specified demographic group, or in the labor force participation rate of that group, are directly linked to changes in the numbers of jobs available in those occupations.

The coefficient estimates for the female and male unemployment rate variables are shown in the fifth and sixth rows of the middle panel of Table 3-2. With none of the coefficients of the male unemployment rate variable being significantly different from zero, there is no evidence of adverse effects on female wage rates in any of the eight designated occupations as a result of men in slack male labor markets competing for jobs usually or sometimes filled by women. The coefficient estimates for the female unemployment rate variable are only significantly negative for the high-education professional/technical and teaching occupations.

Looking at the last row of coefficient estimates in the middle panel, female wage rates do move together with male earnings,

over states, for all of the designated occupations except personal service, sales, and health. The health occupation has relatively high average educational requirements, and it is not one of the occupations for which we halve found significant crowding effects on wage rates. The other clerical and secretarial occupations are ones with relatively low educational requirements, and they are also occupations for which we have found evidence of crowding effects on wage rates.

In the bottom panel of Table 3-2 we show the predicted wage impacts of changes in the log population ratio, the log employment ratio, and the male average earnings variable associated with "moving" a woman who was earning the average wage for her occupation from South Dakota to Oregon. According to our measures of excess supply conditions in female labor markets, there is less crowding in Oregon than in South Dakota. Also, average earnings for men ages 25 to 45 are almost $5,000 higher in Oregon. We chose these two states to demonstrate the magnitude of the estimated wage gains associated with a move from a poorer into a more favorable labor market for female workers. Due to the crude nature of our proxies for excess supply conditions, our rudimentary understanding of how wages are determined, and a variety of possible statistical problems with our estimation results, however, these predictions may be very imprecise.

Personal Characteristics

One problem with looking for crowding and Other related wage effects on an occupation-by-occupation basis is that each one of our broad occupational groups actually contains a range of jobs with differing educational requirements and other barriers to entry; differing pay scales, including differing institutionalized practices governing wage growth with increased seniority; and differing balances of bargaining power between' employers and employees. Moreover, different sorts of jobs within the same broad occupational group tend to be filled by different sorts of workers.

To examine the possibility that, regardless of occupation, certain types of women are more likely to end up in those jobs in which accumulated human capital is less rewarded and in which wages are more subject to crowding effects, we estimated log wage equations separately for women with less than 12 years of schooling and for those with at least 12 years, for women with children and for those with no children ever born, for black women and for nonblack women, and for women who were working 5 years earlier and for those who were not (Table 3-3). From the first row of Table 3-3, women with children, black women, and (obviously) women with less than 12 years of schooling have lower mean educational levels than the other groups of women. From the wage statistics presented in the top panel, it is clear that the women in these three groups, as well as those women who were not working 5 years earlier, are more poorly paid in general than the women in the other groups.

Looking now at the first two rows of coefficient estimates in the middle panel of Table 3-3, women with less than 12 years of schooling, women with children, black women, and women who were not working 5 years earlier also earn lower rates of return on additional years of schooling or for additional years of potential labor market experience, or both. These are the groups of women, too, for whom the estimated coefficients of the log population ratio are significantly negative. Moreover, the estimated coefficients for the female unemployment rate variable are consistently negative for these four groups, and they are statistically significant for both women with less than 12 years of education and women with children.

Again, there is no evidence of adverse effects on female wage rates from men in states with higher unemployment rates com-

TABLE 3-2 Descriptive Statistics and Regression Results for Log Wage Equations for Working Women Ages 20 to 24, Classified by Occupation

Descriptive Statistics and Variables	Personal Service	Other Clerical	Secretarial	Sales	Managerial	Health	Professional/ Technical	Teaching
				Descriptive Statistics				
Mean years of schooling	12.0	12.7	12.8	13.1	13.4	13.5	14.4	15.0
Mean years of potential labor market experience[a]	3.8	3.1	3.2	2.8	3.0	2.7	2.0	1.7
Mean wage in $s (standard deviation)	4.66 (9.83)	4.71 (7.61)	4.53 (3.54)	4.60 (4.31)	5.09 (3.25)	5.04 (4.48)	5.97 (7.51)	5.19 (4.50)
Percent with wage lower than $2.50	30.3	18.4	11.3	19.2	11.5	14.9	12.3	15.6
Percent with wage lower than $4.50	74.2	69.2	61.7	67.2	47.7	54.9	41.9	55.6
				Regression Coefficient Estimates for Log Wage Equations (standard errors)[b]				
Years of schooling	.03 (.03)	.04* (.01)	.07* (.02)	.07* (.02)	.09* (.02)	.11* (.02)	.06* (.01)	.17* (.02)
Years of potential labor market experience[b]	.02 (.02)	.04* (.01)	.05* (0.1)	.05* (.02)	.07* (.02)	.04* (0.2)	.10* (.01)	.12* (.03)
Log population ratio[c]	−.50* (.36)	.00 (.15)	−.06 (.18)	−.37* (.29)	.09 (.17)	.00 (.23)	−.03 (.22)	.75* (.30)
Log employment ratio[d]	−1.43 (1.24)	−1.08* (.58)	−.61* (.47)	−.52 (.80)	.34 (.68)	−.12 (.68)	.59 (.68)	−2.08* (1.01)
Unemployment rate for women 20–29	.41 (1.62)	.56 (.71)	.45 (.65)	−.64 (1.10)	1.28* (.94)	1.17 (.96)	−1.85* (.97)	−4.30* (2.45)

Unemployment rate for men 20–29	1.09	−.35	.09	1.10	−.52	−.28	.39	.72
	(1.11)	(.55)	(.49)	(.88)	(.72)	(.80)	(.63)	(.72)
Log of mean annual earnings for men 25–45	.17	.89*	.59*	−.34	.76*	.38	.53*	1.57*
	(.41)	(.24)	(.21)	(.35)	(.25)	(.36)	(.31)	(.49)
R^2	.049	.041	.076	.072	.080	.108	.069	.155
N	651	1,459	1,061	754	715	851	1,259	390
Predicted Impacts (in $s) of Selected Variables Associated with a Move from South Dakota to Oregon[e]								
Log population ratio	1.48	.00	.15	1.04	−.26	.00	.10	−2.64
Log employment ratio	.56	.42	.23	.20	−.14	.05	−.28	.94
Log of mean annual earnings for men 25–45	.24	1.41	.86	−.44	1.27	.60	1.01	3.04

NOTES: The descriptive statistics as well as the dependent and explanatory variables for the estimated log wage equations were calculated using microdata from the 1980 U.S. Census (5 percent A public-use sample). The dependent variable for the regressions is the logarithm of the hourly wage, defined as the annual earnings for calendar year 1979 divided by weeks of work times usual hours of work for those weeks worked in 1979. A constant term and other control variables listed in the text were also included in these regressions. A woman was classified as working if she had positive employment income, weeks of work, and usual hours of work for 1979. An asterisk indicates that a coefficient is significantly different from zero using a two-tailed critical region of .20 and *t*-statistics calculated using heteroscedasticity-corrected standard errors.

[a]Potential labor market experience is defined as age minus years of schooling minus six.
[b]Heteroscedasticity-corrected standard errors (White, 1980).
[c]Defined as the logarithm of the state-specific number of women ages 20 to 24 divided by the number of women ages 25 to 29.
[d]Defined as the logarithm of the state-specific employment rate of women ages 20 to 24 divided by the employment rate of women ages 25 to 29.
[e]Calculated as deviations from the mean wage shown above in the top panel. The population ratio, employment ratio, and mean annual earnings for men ages 25 to 45 are, respectively, 1.29, 1.05, and $13,565 for South Dakota and .74, .97, and $18,204 for Oregon. Both states had unemployment rates of .10 for women ages 20 to 29 and .11 for men ages 20 to 29.

TABLE 3-3 Descriptive Statistics and Regression Results for Log Wage Equations for Working Women Ages 20 to 24, Classified by Personal Characteristics

Descriptive Statistics and Variables	Less Than 12 Years Schooling	With Children	Black	Not Working 5 Years Earlier	At Least 12 Years Schooling	No Children	Nonblack	Working 5 Years Earlier
Descriptive Statistics								
Mean years of schooling	9.4	11.7	12.2	12.7	13.2	12.7	12.7	12.6
Mean years of potential labor market experience	6.6	4.7	3.8	2.3	1.8	3.2	3.3	4.0
Mean wage in $s	4.96	4.47	4.91	4.88	5.23	5.29	5.22	5.56
(standard deviation)	(9.32)	(6.10)	(6.01)	(5.75)	(8.09)	(8.52)	(8.49)	(10.49)
Percent with wage lower than $2.50	23.9	23.9	23.4	18.7	15.2	15.4	15.7	13.8
Percent with wage lower than $4.50	65.1	72.2	64.3	62.0	55.9	55.1	56.4	51.5
Regression Coefficient Estimates for Log Wage Equations (standard errors)								
Years of schooling	.02*	.05*	.06*	.06*	.06*	.07*	.07*	.08*
	(.02)	(.02)	(.02)	(.006)	(.005)	(.005)	(.005)	(.007)
Years of potential labor market experience	.00	.01	.03*	.03*	.05*	.04*	.04*	.05*
	(.01)	(.01)	(.01)	(.006)	(.004)	(.004)	(.004)	(.006)

Descriptive Statistics and Variables	Less Than 12 Years Schooling	With Children	Black	Not Working 5 Years Earlier	At Least 12 Years Schooling	No Children	Nonblack	Working 5 Years Earlier
Log population ratio	-.34*	-.28*	-.58*	-.19*	-.07	-.09*	-.06	-.02
	(.17)	(.15)	(.23)	(.07)	(.06)	(.06)	(.06)	(.08)
Log employment ratio	.21	-.73*	-.47	-.03	-.09	.04	.00	-.05
	(.59)	(.56)	(.65)	(.23)	(.18)	(.18)	(.18)	(.26)
Unemployment rate for women 20–29	-.67*	-1.31*	-.62	-.28	.02	.09	-.06	.16
	(.85)	(.78)	(.99)	(.33)	(.25)	(.26)	(.25)	(.37)
Unemployment rate for men 20–29	.85*	1.03*	1.44*	.57*	.44*	.44*	.42*	.42*
	(.60)	(.54)	(.67)	(.24)	(.18)	(.18)	(.18)	(.24)
Log of mean annual earnings for men 25–45	.25	.03	-.04*	.40*	.53*	.55*	.55*	.60*
	(.24)	(.22)	(.25)	(.10)	(.08)	(.08)	(.08)	(.11)
R^2	.046	.046	.051	.058	.068	.062	.067	.065
N	2,514	2,142	1,821	9,498	15,012	15,384	15,705	8,028
Predicted Impacts (in $s) of Selected Variables Associated with a Move from South Dakota to Oregon								
Log population ratio	1.02	.74	1.84	.54	.20	.27	.18	.06
Log employment ratio	-.08	.27	.19	.01	.04	-.02	.00	.02
Log of mean annual earnings for men 25–45	.38	.04	-.06	.61	.88	.93	.92	1.07

NOTES: See notes to Table 3-2. These results are based on data for women in the eight occupational groups considered in Table 3-2 as well as women working in all other occupations.

TABLE 3-4 Further Descriptive Statistics and Regression Results for Log Wage Equations for Working Women Ages 20 to 24, Classified by Personal Characteristics

	At Least 12 Years Schooling							
	Less Than 12 Years Schooling				Nonblack		Nonblack with No Children	
Descriptive Statistics and Variables	Black	Nonblack	Black	Nonblack	With Children	No Children	Not Working 5 Years Earlier	Working 5 Years Earlier
Descriptive Statistics								
Mean years of schooling	9.8	9.3	12.9	13.2	12.5	13.3	13.4	13.2
Mean years of potential labor market experience	6.2	6.6	3.1	2.8	4.0	2.7	2.2	3.3
Mean wage in $s (standard deviation)	4.54 (5.94)	5.04 (9.80)	5.00 (6.03)	5.25 (8.27)	4.46 (5.84)	5.34 (8.48)	5.00 (5.73)	5.74 (10.87)
Percent with wage lower than $2.50	31.1	22.7	21.4	14.5	19.8	14.0	16.8	11.6
Percent with wage lower than $4.50	70.3	64.2	62.7	55.2	69.9	53.6	58.8	47.5
Regression Coefficient Estimates for Log Wage Equations (standard errors)								
Years of schooling	.02 (.06)	.03* (.02)	.07* (.02)	.06* (.005)	.07* (.02)	.06* (.006)	.05* (.007)	.07* (.009)

	At Least 12 Years Schooling							
	Less Than 12 Years Schooling				Nonblack		Nonblack with No Children	
Descriptive Statistics and Variables	Black	Nonblack	Black	Nonblack	With Children	No Children	Not Working 5 Years Earlier	Working 5 Years Earlier
Years of potential labor	-.04	.01	.07*	.05	.02*	.05*	.06*	.06*
market experience	(.04)	(.01)	(.02)	(.004)	(.01)	(.005)	(.007)	(.007)
Log population ratio	-.48	-.30*	-.57*	-.02	-.06	-.02	-.13*	.12*
	(.54)	(.18)	(.24)	(.06)	(.18)	(.06)	(.08)	(.09)
Log employment ratio	-.59	.39	-.47	-.05	-1.00*	.04	.10	-.02
	(1.41)	(.66)	(.73)	(.18)	(.62)	(.19)	(.26)	(.28)
Unemployment rate for	-1.36	-.70	-.58	.06	-.87	.17	.15	.20
women 20–29	(2.30)	(.89)	(1.07)	(.25)	(.80)	(.26)	(.36)	(.39)
Unemployment rate for men	1.65	.77	1.55*	.35*	.55	.35*	.24	.46*
20–29	(1.72)	(.63)	(.73)	(.18)	(.62)	(.19)	(.26)	(.26)
Log of mean annual earnings	-.18	.31	-.05	.59*	.27	.62*	.50*	.77*
for men 25–45	(.57)	(.27)	(.27)	(.08)	(.22)	(.09)	(.12)	(.12)
R^2	.082	.046	.053	.070	.049	.069	.060	.067
N	380	2,134	1,441	13,571	1,304	12,267	6,650	5,617
Predicted Impacts (in $s) of Selected Variables Associated with a Move from South Dakota to Oregon								
Log population ratio	1.37	.90	1.84	.06	.15	.06	.37	-.37
Log employment ratio	.22	-.15	.19	.02	.37	-.02	-.04	.01
Log of mean annual earnings for men 25–45	-.23	.48	-.07	.99	.37	1.07	.79	1.46

NOTES: See notes to Table 3-2. These results are based on data for women in the eight occupational groups considered in Table 3-2 as well as women working in all other occupations.

peting with women for jobs. (The coefficient estimates for the male unemployment rate are positive, not negative.) Also, as expected, the coefficients for the male earnings variable are insignificantly different from zero for those groups of women found to be most subject to adverse crowding effects. In the bottom panel of Table 3-3 we show predicted impacts for selected variables.

The results presented in Table 3-3 raise a number of questions. For instance, would the wages of women with less than 12 years of schooling still be relatively unresponsive to human capital differences and the level of male earnings, but vulnerable to crowding effects, if we limited this low-education sample to nonblack women? From the results presented in the second column of Table 3-4, the answer to this question is probably yes. Based on the results in Table 3-3 we might also wonder if the wage rates of women with children would be found to be more responsive to human capital variables and the state level of male earnings, and less responsive to crowding effects, if we limited the sample of women with children to nonblacks. Comparing the coefficient estimates in the fifth column of Table 3-4 with those in the second column of Table 3-3, the answer to this question is probably yes with respect to the human capital effects and probably no with respect to the other effects.

In Table 3-3, the wages of black women are adversely affected by crowding and unrelated over states to the average level of male earnings. From column 3 of Table 3-4, these conclusions still hold even if we limit the sample of black women to those with at least 12 years of schooling. Finally, we might wonder whether we would still find evidence of crowding effects on the wage rates of young women who were not working 5 years earlier if we limited this sample to those who are nonblack and childless. From the coefficient estimates in column 7 of Table 3-4, the answer to this question is yes. In general, the conclusions reached on the basis of Table 3-3 seem to be borne out by the findings for more detailed groupings of women presented in Table 3-4.

Alternative Causal Explanations

In the empirical literature on female work behavior, log wage equations similar to those estimated in this study are viewed as reflecting the wage offers made to women with specified productive attributes in competitive labor markets in which the wage distributions are determined by marketwide supply and demand conditions not subject to the control of individual employers or labor force participants. Thus, these equations usually include both individual-specific explanatory variables, such as years of schooling, and certain marketwide variables, such as the state or county unemployment rate (see, for instance, Heckman, 1981; Nakamura and Nakamura, 1981). The estimated coefficients of the marketwide variables are presumed to represent the responsiveness of the female wage distribution, and hence the responsiveness of the wage offers received by individual women, to marketwide supply and demand conditions reflected in the values of the marketwide variables. The log wage equations estimated in this study contain a number of marketwide variables. It has been argued that negative coefficient estimates for two of these variables, the state-specific log population and log employment ratios, are indicative of negative crowding effects on the wage rates of working women.

Could it be, however, that the log employment ratio variable is serving as a proxy for other sorts of impacts on the wage distributions of women ages 20 to 24? It is often argued that the probability that a woman will work is positively related to the wage offers she receives. If marketwide supply-side effects of this sort were strong enough, there would be a tendency for the

values of the log employment ratio to be higher in states where wages are relatively high for women ages 20 to 24 versus women ages 25 to 29. As a result, the coefficient estimates for this variable might turn out to be insignificantly different from zero or significantly positive, even though there are also negative crowding effects on female wage rates. Because of their positive effects on wage rates, however, supply-side feedbacks of this sort could not contribute to an erroneous conclusion that there are crowding effects.

On the other hand, it has also been argued in the literature that employers make minimal specific training investments in women and, therefore, are generally willing to substitute younger for older female workers (or vice versa) in order to minimize labor costs. If marketwide demand-side effects of this sort were sufficiently strong, there would be a tendency for the values of the log employment ratio to be lower in states where wages are relatively high for women 20 to 24 versus 25 to 29 years old. As a result, the coefficient estimates for the log employment rate variable might be found to be significantly negative even in the absence of crowding effects on the wage rates of female workers. However, when women lose or cannot find jobs due to the substitution of lower priced female labor from another age bracket, those women are being "crowded out" in terms of employment opportunities. Thus, negative coefficient estimates for the log employment ratio variable can still be considered to be indicative of crowding effects in female labor markets, although these crowding effects may be employment rather than wage related.

Conclusions

The evidence presented in this study suggests that increases in the female work force, brought about by population increases and increases in female employment rates, have resulted in wage erosion that has been more serious for working women in some demographic and occupational groups than in others. In particular, we find there have been adverse crowding effects on the wage rates of women employed in the personal service, other clerical, secretarial, and sales occupations, and on the wage rates of women with less than 12 years of education, those with children, black women, and women who are relatively recent labor market entrants or reentrants (that is, those who were not working 5 years earlier). On the other hand, we find no evidence of crowding effects for working women who have at least 12 years of education, or who have no children, or who are not black, or who were already working 5 years earlier. Nor do we find any evidence of crowding effects for women working in managerial, health, and professional/technical occupations. We conclude that either there is less crowding in the segments of the female labor market in which these women are employed or the wage rates for the sorts of jobs these women have are better protected by institutional and other factors from erosion due to excess supply pressures. To the extent that these results reflect reality, it is appropriate to ask what the policy implications of these findings might be.

Bergmann (1986:128) made the following observation:

> Every woman now on the women's labor market who would be allowed into a job in the men's market would reduce the pay gap between the sexes. Her move would push the wage scale in the two markets toward equality by increasing the supply of labor to the men's market and decreasing the supply to the women's.

Our empirical results indirectly support this position. They also lend added credence to Bergmann's assertion that "continued [occupational] segregation would make the efforts to close the pay gap between women and men a continual uphill struggle." If this is the case, the continued importance of

vigorous affirmative action and other programs promoting employment opportunities should not be lost sight of in the political rush to institute pay equity programs.

The results of this study also suggest a general need to examine practices and institutions that prevent the development of excess supply conditions in some labor markets or prevent wage declines in the face of excess supply conditions. Women could seek an expansion of such practices and institutions in female labor markets. The push to increase the representation and power of women in labor unions falls under this rubric. Pay equity programs can also be viewed as an institutionalized concession from employers that may serve to insulate the wages of jobholders in some sectors of the female labor market from excess supply pressures.

Affirmative action and equal opportunity programs act to break down barriers regulating female entry into occupations and cushioning the wage rates of those holding jobs in these occupations against excess supply pressures that might otherwise develop. Thus, affirmative action and equal opportunity programs contribute to the development of a labor market in which excess supply pressures on wage rates spread more evenly and more quickly through all sectors of the labor market and, hence, are borne more equally by all groups of workers. On the other hand, we have characterized pay equity programs as yet another measure for protecting the wages of those who have jobs against potential excess supply pressures. We do not see any incongruity in the fact that groups pushing for improved labor market conditions for women are supporting both of these types of measures. The goal is clearly to reduce the sensitivity of wages to excess supply pressures in the secretarial and certain other female labor markets, and at the same time open up to women a wider range of what have traditionally been male occupations.

Finally, we believe that the results of this study convey a cautionary message. We have found that some groups of women are more likely than others to have their wage rates adversely affected by excess labor supply conditions. These results suggest that those implementing pay equity programs for the other clerical and secretarial occupations, for instance, must be careful to design those programs so that the employment opportunities of groups of women, such as blacks, those with children, and those with low educational levels, are not improperly infringed upon. The other clerical and secretarial occupations have offered black women and women with low levels of education some of the most attractive jobs, in wage terms, available to them. If wages rise in these occupations due to pay equity adjustments, competition for these jobs will presumably intensify. What needs to be guarded against is the formal or informal institutionalization of educational and other requirements for these jobs that are not dictated by productivity considerations and that would exclude from consideration for these jobs some of the sorts of women who currently rely on them for employment.

Policy conclusions are the result of judgment as well as logic. As such, they inspire disagreement. In this particular case, moreover, there is bound to be disagreement not only about the particular policy conclusions stated, but also about whether any policy conclusions at all can be drawn from a study such as ours.

Some will argue, for instance, that no policy implications can be drawn from our study because we have not established the extent to which excess supply pressures in female labor markets are the result of voluntary career decisions rather than a reflection of sex-related employment discrimination. A woman might have become a secretary because of a preference for this sort of work, because she thought this job would blend more easily with homemaking responsibilities than other possible jobs, because this was the best job she could find

when forced to look for work by economic necessity with little or no career preparation, or because she was rejected for training programs or jobs in her chosen career area (perhaps because of discrimination). Our data source only provides information on a woman's occupation, not on her reasons for being in that occupation.

Some economists would argue that the erosion of female wage rates due to crowding pressures is an appropriate public policy concern only if the crowding can be shown to be largely due to employment discrimination against women. Demonstrating this point would probably require a fully articulated model of occupational choice. Thus, the acceptance of this position would certainly forestall any timely debate of policy measures intended to reduce or counterbalance crowding pressures on female wage rates because occupational choice is one of the most poorly developed topic areas in labor economics. A number of other economists are also pushing forward with the analysis of implications of pay equity programs, despite the paucity of empirical evidence on key behavioral responses (see, for instance, Beider et al., 1986).

Others would argue that no policy implications can be drawn from our empirical results because we have not demonstrated that crowding effects on wage rates are more severe in female than in male labor markets. It is true that our results do not shed light on the question of whether differences in the severity of crowding pressures in female versus male labor markets are an important cause of the female-male wage gap. But we do not agree that consideration of policies to deal with crowding effects in female labor markets must await evidence that this crowding is due to discrimination or that the wage effects of crowding are more severe for female than for male workers. Perhaps our position on this question can be clarified by pausing for a moment to consider some of the issues in the health care area that have come to be viewed as appropriate topics for public policy debate and potential government action. Virtually everyone agrees that providing some minimal level of health care for the nation's elderly is an appropriate public concern. This is despite the fact that many elderly individuals are suffering from ailments that are the result of their own voluntary life-style choices (both present and past).

There is also special public concern about factors that appear to affect' adversely the health status of those in subgroups of the elderly population that have particularly severe overall health problems. There is special concern, for instance, about the effects of high blood pressure and poor nutrition on the health status of elderly blacks. This is the case even though these same factors may have just as severe adverse effects on the health of those belonging to groups for whom the overall health picture is more satisfactory. Demonstrated need provides both the justification for public expenditures on health care for the elderly and the rationale for making extra funding available for programs designed to provide special assistance to certain subgroups of the elderly population.

The case for public policies to improve female labor market conditions rests on a similar foundation. There is clear evidence that the earnings situation for female workers is poor in an overall sense, even though employment and wage conditions for women have improved in recent years. Moreover, the poor earnings situation of large numbers of working women causes suffering. There is widespread and growing poverty, for instance, among widowed, divorced, and separated women and the dependent children of those women. To us the question is not whether, but how, public policy should be harnessed to improve the economic status of women. We undertook this study in the hopes of improving the understanding of how wages are determined in female labor markets, for it is this understanding that must form the basis for

policy discussions on how the wages of working women can be enhanced.

Acknowledgments

We are grateful to Francine Blau, Harriet Duleep, Ronald Ehrenberg, and particularly, Arthur Goldberger for their helpful comments on earlier versions of this paper.

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APPENDIX A Definitions of Occupational Groups

Group Name	1980 Census Codes
Personal service	403–407, 449, 453, 457, 467, 468
Other clerical	275, 276, 319, 323, 325–329, 335–339, 343–349, 353, 354, 364, 365, 368, 374, 377–379, 383–387, 389
Secretarial	313–315
Sales	256, 259, 263–269, 274, 283
Managerial	004–009, 013–019, 024–029, 033–037
Health	095, 097–099, 103–105, 203–208, 445–447
Professional/technical	023, 043–049, 053–059, 064–069, 073–079, 083–089, 113–119, 123–129, 133–139, 143–149, 153, 154, 164–169, 173–179, 183–189, 193–199, 213–218, 223–229, 233–235
Teaching	155–159, 163

APPENDIX B State-Specific Variables Calculated Using Public-Use Sample (5 percent) Data from the 1980 Census

	Ratio for Women 20–24 Versus Women 25–29		Unemployment Rate		
State	Population	Employment Rate	Women 20–29	Men 20–29	Mean Annual Earnings for Men 25–25 ($s)
Alabama	1.13	.94	.15	.08	15,684
Alaska	1.00	.96	.06	.06	26,031
Arizona	1.22	1.00	.11	.05	15,992
Arkansas	1.21	.98	.10	.06	14,482
California	1.05	.97	.07	.09	18,192
Colorado	1.10	1.01	.08	.06	18,481
Connecticut	1.03	.96	.03	.06	19,442
Delaware	1.16	1.05	.11	.02	17,140
District of Columbia	.92	1.02	.10	.10	14,726
Florida	1.17	.97	.07	.06	16,345
Georgia	1.11	.93	.11	.09	15,731
Hawaii	1.05	1.04	.10	.04	17,284
Idaho	1.64	.89	.07	.08	16,589
Illinois	.98	.96	.08	.12	19,227
Indiana	1.03	.98	.10	.12	18,033
Iowa	1.19	.95	.05	.09	17,332
Kansas	1.22	1.00	.10	.09	17,511
Kentucky	1.18	.97	.08	.11	16,934
Louisiana	1.11	.90	.09	.07	17,726
Maine	1.17	.99	.09	.16	12,764
Maryland	1.14	.96	.09	.07	18,963
Massachusetts	1.10	.96	.04	.07	17,576
Michigan	1.01	.98	.12	.19	20,020
Minnesota	.98	1.03	.04	.10	18,313
Mississippi	1.48	.92	.16	.12	14,101
Missouri	.96	.99	.10	.11	17,080
Montana	1.06	1.00	.08	.16	17,355
Nebraska	.81	.96	.02	.01	17,596
Nevada	.89	1.03	.04	.04	19,081
New Hampshire	1.57	.97	.02	.08	18,610
New Jersey	1.09	.95	.09	.08	18,815
New Mexico	1.14	.99	.10	.09	16,153
New York	1.06	.91	.08	.12	17,428
North Carolina	1.18	.98	.10	.07	14,314

	Ratio for Women 20–24 Versus Women 25–29		Unemployment Rate		
State	Population	Employment Rate	Women 20–29	Men 20–29	Mean Annual Earnings for Men 25–25 ($s)
North Dakota	.87	1.00	.08	.06	18,091
Ohio	1.06	.99	.11	.14	18,004
Oklahoma	1.01	.95	.05	.06	16,487
Oregon	.74	.97	.10	.11	18,204
Pennsylvania	1.26	.94	.07	.11	17,506
Rhode Island	1.12	.98	.02	.07	15,328
South Carolina	1.20	.99	.08	.06	14,243
South Dakota	1.29	1.05	.10	.11	13,565
Tennessee	1.53	.99	.08	.12	16,166
Texas	1.07	.96	.07	.04	17,960
Utah	1.16	.94	.07	.04	17,314
Vermont	1.05	1.06	.12	.15	14,394
Virginia	1.13	.95	.07	.06	16,953
Washington	1.13	.95	.10	.12	18,439
West Virginia	1.09	.99	.04	.11	15,172
Wisconsin	1.07	.99	.09	.08	17,171
Wyoming	.84	1.07	.03	.02	19,137

NOTE: Natural logarithms of these variables were used in the regressions for which results are reported in Tables 3–2, 3–3, and 3–4.

APPENDIX C Definitions of Industrial Groups and Values for an Industry-Specific Relative Earnings Variable

Industrial Group	1980 Census Codes	Industry-Specific Demand Index[a]
Durable goods	230–391	1.29
Food and kindred products	100–122	1.02
Textile products	132–152	.92
Other nondurable goods	130, 160–222	1.11
Transportation	400–411, 420–432	1.37
Communications	440–442	1.47
Utilities and sanitary services	460–472	1.28
Wholesale trade	500–571	1.19
Retail trade	580–691	.76
Finance, insurance, and real estate	700–712	1.21
Business and repair services	732–760	1.12
Personal services	761–791	.77
Entertainment and recreation services	800–802	.70
Health services	812–840	1.12
Legal services	841	1.31
Educational services	842–851, 860–861	.83
Other services	852,862–892	.86
Other	All remaining codes	1.01

[a] Defined as the average earnings of women 20–24 in the given industry divided by the average earnings of all women 20–24. The natural logarithm of this variable was included in the log wage equations to account for demand effects.

4

The Effects of Sex-Role-Related Factors on Occupational Choice and Salary

Linda Mezydlo Subich, Gerald V. Barrett, Dennis Doverspike, and Ralph A. Alexander

Despite passage of the Equal Pay Act of 1963 and Title VII of the Civil Rights Act of 1964, pay discrimination is still an issue for the courts and the subject of many scholarly inquiries (Cooper and Barrett, 1984; Milkovich and Newman, 1984; Rynes and Milkovich, 1986). Many of these inquiries focus, as Rynes and Milkovich (1986) point out, on the definition and measurement of market wages. Although this focus is an important one, an additional area of research that may prove fruitful is the examination of how and why women continue to enter lower paying jobs, fail to advance in their salary and position, or both. Osmond (1984) highlights a wide variety of social and personal factors that may have to be considered to unravel the pay gap between men and women. Similarly, Schwab et al. (1987) suggest the need to look at employment as a "two-way decision process." This paper examines how factors related to sex-role may affect occupational choices of women and men and their obtained wages. 9

The Occupational Choices of Men and Women

It has been observed that women's jobs tend to occupy the periphery rather than the core of the industrial sector (Ward and Mueller, 1985). Men are found, for example, in steel while women are found in support services related to the steel industry. These peripheral jobs, in contrast to core jobs, tend to be lower paying; numerous studies have documented the relationship between female-dominated occupations and lower wages (Lewis, 1985; O'Bryant et al., 1978). Women, however, appear to continue to select such jobs despite their lower wages. Evidence suggests that while discriminatory policy accounts in part for men's and women's sex-stereotypic job choices and salary differentials, other factors are important as well (Lewis, 1985).

Socialization, sex-role stereotyping, and role differentiation of women have all been proposed as constraints on women's choices that lead to lower paying positions (Card et al., 1980; Mallan, 1982; O'Leary, 1974). These processes have been called on to explain why women in laboratory settings

pay themselves less than men pay themselves for identical work and less than what observers judge their work to be worth (Callahan-Levy and Messé, 1979; Major and Forcey, 1985).

Women seem to value their efforts less than do men, a situation that leads to gender differences in salary expectations—that is, women expect less than what men expect (Major and Konar, 1984; Posner et al., 1985). This gender difference in expectations is especially salient in light of a study by Major et al. (1984), who produced laboratory evidence that the more money an applicant requested for salary, the more he or she was awarded if hired. If women expect less, it seems likely that they will also request less money from prospective employers.

Zappert and Weinstein (1985) suggest that women may be more easily satisfied than men with regard to salary, and Sauser and York (1978) have presented some evidence for this explanation. Empirical examinations of whether this means that men and women differ in the value they place on monetary rewards, however, have yielded mixed, weak results. Men and women are found by some to value pay similarly (Brief et al., 1977; Lacy et al., 1983; Walker et al., 1982) and by others to value it differently (Bartol, 1976; Subich et al., 1986). Only in theoretical papers (eg., Parsons and Goff, 1978) and descriptive studies of higher and lower paid women (Jacobowitz and Vidler, 1982; Nordholm and Westbrook, 1982) however, has the concept of differences in values received any consistent support. Such tentative evidence does not argue strongly for gender differences in values regarding salary.

Women's lower earnings, then, are probably not a result of their being unconcerned about finances; instead, they may be partly a function of their initial choices of lower paying occupations and their willingness to accept lower salaries. Such behaviors may be tied to socialization processes that influence women's views of their abilities and their standards for compensation. The relationship between women's socialization and the process of occupational choice has been examined extensively for a variety of important reasons, including the fact that early occupational choices lay the foundation for future pay and advancement (London and Stumpf, 1983). Expectancy theory models of women's occupational choice, for example, have been used to show the predictive utility of such socially transmitted factors as the values of various job outcomes, the influence of significant others' expectations, and personal motivations (Bartol, 1976). Wheeler and Mahoney's (1981) theory of occupational choice also addresses the impact of socialization on women's occupational choices; they suggest that choice is a function of attraction to the occupation, expectation of attainment, and expected costs of the attainment—all factors on which women's socialization is likely to be a powerful influence. It therefore makes good theoretical sense to suggest that variation in career choice is due, at least in part, to socialization processes (Eccles, 1986).

Empirical support for the existence of socialization differences between women who choose nontraditional, higher paying occupations and those who choose traditional positions has been reported. Moore and Rickel (1980), Waddell (1983), and Williams and McCullers (1983) all found women in nontraditional careers to be more masculine in their sex-role identification. Standley and Soule (1974) described women in a variety of nontraditional occupations as having had similar socialization patterns with regard to engaging in "boyish" play, being considered special by parents because of firstborn status, and having had achievement emphasized by their parents. Other important factors in choosing a nontraditional occupation are exposure to innovative female role models (Doll et al., 1982; Gilbert, 1981) and to information about the availability of

such occupations for women (Bridges and Bower, 1985).

On the basis of these studies, it would seem that women who choose more prestigious, male-dominated occupations are fundamentally different in experience and socialization from those who make traditional choices. They adhere to attitudes, beliefs, and standards that are more similar to those of men and the masculine role, and they may have been exposed to more nontraditional information than their peers who make traditional choices. That difference seems to enable them to go beyond the barriers that restrain other women.

This interpretation is further bolstered by evidence of gender differences in career behavior. Since most women adhere to standards of behavior associated with the feminine sex-role stereotype and most men adhere to standards of behavior associated with the masculine sex-role stereotype, comparisons by gender often provide additional information regarding sex-role-related differences. Van der Burg and Schoemaker (1985) pointed to the effects of passive discrimination, negative expectations, and differential skill acquisition on women's poorer labor chances. Raelin (1982) described women as "career deprived" as a result of societal and individual factors.

Research has shown that men perceive more job options for themselves than do women (Poole and Cooney, 1985), apply for more jobs and receive more offers (Leviton and Whitely, 1981), and explore options more systematically and with greater self-esteem (Stumpf and Colarelli, 1980). Women have been found to be more likely to gravitate to predominantly female occupations than men and less likely to assume that 'they will get preferential treatment because of their sex (Heilman and Herlihy, 1984), to expect to have more trouble in getting a job and less ability to do well at it (Gurin, 1981), and to be more influenced by a job's intrinsic factors (Miller, 1980). Despite gender differences in organizational commitment and extent of role conflict (Graddick and Farr, 1983; Polachek, 1981), women and men in business have been found to be similar in their potential for management and advancement (Ritchie and Moses, 1983). This latter study, however, is limited in that it studied a group of women who may already have been self-selected on the basis of masculine sex-role orientation. Overall, socialization does appear to be an important influence on women's work attitudes and outcomes.

The Influence of Sex-Role-Related Factors

This paper focuses on three factors related to sex-role that may influence the occupational choices made and salaries attained by women: occupational information, self-confidence, and risk taking. Occupational information is examined as a factor that may mediate sex-role stereotypic occupational choices. Women's awareness of occupations and their salary structures appears less accurate and complete than men's. This may lead to women's consideration of erroneous information in the occupational decision-making process as well as omission of information from the process. Gender differences in self-confidence may likewise contribute to sex-role stereotypic occupational choices. Women's lower expectations for their performance in challenging or male-dominated occupations may result in lower salary expectations and attainment. Finally, women's lesser tendencies toward risk taking may limit the range of their occupational behavior to the extent that opportunities for advancement or salary increase may be lost. These factors, then, are examined so they may be considered for inclusion in models that attempt to explain the gender differences noted in occupational behavior and its outcomes.

Occupational Information

One way of broadening career exploration and choice considerations may be to increase exposure to information regarding occupational choices. Greene et al. (1982) and Zasada (1978) have produced evidence that career behavior, especially sex-typed career behavior, may be altered through provision of information. Women, more so than men, have been noted to report a lack of information about nontraditional occupations (Yanico, 1983; Yanico and Hardin, 1986; Yanico and Mihlbauer, 1983), and Pedro (1982) found men seek more occupational information than women.

With regard to salary information possessed by men and women, O'Bryant et al. (1978) found male and female high school students to rate "male-dominated" jobs as having higher salaries than "female-dominated" jobs and men as more likely to be better paid than women in whatever type of job they chose. Beyard-Tyler and Haring (1984) also reported perceptions of the prestige and monetary worth of a job to be a function of the job and its incumbent, and men were most often given the earnings advantage. In addition, their subjects reported being discouraged from nontraditional choices, a finding with far more serious consequences for women than for men since traditionally male-dominated occupations have always been accorded higher value. Women's salary information, then, may be both more limited than that of men and permeated With the belief that women's work is worth less than that of men.

Even when women choose nontraditional occupations, there is some evidence that they receive lower salaries. Sigelman et al. (1982) compared salaries of male and female administrators and found that the women earned $ 5,000 per year less overall, and $ 2,000 per year less when responsibilities were matched. Similar results were obtained by Tucker (1985) when she examined salaries of men and women holding a master's degree in business administration. One hypothesis may be that the salaries requested and accepted by women pursuing nontraditional occupations are influenced by the salary structure with which the women are familiar: A level of earnings that is low by male standards may be relatively attractive for a woman acquainted only with typical female earnings. This may partially explain women's acceptance of lower earnings in jobs that are typically well paying, but other factors, such as self-confidence and risk-taking behavior, may also play a role.

Self-Confidence

One factor that influences women's lower earnings may be their lower expectations for job performance and advancement. It has been suggested that one key to advancement and higher salaried positions is the expectation that one will succeed (Keown and Keown, 1982), and Stake (1979) has proposed that self-esteem may play a particularly important role in women's career development. In fact, Hackett and Betz (1981) have adapted Bandura's theory of self-efficacy to explain gender differences in career behavior; they argue that women's socialization has not prepared them to expect success in career areas and that this accounts for many of the difficulties they experience. Supportive of this model is the finding that higher self-esteem correlates with more effective job search behaviors and more satisfying outcomes (Ellis and Taylor, 1983).

Studies of children indicate that, even at early ages, girls and boys perceive men, particularly those engaged in traditionally masculine activities, as more competent than women (Bridges and del Campo, 1981; Rosenthal and Chapman, 1980). These attitudes seem to be internalized and to persist in later life, as evidenced first by Wallach and Kogan's (1961) and then by Erkut's (1983) finding that female students expected

to do more poorly than male students even though their performance was actually equivalent to that of the males. Alagna (1982) and Erkut (1983) suggest that it is not gender but sex-role that determines expectations of success. They present information that the feminine sex-role is associated with lower perceptions of competence, self-esteem, and performance. According to these authors, the fact that more women than men endorse such a sex-role explains the apparent gender differences in self-concept that have been noted by other researchers.

In studies that have examined ratings of male and female performance it has been found that both sexes downgrade women and upgrade men (Deaux and Taynor, 1973; Feather and Simon, 1975). Surprisingly, Ezell et al. (1980) reported that when male and female managers rated the competence of female managers, it was the female managers who were most critical of other females' performance. These consistent findings of an association between feminine gender or sex-role and lower perceived competence have rarely been disputed (e.g., Greenhaus and Simon, 1976) and imply that women may have to work harder to achieve the same performance ratings as men.

In studies of individuals' personal performance ratings, similar findings have been reported. Working women's self-esteem has been found to be positively related to self-perceptions of job performance (Goh and Mealiea, 1984). Both women's and (especially) men's perceptions of efficacy have also been found to be positively linked to performance (Weinberg et al., 1980). Such evidence suggests that women's lower self-ratings of job performance, as well as their related lower self-esteem and lower efficacy, may prevent them from asking for a salary increase whether or not their actual performance merits it. In addition, lower perceptions of efficacy may actually interfere with performance such that advancement is hindered.

Lemkau (1979) reviewed the literature from 1930 to 1976 on characteristics of women in nontraditional occupations and found that the women who succeeded at those occupations were more masculine, self-confident, and dominant than those in traditional careers. Zuckerman (1980) also reported that self-confidence, long considered a masculine attribute, was a good predictor of choosing high-prestige careers for both men and women. Additional research on gender differences in occupational preferences has shown that expectation of success is related to a preference for higher paying and more prestigious careers (Collins et al., 1980; Wheeler, 1983a). Complementarily, Stake (1981) found that women are less likely to express preferences for traditionally masculine careers and more likely to set lower goals for themselves.

Special attention has been paid to women in management positions because of their nontraditional status. Work in this area suggests that "the most well validated trait distinguishing male and female managers is self-confidence" (White et al., 1981:552). Despite female managers' lower self-confidence, however, they are typically more confident than women who have not advanced to management positions (Morrison and Sebold, 1974; Place, 1979). In addition to these findings that female managers have more doubts than male managers about their potential for success, there is also evidence that those who make promotion decisions also doubt women's capacities to succeed and advance (Garland et al., 1982; Wiley and Eskilson, 1983). These researchers found that in the long run most women were not expected to live up to their potential. Given these circumstances, many promising women may have to cope not only with their own attitudinal barriers to advancement, but with those of others also.

The lower self-confidence of women in general is greater in nontraditional occupations. Women have been found to report less confidence in their performance when working beside a man (Heilman and Kram,

1978) or anyone they believe to have good ability (Corbin, 1981). Since most high-prestige occupations are occupied predominantly by men and both sexes perceive men as more competent, it seems inescapable that women in such positions must continually struggle against feelings of inferiority, which can hamper their performance. These self-doubts have been found to be especially salient for women in the early stages of their career development (Popp and Muhs, 1982), when it is most important to be recognize as having advancement potential.

Risk-Taking Behavior

Lack of self-confidence is clearly one personal factor capable of hampering women's career development, but another important influence may be lack of risk-taking behavior. Risk taking as a value (Kelling et al., 1976; Wallach and Wing, 1968) seems to be held in high regard by the business community as long as the risk is successful (Finney, 1978). Indeed, some research suggests that willingness to engage in risk-taking behavior depends on one's perceptions of the probable outcome (Clark and Willems, 1969). People generally prefer to avoid risk when the consequences are serious and are more willing to take risks when success appears likely.

It has been suggested that women's lower salaries and advancement are a result of an unwillingness to take risks (Baird and Thomas, 1985) and that this pattern will continue until women have more risk-taking role models (Schwartz, 1976). Support for this contention may be drawn indirectly from work that describes women in management and other high-prestige areas as more likely to take risks (Gackenbach et al., 1979; Grey and Gordon, 1978).

Risk-taking tendencies may also play a role in career selection processes, according to Ziller (1957). He found that students with higher risk-taking scores were more likely to express an interest in sales occupations than in such areas as engineering, education, and business administration. These results were disputed by Davidshofer (1976), but a recent study by Moriarty (1983) supports Ziller's contentions. She found evidence that professional women were greater risk takers than women who had chosen clerical careers. In addition, Fischer's (1976) work has supported the role of risk taking as a factor in evaluations of job offers.

Examinations of gender differences in risk taking have been mixed. One study of Latin American students reported that women took more risks in a simulation game (Tuchman, 1981), but most research has pointed to either a lack of gender differences or an advantage for men. Evidence for findings of no differences was found in examinations of children's classroom risk taking (Kourilsky and Campbell, 1984), students' risk taking on exams (Slakter, 1967), and adults' risk taking in simulated investment situations (Blum, 1976). In the area of occupational behavior, Blum (1975) and Lettman (1981) both reported no gender differences in the role of risk taking as it related to students' occupational preferences. In addition, Rynes and Rosen (1983) noted that men and women in their study were similar in their perceptions of what salary inducements were necessary to justify taking various promotion risks in a job setting.

The bulk of the literature by far, however, has supported the idea that risk taking is a masculine attribute (Agarwal and Kumari, 1982; Douce, 1977). Boys have been reported to be bolder and more venturesome (Ginsberg and Miller, 1982; Saklofske and Eysenck, 1983), and male students in groups have been noted for their greater risk taking and encouragement of others' risk taking (DiBerardinis et al., 1984; Seeborg et al., 1980). Men have also been reported to take more risks in more situations than women (Hudgens and Fatkin, 1985), and women are more likely to be dissuaded from risk taking than are men (Finney, 1984).

Monetary risk taking has consistently shown gender differences as well. Cvetkovich (1972) reported that men place riskier bets than women. Baker (1970) and Wallach and Kogan (1959) reported women to be more conservative than men with regard to financial decisions, and other work has suggested that men may be more likely than women to gamble on asking for a raise rather than waiting for one to be awarded (Brenner and Bertsch, 1983).

Finally, in studies of risk taking in occupational behavior, Muldrow and Bayton (1979) found male and female executives to make decisions similarly but for men to be more prone to risk taking. Fleming (1973) presented evidence that social position determines risk taking—those from higher and more secure social backgrounds are more likely to take risks. Given women's traditional levels of social and economic power, an unwillingness to risk may thus be justified. These findings of gender differences in risk taking are further bolstered by a report (Kogan and Dorros, 1978) stating that highly achieving women are viewed as exceptional by men and women alike and therefore are judged more able to tolerate greater risk taking than the average woman. The implication here is that achievement and risk taking are related and that only very unusual women are likely to be categorized in such terms.

Integrating Sex-Role-Related Factors

The literature reviewed indicates that men and women differ in occupational choice processes, occupational information, self-confidence, and risk-taking behavior and that these factors may all have an effect on gender differences in obtained occupation and salary. Although much of the literature deals with these variables separately, some integrative work has been done. Daniel and Droppova (1979), for example, report that workers' risk taking and determination to succeed correlated positively with one another. Moriarty (1983) found a positive correlation between risk taking and self-esteem for working women.

Baird and Thomas (1985) present a model of strategic risk taking that has been supported with research indicating relationships between risk taking and greater confidence, possession of more information about the situation, and greater importance of the derived benefits. Similar connections among variables were drawn by Chusmir (1983), who found that women in nontraditional occupations shared characteristics of risk taking, self-confidence, and career commitment. They also possessed higher levels of these characteristics than their counterparts in traditionally feminine occupations. The significance of these two papers is that they suggest that, in both theory and practice, variables of risk taking, self-confidence, and knowledge may interact to influence behavior.

In the interest of examining whether male and female college students' salary information, self-confidence regarding future career success, and occupational risk-taking tendencies indeed differ and covary according to the patterns noted in the previously reviewed literature, the authors conducted two preliminary studies (unpublished data). First, a heterogeneous group of 80 juniors and seniors in college completed measures of their knowledge of the entry-level and peak salaries for their intended career and other selected occupations, willingness to compromise their entry-level salary, self-confidence in their ability to succeed in their intended field, and risk-taking propensity in general and in occupational situations. Second, 61 graduating college seniors in business administration completed the same measures.

It was hypothesized in both cases that men would be more confident of their future success, less willing to compromise as much of their expected entry-level salary, more likely to expect a greater increase from

entry-level to peak salary, and more likely to take risks than women. It was also expected that men would be more accurate in their salary estimates than women and, if they did err, would, be more likely to overestimate what jobs were worth. In addition, relationships were expected to be found between risk taking, self-confidence, and expected salary levels.

The results obtained were not conclusive, but they did indicate that men and women may differ in their perceptions of salaries. Both groups of subjects consistently overestimated salaries for their intended occupation as well as for the other selected occupations. Men, however, overestimated salaries to a greater extent than did women, particularly their own expected salaries. In the first study, for example, men overestimated their entry-level salary by an average of $5,265, while women overestimated by an average of $2,322.

Data on men's and women's confidence regarding likely career success were more equivocal, perhaps due to the inadequacies of a single general rating, the natural optimism of prospective graduates, or both. Among students in the heterogeneous group there was no evidence of a gender difference in confidence, but in the homogeneous group men appeared to be more confident of their future success. In addition, for women in the homogeneous group, confidence ratings were correlated with estimates of entry-level salary ($r = .35$) and with willingness to compromise the expected entry-level salary ($r = -.53$). No such correlations were found for the male students in the sample. On the basis of this preliminary evidence, it would seem that women's confidence levels, more so than men's, may be important factors in determining initial salary expectations and to what extent employer pressures may be effective in eliciting compromises of those expectations.

General risk-taking tendencies showed clear sex differences in the expected direction. Men in both samples reported a greater likelihood of risk taking, and in the heterogeneous sample greater risk taking was found to be related to greater salary expectations. This latter relationship was strongest for expected peak increases and held true for men and women ($r = .35$ and $r = .34$, respectively). Men's tendency to risk was also significantly correlated with expected entry-level salary ($r = .26$) and a greater willingness to compromise on the entry-level salary ($r = .29$). Risk taking may thus be one factor in determining an individual's probability of attaining an above-average salary and may even predict job behavior directed toward that end. For men, especially, risk taking may be related to a willingness to gamble in the short-term with the goal of a larger future payoff.

The inconclusive nature of these preliminary results may have been a function of a number of factors. The enormous error variance in salary estimates found throughout the data may have weakened or eliminated some effects. The lack of discrimination of the single confidence measure may also have been a problem, as students' pre-graduation positivism predominated. Finally, some of the results from this investigation may be explained only when placed in the context of a more complex model of gender-related behavior, such as that presented by Deaux and Major (1987). Nonetheless, these preliminary findings remain suggestive of the value of the present line of inquiry.

Summary and Implications

Our preliminary studies do support in a general way most of the previously reviewed work and theorizing about sex differences in occupational information, self-confidence, and risk taking, but the most valuable findings may pertain to how these variables relate to one another and to salary expectations. Evidence that risk taking correlates with salary expectations and attitudes regarding salary compromise, and that con-

fidence seems to relate to salary expectations for women but not men, provides support for the previously cited models of Baird and Thomas (1985) and Chusmir (1983). Women's socialization to take fewer risks and to be less confident of their abilities may indeed play a critical role in their perceptions of the salary they deserve and the importance they place on this factor in career decision making (Subich et al., 1986).

In addition, in view of the findings of Major et al. (1984), the fact that men in our preliminary studies greatly overestimated salaries compared with women may indicate their greater likelihood of asking for and receiving higher wages, Women's lower confidence and tendency to risk would certainly not contraindicate such a conclusion. And while both sexes grossly overestimated salaries, it is not the accuracy but the attitude that bodes well for men rather than women. The economic reality that employers and prospective employees view salary setting with conflicting goals suggests that a successful strategy may be for the employee to be very aggressive in wage negotiations. Regrettably, women's socialization may be a major obstacle to such behavior.

Beyond adding to the current body of knowledge concerning pay equity, this review and our preliminary studies have implications for those who would attempt to eliminate wage differentials. Maximizing self-efficacy, providing salary information, and encouraging risk taking are examples of strategies that could have an impact on how women negotiate salaries. Also affected by such efforts might be women's expectations and behaviors on the job with regard to bargaining for salary increases; sex difference in initiating discussion of raises (Brenner and Bertsch, 1983) might thereby be eliminated. Strategies such as those outlined above could be implemented in a variety of settings to reach women of different backgrounds and ages.

Our review and findings also illustrate some fruitful areas' for future research. Of primary importance would be carefully conceived and carried out investigations of the variables examined in our preliminary studies. In any such endeavors, the use of paper-and-pencil procedures should closely approximate actual applicant situations and behaviors. And, research with homogeneous, rather than heterogeneous samples may be preferable in that the information elicited from such samples may be more meaningfully interpreted and could be compared across career areas (nursing, engineering, and so on). There may be differences in salary attitudes and personal characteristics across careers (Wheeler, 1983b) and by gender within a specific career area.

Field studies of salary-negotiation behavior are also desirable, especially because there is some evidence that sex differences found in the laboratory may not be replicated in the workplace (Dalton et al., 1987). In general, discrimination may be more evident in the laboratory than in an actual field setting. Thus, an examination of students or workers' obtained salaries and their relation to the variables of self-confidence, risk taking, and salary expectation would be valuable in determining how these preliminary results relate to real-world issues. In the same vein, followup of subjects to the point of peak earning capacity would also be of interest. Observations of interview and salary-negotiation behaviors of men and women could prove to be another important line of inquiry.

In summary, this literature review and the preliminary study results presented point to the need to study both wage systems and the individuals involved in them in order to understand more fully pay equity and inequity. The results and review are by no means definitive, but they do lead to some intriguing and potentially important questions that should be addressed in future research and theorizing. They also point to some concrete and practical strategies for combating the attitudes and socialization

processes that may contribute to women's lower earnings.

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PART II

JOBS AND OCCUPATIONS AS THE UNIT OF ANALYSIS

5

Pay the Man: Effects of Demographic Composition on Prescribed Wage Rates in the California Civil Service

James N. Baron and Andrew E. Newman

Debates regarding comparable worth have rekindled interest in whether "women's work" is undervalued relative to commensurate work done by men. Various laboratory experiments have demonstrated that men and women ascribe less worth to work performed by women (see Deaux, 1985; McArthur, 1985; Major et al., 1984). Other research has consistently reported negative associations between the proportion of women in an occupation and reward levels, even controlling for average occupational skills and vocational requirements (see Parcel et al., 1986; Treiman and Hartmann, 1981). Unfortunately, there have been fewer studies of how gender composition shapes organizational pay decisions.

From both a theoretical and policy standpoint, it would clearly be helpful to know more about pay decisions within actual work organizations, rather than having to infer gender biases in organizational personnel systems from laboratory studies or aggregate research on occupations. Several recent longitudinal studies of organizations have documented persistent negative effects of the percentage female in a job on the pay of incumbents, even controlling for workers' skills and job requirements (Pfeffer and Davis-Blake, 1987; Rosenbaum, 1985). These few studies are thus consistent with findings from the laboratory and occupational research mentioned above.

The nature of the relationship between gender composition and organizational pay practices, however, is still not well understood. As Hartmann et al. (1985:18) note, pay and salary levels of different jobs within an enterprise are not automatically determined by the operation of abstract forces such as . . . 'low valuation of women's work'. . . . [Pay] decisions are poorly understood, partly because it is difficult for researchers to obtain access to data on individual firms."

This paper tries to help fill that void by examining how the prescribed pay rates of jobs vary as a function of the demographic composition of incumbents in those jobs. The data we analyze have several potential advantages. First, they characterize prescribed pay rates for jobs (rather than the average pay of incumbents), thereby providing a measure of job "worth" that is independent of variations across jobs in incumbents human capital. Second, they en-

able us to examine the effects of race and sex composition on pay rates. Third, they permit fairly precise controls for the training and task requirements of positions in assessing the net effects, of demographic composition on pay. Fourth, they cover multiple time points, which enables us to examine whether changes in demographic composition affect the relative worth of jobs.

The data describe pay structures in California state agencies. The California civil service is arguably as rationalized and subject to intense scrutiny and pressures for egalitarian reform as any personnel system in the private sector, State governments may also have greater slack with which to absorb pay equity costs than most private enterprises do (Killingsworth, 1985). Our results, therefore, provide a useful benchmark in assessing the magnitude of pay inequities, because pay and personnel practices in the private sector are probably less egalitarian (in general) than in California's state government.

The Setting

The executive branch of the California state government consisted in 1985 of approximately 120 standing agencies, boards, and commissions and several dozen temporary, special-purpose commissions. Total employment in the 120 regular agencies was approximately 150,000 as of March 1985—over 120,000 full-time civil servants and roughly 30,000 part-time and temporary workers. California state agencies range in size from commissions with fewer than 10 full-time staff members to agencies with over 10,000 employees each, such as the Departments of Transportation and Corrections. In March 1985, 90 agencies had 10 or more employees; the mean was approximately 1,350 employees and the median was approximately 275, Each agency consists of a chief executive, appointed by the governor, and (in larger agencies) one or two assistant executives, who are also political appointees. The remaining full-time staff in each agency consists of civil servants enjoying tenure rights.

California's civil service merit system consists of formal rules and policies governing every aspect of personnel management. These rules and policies were first set out in the California Civil Service Act, passed in 1913. This act called for the use of merit principles in staffing state agencies and created a Civil Service Commission to administer the new merit system and ensure compliance with its principles by individual agencies and boards. The commission was replaced in the mid-1930s by the State Personnel Board (SPB), which continues to administer the system. The Department of Personnel Administration (DPA) was created in 1981 to administer the civil service salary system and has gradually gained jurisdiction over additional personnel matters formerly managed by the SPB—most notably, position classification.

Approximately 5,000 job titles exist across state agencies (although many are without incumbents at any given time) and are organized into the job classification (or class) system administered by the DPA and SPB. The DPA and SPB also maintain class specification sheets, which describe the duties and qualifications for each class. Other personnel functions, including testing and related aspects of selection, have been delegated to individual agencies over the past several years. The result has been considerable decentralization of the California state civil service system and a gradual transition of the SPB from a centralized personnel authority to a body whose responsibilities are increasingly limited to monitoring and oversight.

The decentralization has by no means been complete, however. The SPB continues to administer employment activities involving agencies too small to have their own personnel function. Moreover, the SPB is responsible for administering "service-wide classes"—jobs that are used by many agencies statewide (e.g., general clerical classes) and that are thus subject to centralized SPB

control rather than the discretion of individual agencies or subunits. The SPB is also responsible for ensuring agency compliance with governmental regulations concerning equal employment opportunity, affirmative action, and pay equity.

There is one noteworthy difference between the California civil service and the federal government (and other jurisdictions organized along similar lines). The federal civil service system incorporates General Schedule (GS) grades and subdivisions that link educational and experience requirements to pay rates in a standardized manner across disparate occupational series. In the California civil service system, however, each job is assigned to a particular pay range, but there is greater flexibility across occupations in how this is done and in the precise minimum and maximum pay assigned, even for jobs nominally allocated to the same pay-range category. Consequently, there appears to' be greater latitude for the demographic mix of incumbents to affect perceived position worth in the California system than in the federal government and other systems having more uniform criteria for mapping job titles to pay ranges.

Hypotheses

Based on previous research, we hypothesize that prescribed pay rates are lower in positions staffed disproportionately by women or ethnic minorities, even after controlling for job content and requirements. We also hypothesize that the entry of women or minorities into jobs devalues them, that is, reduces their relative pay. Accordingly, we supplement our cross-sectional results with analyses of data at two time points in order to examine whether *changes* in demographic composition produce *changes* in a job's standing within the wage hierarchy.

Organizational theorists posit that the environment is "imprinted" on organizations at the time of founding and that arrangements appropriate to that period persist through structural inertia (Hannan and Freeman, 1984; Stinchcombe, 1965). If this is true for jobs as well, then positions created more recently should be more likely to reflect contemporary concerns with pay equity, whereas older jobs should be more likely to be devalued if held by women and minorities. Therefore, we report separate cross-sectional results for newly created versus "enduring" positions, which enables us to assess whether tendencies toward devaluation are less pervasive in recent cohorts of jobs.

Finally, we hypothesize that the effects of changing demographic composition on pay rates depend on the extent of employment growth in a job. One common explanation for lower pay in occupations having a disproportionate share of women or racial minorities is the "crowding" that occurs when lower status workers enter a line of work and drive down wages (Bergmann, 1974; Hodge and Hodge, 1965). By creating excess supply, it is argued, women and minorities compete against white men and thereby lower wages. Although it is difficult to operationalize and measure the relationship between labor supply and demand in a given job (see Nakamura and Nakamura, in this volume), this line of argument suggests that the entry of lower status workers might devalue a job most when employment is declining. Moreover, it is likely that the entry of women or nonwhites into a job would be more salient under conditions of decline than under expansion, exacerbating the tendency for their entry to diminish the perceived worth of the position. In contrast, rapid growth in a job might ease competitive pressures and crowding, thereby reducing the tendency for the entry of women and minorities to depress wages.

Data and Methods

The Sample

We analyze data describing staffing patterns, published pay schedules, and other

characteristics of all jobs having incumbents in the California state civil service system in two time periods. As of March 31, 1979, there were 2,844 jobs in use and 113,569 full-time incumbents. As of March 31, 1985, there were 3,188 jobs and 123,212 full-time incumbents. The data files provide information on the staffing patterns (by ethnic group and sex) and the wage range (i.e., the minimum and maximum pay prescribed by the civil service) for all jobs in every agency. We analyze data describing state employment as of both dates, and in our longitudinal analyses, we look at the effects of changes in demographic composition on prescribed pay rates over that 6-year period.

Because California is currently involved in a suit brought by the California State Employees Association (service Employees International Union), the largest comparable worth lawsuit in U.S. history, the results of our study have added relevance. We coincidentally obtained these data from the state for basic research purposes just before the lawsuit was filed. We have had regular conversations with both parties to the litigation, keeping them informed about our analyses and seeking answers to specific questions about the state personnel system, union activities, and the like. We have been steadfastly nonpartisan throughout the litigation, however, (The state did not impose any quid pro quo for providing us with the data other than requesting that we apprise them of our results and honor certain routine confidentiality requirements.)

Operationalization

We operationalize *job worth* as the prescribed monthly starting pay in a job class.[1] Unlike a measure based on the average wage received within each job, our operationalization is not affected by sex or race differences in human capital, seniority, or productivity within a job classification. Note that if jobs dominated by white men provide greater chances of beginning employment above the prescribed starting pay or of ascending the pay ladder more quickly, those sources of advantage are not captured by our analyses. Thus, we are conservative in assessing the extent to which work done by women and minorities is "devalued."

We measure *sex composition* as the percentage of full-time incumbents in each job who are female. *Race composition* is measured by three variables indicating the percentage of full-time job incumbents who are black, Hispanic, or in "other" ethnic minority groups (mainly Asians within most job categories). We also look at interactive effects of sex and race composition. One might expect, for instance, that although a predominance of women or minorities in a job lowers its perceived worth, there is no additional "penalty" (i.e., interaction effect) associated with having a predominance of female minorities. Accordingly, we also include variables denoting the percentage in each job who are black females, Hispanic females, and females belonging to other minority groups.

We control for *job content* somewhat indirectly because California has no formal point system for judging job worth. To date, the state has gauged pay equity principally by comparing "the results . . . of comparable worth or point factor studies performed in other jurisdictions to current salary relationships of classes which have similar duties and responsibilities within State service" (California State Department of Personnel Administration, 1982:14).

Lacking formal ratings of job worth, we can only conduct an indirect and preliminary study of this facet of comparable worth. We do so in two ways. First, we rely on the occupational classification system used by the' state civil service system itself. Our regression analyses include vectors of dum-

[1] We conducted supplementary analyses measuring job worth in terms of the prescribed maximum (rather than minimum) pay, as well as in a logarithmic metric. The results were unchanged.

my variables (at varying levels of detail) that control for detailed job families—jobs that the state civil service identifies as having comparable duties and requirements (see the appendix). This procedure may understate pay inequities to the extent that people are segregated across jobs for reasons unrelated to skills, abilities, and voluntary choices. Therefore, for a subset of jobs, we report somewhat more refined analyses that control for the detailed educational and experience requirements of jobs listed in official job descriptions for a sample of state agencies and civil service jobs. If differences in prescribed pay across job families solely reflect differences in job requirements, then controls for educational and training demands should eliminate (or severely reduce) any net effects of job family on base pay rates. An effect of demographic composition on pay rates net of experience and educational requirements would be prima facie evidence of unequal pay for comparable work.

Job growth is measured by the percentage increase in employment between March 1979 and March 1985 within each job class (for classes having one or more incumbents at both time points).

Cross-Sectional Analyses

Effects of Demographic Composition

Table 5-1 provides descriptive statistics for base pay rates and demographic composition for three sets of jobs: positions having incumbents as of March 31, 1979, positions with incumbents as of March 31, 1985, and positions that were occupied at both time points (i.e., enduring jobs). The statistics reported in parentheses weight each job according to its number of incumbents; the other statistics are unweighted. These descriptive statistics are provided principally to assist readers in interpreting the magnitude of effects reported in the regression analyses that follow.

In 1985 the average full-time California civil servant was in a job in which the entry pay rate had increased roughly 38 percent since 1979. As seen from the second row of Table 5-1, however, adjusting 1979 pay rates to 1985 dollars reveals a real *decline* in pay rates over this period, a result that is not altogether surprising given similar trends in the private economy and the impact of tax reform (Proposition 13) on the state budget.[2]

Roughly four out of nine full-time civil servants in 1985 were female, and over 34 percent were minorities, up from 24 percent in 1979. Just over half the black employees were female, and women represented just under 50 percent of the remaining ethnic categories.

Table 5-2 reports results from ordinary least-squares (OLS) regressions in which the dependent variable is the prescribed 1985 monthly minimum starting pay in each job classification (in dollars). Coefficients in parentheses are from regressions that weight each job according to its number of incumbents; those results convey relationships that pertain to the typical civil service *worker*, rather than the typical civil service job.[3] Table 5-2 summarizes relationships among 3,188 jobs that employed 123,212 full-time workers as of March 31, 1985.

Because California has no systematic procedure for quantifying job requirements, we attempt to capture compensable differences in job content by adding control variables at increasing levels of occupational

[2] The Bureau of Labor Statistics calculated the Consumer Price Index in California to be 216.2 in 1979 and 320.0 in 1985 (1967 = 100), which implies a 48.01 percent cost of living increase over the 6-year period (California State Department of Finance, 1986:61). We have thus inflated 1979 pay rates by that amount in adjusting them to 1985 dollars.

[3] In all weighted analyses, we resealed the weights to sum to the actual number of jobs involved. This ensures that weighted effects do not appear statistically significant simply because the sample size is inflated when jobs are weighted by employment.

TABLE 5-1 Descriptive Statistics: Demographic Composition and Prescribed Minimum Monthly Starting Pay for California Civil Service Jobs

	All Jobs Occupied in 1979				All Jobs Occupied in 1985				Jobs Occupied Throughout 1979–1985							
									1979				1985			
Variable	Mean		Standard Deviation		Mean		Standard Deviation		Mean		Standard Deviation		Mean		Standard Deviation	
Prescribed minimum monthly starting pay (current $)	1,806.58	(1,345.18)	586.92	(481.84)	2,487.70	(1,860.31)	858.85	(642.91)	1,810.52	(1,337.89)	590.45	(499.96)	2,486.81	(1,843.67)	846.91	(659.81)
Prescribed minimum monthly starting pay (1985 $)	2,673.94	(1,991.02)	868.70	(713.18)	2,487.70	(1,860.31)	858.85	(642.91)	2,679.77	(1,980.23)	873.92	(740.00)	2,486.81	(1,843.67)	846.91	(659.81)
Percent female	19.87	(42.54)	32.49	(37.97)	27.38	(44.19)	35.48	(35.44)	19.92	(43.47)	32.33	(38.65)	24.37	(44.71)	33.18	(36.02)
Percent black	5.90	(8.66)	15.30	(8.50)	7.10	(11.29)	16.22	(9.52)	5.75	(8.70)	14.27	(8.80)	7.15	(11.76)	15.19	(9.63)
Percent Hispanic	5.25	(8.12)	13.77	(6.96)	8.25	(12.23)	16.84	(7.94)	5.17	(7.90)	13.41	(6.44)	8.29	(12.26)	16.14	(7.53)
Percent other minorities	7.19	(7.44)	16.37	(7.36)	9.96	(10.80)	18.68	(9.04)	7.04	(7.47)	15.32	(7.22)	9.99	(10.78)	17.75	(8.82)
Percent black female	2.06	(4.50)	9.14	(5.20)	3.05	(6.10)	10.79	(6.30)	1.91	(4.51)	7.85	(5.04)	2.59	(6.33)	8.77	(6.21)
Percent Hispanic female	0.95	(3.54)	4.47	(4.42)	2.18	(5.63)	7.52	(6.37)	0.90	(3.46)	4.16	(4.19)	2.06	(5.66)	7.56	(6.25)
Percent other female	1.65	(3.66)	6.98	(4.84)	2.95	(5.33)	9.38	(6.52)	1.69	(3.75)	6.72	(4.92)	2.67	(5.44)	8.08	(6.51)
N of jobs		2,844				3,188				2,285				2,285		
N of incumbents		113,569				123,212				100,424				104,717		

NOTES: Statistics in parentheses are weighted by number of job incumbents. Pay rates for 1979 were adjusted to 1985 dollars based on Bureau of Labor Statistics data on the Consumer Price Index for California, reported in California State Department of Finance (1986:61).

TABLE 5-2 Effects (in dollars) of Demographic Composition on Prescribed Minimum Monthly Starting Pay in 3,188 California Civil Service Jobs, 1985

	Effect of										
	Sex	Race			Sex and Race						
Model Including	Percent Female	Percent Black		Percent Hispanic		Percent Other	Percent Black Female		Percent Hispanic Female		Percent Other Female		$\bar{R}^2$
A. Sex	−9.85	(−10.07)											.17 (.31)
B. Race		−10.20	(−22.56)	−6.74	(−26.05)	−5.81 (−9.63)							.06 (.31)
C. Sex, race	−9.15	(−8.19)	−6.64	(−17.36)	−6.28	(−20.21)	−4.77 (−1.06)						.20 (.48)
D. Sex × race	−9.46	(−10.36)	−10.42	(−21.19)	−4.96	(−21.83)	−4.79 (−2.80)	8.92	(11.26)	−6.23	(3.98*)	0.47*	(4.67*)	.21 (.49)
E. Sex × race + controls for 20 job categories[a]	−6.24	(−9.72)	−4.99	(−12.91)	−1.82	(−13.00)	−3.44 (−10.21)	5.17	(6.68)	−0.58*	(4.26*)	2.45*	(13.31)	.60 (.73)
F. Sex × race + controls for 99 major schematic classes[b]	−7.42	(−11.18)	−5.98	(−13.94)	−3.47	(−14.71)	−3.80 (−8.52)	3.46	(4.78)	−2.79*	(0.73*)	−0.92*	(9.73)	.64 (.80)
G. Sex × race + controls for 20 job categories[a] + controls for 99 major schematic classes [b]	−4.66	(−7.83)	−3.78	(−8.21)	−1.87	(−8.30)	−2.45 (−6.25)	2.74	(2.18*)	−0.30*	(2.15*)	0.28*	(6.47)	.80 (.89)
H. Sex × race + controls for 281 detailed schematic classes[c]	−7.45	(−11.27)	−5.64	(−14.95)	−3.45	(−14.27)	−3.78 (−10.11)	3.02	(5.73)	−1.85*	(2.70*)	−1.14*	(5.02)	.67 (.83)
I. Sex × race + controls for 20 job categories[a] + controls for 281 detailed schematic classes[c]	−4.65	(−7.68)	−3.66	(−8.79)	−2.14	(−7.59)	−2.40 (−6.69)	2.23	(1.83*)	−0.02*	(2.25*)	0.13*	(6.14)	.81 (.90)

NOTE: Coefficients in parentheses are from regressions weighting each job by the number of incumbents.

[a]See appendix.
[b]See appendix. This categorization includes the following level of detail: general, typing, stenography and secretarial, and so on.
[c]See appendix. This categorization includes controls for detailed schematic classes (e.g., key data, mailing, microfilm).

* $p > .05$; all other coefficients significant at .05 level (two-tailed). Coefficients of determination are adjusted for degrees of freedom.

detail.[4] Accordingly, Table 5-2 shows the effects of sex and race composition on pay rates under various specifications. Models A through D regress pay rates on various combinations of demographic variables: sex only (model A), race only (model B), main effects of sex and race (model C), and main and interaction effects of sex and race (model D). Model E adds controls for the 20 major job categories used by the state for reporting to the Equal Employment Opportunity Commission (EEOC). (See the appendix for job categories.) These controls capture differences in pay rates associated with major families of work roles, such as "supervisory clerical," "clerical," and "semiskilled" workers.

Model F controls for 99 major schematic classes characterizing specific categories of work activity, such as "machine operations" within "office and allied services" or "police and law enforcement" within "regulatory and public safety" (see appendix). Model G combines the occupational controls contained in models E and F. Finally, to provide the most detailed controls for job content, model H includes controls for 281 detailed schematic classes, which represent detailed subdivisions of the 99 categories controlled in models F and G. These categories demarcate very specific job categories, such as "duplicating" within "machine operations" or "fish and game" within "police and law enforcement" (see the appendix). Model I adds dummy variables for the major EEOC categories to these detailed occupational controls.

Note that our controls for detailed occupation may absorb some effects of demographic composition that are of interest. In other words, our analyses only assess comparable worth *within* occupational families, not across disparate types of jobs, such as nurses versus gardeners. All differences in pay rates across detailed occupational groups—including some that may have to do with the sex and race of incumbents—were removed from models F through I before we assessed the effects of demographic composition. Thus, our assessments of bias against female-and minority-dominated jobs[5] are quite conservative, and we report results from models that control for detailed occupation only because those controls very much stack the deck against finding net relationships between demographic composition and pay rates.

Yet, even after including the most detailed occupational controls, we find strong effects of race and (especially) sex composition on pay rates (Table 5-2). Jobs dominated by men pay considerably more than otherwise comparable jobs dominated by women, and jobs dominated by whites pay substantially more than jobs dominated by blacks, Hispanics, or members of other ethnic groups.[6] Moreover, these effects tend to be stronger, rather than weaker, when jobs are weighted by the number of incumbents, which suggests that it is actually in the most populous jobs within the civil service that these effects are manifested, rather than in a few anomalous single-person classes. Controls for occupational categories reduce but by no means eliminate these demographic effects. The metric effect of sex composition in the most elaborate specification (model I) is nearly half the size of the bivariate effect (model A). Controls for

[4] Not surprisingly, there is considerable sex and race segregation across occupations, particularly at detailed levels of disaggregation. Consequently, there is sometimes extreme collinearity in models that attempt to disentangle effects of demographic composition from those of occupational differentiation. This reduces the chances of discovering statistically significant demographic effects and also suggests that the precise point estimates we report may be unstable.

[5] We use the terms female-dominated and minority-dominated to refer to jobs with disproportionate numbers of women or nonwhites, rather than meaning to imply that females or minorities are necessarily numerically dominant in any given classification.

[6] In supplementary analyses, we found no systematic evidence of nonlinearities in the effects of percent female or percent nonwhite on pay rates.

occupation absorb somewhat more of the effects of race composition. Even with the most detailed controls for job content, however, the effects of race and sex composition are substantively and statistically significant.

The results in Table 5-2 also suggest that, for the most part, the effects of sex and race composition on pay rates are additive. One apparent exception concerns the weighted effects for "percent other female," which indicate that jobs staffed disproportionately by women in this minority group (predominantly Asians) involve smaller penalties than are implied simply by the additive effects of sex and race composition. Given the high levels of educational and labor force attainment among California's Asian work force, this effect is not altogether surprising. Certain models in Table 5-2 also indicate that in jobs dominated by black women, there is some "redundancy" or overlap in the penalties associated with the presence of women and blacks. (Some numerical examples of the pay penalties associated with differences in demographic composition are provided below.)

Educational and Experience Requirements

The results in Table 5-2 might, however, merely reflect fine-grained segregation within job ladders. In other words, if pay rates reflect educational and experience requirements for positions within a job ladder, and women (or minorities) are concentrated disproportionately at the lower rungs of that ladder, one would find a negative effect of percent female (or nonwhite) on wage rates simply by failing to control for the differences in requirements at various levels of the ladder.

To examine this possibility, we coded the detailed educational and experience requirements from job descriptions for a random sample of state civil service jobs. We supplemented this sample with a complete census of jobs within four representative agencies. We used this strategy to ensure a representative sampling of civil service jobs, as well as a complete set of positions linked within detailed job ladders (from the four representative agencies). Analyses of pay determination within this subset of jobs enabled us to determine whether the findings in Table 5-2 were due to the concentration of women and minorities in jobs that are toward the bottom of detailed job hierarchies and that required less education and experience.

California civil service job specification sheets typically list various combinations of education and experience that can be used to satisfy entry requirements. We characterized each job's requirements in terms of the particular combination involving the most experience and the least schooling.[7] Because women are more disadvantaged (relative to men) in labor force experience than in formal schooling, our conservative procedure increases the chances that training requirements will absorb the gross effect of sex composition on pay rates.

We coded educational and experience requirements for 406 positions that employed 32,719 full-time civil servants in 1985 (27 percent of the work force whose jobs were analyzed in Table 5-2). For those positions, Table 5-3 reports regression estimates similar to those in Table 5-2, but with these more precise controls for job requirements.

Not surprisingly, educational and experience requirements explain much of the variation in pay rates across jobs (84 percent

[7] For instance, a job specification might have listed the following combinations of education and experience as permissible: college graduate *or* 2 years of college and 2 years of experience in related classification *or* high school degree and 4 years of experience in related classification. We would have coded the last of these options and characterized the job as requiring 12 years of education (minimum) and 4 years of experience (maximum). In supplementary analyses, we also controlled for whether a specific curriculum, license, or other credential was required; those controls did not alter our results.

according to model E, when jobs are weighted according to the number of incumbents). Demographic composition continues to have a sizable effect on job worth, however, even after educational and experience requirements are controlled. As in Table 5-2, the effects of race composition are reduced more by controls for job content than is the case for sex composition. The pattern of results, however, is generally the same as in Table 5-2. Moreover, controls for major EEOC job class and major schematic (industry) group in Table 5-3 generally do not add much explanatory power once educational and experience requirements are already controlled, nor does their inclusion seem to absorb much of the effects of demographic composition on pay rates (compare models F and H in Table 5-3). This' gives us some confidence in our use of dummy variables for job category and schematic class (Table 5-2) as proxies for differences in job content, since their effect on pay rates appears to be due overwhelmingly to differences in educational and experience requirements across job categories and schematic classes.

TABLE 5-3 Effect (in dollars) of Demographic Composition and Education/Experience Requirements on Prescribed Minimum Monthly Starting Pay in 406 California Civil Service Jobs, 1985

	Effect of Sex		Race						Sex × Race	
Model Including	Percent Female		Percent Black		Percent Hispanic		Percent Other		Percent Black Female	
A. Sex	-12.49	(-14.11)								
B. Race			-13.71	(-39.85)	-9.30	(-20.23)	-6.49	(-20.06)		
C. Sex, race	-11.84	(-11.71)	-9.45	(-14.76)	-8.07	(-18.27)	-6.50	(-12.59)		
D. Sex × race	-10.01	(-11.35)	-10.34	(-13.38)	-4.49*	(-16.46)	-5.68	(-13.15)	6.22	(0.01*)
E. Experience and educational requirements										
F. Sex × race + requirements	-6.97	(-7.18)	-4.17	(-4.24)	2.73*	(-1.71*)	-5.39	(-8.28)	3.59*	(-0.20*)
G. Sex × race + requirements + controls for 20 job categories	-5.72	(-6.76)	-4.52	(-3.72*)	2.34	(-4.05*)	-3.12	(-5.30)	4.41*	(3.32*)
H. Sex × race + requirements + controls for 20 job categories + controls for major schematic (industry) group[a]	-5.99	(-6.44)	-4.53	(-3.67*)	2.38	(-1.60*)	-2.21*	(-3.83)	4.22	(-4.24*)

NOTE: Coefficients in parentheses are from regressions weighting each job by the number of incumbents.
* $p > .05$; all other coefficients significant at .05 level (two-tailed). Coefficients of determination are adjusted for degrees of freedom.
[a] See appendix. This categorization includes the following level of detail: office and allied services, regulatory and public safety, and so on.

The fact that the demographic effects persist in Table 5-3 suggests that they are not simply capturing the segregation of women and minorities in positions within detailed job ladders that require less human capital.[8] Moreover, as in Table 5-2, the

[8] We conducted supplementary analyses limited to the subset of jobs in the four state agencies for which we had information on all jobs, which enabled us to look at each job's position within specific detailed ladders. These analyses yielded results comparable to those reported in Table 5-3, and there were no major differences in the extent to which the effects of demographic composition on pay rates were mediated by educational and experience requirements.

results in Table 5-3 are even stronger when jobs are weighted by their number of incumbents, which suggests that our findings are not due simply to several anomalous jobs with few incumbents.

	Effect of									
	Sex × Race				Requirements					
Model Including	Percent Hispanic Female		Percent Other Female		Years Experience (Maximum)		Years Education (Minimum)		$\bar{R}^2$	
A. Sex	.28	(.58)								
B. Race	.09	(.34)								
C. Sex, race	.34	(.67)								
D. Sex × race	-28.45	(-5.40*)	-3.62*	(2.05*)					.35	(.67)
E. Experience and educational requirements					201.63	(208.81)	193.58	(157.17)	.60	(.84)
F. Sex × race + requirements	-9.33*	(4.75*)	1.99	(7.71)	156.36	(153.20)	179.63	(135.24)	.69	(.91)
G. Sex × race + requirements + controls for 20 job categories	-8.94*	(7.40*)	-1.17*	(4.43*)	119.30	(165.08)	155.94	(152.64)	.76	(.92)
H. Sex × race + requirements + controls for 20 job categories + controls for major schematic (industry) group[a]	-7.95	(6.38*)	-1.45*	(1.60*)	120.00	(160.38)	126.53	(131.67)	.79	(.93)

NOTE: Coefficients in parentheses are from regressions weighting each job by the number of incumbents.
* $p > .05$; all other coefficients significant at .05 level (two-tailed). Coefficients of determination are adjusted for degrees of freedom.
[a] See appendix. This categorization includes the following level of detail: office and allied services, regulatory and public safety, and so on.

Penalties Associated with the Presence of Women and Nonwhites in a Job

The penalties against female-and minority-dominated jobs that are implied by our regression models are illustrated in Table 5-4, which reports the predicted minimum monthly starting pay for jobs under various hypothetical demographic compositions. The estimates in Table 5-4 are based on (unweighted) regression results from three of our models. The first column uses the coefficients from model D of Table 5-2, which controls only for demographic composition; thus, these predictions pertain to the typical civil service job. The second column uses coefficients from model G of Table 5-2, which controls for demographic composition, the 20 EEOC job categories, and 99 detailed occupational schematic categories. (The predicted pay rate pertains to a nonsupervisory clerical position within the occupational category "office and allied services—general"). The third column uses coefficients from model H of Table 5-3, which controls for demographic composition, educational and experience requirements, EEOC job categories, and major schematic categories. (The job in question is assumed to be a nonsupervisory clerical position within "office and allied services" that requires 13 years of education [minimum] and 4

TABLE 5-4 Predicted 1985 Monthly Starting Pay Rate for California Civil Service Jobs as a Function of Demographic Composition, Based on Regression Results in Tables 5-2 and 5-3

	Predicted Monthly Starting Pay According to (Unweighted) Results of		
Hypothetical Demographic Composition of Job	Model D, Table 5-2[a]	Model G, Table 5-2[b]	Model H, Table 5-3[c]
1. Average full-time state employee's job (38.56, 27.13, 5.18, 6.10, 6.61, 5.63, 5.46, 5.33)[d]	$2,358	$1,505	$2,050
2. Average full-time white male's job (60.57, 12.68, 5.47, 2.69, 7.85, 1.99, 6.66, 2.09)	2,637	1,633	2,230
3. Average full-time white female's job (18.02, 46.31, 2.87, 8.71, 3.63, 8.81, 3.19, 8.47)	2,089	1,378	1,860
4. Average full-time black male's job (40.68, 15.03, 15.04, 6.10, 11.49, 3.94, 5.23, 2.50)	2,421	1,547	2,136
5. Average full-time black female's job (17.01, 38.72, 5.18, 12.59, 5.21, 10.18, 3.06, 8.04)	2,065	1,374	1,863
6. Average full-time Hispanic male's job (45.82, 14.91, 9.02, 4.81, 13.44, 9.91, 5.63, 2.47)	2,364	1,532	2,107
7. Average full-time Hispanic female's job (13.62, 42.47, 3.63, 11.04, 4.59, 12.84, 2.93, 8.88)	2,000	1,348	1,817
8. Average full-time "other" male"s job (47.02, 15.83, 4.96, 3.41, 6.81, 3.02, 14.61, 4.35)	2,519	1,576	2,155
9. Average full-time "other" female's job (15.09, 43.10, 2.43, 9.20, 3.06, 9.37, 4.46, 13.30)	2,037	1,353	1,821
10. 100 percent white male	2,984	1,787	2,387
11. 90 percent white male, 10 percent white female	2,890	1,741	2,327
12. 90 percent white male, 10 percent black male	2,880	1,750	2,342
13. 90 percent white male, 10 percent black female	2,875	1,730	2,324
14. 90 percent white male, 10 percent Hispanic male	2,935	1,769	2,411
15. 90 percent white male, 10 percent Hispanic female	2,778	1,719	2,271
16. 90 percent white male, 10 percent "other" male	2,936	1,763	2,365
17. 90 percent white male, 10 percent "other" female	2,846	1,719	2,290

[a] Results pertain to the typical civil service job.
[b] Results pertain to a nonsupervisory clerical job within the occupational category "office and allied services: general.
[c] Results pertain to nonsupervisory clerical job within "office and allied services," which is assumed to require 13 years of education (minimum) and 4 years of experience (maximum).
[d] Numbers in parentheses give percent white male, white female, black male, black female," Hispanic male, Hispanic female, "other" male, and "other" female, respectively.

years of experience [maximum], roughly the statewide average.)[9]

Row I of Table 5-4 reports predictions that assume that the position had the sex and race composition that characterized the job held by the average full-time state" employee in March 1985. Rows 2 through 9 report predictions that assume that the position had the sex and race composition that characterized the job held by the average member of specific sex and race subgroups—for instance, the average white male or female Hispanic. By comparing these predictions, the reader can determine how the pay rate in a job is predicted to vary if that job had the demographic composition that characterizes female (versus male) or non-white (versus white) civil servants.

Table 5-4 documents that a job is expected to pay substantially more if it has the demographic composition characteristic of white men in the state civil service than if that same job had the demographic composition typical of any other group. For instance, according to model G of Table 5-2, which controls for detailed occupational distinctions, the job would pay roughly $255 less per month if it had the demographic composition characteristic of white females than if it had the mix typical of white males, and slightly greater penalties are predicted if the job had the mix characteristic of non-white females (blacks, Hispanics, and "other" females).

Model H of Table 5-3, which controls for educational and experience requirements but not for occupational distinctions at such a detailed level, estimates the penalties to be even larger. Compared with the average white male's job, the position would have an entry pay rate of roughly $370 less per month if it had the composition typical of white females or black females, and less still if it had the demographic composition characteristic of Hispanic and "other" females. Considering that these models control for detailed occupational differences and/or formal educational and experience requirements, these penalties appear quite large and suggest that the typical female or nonwhite civil servant pays a substantial price by virtue of being in a job classification not dominated by white males.

Rows 10 through 17 of Table 5-4 provide a different means of assessing the devaluation of female-and minority-dominated jobs. Row 10 reports the predicted pay rate in the hypothetical job if it were held exclusively by white males (i.e., if all seven variables capturing sex-race combinations in Tables 5-2 and 5-3 equal zero, implying that all incumbents are in the omitted category of white males). Under model G of Table 5-2, the starting pay rate would be about $282 higher per month if the job were held only by white men than if it had the demographic mix characteristic of the state civil service workers overall; under model H of Table 5-3, the estimated premium is of roughly the same magnitude.

Contrasting rows 11 through 17 with row 10 shows the estimated effect on the pay rate if the demographic composition is altered so that the white male share of employment in the job declined by 10 percentage points and those white males were replaced by females or minority males. For instance, row 11 reports the predicted pay rate if the variable measuring the percentage of white females in the job equals 10 and the six remaining sex-race variables in Tables 5-2 and 5-3 equal 0, implying that 90 percent of the job incumbents are in the omitted category of white males. If the job composition changed from 100 percent white males to 90 percent white males/10 percent white females, the pay rate is predicted to decline by nearly $100 per month (based on model D, Table 5-2), and by roughly

[9] The use of different implicit reference points in computing predicted pay rates in each column of Table 5-4 affects the absolute size of the predicted values in the table, but not the size of the penalties associated with differences in demographic composition, which is the major focus of the table.

$50 to $60 per month even after controlling for detailed occupation and formal job requirements (model G of Table 5-2 and model H of Table 5-3). The penalties are estimated to be even greater if the replacements were nonwhite women. The net penalties associated with nonwhite men in a job are less severe, but still nontrivial. For instance, replacing 10 percent of the white men with black men is predicted to lower the pay rate by $37 to $45 per month after controlling for occupation and job requirements.

In sum, Table 5-4 dramatizes the large gross and net penalties against female-and minority-dominated jobs implied by our regression results in Tables 5-2 and 5-3. Table 5-4 shows how much more female-and minority-dominated jobs would pay if they were dominated by white males. Note that most of the estimated penalties in Table 5-4 would have been even larger if the weighted (rather than unweighted) regression results in Tables 5-2 and 5-3 were used to calculate predicted pay rates.

Trend Analyses

We examined temporal changes in the effects of demographic composition on pay rates in several ways. (For the sake of brevity, we merely summarize these results.[10]) First, we estimated cross-sectional regressions. similar to those in Table 5-1 for two sets of jobs: enduring jobs (positions that were occupied in 1979 and 1985) and job births (positions that entered the civil service between 1979 and 1985). Contrasts between these sets of jobs provide interesting information on the nature and magnitude of changes in pay inequities (for additional details, see Baron and Newman, 1988). Second, we undertook longitudinal analyses of changes in demographic composition and pay rates for jobs having incumbents in 1979 and 1985.

Enduring Jobs: Cross-Sectional Regressions, 1979 and 1985

For enduring jobs, we examined whether the effects of demographic composition on pay rates differed for 1979 and 1985. In these analyses, the dependent variable was the logarithm of the prescribed minimum monthly starting pay rate. (Using logarithms enabled us to examine how demographic composition affects pay rates in proportionate, rather than absolute, terms, thereby circumventing any confusion caused by the inflation of pay rates between 1979 and 1985.)[11] These analyses reveal that the wage penalties associated with the presence of blacks and male Hispanics in jobs had actually *increased* significantly by 1985, even after controlling for the 20 major EEOC job classes and 99 occupational schematic categories. In 1979, replacing 10 percent of white males with Hispanic males implied a decline of roughly 1.1 percent in the prescribed starting pay rate, net of occupational controls; by 1985 that penalty was about 3.7 percent. Similarly, a hypothetical 10 percent replacement of white males by black males was associated with a 2.6 percent decline in the entry pay rate in 1979, compared with a 3.9 percent decline in 1985. It appears, however, that jobs dominated by black females fared especially badly: a 10 percent increase in black females was associated with a 4.6 percent decline in the 1979 pay rate, compared with a 9.2 percent decline in 1985.

[10] Details are available from the authors on request (also see Baron and Newman, 1988). All results reported in this section are based on analyses that weighted jobs in proportion to their number of incumbents in a given year and are significant beyond the .05 level (two-tailed tests).

[11] In these analyses, the effects of the job and occupational controls were constrained to be equal in 1979 and 1985. Supplementary analyses based on constant dollars revealed the same general pattern of results. Except as noted in the' text, models that allowed the effects of the job and occupational controls to vary across years also showed the same general pattern of results.

In contrast, the wage penalties associated with the presence of white and Hispanic women in jobs decreased significantly, even after controlling for the 20 major EEOC job classes and 99 occupational schematic categories. In 1979, a 10 point increase in the percent white female lowered the starting pay rate by about 3.3 percent, net of occupational controls; by 1985, the corresponding penalties had declined to 2.7 percent. Improvement seems to have been particularly prevalent in jobs having a disproportionate share of female Hispanic incumbents: In 1979, a 10 point increase in the proportion of female Hispanics was associated with a 12.7 percent decline in the starting pay rate; by 1985, that same change in demographic composition was associated with a net penalty of 5 percent.

These results suggest that the pay equity movement, which has been defined as a "women's" issue, may have lowered the penalties associated with jobs dominated by white and Hispanic women between 1979 and 1985. Indeed, at the beginning of 1985, the state upgraded pay rates in selected female-dominated (especially clerical) occupations as part of pay equity agreements with several collective bargaining units. In supplemental analyses, we allowed the effects of major job category on pay rates to differ between 1979 and 1985 in order to capture this realignment. The results document a considerable upgrading of clerical positions relative to other jobs; that upgrading, in turn, is responsible for the reduced penalties against enduring female-dominated positions observed in 1985. During this same period, however, the penalties associated with nonwhite men and black women in jobs actually increased. Perhaps in comparison to nonblack women, black women were underrepresented in the female-dominated titles that were upgraded within the civil service pay hierarchy in 1985.[12]

Comparing 1979 and 1985 cross sections also suggests that less of the gross penalty associated with female- and minority-dominated jobs is mediated by major job category in 1985 than in 1979. In other words, the pay disparities associated with demographic composition in 1985 do not reflect the mere exclusion of women and minorities from higher paying lines of work as much as in 1979.

Comparing 1985 Penalties in Enduring Jobs and Job Births

This comparison provides some evidence that penalties against female-and minority-dominated jobs are less severe in more recently created positions, consistent with our hypotheses about the effects of founding conditions on job definitions. In weighted analyses controlling only for demographic composition, the 1985 monthly penalty for a 1 percent increase in white females in a job was $4.27 less among jobs founded between 1979 and 1985 than in enduring jobs, and the monthly penalties associated with the presence of black males and black females were also reduced: $19.74 and $16.88 less per percentage point, respectively. Controls for major job category and detailed occupation mediate these effects almost entirely; in other words, many of these newly created positions were in high-wage lines of work, some of which employed female and minority workers. Thus, the lower penalties associated with recently created jobs appear to reflect an upgrading of the state's occupational structure and greater access of women and minorities to these higher wage positions than in the past, rather than a

[12] The special pay equity adjustments were concentrated primarily in female-dominated clerical and technical titles. Civil service positions having large numbers and percentages of black women, in contrast, include a number of low-level, service-oriented jobs (e.g., in nursing and food preparation), as well as positions in several state agencies that have been sanctioned in the past by the SPB for poor affirmative action performance.

pattern of increased equity in pay setting across-the-board in newer jobs.

Longitudinal Analyses

For enduring jobs, we examined how a position's initial demographic composition and changes in its demographic composition between 1979 and 1985 affected changes in the prescribed pay rate. The causality could run in the opposite direction, however: If men have superior opportunities and women are therefore willing to accept lower wages, then a decline in the relative standing of a job in the wage hierarchy might make it more likely that women will dominate that position. Pfeffer and Davis-Blake (1987), for instance, concluded that when educational organizations increased their wages (relative to wages paid by competitors), they were better able to compete for desired male administrators (also see Blau's 1977 study of clerical workers). This argument may make sense when applied to the allocation of individuals within a particular occupation. We think it unlikely, however, that changes in the prescribed pay of different civil service jobs would affect demographic composition by changing the labor supply available in each position—for instance, that an increase in the relative wages of some occupation would induce male (but not female) clericals or schoolteachers to change to that other line of work. Such major career adjustments seem particularly unlikely within the rather short interval (6 years) spanned by our data. Accordingly, we do not pursue that causal argument in this paper.

Table 5-5 reports the results of analyses that regress 1985 pay rates on 1979 demographic composition and changes in demographic composition between 1979 and 1985, controlling for 1979 pay rate. (These analyses weight jobs according to the number of incumbents.) Not surprisingly, there is tremendous inertia in the wage hierarchy within California's civil service system; indeed, one can explain 96 percent of the variation in 1985 base pay rates simply by knowing the 1979 pay rates. Given this stability, the deck is somewhat stacked against finding net effects of demographic composition (and changes in composition) on pay rates.

Nonetheless, Table 5-5 reveals that the demographic composition of jobs in 1979, as well as changes in composition between 1979 and 1985, had significant effects on changes in prescribed wage rates. Model 1 assesses the effects of 1979 demographic composition and changes in demographic composition on 1985 pay rate, controlling for 1979 pay rate. Jobs that became increasingly dominated by women, blacks, and "other" females experienced less growth in their prescribed entry pay rates than did other jobs. In addition, jobs with a disproportionate share of blacks (especially black women), Hispanics, or female members of other minorities in 1979 had their pay rates rise less quickly than did other jobs. Conversely, model 1 indicates that jobs dominated in 1979 by females, particularly female Hispanics, actually had larger net wage gains, as did jobs that increased their percentage of female Hispanics by 1985.[13]

Labor market conditions might explain these trends: Women and minorities may simply have entered occupations in which there was an oversupply of workers, relative to other kinds of work, and consequently pay rates grew less quickly in those lines of work. To examine that possibility, model 2 of Table 5-5 controls for major job category and detailed occupational schematic code, as well as 1979 base pay rate. Thus, this model assesses the effects of demographic composition and change on pay rates by comparing jobs in the same specific line of

[13] Supplementary analyses that measured 1985 and 1979 pay rates in a logarithmic metric revealed the same general pattern of results, as did analyses allowing for nonlinear effects of change in demographic composition between 1979 and 1985.

work. Consequently, any effects of demographic composition net of these detailed occupational controls seem unlikely to reflect differences in labor supply and demand throughout the occupational structure of the state civil service system.

TABLE 5-5 Effects (in dollars) of Demographic Composition (1979) and Changes in Demographic Composition (1979–1985) on 1985 Prescribed Minimum Monthly Starting Pay in 2,285 California Civil Service Jobs

	Model 1[a]		Model 2[a]	
Variable	b	p	b	p
Percent female, 1979	.495	.010[b]	-.041	.848
Percent black, 1979	-1.192	.012	-1.981	<.001
Percent Hispanic, 1979	-6.251	<.001	-1.599	.002
Percent other minorities, 1979	.893	.070	-.769	.091
Percent black female, 1979	-1.810	.085	.799	.366
Percent Hispanic female, 1979	-11.267	<.001	4.423	<.001
Percent other female, 1979	-1.902	.063	.532	.511
Change in percent female	-2.446	<.001	-2.661	<.001
Change in percent black	-4.071	<.001	-1.467	.006
Change in percent Hispanic	-.319	.592	.038	.931
Change in percent other minorities	.882	.098	-.041	.918
Change in percent black female	1.394	.230	.731	.371
Change in percent Hispanic female	2.859	.006	.088	.910
Change in percent other female	-1.874	.051	-1.547	.021

[a] Analyses weight each job according to its number of incumbents in 1979. Model 1 controls for 1979 prescribed pay rate; model 2 also controls for 20 major job categories and 99 detailed occupational schematic codes (see appendix).
[b] Two-tailed significance level of regression coefficient.

Model 2 indicates that the negative effects on pay rates associated with the movement of women, blacks, and other females into jobs persist, even after controlling for the kinds of jobs involved. (These weighted effects are stronger than in unweighted analyses, which suggests that the entry of women and minorities occasioned the largest penalties in heavily populated job classifications.) Moreover, the few positive effects in model 1, such as the effect of percent female in 1979 on 1985 wage rates, were due almost entirely to the kinds of positions involved and they vanished once we controlled (model 2) for detailed occupational type. In other words, jobs that were dominated by women or minorities in 1979 and that had unusually rapid wage growth by 1985 were concentrated in parts of the civil service structure for which wage gains generally were bigger over this period. As noted above, for instance, pay equity adjustments in female-dominated (especially clerical) positions occurred at the beginning of 1985 and may explain the gross positive effect of percent female in 1979 on 1985 pay rates. Given that such adjustments occurred, it is all the more striking to find that *increases* in female representation between 1979 and 1985 had strong negative effects on the relative pay of civil service jobs.

A different interpretation of these demographic effects is that they simply reflect some decline between 1979 and 1985 in the requirements and duties of jobs in which the percentage of women or minorities increased. Accordingly, we reestimated the models in Table 5-5, including a dummy variable indicating whether each position had its job specification revised during the

1979–1985 period. As we expected, there was a slight negative effect of job revision on growth in pay rates—that is, jobs that were revised during this period apparently did have their educational or experience requirements lowered, which resulted in diminished wage growth. Including this control variable, however, did not change the estimates reported in Table 5-5, which suggests that the results are not spurious.

Examining the Crowding Hypothesis: The Interaction Between Employment Growth and Changes in Demographic Composition

We predicted less devaluation in jobs undergoing employment growth than in jobs that were declining because growth should diminish the perceived threat of competition and crowding. To test this hypothesis, we estimated one final version of the longitudinal models reported in Table 5-5, this time adding interaction terms between employment change and changes in demographic composition (percent female and percent nonwhite) in each job between 1979 and 1985.

The results generally supported our hypothesis. When employment change between 1979 and 1985 was measured in percentage terms, there was a significant positive interaction between growth and change in percent female. As hypothesized, the devaluation associated with women entering a position is most severe when employment is declining. This effect is present even in models that control for demographic composition in 1979, changes in demographic composition by 1985, 1979 wage rate, the 20 major job categories, the 99 detailed schematic codes, and whether each job was revised between 1979 and 1985 ($b = 1.004$; $p < .001$, two-tailed). Measuring employment change in absolute rather than percentage terms also produces a significant positive interaction effect with change in percent female, but only in the full model (i. e., model 2, Table 5-5); the effect is in the opposite direction in models that do not control for detailed occupation.

In the case of race composition, the interaction between proportionate employment change and changes in percent non-white is also substantial, significant, and in the predicted direction, even in a model that controls for 1979 demographic composition and changes in demographic composition, 1979 wage rates, whether a job was revised between 1979 and 1985, and the 20 major job categories ($b = .365$; $p = .034$, two-tailed). The effect becomes insignificant, however, once controls for the 99 detailed occupational codes are included ($b = .168$; $p = .23$). Models measuring employment change in absolute terms, however, consistently reveal significant positive interactions with changes in percent non-white, as hypothesized.[14]

In sum, our longitudinal results are consistent with numerous studies suggesting that the entry of women and minorities into positions devalues them. This effect appears to be moderated, however, in recently created jobs and in lines of work that are growing. By estimating the models on a stable set of positions within a single administrative system, and by controlling in detail for the kinds of jobs involved (and the prevalence of job revisions), these analyses strongly point to a real organizational devaluation in the perceived worth of positions as women and minorities enter them. By focusing on changes in pay rates rather than average wages actually received in each job, and by including 1979 pay rate and demographic composition as control variables, our longitudinal analyses preempt a criticism sometimes leveled at this literature—namely, that the apparent wage "pen-

[14] These results weight jobs based on the number of incumbents and are therefore unlikely to be affected by extreme values for percentage growth associated with very small job categories (e.g., a job that increased from one to five incumbents between 1979 and 1985).

alties" against female-and male-dominated jobs simply reflect lower requirements and labor quality in those jobs.

Summary and Implications

Our results document substantial wage penalties associated with the presence or entry of women and nonwhites in job classifications within the California civil service. We have construed the notion of comparability across jobs very narrowly. That is, for the most part, our analyses have compared wage rates among civil service positions that involve essentially similar duties and requirements and that differ only in their demographic composition, rather than comparing disparate jobs in different parts of the state's occupational structure. We have reported results from models that control for educational and experience requirements of jobs and for occupational distinctions, at varying levels of detail, in assessing the effects of demographic composition on wage rates. Readers can make their own judgments about the extent of devaluation, depending on how broadly or narrowly they think "comparability" among work roles should be construed. Perhaps our most striking result, however, is that the net penalties against female-and minority-dominated jobs appear severe regardless of how strict a standard of comparability one employs.

Our analyses have also taken the occupational classification system and job specifications of the California civil service system at face value. Yet, there may be gender or race biases in how positions are described, classified, and have their requirements assessed. A recent court decision concerning the comparable worth lawsuit pending against California relied heavily on a 1934 report drafted by a state government official that documented historically how gender distinctions were incorporated into job specifications and wage rates within the state civil service system (Becker, 1934). The pervasive effects of sex and race composition that we have documented appear to represent the continuing legacy of those historical practices.

Our analyses, on the other hand, also indicate that the tendency for female-and minority-dominated jobs to be devalued is not inevitable. We found, for instance, that underpayment for female-and minority-dominated positions appeared to be greatest in large "generic" jobs, compared with positions with few incumbents—that is, the weighted results were invariably stronger than the unweighted ones (also see Baron and Newman, 1988). Large job classifications (e. g., secretarial positions) are most closely tied to the external labor market and may therefore reflect widely held stereotypes about their appropriateness for women or minorities. Moreover, they are also likely to be key job classifications within the civil service that serve as anchors for setting wage rates in other classifications (Dunlop, 1957). Thus, politically and economically, it is most costly for reformers and personnel specialists to attempt to re-calibrate the worth of those positions.

In other research (Baron and Newman, 1988), we have shown that the degree of devaluation also depends on the age, union coverage, and task ambiguity of the job. Thus, devaluation is not universal, which underscores the importance of examining the organizational and institutional factors governing pay setting and related personnel activities in studying pay equity. Those factors have too often been overlooked in individual-and occupation-level research on sex and race inequality. Research that examines the characteristics of jobs, organizations, and institutional environments that favor or discourage devaluation would be of inestimable value to scholars, policy-makers, and personnel practitioners.

Our analyses of trends provided some evidence of improvement and some evidence to the contrary. On the one hand, we found that the entry of women or mi-

norities into state civil service jobs had significant negative effects on the assessed worth of those jobs, especially when employment was not growing rapidly enough to embrace those entrants without threatening white males who previously monopolized those jobs. To cast some light on the processes underlying our longitudinal results, we took a detailed look at particular jobs in which large demographic changes between 1979 and 1985 were accompanied by large changes in prescribed pay. A number of these were occupations in data processing, where the rapid entry of women into specific lines of work appears to have devalued those positions relative to other jobs within computing. Using census data, Strober and Arnold (1987b) have documented a similar channeling of women into the least lucrative positions within the computing sector. Our analyses suggest those positions may have become relatively less lucrative precisely *because* women were entering them, perhaps causing the work to be perceived as more clerical than technical in nature and thus warranting lower relative pay.

Demographic changes were also accompanied by changes in pay for several "uniformed" law enforcement and correctional titles, located in agencies that had been sanctioned in the past for failing to hire women and nonwhites. It appears that as gains in female and minority representation occurred within uniformed classes, those classes were left behind in the pay hierarchy, relative to other positions within the same occupational families.

Finally, we found a few instances in which increased male representation in certain titles previously dominated by women apparently led to a revaluation upward of the pay of those positions, relative to lower level, female-dominated titles within the same occupational family. These results suggest that as an occupation becomes more integrated by sex or race, there is increasing stratification and devaluation of work performed by women or nonwhites *within* the occupation, a conclusion buttressed by other recent studies relying on diverse data sources (Bielby and Baron, 1986; Reskin and Roos, 1987; Strober and Arnold, 1987a; Tienda and Ortiz, 1987).

The felicitous effects of growth in tempering the devaluation of jobs entered by women and nonwhites is consistent with other research, which indicates that women and minorities benefit disproportionately from economic expansion (see Baron, 1984). If declining employment in a job exacerbates tendencies toward devaluation, however, it is interesting to speculate about how current trends toward reducing permanent employment and privatizing public sector functions will affect progress toward pay equity in the civil service. By exacerbating crowding, the trend toward "contingent" employment in the public sector could conceivably have the effect—if not the intent—of creating further obstacles to pay equity in state government.

Although the movement of women and minorities into jobs between 1979 and 1985 appears to have devalued those positions, we did find that recently created occupations in state government imposed less devaluation than did older civil service positions, which suggests some progress toward equity. It may simply be that these newer jobs have not existed long enough for stereotypes concerning race and sex appropriateness to develop. Strober and Arnold (1987a) have suggested, for instance, that such stereotypes evolved in computing occupations after an initial period of ambiguity about the appropriate personnel in various computer-related jobs. Taken together, our findings concerning trends seem to indicate that in a large bureaucratic labor market, such as the California civil service, progress toward pay equity is harder to achieve among enduring, inert jobs, especially under circumstances of declining employment, than among newly created positions in the system.

Our longitudinal results also cast doubt on the claim that devaluation in state government merely reflects external market forces. Even controlling for 1979 pay levels and detailed occupational distinctions, which presumably capture market-based differences in compensation, we found that increasing representation of women and non-whites in a job lowered its position within the state government pay hierarchy. Moreover, many civil service positions have few, if any, counterparts in the private sector, and so the very notion of a market wage is itself often problematic in this context. The state government in some instances has even acknowledged biases in assessing prevailing wage rates for female-dominated jobs, yet failed to mitigate those biases (see Baron and Newman, 1988; also cf., Bridges and Nelson, 1988). Thus, our results point to organizational practices and procedures—and not simply to inexorable or objective market forces—as sources of devaluation in jobs held disproportionately by women and nonwhites.

In one sense, the results we have reported are not noteworthy because they are consistent with prior studies, even research using other kinds of data (particularly U.S. census occupational trends). Such consistency is not always the norm in social science research. What *is* striking is how closely our results parallel those obtained in the few other longitudinal studies of organizational wage determination, such as Pfeffer and Davis-Blake's (1987) study of wage determination among college and university administrators between 1978 and 1983 and Rosenbaum's (1985) analysis of gender composition and wages in a large corporation between 1962 and 1975. Taken together, these studies document very similar processes by which work done by women and nonwhites is devalued, but across quite diverse organizational settings: state government agencies, educational organizations, and a large private firm. Clearly, more research is required along these lines, including historical and ethnographic studies of how job classification and compensation systems are designed in organizations, the circumstances under which they change versus remain inert, and their effects on individuals' careers.

Acknowledgments

This research was supported in part by a grant from the Panel on Pay Equity Research, National Research Council (NRC), and by research funds from the Stanford Graduate School of Business. This paper was completed while the first author was a Fellow at the Center for Advanced Study in the Behavioral Sciences; support from the Alfred P. Sloan Foundation and from the Center staff is gratefully acknowledged. Officials at the California State Personnel Board, Department of Personnel Administration, Controller's Office, and the California State Employees Association were extremely generous in providing access to data and answering innumerable questions, but they bear no responsibility for the conclusions of this paper. Ann Bucher and Jill Fukuhara ably assisted in preparing the manuscript. The authors appreciate helpful assistance and suggestions from members of the NRC panel and staff, Bill Bielby, Albie Lau, Don Palmer, Marilyn Pearman, Jeff Pfeffer, Peter Reiss, Jean Ross, and especially, Brian Mittman.

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Appendix

I. Job Category Codes

01 Clerical
02 Supervisory clerical
03 Semiskilled workers
04 Crafts/trades
05 Supervisory crafts/trades
06 Professional
07 Supervisory professional
08 Subprofessional/technical
09 Supervisory subprofessional/technical
10 Law enforcement
11 Supervisory law enforcement
12 Field representative
13 Supervisory field representative
14 Administrative staff
15 Administrative staff supervisory
16 Administrative line
17 Janitor/custodial
18 Supervisory janitor/custodial
19 Laborers
20 "Career opportunity development" classes

II. Sample Schematic Arrangement of Classes

(A) Office and Allied Services
A. General
B. Typing
C. Stenography and Secretarial
D. Legislative
E. Payroll
F. Personnel-clerical
G. Machine operations
1. Key data
2. Mailing
3. Microfilm
4. Duplicating
5. General office
H. Storekeeping
1. General
2. Equipment
I. Communications
J. Fiscal
1. Cashiering
2. Account recordkeeping and review
K. Miscellaneous office services and allied
(B) Regulatory and Public Safety
A. Police and law enforcement
1. Highway patrol
2. Fish and game
3. State police

B. Criminal identification and investigation
1. Administration
2. Fingerprints
3. Criminalists
4. Polygraph
5. Law enforcement consult. Special investigator
C. Field representation
D. 1. Collection/tax admin.
2. Real estate Inspection
E. 1. Regulation of business/professional activities
2. Public health and safety

COMMENTARY

Jean Ross

The study by Baron and Newman analyzes the relationship between demographic factors and wage setting practices within the State of California's civil service system. The system is that of a relatively centralized, large public sector employer. The wage data used consist of the starting pay assigned to each job classification at two points in time, March 31, 1979, and March 31, 1985. The categories for analysis include sex and race, broken down into whites, blacks, Hispanics, and other minorities (primarily Asians).

Within the literature on wage and job segregation, there is a paucity of case study research. As a result, there is considerable debate over the extent to which findings of research using national survey data reflect firm, geographic, and other factors rather than within-firm job segregation or wage discrimination. To the extent that within-employer research exists, it is often prepared by advocates, such as labor unions, and frequently lacks depth and a theoretical framework. This paper is an important contribution to the field because it provides an independent and analytic assessment of pay practices within an organization.

It is also important because of the nature of the employer studied. The California civil service system is large and diverse, employing approximately 150,000 workers in nearly 5, 000 job titles. The state draws from a variety of labor markets, urban and non-urban, for its work force.

Baron and Newman's findings gain added significance as a result of the history of pay equity as an issue for employees in the system. The state is currently involved in litigation with the largest of its employee unions, the California State Employees Association (CSEA)/Service Employees International Union (SEIU) Local 1000. The lawsuit grew out of activism on this issue which began in the late 1970s. The lawsuit was filed in 1984, and the union negotiated a collective bargaining agreement in 1985 containing wage adjustments for a number of predominantly female jobs. Thus, the wage disparities found in this study persist despite attempts to remedy disparities. As a result of the activism around pay equity, one would expect that disparities, if anything, would be less than would be found in the labor market at large.

Baron and Newman find large and significant undervaluation on the basis of race

and sex even when controlling for occupational grouping and education and experience. Effects are greater when jobs are weighted by number of incumbents. As Baron and Newman note, wage disparities are more costly to eradicate in large jobs. Large jobs are also more likely to be ambiguously described and to be sex stereotyped because they have a large number of female or minority incumbents, whereas smaller jobs (and their incumbents) are more likely to be seen as worthy of individualized treatment.

The level of job segregation in the California system is severe—the average white male's job is 12.7 percent white female and the average white female's job is 18 percent white male. The pay gap between the average female and average male's job is $548 per month, without occupational or other controls. Gaps for blacks ($216 for males) and Hispanics ($273 for males) are smaller, but still statistically significant. Occupational and educational controls reduce, but do not eliminate, wage devaluation. Education and experience explain 84 percent of the variation in wage levels, but sex and black and other minority are still statistically significant variables in explaining the residual.

Baron and Newman control for job content using the state's finely differentiated schematic system, which categorizes positions according to 1 of 281 classifications. They acknowledge that analyzing wage disparities controlling for such a finely disaggregated occupational breakdown may incorporate any built-in biases in the classification system (as opposed to the wage setting process). This is supported by the findings that sex and race have a much greater impact when only educational and experience controls are used. The results of this analysis strengthen the overall findings by showing that race and sex have significant and negative effects even within narrowly defined occupational groups. The depiction of within-occupation disparities is one of the strongest and most unique contributions of the paper.

Analysis of the impact of individual human capital as a factor in wage setting was not the focus of this study. In the civil service systems with which I am familiar, however, blacks are frequently segregated into positions with low educational requirements, regardless of the education level of the incumbents. Women, on the other hand, frequently are overeducated relative to job requirements, and given the supply of women with higher educational attainment, employers can finely differentiate job requirements without increasing pay for jobs. They can then hire women whose education exceeds stated requirements.

It is also not surprising that between 1979 and 1985 the education and experience required for jobs was reduced. My guess is that if you looked at human capital indicators for incumbents, they would increase despite the decline in formal requirements. At SEIU, we have seen requirements downgraded when pay equity is raised as an issue in a number of workplaces. Because of labor market factors, the employers can continue to hire at a higher level, but subvert the argument that the position is truly more skilled. In Los Angeles County, for example, the educational requirement for the job of social worker was downgraded to require only a bachelor's degree, even though the county hires persons with master's degrees in social work almost exclusively.

The study differentiates between new and enduring (or stable) jobs during the period analyzed—a useful breakdown. Quite interestingly for enduring jobs, devaluation of black female and minority male jobs, even controlling for job content, increased between 1979 and 1985, whereas, perhaps in response to pay equity pressure, the penalties associated with white and Hispanic female jobs declined. For new jobs, the results support the researchers' hypothesis that the penalties are less severe. The finding that new jobs incur less severe penalties

could reflect the fact that new jobs have not had time to become stereotyped and thus devalued. Occupational controls mediate these results, which reflects the fact that job births represent creation' of higher level jobs filled by women or minorities, rather than upgrading of entire hierarchies.

Also, as would be expected, 1979 salary explains most of the variation in 1985 salary (96 percent). This does not, however, reduce the significance of demographic factors. Jobs that were increasingly held by women or minorities experienced less salary growth. This remained true even when controlling for occupation.

An earlier version of Baron and Newman's paper tested some interesting hypotheses—that jobs that are ambiguously defined (often "large" jobs with many incumbents), professional and administrative jobs, and nonunionized jobs are all more likely to be devalued more on the basis of race and sex than other jobs. For example, they find that unionization counteracts the devaluation for sex, but not for race. In this context, it is interesting to note that within CSEA/SEIU, pay equity has been defined as an issue of sex (as opposed to sex and race) and the lawsuit filed against the state was filed on the basis of sex discrimination.

Baron and Newman note that their results show that no matter how broadly or narrowly the question is framed, sex and race are associated with wage devaluation. The existence of disparities, even using detailed occupational and educational/experiential controls, points to the importance of having correctly classified jobs and of assigning them correctly to a job family and pay rate at the point of creation or revision. Often, female job characteristics are not adequately valued or are explicitly devalued. To remedy wage disparities, we need to develop a better structure for assessing the skill and content of ambiguously defined jobs. Case study research on the work process can help contribute to this task. Some' of the needed research exists for clerical work, but very little exists for other types of work predominantly held by women, such as social services, education, and health services.

Baron and Newman's analysis also illustrates how difficult it will be to implement an equitable values system by which wages can be determined. Penalties against women's (and minorities') work are deeply imbedded and widespread. Efforts at affirmative action are not really eliminating much of the problem. Occupational segregation remains severe and the continued wage gap within occupations remains large. This is supported by the recent Bureau of the Census (1987) report showing wide disparities within a single occupation for women and men, even when women had no gap in employment history.

From the standpoint of an advocate, such as myself, case study research such as this is valuable for several reasons. First, it points to specific instances of sex-and race-based wage discrimination and estimates the magnitude of wage disparities. Second, it provides a model research strategy that could be replicated for other civil service systems that are similarly organized, and many are. Third, its strong base in the scholarly literature helps to point to hypotheses concerning phenomena (e.g., change over time, job size, job age, and unionization) that can provide useful insights in a variety of workplace settings.

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6

Comparable Worth, Occupational Labor Markets, and Occupational Earnings: Results from the 1980 Census

Toby L. Parcel

Comparable worth refers to equal pay for work of equal value. Proponents claim that jobs that are disproportionately held by women (e.g., nursing, clerical work) are not rewarded at the levels of men's jobs that, although different in content, demand similar levels of skill and are performed under similar conditions (Hartmann, 1985; Remick, 1984). Such a reality means that women's years of schooling, experience, and effort are rewarded at a lower rate than are men's, which leads to pronounced and persistent sex differences in earnings.

At the same time that this issue has arisen in the policy realm, sociologists have become interested in structural explanations of economic inequality. Analyses consistent with "the new structuralism" (Baron and Bielby, 1980) investigate the functioning of economic sectors (e.g., Bibb and Form, 1977; Hodson, 1984; Wallace and Kalleberg, 1981), the configuration of class structure in contemporary U.S. society (e.g., Robinson and Kelley, 1979; Wright et al., 1982), and the impact of organizational mechanisms on worker outcomes (Baron and Bielby, 1984; Bielby and Baron, 1984). One branch of the literature, that concerning the existence and functioning of occupational labor markets, appears particularly relevant to thinking on comparable worth. In this paper I develop a theory of occupational earnings differences that draws on both ideas regarding comparable worth and sociological arguments suggesting market influences on wages. I test the theory using data from the 1980 U.S. census and incorporate data from the *Dictionary of Occupational Titles* (DOT) (U.S. Department of Labor, 1977) as controls for job content. In the early sections of the paper I outline theory and hypotheses used to guide the analysis. I then describe the data used to test the hypotheses and report both descriptive and analytic findings. The findings are interpreted as bearing on hypotheses regarding the effects of job content and market influences on earnings and on the relationships among those factors.

Alternative Theories and Literatures

Although there is little dispute regarding the extent of the male-female earnings gap, analysts differ regarding its causes. England

and Farkas (1986) summarize literature suggesting that job segregation by sex explains a good deal of the difference (e.g., see Bielby and Baron, 1984) and that human capital variation, particularly in work experience (Corcoran and Duncan, 1979), also accounts for some of the difference. Those researchers who investigate earnings differences within a comparable worth framework argue that "skill" or "worth" accounts for only a portion of the gender gap in earnings and that the "femaleness" of occupations also influences sex differences in earnings (England et al., 1982; England and Norris, 1985; Treiman et al., 1984).

Critics of comparable worth argue that advocates ignore the role of the quantity of labor supplied and demanded in setting wages across occupational markets. Waldaur (1984) argues that the balance between quantity supplied and demanded influences occupational wage levels. Using data on the number of Ph.D.'s in various academic disciplines, he demonstrates a noticeable positive relationship between the existence of nonacademic job opportunities and remuneration. His findings, however, cannot be assumed to apply to the labor force as a whole, nor does he subject his argument to a rigorous multivariate evaluation.

There is an obvious, although generally ignored, connection between ideas concerning the impact of external market forces on wage setting and sociological notions involving the structure and functioning of occupational labor markets. Following work by institutional economists such as Dunlop (1957) and Kerr (1954), Stolzenberg (1975) argues that skill differentiation produces labor market fragmentation along occupational lines, that is, that the supply of labor is differentiated by occupation. He suggests that occupations constitute distinct markets because the skills demanded across occupations differ. The fact that individual returns on skills would be reduced if workers were to seek employment in occupations for which they were untrained supports this idea. He also argues that the social organization of labor market processes varies by occupation, with some being unionized or governed by professional associations that influence wage structures. Occupational social organization can also be viewed in terms of race and sex composition; the higher the percentage of minorities within an occupation, the greater the competition between minority and majority workers, which bids down the wage rate.

Several strands of thought embedded in Stolzenberg's analysis are particularly useful to this discussion. First, he argues that forces of supply and demand may vary by occupation, a notion very compatible with treatments by Waldaur and others, but much less compatible with the position of advocates of comparable worth who argue against the justice of those forces. Second, his discussion of skill differs at least in emphasis from that implied by the worth perspective. In the comparable worth perspective, skills are those common dimensions, such as manual dexterity or substantive complexity, that underlie substantively distinct bundles of training and talent. It is reliance on these common dimensions that makes it possible to develop evaluations comparing the relative worth of different jobs, such as nursing and computer programming. For Stolzenberg, however, the emphasis is on skills as differing packages that render the capability to perform well at nursing different from the capability to work as a computer programmer. It is the notion of skill fragmentation that supports variation in demand for labor across occupations, a phenomenon that has no place in a comparable worth conceptualization. The theory used in this paper makes greater use of the worth perspective on skill.

Finally, Stolzenberg distinguishes from forces of supply and demand and from skill a third category of factors that can influence wages: dimensions of occupational social organization. His examples include unionization and race and sex composition, factors

that do not directly tap the quantity or quality of labor available in an occupation or that might be potentially demanded, but which may nonetheless exert independent influence on wages. Thus in this context, "social organization" refers to nonproductivity characteristics of occupations or of the occupational incumbents themselves. Studies within the comparable worth tradition, for example, document the impact that the percentage female has on occupational earnings, independent of job content, and attribute that influence to discrimination.

The contribution of Stolzenberg's thinking on occupational market social organization to studies of comparable worth is that it broadens the concern with nonproductivity factors to incorporate other variables. Just as comparable worth advocates object to the fact that the higher the percentage female in an occupation, the lower its wages (controlling for job content), one can identify other nonproductivity measures that may operate similarly. Percentage black is an obvious candidate, and as I indicate below, the marital status of occupational incumbents can be viewed in the same way. Although the percentages of women and blacks are demographic characteristics, Stolzenberg also includes unionization as a dimension of social organization. He argues that the existence of unions within an occupation may push wage levels up, independent of the productivity of workers. Thus, by considering how the social organization, broadly defined, of an occupation may influence wages, one is motivated to consider nonproductivity factors other than percentage female in the empirical analyses.

Theory and Hypotheses

The theory borrows from both the worth and occupational labor market perspectives. First, consistent with the worth perspective, I conceptualize skill in terms of common dimensions underlying substantively distinct combinations of training and talent. Such an assumption enables one to compare the job content of seemingly disparate occupations, an important first step in generating inferences regarding effects of job content on earnings. Second, consistent with Stolzenberg, I argue that occupations do indeed constitute distinct labor markets with potentially differing values for key dimensions of market conditions that potentially affect the quantity of labor supplied and demanded. I also argue that independent of these market conditions occupations differ in terms of social organization. Dimensions of social organization do not reflect productivity-relevant characteristics of occupational incumbents, but they nonetheless may still influence wage levels. Recognizing the existence of these nonproductivity dimensions is vital to understanding the bases along which pay inequality develops.

In this conceptualization, *supply* and *demand* refer not to actual quantities of labor supplied and demanded but rather to factors that *could* be expected to influence levels of supply and demand. Thus, the usage does not strictly follow that of economists, nor does it constitute a completely developed theory. Still, within these limits, notions of supply and demand appear relevant and useful. First, for example, following Waldaur (1984), I argue that diverse labor market opportunities for employment in an occupation will raise its earnings level. Occupations for which a narrow range of settings provide employment opportunities will have reduced bargaining power with employers compared with occupations for which the skills demanded could be utilized in a variety of types of employment settings. Second, the higher the unemployment rate in an occupation the lower the wages; high unemployment could indicate weak quantity demanded and/or excess quantity of those skills supplied, thus depressing the earnings of those workers who are employed in that occupation.

Third, I anticipate a negative relationship between earnings and the size of an oc-

cupational pool that has skills and experience but is not in the labor force. If workers in an occupation can be easily replaced, and if the potential exists for drawing trained, experienced workers from a reserve labor pool into the labor force, workers currently employed are in a relatively poor position to bargain with employers. Fourth, I argue that substantial government employment in an occupation will increase earnings because government jobs pay more, at least at the entry level, than many jobs in the private sector and may tend to bid up wage rates for nongovernment workers in those occupational markets. At the higher levels of government service, however, earnings may be depressed relative to the private sector; these relationships may become obvious in the multivariate analysis.

Similarly, I hypothesize that the productivity-related characteristics of occupational incumbents may influence earnings; these can be interpreted to reflect the quality of labor supply. I view the overall educational and experience levels of workers within occupations as supply factors that should be positively related to earnings levels. Following general human capital arguments, investments in schooling and experience should be rewarded with financial returns, independent of other market characteristics and of job content.

Turning to the social organization of occupational markets, although several studies find that the percentage female does influence earnings, I extend the investigation of the social organization of markets in three directions. First, racial composition is an important and relatively neglected aspect of market social organization. Remick (1984) notes the relative lack of attention to the role that racial minority participation in occupations plays in determining earnings, although traditionally within sociology and economics the "competition" and "crowding" literatures have studied the issue (Bergmann, 1971; Hodge and Hodge, 1965; Snyder and Hudis, 1976; Taeuber et al., 1966). These analyses, however, have not evaluated the impact of racial minority participation on earnings controlling for job content and other market conditions. I hypothesize that the higher the level of black and Hispanic participation, the lower the earnings, an hypothesis directly parallel to that concerning female concentration. In addition, the data enable one to distinguish among several distinct racial minorities. Although I hypothesize that both percentage black and percentage Hispanic will be negatively associated with earnings, I expect that percentage Asian will be positively associated with earnings. Asian minority groups in the United States have historically achieved higher levels of schooling and socioeconomic status than black and Hispanic minorities, and I expect these differences to be reflected in this analysis as well.

Second, the nexus of family organization and work outcomes is of interest. Certainly the marital status of family members can influence earnings. Traditionally, the assumption of marital responsibilities has been viewed differently by employers, depending on whether the employee is male or female. For men, the stereotype is that married men are more settled than unmarried men—they have assumed responsibility for financially supporting a wife and possibly children and therefore are likely to be more dependable than unmarried men. For women, getting married is viewed as a harbinger of interrupted labor force participation in order to rear children or to move with a husband when he is relocated. At a minimum, married women may have reduced bargaining power with their employers if the latter perceive them as likely to accumulate less firm-specific experience than their male counterparts. Certainly, these stereotypes do not operate with consistency. Women are increasingly remaining in the labor force while their children are young (Bureau of Labor Statistics, 1986), and families in which both spouses are employed do not necessarily sacrifice the wife's work

situation to accommodate that of the husband. However, until very recently the traditional models were considered normative.

I utilize these models to suggest two hypotheses. First, the higher the proportion of men who are married in an occupation, the higher its earnings. Second, the higher the proportion of women who are married in an occupation, the lower its earnings. Of course, a number of competing explanations cannot be evaluated in this analysis. Married women may be willing to sacrifice wages for convenient job location, regular hours of work, and minimal demands for travel and other activities that could interfere with family obligations, or they could actively seek such advantages at the expense of wage increases. Married men may be willing to accept or actively seek such job conditions in order to realize promotions and attendant wage gains. In addition, occupations with high proportions of unmarried men or with high proportions of married women may contain a higher number of entry-level or secondary labor market type jobs, and thus the relationships observed may not be directly rooted in the intersection of family and work arrangements. Still, if the proportions of married men and women are statistically significant net of job content factors and of female concentration, that may suggest the possibility of discrimination independent of sex composition. I expect sex composition and proportion of women married to operate in the same direction, and for each to contribute to an explanation of earnings.

Second, following Stolzenberg (1975), who argues that occupational unionization positively influences wages, as well as the extensive literature reviewed by Freedman and Medoff (1984), I hypothesize that unionization will positively affect earnings across occupations. Finally, I control for the fact that workers in urban areas earn more than those in nonurban areas. To avoid confounding, I control for the extent of urbanization in an occupation, which I expect to have a positive effect on earnings.

Previous Tests of Related Theory

This theory has not been fully tested in prior research. Several studies have found that the sex composition of jobs or occupations affects pay levels (England and Farkas, 1986; Hodge and Hodge, 1965; Remick, 1984). Even recent analyses, however, did not systematically evaluate the effect on earnings of market conditions influencing supply or demand, nor did they utilize the notion of occupational market social organization to expand the focus of nonproductivity characteristics beyond percentage female. England et al. (1982) control for a wide variety of skill factors in studying earnings differences across occupations. They document that although male-and female-dominated occupations differ in the skills required, the differences do not explain the gender earnings gap because female-dominated occupations pay less than expected on the basis of their skill demands. In a similar analysis, England and Norris (1985) interpret the effect of percentage female on earnings, with other skill factors controlled, as "comparable worth discrimination" and suggest that this explains close to 30 percent of the annual earnings differential between men and women employed full time and year-round. Still, the impact of skill on earnings is evaluated, but market conditions and social organization are slighted.

Treiman et al. (1984) use 1970 census data to evaluate whether returns to job content characteristics vary depending on whether the occupation is male or female dominated and to estimate those relationships across all occupations. They find that workers in female-dominated occupations obtain returns to motor skills and physical demands but not to complexity of their work, and that independent of these "worth" factors, the higher the concentration of fe-

male incumbents, the lower the level of occupational earnings. They estimate that there is substantial inequality in pay after the worth factors have been controlled; perhaps as much as 66 percent of the difference is attributable to some form of discrimination. This study is of particular importance because it described relationships between measures of worth and percentage female, thus confronting very directly, although incompletely, the fact that there are relationships among measures of job content, market conditions, and occupational social organization.

Parcel et al. (1986) tested a theory similar to the one described in this paper using 1970 census data. They operationalized a much broader range of occupational market characteristics than did the earlier works described above. They found predictable zero-order relationships between occupational earnings and measures of occupational market conditions, such as reserve labor pool and unemployment rate, as well as with aspects of market social organization, such as percentage nonwhite, percentage of female occupational incumbents married, and percentage of male occupational incumbents married. The strongest effects on earnings were from years of schooling, experience, and percentage female, but most of the remaining effects were maintained in multivariate analysis when job content was controlled. This analysis demonstrated the feasibility of conducting an analogous investigation with data from the 1980 census, the results of which I report below.

Method

Measurement of Job Content

The unit of analysis is the detailed occupation, as defined by the 1980 census. To measure job content, I matched DOT data to data on 1980 detailed census occupations (provided by Dr. Paula England). These data were created using a tape of individual respondents that had been double-coded using 1970 and 1980 occupations. Data for 503 occupations were produced; these occupations were derived by reducing all industrial, government sector, and public-private variation in occupational titles to a single title by computing weighted averages within occupational categories. I conducted a principal components analysis with orthogonal rotation of the 503 occupations to facilitate data reduction and to develop reliable measures that would serve as good measures of job content. In the solution reported here, eight factors met the eigenvalue criterion and five were substantively interpretable; the five factors accounted for 67.7 percent of the common variance. I formed factor-based scales of each interpretable factor, where individual items consisted of Z scores and were reversed in direction as necessary so that all items within a scale ran in a consistent direction. For an item to be incorporated into a scale, it had to have loaded at an absolute value of .40 or higher on a factor.

The first extracted factor, "substantive complexity," contains 17 indicators tapping General Educational Development; Specific Vocational Preparation; intelligence; complexity of functioning with data and with people; verbal and numerical aptitudes; preference for dealing with abstract and creative versus routine, concrete activities; repetitive or continuous processes; direction, control, and planning of others' activities; sensory or judgmental criteria; reaching, handling, fingering, and feeling; clerical, spatial, and form perceptions; influencing people; and talking. The scale has a reliability of .95. The second factor extracted, "physical dexterity/perceptual ability," contains 12 items tapping finger and manual dexterities; motor coordination; complexity of functioning with things; form and spatial perceptions; seeing; reaching, handling, fingering, and feeling; setting limits; tolerances or standards; color discrimination; prefer-

ence resulting in tangible satisfaction versus prestige; and dealing with measurable or verifiable criteria. This scale has a reliability of .91.

The third factor extracted, "physical activity/working conditions," contains nine items tapping climbing; stooping; eye-hand-foot coordination; hazardous working conditions; lifting, carrying, pulling, and pushing; outside working conditions; noise and vibration; clerical perception; and fumes, odors, dust, and poor ventilation. This scale has a reliability of .89. The fourth factor extracted, "people-things," contains nine items that overlap heavily with those contained in the substantive complexity factor. Included items are a preference for activities involving machines as opposed to social welfare; setting limits, tolerances, or standards; dealing with people; influencing people; talking; complexity of functioning with people; measurable or verifiable criteria; seeing; and use of sensory or judgmental criteria. It has a reliability of .92 and runs from things at the "positive" end of the continuum to people at the "negative" end of the continuum. The final factor, "undesirable working conditions," contains three items tapping extreme heat, wet and/or humid working conditions, and extreme cold; it has a reliability of .54.

The factor solution of DOT data based on 1980 occupational titles is both similar to and different from that reported in Miller et al. (1980). They conducted a similar factor analysis of the DOT data matched to 1970 census data on detailed occupations. The major difference between the solutions appears to revolve around the extent of variation in occupational characteristics each set of factors allows. The factor solution reported here provides an additional factor, people-things, on which to differentiate occupations. In addition, the factors derived here frequently contain more items than does the Miller et al. solution, owing in part to their more restrictive selection criteria for inclusion of items within scales.

Measurement of Occupational Labor Market Conditions

Measures of occupational labor market conditions were derived from the unpublished 1980 Census of Population Subject Report, Occupational Characteristics (PC-2-7A), provided on tape by the Bureau of the Census from the U. S. Census of Population matrices. Potential quantity of labor supplied and demanded is measured by the percentage of the experienced civilian labor force (ECLF) that is self-employed and by reserve labor pool—the ratio of the number not in the labor force who last worked between 1975 and 1979 to the number in the occupation's ECLF. Unemployment rate for each occupation is also included, as is the percentage of government employment.

Supply characteristics of occupational incumbents (quality of labor supplied) include mean years of schooling in the ECLF and estimates of mean years of experience. To estimate experience for male occupational incumbents, I subtracted from mean age the mean number of years of schooling plus six for each occupation (see Mincer, 1974, for a discussion of this proxy). For females, I took an analogous figure for each occupation and, following Beck et al. (1980), deflated the figure to varying degrees depending on combinations of the proportion of white and nonwhite occupational incumbents and on the proportions of currently married and currently nonmarried occupational incumbents. Descriptive analysis revealed that this strategy noticeably lowered the estimates of experience for female occupational incumbents, although it is best to remember that, particularly for females, the figures should be interpreted as *estimates* of experience.

Indicators of market social organization that apply to the ECLF include percent female, percent black, percent Spanish speaking, and percent Asian. To tap the concepts relevant to family and work, I include the percentage of male employed

persons who are married with spouse present and the percentage of female employed persons who are married with spouse present. Data on the percentage of occupational incumbents who are unionized were provided by Prof. Randall Filer, as taken from Kokkelenberg and Sockell (1985). The union data consist of a 3-year moving average centered on 1980. The percentage of employed persons living in urban areas is also included.

Measurement of Annualized Earnings

Following Treiman et al. (1984), I use annualized earnings as the dependent variable. This measure was calculated by taking a weighted average of mean male and female earnings, where these respective figures have been adjusted to take into account occupation-specific average hours worked per year. To create each sex-specific component, mean annual earnings was multiplied by 2080 and divided by the product of the mean hours worked per week (measured during the census survey week) times the mean weeks worked per year. The constant 2080 reflects the assumption that full-time workers work 52 weeks per year and 40 hours per week. For many occupations, women work fewer hours per week and/or fewer weeks per year than men. Annualizing earnings removes the confounding of time worked by gender since it reflects the level of earnings that they would obtain in an occupation if all incumbents worked 40 hours per week for 52 weeks per year.

Below, I describe the interrelationships among these variables in preparation for multivariate analysis. Of particular interest are the relationships of each independent variable with the dependent variable, the relationships among the measures of occupational market conditions, and the relationships between market conditions and measures of job content. The analytic strategy involves multiple regression.

Results

Descriptive Analyses

Table 6-1 presents the means and standard deviations of the variables used in the analysis, along with zero-order correlations. Looking at all occupations, they contain incumbents who have, on average, 12.7 years of schooling and 17 years of experience. They average 32.3 percent female, 9.21 percent black, 5.51 percent Spanish speaking, and 1.78 percent Asian incumbents; they are relatively urbanized. An average of 65.3 percent of the male and 52.8 percent of the female incumbents are married. The average rate of self-employment is low, and the pool of reserve experienced labor averages about 20 percent, as does the rate of government employment. Means for the DOT-based composites are 0, allowing for rounding error, since they are sums of Z scores; the standard deviations of Z scores deviate from 1 because these variables are composites and because of rounding error.

Inspection of the zero-order correlations is important for several reasons. First, correlations between each job content or market characteristic variable and earnings portray these relationships in preparation for multivariate analysis. Male and female annualized earnings, male and female experience levels, and male and female years of schooling are omitted from the table because their correlations are very similar to those variables for all occupational incumbents. Hypotheses regarding the zero-order associations of independent variables with annualized earnings are all supported. Earnings is positively associated with years of schooling, substantive complexity, self-employment, unionization, and percents government employment, males married, urban, and Asian. Negative relationships include those with unemployment rate, reserve labor pool, and percents female, black, and Spanish speaking. Second, inspection

TABLE 6-1 Means, Standard Deviations, and Zero-Order Correlations Among Worth, Market, and Earnings Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean	Standard Deviation	N[a]
1. Occupational earnings	1.000																				15,935	5,369	494
2. Mean years of schooling	.626	1.000																			12.70	2.09	
3. Experience	.221	−.302	1.000																		17.10	4.48	
4. Reserve labor pool	−.537	−.346	−.152	1.000																	20.40	14.06	
5. Percent self-employed	.129	.034	.261	−.024	1.000																6.44	12.50	
6. Percent urban	.175	.497	−.294	−.051	−.222	1.000															75.42	11.61	
7. Percent females married	−.042	−.036	.135	−.096	.207	−.283	1.000														52.83	6.25	
8. Percent males married	.582	.276	.418	−.529	.136	−.144	.331	1.000													65.34	13.14	
9. Percent female	−.500	.073	−.478	.438	−.150	.305	.112	−.521	1.000												32.30	28.51	
10. Percent black	−.480	−.487	.099	.337	−.207	−.067	−.105	−.435	.298	1.000											9.21	6.69	
11. Percent Spanish speaking	−.497	−.626	.091	.364	−.075	−.263	.076	−.291	.109	.485	1.000										5.51	3.63	
12. Percent Asian	.095	.319	−.219	.046	−.028	.187	−.013	−.129	.224	−.010	.061	1.000									1.78	1.55	
13. Percent government	.201	.503	−.067	−.062	−.238	.255	−.067	.119	.092	−.036	−.296	.082	1.000								20.18	25.87	

14. Substantive complexity	.612	.889	−.152	−.376	.114	.411	.024	.365	−.047	−.541	−.586	.284	.414	1.000									.00	12.82	493[b]
15. Physical dexterity/ perceptual abilities	.074	−.213	.065	−.212	.167	−.181	.047	.195	−.281	−.196	.073	.057	−.347	−.129	1.000								.00	8.50	493
16. Physical activities/ working conditions	−.129	−.588	.274	.058	.094	−.617	−.066	.047	−.476	.134	.343	−.366	−.204	−.514	.336	1.000							.00	6.58	493
17. People-things	−.178	−.603	.185	−.069	−.008	−.368	.010	.066	−.303	.091	.325	−.118	−.488	−.582	.743	.517	1.000						.00	6.95	493
18. Undesirable working conditions	−.086	−.270	.146	.065	−.053	−.206	−.033	.047	−.161	.176	.165	−.129	−.014	−.299	.037	.365	.175	1.000					.00	2.17	493
19. Unemployment rate	−.387	−.631	−.033	.408	−.018	−.398	−.089	−.280	−.106	.314	.562	−.193	−.343	−.599	.094	.584	.380	.219	1.000				5.90	4.62	
20. Percent unionized	.079	−.408	.324	−.189	−.253	−.186	−.005	.223	−.362	.189	.167	−.319	.032	−.395	.205	.465	.391	.252	.239	1.000			26.83	19.74	432[c]

[a]Unless otherwise noted, all variables are measured for 503 occupations.

[b]Data from Dr. Paula England enabled the construction of measures based on the *Dictionary of Occupational Titles* (U.S. Department of Labor, 1977) for 493 occupations. The remaining 10 occupations were not sufficiently represented in the data set she used for translation between 1970 and 1980 occupational codes to allow measure construction.

[c]Kokkelenberg and Sockett (1985) report unionization data for 432 of the 503 occupations used here. Illustrative occupations for which unionization data are missing include legislators, actuaries, a variety of postsecondary schoolteachers, stenographers, hotel clerks, cooks, sheet metal apprentices, food machine operators, and marine engineers.

of the correlations among the job content variables suggests negative relationships between substantive complexity and the three remaining indicators, but generally positive relationships among those latter measures, such as between physical dexterity and people-things and between people-things and physical dexterity.

Third, correlations among the indicators of labor market conditions suggest relationships between the occupational characteristics we are familiar with and more newly developed measures. There are clear relationships, for example, between the percentages of female and racial minority incumbents and indicators of market conditions; these relationships suggest the possibility of explaining the often-found negative relationships between percent minority and earnings in terms of the occupational labor market conditions analyzed here. Note that the higher the percentages of blacks and Spanish-speaking incumbents, the higher the unemployment and reserve labor pool, and that percent female is negatively associated with unemployment but strongly associated with reserve labor pool. The more Asian incumbents, the lower the unemployment rate, but there is no relationship with reserve pool. In addition, blacks and Spanish-speaking workers tend to be segregated into the same occupations, and those occupations have lower levels of married men. Correlations between years of schooling and the remaining market variables are often strong; there are negative relationships between years of schooling and unemployment rate, unionization, experience, labor reserve, and percents black and Spanish speaking. Schooling shows positive relationships with percents government, Asian, urban, and married males. As will be seen below, these strong correlations with schooling influence the results of the multivariate analyses.

Finally, consider the relationships between the job content variables and market characteristics. Given the lack of attention to market determinants of occupational earnings, there has been a corresponding lack of understanding regarding the relationships between job content and market variables. Substantive complexity is positively associated with percents government, Asian, urban, and married males and is negatively associated with unemployment rate, unionization, labor reserve, and percents black and Spanish speaking. Physical activities often shows relationships of similar strength but opposite in sign. It is positively associated with unemployment rate, unionization, and percents black and Spanish speaking, but negatively associated with percents government, Asian, female, and urban. People-things shows similar correlations to those of physical activities.

Multivariate Analyses

We can now examine these relationships in multivariate terms. Preliminary analyses revealed that multicollinearity between and among sets of variables necessitated exclusion of certain variables when others were included. In particular, the .889 correlation between years of schooling and substantive complexity necessitated that these variables not be used in the same equation. Similarly, reserve labor pool is used but unemployment rate is omitted from the multivariate analyses. People-things is also omitted from analyses because of its strong relationship with substantive complexity. Table 6-2 predicts occupational earnings as a function of various combinations of job content and/or market characteristic variables.

Table 6-2, Equation (1), portrays the impact of the job content variables on occupational earnings. Substantive complexity dominates the equation; both the physical dexterity and physical activities composites positively influence earnings, but the effect of physical activities is nearly twice as strong as that of physical dexterity. The second equation investigates the impact of the market conditions variables on earnings. In this

TABLE 6-2 Job Content and Occupational Labor Market Determinants of Occupational Earnings

Independent Variables	Mean Annualized Earnings														
	Equation (1)			Equation (2)			Equation (3)			Equation (4)			Equation (5)[a]		
	B		B*	B		B*	B		B*	B		B*	B		B*
Substantive complexity	310.84	(16.96)[b]	.742							176.84	(23.19)	.422			
Physical dexterity/ perceptual abilities	64.01	(23.23)	.101				14.08	(18.18)	.022	−39.92	(22.28)	−.063	14.15	(19.83)	.023
Physical activities/ working conditions	162.36	(35.93)	.199				62.78	(34.42)	.077	8.13	(42.79)	.010	91.62	(35.34)	.111
Undesirable working conditions	129.56	(92.70)	.052				11.75	(60.57)	.005	64.05	(75.91)	.026	5.91	(60.68)	.003
Mean years of schooling				2,475.69	(136.77)	.962	2,563.82	(143.15)	.996				2,488.48	(160.09)	.863
Experience				293.45	(38.36)	.245	316.15	(39.74)	.264	92.80	(46.43)	.077	344.56	(45.81)	.280
Reserve labor pool				10.15	(11.55)	.027	10.17	(11.77)	.027	−27.94	(14.40)	−.073	4.87	(11.85)	.013
Percent self-employed				−2.16	(11.66)	−.005	−8.33	(12.00)	−.019	23.93	(14.77)	.056	−27.25	(12.21)	−.068
Percent unionized				78.54	(8.60)	.289	73.24	(8.88)	.269	50.60	(11.16)	.186	45.19	(9.14)	.168
Percent government				−52.48	(6.36)	−.252	−53.89	(6.54)	−.260	−15.14	(7.57)	−.073	−45.29	(6.70)	−.205
Percent urban				−16.01	(14.00)	−.034	−3.32	(15.79)	−.007	47.03	(19.40)	.102	5.08	(15.91)	.011
Percent males married				18.97	(15.37)	.048	18.06	(15.74)	.044	76.05	(19.16)	.186	17.91	(16.60)	.046
Percent females married				−36.39	(24.34)	−.042	−26.01	(24.80)	−.030	−64.23	(30.88)	−.075	−10.51	(25.18)	−.013
Percent female				−57.38	(6.75)	−.305	−51.92	(7.25)	−.276	−50.00	(9.10)	−.265	−55.32	(7.79)	−.296
Percent black				.90	(25.34)	.001	6.42	(25.82)	.008	−35.13	(32.53)	−.044	6.80	(27.31)	.009
Percent Spanish speaking				−17.17	(47.16)	−.012	−31.93	(47.94)	−.022	−226.98	(57.75)	−.153	−48.92	(50.83)	−.034
Percent Asian				118.46	(90.05)	.034	130.87	(97.30)	.038	502.44	(118.15)	.145	92.49	(126.21)	.023
Constant	15,935.16	(181.21)		−18,138.64	(2,304.78)		−21,048.93	(2,635.33)		10,883.10	(2,634.76)		−20,782.47	(2,817.77)	
	R^2 = .431; $\bar{R}^2$ = .426			R^2 = .797; $\bar{R}^2$ = .790			R^2 = .799; $\bar{R}^2$ = .792			R^2 = .687; $\bar{R}^2$ = .674			R^2 = .770; $\bar{R}^2$ = .761		

NOTE: Unless otherwise indicated, all variables are measured for 503 occupations.

[a]Listwise deletion of missing data used, N = 424 occupations.
[b]Standard errors in parentheses.

model, mean years of schooling is predominate. The remaining statistically significant predictors have smaller impacts on the dependent variable although most of their signs are consistent with the hypotheses. Percent female has a negative impact on earnings, and experience and unionization have positive effects. Percent government employment, however, has a negative effect and is also statistically significant, despite its positive zero-order relationship with the dependent variable. Additional analyses suggest that once years of schooling is controlled, the net effect of governmental employment is negative. The remaining market and social organization characteristics fail to attain statistical significance, but that is not uniformly true in the specifications considered below.

Equations (3) and (4) present composites of the job content and market variables. Since substantive complexity and mean years of schooling cannot be included simultaneously owing to multicollinearity, their effects, and those of the remaining predictors common to each model, are included sequentially. Years of schooling serves as a more effective control than does substantive complexity in the prediction of earnings. Its effect is stronger on the dependent variable, the model in which it is contained explains more variance, and it appears to change the effects of other measures. Compare, first, Equations (2) and (3). In Equation (3), years of schooling dominates and percent female, experience, percent government, and unionization maintain the effects observed in Equation (2). Physical activities is also statistically significant, although its effect is less than half as strong as in Equation (1), in which labor market conditions were not controlled.

Comparing Equations (3) and (4), substantive complexity is the most important predictor of earnings in Equation (4), as its "counterpart, " years of schooling, was in Equation (3). Note, however, that controlling for market factors reduces the importance of substantive complexity in comparison with Equation (1), and that substantive complexity is not as strong a predictor of earnings as is years of schooling. When substantive complexity is included in the model, the effect of physical dexterity is negative, although small in magnitude. Percent female remains as strong a predictor as in Equation (3), but the effects of unionization, percent government, and experience are diminished, although still important.

Additional labor market characteristics also attain statistical significance in Equation (4). Reserve labor pool exercises a statistically significant negative effect on annualized earnings, and the effect of percent urban is statistically significant and positive. Interestingly, four additional social organization characteristics of occupational labor markets also attain statistical significance. Percent males married exerts a sizable, positive effect on the dependent variable and the effect of percent females married is negative, albeit of smaller impact. Both of these effects are independent of gender composition of occupations. Percent Asian positively affects earnings but percent Spanish speaking has a negative impact; both of these effects are of moderate importance to the model. The overall explained variance is reduced in this specification as compared with Equation (3).

Equation (5) enables us to evaluate the possibility that the pattern of missing data has influenced the findings. The other equations were estimated using pairwise deletion of missing data in order to take advantage of all available information, but Equation (5) estimates the model shown in Equation (3) with listwise deletion of missing data. Exclusions result in 424 cases available for analysis. Differences between the two equations are generally ones of magnitude, although the effect of percent self-employed is statistically significant for the first time. The effects of years of schooling, percent government, and especially, unionization are reduced in this model as compared with Equation (3), but the effects of experience and percent female

are similar across the two models. It appears that the pattern of missing data may tend to increase the effects of certain variables when pairwise deletion is used; thus, the magnitude of estimates using pairwise deletion should be viewed as upper bounds and interpreted with caution.

Table 6-3 estimates Equation (3) from Table 6-2 for two additional dependent variables: male and female annualized earnings. For these models, experience and years of schooling are measured on a sex-specific basis. Although years of schooling dominates both models, and neither dependent variable is predicted by any of the remaining job content variables, the effects of other predictors vary noticeably across the models. Returns to experience are lower for female earnings than for male earnings. The negative effects of percents government and female are weaker for female as compared with male earnings, as are the positive effects of unionization and percent males married. Male earnings appear to benefit from reserve labor pool, but female earnings are not affected by it positively or negatively. Female earnings are negatively affected by percents Spanish speaking and self-employed, and positively affected by percents Asian and urban. These findings suggest that although years of schooling dominates the equations for annualized earnings presented in both Tables 6-2 and 6-3, a variety of labor market characteristics are important to the prediction of male and female annualized earnings, even when schooling is controlled.

Discussion

Several limitations of the data influence the analysis. First, the analysis has relied

TABLE 6-3 Job Content and Occupational Labor Market Determinants of Female and Male Annualized Earnings

	Female Annualized Earnings			Male Annualized Earnings		
Independent Variables	B		B*	B		B*
Substantive complexity						
Physical dexterity/perceptual abilities	-18.14	(12.29)	-.048	15.22	(19.68)	.024
Physical activities/working conditions	30.16	(22.52)	.061	50.13	(37.14)	.062
Undesirable working conditions	-21.88	(40.31)	-.014	36.01	(65.47)	.015
Mean years of schooling	1,597.47	(100.49)	.925	2,616.69	(150.75)	1.060
Experience	137.84	(36.66)	.136	309.10	(36.55)	.271
Reserve labor pool	-9.73	(7.80)	-.042	29.32	(12.80)	.077
Percent self-employed	-27.52	(7.65)	-.107	-8.89	(12.85)	-.021
Percent unionized	59.10	(5.76)	.362	72.19	(9.66)	.267
Percent government	-23.76	(4.35)	-.191	-58.26	(6.97)	-.282
Percent urban	17.22	(10.20)	.062	.68	(17.20)	.001
Percent males married	23.91	(9.78)	.098	30.68	(17.52)	.076
Percent females married	-10.65	(16.54)	-.021	-15.26	(26.83)	-.018
Percent female	-7.62	(4.61)	-.067	-35.27	(7.53)	-.189
Percent black	-8.86	(17.20)	-.018	-30.05	(27.42)	-.038
Percent Spanish speaking	-66.63	(31.42)	-.075	-19.35	(52.14)	-.013
Percent Asian	228.33	(63.51)	.110	74.10	(104.78)	.022
Constant	-12,920.89	(1,889.94)		-22,847.44	(2,740.74)	
	$R^2$2 = .754;	$\bar{R}^2$ = .745		R^2 = .759;	$\bar{R}^2$ = .750	

NOTE: Standard errors in parentheses.

on data from the DOT to operationalize the job content of occupational 'work activities because there is no other data source from which such measures for detailed occupations can be developed. Cain and Treiman (1981) document difficulties with the DOT that must be taken into account, however. For example, DOT ratings on variables are best viewed comparatively *within* groups of occupations, rather than *across* occupations of very different types. A psychiatrist may have a higher "involvement with people" score than either a social worker or a bricklayer, but a comparison between the psychiatrist and the bricklayer on that dimension may be misleading because the construction of the scores was based on within-establishment, not across-establishment, comparisons. Since the psychiatrist and the social worker are more likely to have worked together than either of them with the bricklayer, comparisons across very different occupations are only approximations.

Second, the DOT has poor measures of authority relationships, which are very important in evaluations of worth and are likely to vary considerably within and between occupations. The DOT is, however, the only source of data for investigations that compare occupations using national samples, and it has been the source of job content measures for all studies with a focus similar to this one. Unfortunately, it does not appear that its limitations will be rectified soon. In addition, measurement of experience, particularly for female occupational incumbents, should be viewed as an estimate.

Despite the limitations of the data, the inferences produced here are sound and important. This analysis makes three types of contributions to thinking on earnings attainment. The first is a conceptualization of occupational market effects on earnings that enhances thinking within "the new structuralism" in sociology and also contributes to thinking on comparable worth. Drawing on Stolzenberg's notions of occupational labor markets, the analysis suggests a theoretical framework for understanding occupational earnings that highlights three types of factors: job content, characteristics of occupational labor market conditions influencing potential supply and demand, and occupational labor market social organization.

This conceptualization represents a comprehensive approach to occupational market determinants of earnings, and it may provide additional impetus to further analyses of occupational market differentiation in our economic system. When previous studies of earnings differences. conducted from a comparable worth perspective are viewed from this framework, it becomes clear that they have neglected conceptualization of market conditions as compared with skill or job content and that they have failed to consider that "percent female" is but one aspect of occupational market social organization. Although female concentration rightly remains a central element of market social organization, this analysis provides evidence that racial concentrations, unionization, and marital status also influence earnings.

In addition, given that this study has demonstrated the usefulness of this approach, additional measures can be developed that are compatible with the perspective. Researchers could assess, for example, how the number of children per occupational incumbent influences earnings and investigate whether this could promote male earnings attainment but hinder female earnings attainment. Within this framework, number of children could be viewed as an additional dimension of occupational social organization. Additional measures of job content tapping authority position within organizations could also be added within the framework. Filer's analysis (in this volume) suggests additional possibilities that might also fit within the perspective.

The second contribution of this analysis

is the detailed descriptive picture it provides of the relationships among variables tapping job content, market characteristics influencing supply and demand, and measures of market social organization. For example, these data can be used to summarize the market conditions and job content characteristics of occupations with high concentrations of economic minorities. Female-dominated occupations are low in earnings, experience, percent males married, unionization, and the job content measure of physical activities. They have high reserve labor pools, are urbanized, and: have high black and Asian concentrations. Occupations in which blacks predominate tend to be low paying, have incumbents with lower levels of schooling and higher levels of unemployment and reserve labor pools, fewer males married, lower levels of substantive complexity, and modest levels of unionization. Occupations in which Hispanics are concentrated are similarly organized. However, they are less urbanized than black-dominated occupations and less female dominated. They have a weaker negative relationship with males married and higher rates of unemployment and the job content measure of physical activities. As compared with female-dominated occupations, those in which racial minorities are concentrated are more likely to involve unpleasant working conditions.

Another insight gained from these data is that the variables classified as "job content" or as "supply characteristics of occupational incumbents" are sometimes closely related, and those relationships may reflect more general social phenomena. The close relationships among substantive complexity, years of schooling, and earnings constitute an extreme and obvious example. The occupations that involve complex work activities offer greater opportunities for earnings and either require higher levels of schooling to perform job duties or obtain better educated incumbents because employers can afford to select on educational attainment. Other important clusters of variables involve the negative relationships among reserve labor pool, complexity, and schooling and the even stronger negative relationships among unemployment, complexity, and schooling. These data suggest that those occupations in which incumbents have low levels of schooling and perform work low in complexity are likely to face larger reserve labor pools and, especially, to be subject to greater unemployment than those occupations characterized by more complex work and more highly educated incumbents. This descriptive understanding of occupational market characteristics will facilitate other studies in which occupational labor market conditions are incorporated in analyses of other dependent variables.

Third, the multivariate: analyses presented in this chapter have demonstrated the usefulness of the vast majority of the independent variables included in the models. Annualized earnings was significantly predicted by only a subset of the variables included: schooling, experience, unionization, and percents female and government. Male and female annualized earnings, however, were best understood by considering the fuller range of market and social organization factors. In addition to the factors affecting annualized earnings, male annualized earnings was positively affected by percent males married and by the size of the reserve labor pool. Female annualized earnings, in addition to being affected by the five variables noted as determining annualized earnings, was positively affected by percents Asian, urban, and males married and negatively affected by percents Spanish speaking and self-employed. Social organization and other market characteristics appear to be particularly important to predicting female annualized earnings. In interpreting the preeminence of years of schooling in predicting earnings, its relationships with the remaining market and social organization characteristics should be kept in mind. Those occupations with highly educated incumbents

have other market characteristics favorable to producing earnings: low unemployment and reserve labor pools; low concentrations of females, blacks, and Hispanics; high proportions of males married; access to government employment; and complex work activities. When substantive complexity was substituted for years of schooling in the analysis, additional market and social organization factors were shown to be important to explaining variation in the dependent variable, thus corroborating this idea.

Substantively, the findings are generally consistent with the hypotheses, with two exceptions. First, it appears that the effect of government employment turns negative once years of schooling is taken into account, possibly because greater earnings opportunities exist in the private sector for well-educated workers. Second, the existence of self-employment opportunities does not turn out to operate as financial "leverage" for employees across occupations. The strong positive effects of schooling, experience, and unionization, however, were expected and consistent across specifications.

Other findings were consistent with hypotheses, although less frequently significant. The effect of percent males married is a case in point. Although not a statistically significant predictor of annualized earnings, it positively affects both male and female annualized earnings. This finding reflects an additional basis for discrimination independent of percent female, and it may suggest that processes of job allocation, promotion, and salary increases within establishments work against women when proportions of males married within occupations are high. That female annualized earning attainment is also influenced predictably by concentrations of racial minorities again reinforces the notion that percent female is but one dimension of market social organization that affects female earnings attainment. Indeed, the effect of percent female on female earnings is modest, although it is stronger in its effect on male earnings.

Because many of these measures are newly constructed or have not been used in earnings research previously, questions regarding their interpretation remain. The effects of percent Asian are a case in point. In the analysis, Asian concentration had a stronger impact on earnings when education was not controlled, which suggests that the higher educational attainment of Asian incumbents partly accounts for this social organization effect. The analysis also found, however, that female occupational earnings is greater the higher the percent Asian in the occupation. There may be unmeasured productivity factors that explain this, such as job skills not captured by the DOT variables, or it may be that wage rates in occupations in which Asians are concentrated have historically been higher owing to scarcity of labor or custom. Additional research should attempt to adjudicate among these possibilities.

Future analyses should also consider the nature and extent of changes in these earnings processes over time. Parcel and Mueller (1989) compare the models discussed here with those generated for the 1970 time period in an effort to understand the stability of these market processes during the 1970–1980 time period. Additional investigations are needed that use these macro-level characteristics in conjunction with micro-level data sets to determine more fully how occupational markets operate as important contexts affecting the socioeconomic standing of individual workers. Sociologists have been interested in such models for some time (e.g., Parcel and Mueller, 1983), and these newly developed measures will provide an additional resource with which to pursue such investigations.

Acknowledgments

I wish to thank Mohammad Siahpush and Gopal Singh for research assistance, Robert Kaufman and Lauren Krivo for helpful suggestions, and especially; Richard Haller for

essential contributions to data production. Paula England provided the data matching DOT categories with 1980 U.S. census codes, and Randall Filer provided the data on unionization. John Priebe at the Bureau of the Census facilitated my obtaining the unpublished data on occupations from the 1980 census. I retain responsibility for remaining errors.

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7

Occupational Segregation, Compensating Differentials, and Comparable Worth

Randall K. Filer

In surveying the relative positions of men and women in the labor market, two facts stand out. First, wage differences between the two sexes are substantial. Second, differences in occupational structure are significant; men and women are concentrated in different occupations and heavily female occupations tend to be lower paying. Recent years have seen substantial shifts in both of these factors. Median weekly earnings of full-time female workers over age 16 have risen from 61 percent of those for men in 1978 to 71 percent of male earnings in the second quarter of 1987. Thus, in the past 10 years approximately 25 percent of the difference in male and female earnings has been eliminated. At the same time, although there are methodological difficulties in measuring changes in the degree of occupational sex segregation over time, numerous recent studies have documented that the degree of sex segregation in occupations has declined since at least 1970 (and probably since 1960).[1] As one example, Bianchi and Rytina (1986) found that the index of dissimilarity fell from 67.9 in 1970 to 59.4 in 1980.[2]

Despite these improvements in the relative economic position of women over the past few years, significant differences in occupational distributions and earnings between the sexes persist. There are important policy implications to be derived from an understanding of why these differences exist. To the extent that they arise from unequal opportunities caused by unfair hiring or promotional practices, the economy has failed to make appropriate use of human resources and has created inefficiencies. In this case there is justification for intervention to facilitate greater sex equality in the labor market. On the other hand, to the extent that sex differences in occupational structure and earnings arise from differences in individual productivity or choices, despite equal labor market opportunity, interventions to change either employment

[1] The methodological difficulties arise from changes over time in the categories into which occupations are classified (England, 1981).

[2] The dissimilarity index is roughly equal to the percentage of workers who would have to change jobs in order to create an equal distribution of the sexes in all jobs.

or earnings patterns would lead to distortions in resource allocation and the creation of inefficiencies.

Possible Causes of Sex Differences

The observed pattern of the genders being concentrated in different occupations, coupled with lower average wages in the occupations that are heavily female, is consistent with a number of possible explanations that have been proposed by economists. Those explanations provide the framework for the analysis in this paper.

Differences in Productivity

It may be that one gender has lower average levels of productivity and has concentrated in occupations in which it has a comparative advantage. Primary among the factors that may contribute to differences in productivity between typical men and women is past work experience. Previous research has established that between one-quarter and one-half of the gender gap in wages may be due to differences in the extent of previous employment (Corcoran, 1979; Mincer and Ofek, 1982; Mincer and Polachek, 1978; Sandell and Shapiro, 1978).

Physical differences may also contribute to differing occupational comparative advantages and overall productivity. In one setting, Hoffmann and Hoffmann (1987) found that upper body strength and lifting requirements limited women's bidding on and accepting "male" jobs even though they were actively encouraged to do so by their employer. Similarly, several authors (e. g., Daymont and Andrisani, 1984; Filer, 1983; Greenfield et al., 1980) have observed that women and men in the labor market have substantially different personality patterns with respect to such characteristics as empathy and aggression, which may lead to different job choices and, consequently, different reward structures.[3]

Differences in Utility Functions

Men and women may make rational choices in the job market based on differences in utility functions that create differing preferences for certain types of work and other duties. For example, some evidence indicates that women attach greater importance to various forms of attractive working conditions and that men place relatively greater emphasis on incomes (Forgionne and Peters, 1982; Harvey, 1986; Murray and Atkinson, 1981). Such a difference in preferences, coupled with the fact that the market forces employers to pay compensating differentials to those workers who fill jobs with relatively unattractive working conditions, will, even given equal productivity, result in women being concentrated in lower paying but otherwise more attractive jobs. Evidence presented in Filer (1985) suggests that such compensating differentials may be responsible for up to one-quarter of earnings differences between men and women.

Much of the literature regarding differences between men and women in labor market preferences starts with the fact that there are differences in home duties. Filer (1985) reports that jobs typically held by women are those from which it is easier to take time off for personal reasons and are typically located closer to their homes.[4]

[3] It should be noted that nothing has been said about how these personality differences may have arisen. Some maintain that they are innately linked to biological differences between the sexes; others believe they are the result of childhood conditioning. The reality is probably some combination of these and other sources.

[4] Such locational differences contribute to wage differentials because commuting time is a negative characteristic that must be compensated for and because, by restricting the opportunity set from which a job may be chosen, individuals who desire to work close

Others (O'Neill, 1983, 1985; Waite and Berryman, 1985) have pointed out that female-dominated jobs require less overtime, are less likely to have rotating shifts, and are more likely to be part time. All of these findings are consistent with women assuming responsibility for child rearing.

Perhaps the most frequently advanced reason why differing home responsibilities might lead to occupational segregation comes from the fact that women tend to have more discontinuous work histories. This should lead them to choose jobs that require little firm-specific human capital and in which there is relatively little atrophy of skills when not in use. Such a rational investment reason for occupational segregation has been most forcefully advocated by Polachek (1979, 1981, 1985, 1987). It can also be found in Aneshensel and Rosen (1980), Blakemore and Low (1984), Matthaei (1982), Mincer and Ofek (1982), and Waite and Berryman (1985). Evidence casting doubt on this hypothesis has been presented by Corcoran et al. (1984), England (1982, 1985), and England et al. (1986). A related but more complex explanation has been advanced by Goldin (1986), who argues that a higher turnover rate for women makes structuring of contracts preventing. shirking' more difficult and therefore results in the concentration of women in occupations in which such contracts are less critical.

Employers may respond to a greater propensity of women to leave the labor force by investing less in training women and being less likely to promote women (see Lazear and Rosen, 1989). Such theories of "statistical discrimination" rest on the inability of employers to distinguish between those women who will remain on the job and those who will leave. They do not, however, explain why women, who presumably know whether they intend to leave their employer to assume responsibilities at home, do not negotiate contingent claims contracts insuring employers against lost investments. Finally, Becker (1985) provides a theoretical rationale for why differing home duties will result in men providing greater levels of effort on the job.

Discrimination

If lower wages for one group are not the result of lower productivity and are not fully compensated by nonwage aspects of the job, the labor market is not in equilibrium and members of the group receiving lower wages should move into higher wage occupations. The absence of such equilibrating movement (and thus a stability over time in the extent of occupational sex segregation) would suggest that women have been involuntarily denied access to certain occupations (see Bergmann, 1974; Blau, 1984; Madden, 1975; Stevenson, 1984). Obviously, such conscious denial of access to occupations, whether through the actions of employers, other workers, customers, or legislative action, would create occupational segregation.[5] This

to home limit their ability to seek out their highest productivity and highest paying match. Occupational segregation will result from the fact that workers who desire employment close to home will only be available to those industries that are well suited to decentralized production in residential areas. Firms requiring large work forces (therefore having to draw workers from a wide geographic area) or not able to locate in residential neighborhoods (due to the need to be in a central place or because of production externalities) will tend to have a disproportionate share of male workers. To the extent that such firms are (as would appear likely) better paying establishments, this segregation will also contribute to wage differentials.

[5] It is an unanswered question to what extent observed patterns of occupational segregation result from impositions from outside the labor market. An obvious example is the law preventing women from serving in combat specialties in the armed forces. Until very recently, many states had protective legislation that limited the exposure of women to hazardous working conditions and restricted the schedules and number of hours women could work.

It has been very difficult to develop models of how denial of access can be stable over time and not create incentives for nondiscriminatory employers (including women themselves) to employ women in the previously denied occupations. Indeed, most models of discriminatory actions on the part of employers lead to firm segregation rather than occupational segregation, a result consistent with the finding of Bielby and Baron (1984) that segregation among firms is generally greater than that across occupations.

could explain lower wages for women through one of two mechanisms. "Crowding" of women into a limited number of jobs could artificially increase supply and depress wages (see Bergmann, 1974; Johnson and Solon, 1984). Alternatively, employers may consciously take the sex composition of jobs into account when setting pay levels (see England et al., 1982; Treiman and Hartmann, 1981).

If discriminatory differences in occupational structures are not being eliminated by labor market mobility, some structural barrier must be preventing such movement. This would suggest two possible courses of action. Either the barrier(s) to mobility may be removed so that rational mobility decisions on the part of workers will create equality of compensation, or the occupational distribution may be taken as fixed and an attempt made to raise wages in jobs heavily filled by women.[6]

It is the latter policy that has come to be known as "comparable worth." Advocates of comparable worth call for pay to be administratively set so that differences in wages (or full compensation, including the value of fringe benefits) not based on differences in productive skills, effort, responsibility, and working conditions are eliminated. An excellent review of the development and implementation of the concept of comparable worth is presented in Weiler (1986).

Analytic Framework

This paper investigates the extent to which there exist differences in the wages paid in various occupations that are not related to levels of effort and responsibility, working conditions, or the productive characteristics of incumbents in them, but which are related to the sex composition of the occupation. Much recent work has applied a similar procedure to micro-level data, regressing individual wages on personal characteristics and the percentage of women in an individual's occupation.[7] Studies such as England (1982, 1985), England et al. (1986), Ferber and Lowry (1976), Jusenius (1977), and Stevenson (1975) have found a negative relationship between the proportion of female workers in an occupation and its average wage.

Other studies (Aldrich and Buchele, 1986; England et al., 1982; Fuchs, 1971; Treiman et al., 1984) have used occupations as the unit of analysis, regressing average wages in an occupation (either separately for men and women or combined) on a set of explanatory variables as well as the occupation's sex composition. These studies have been handicapped by their ability to include, at most, a small subset of the factors encompassed in an occupation's "effort, responsibility, working conditions and productive requirements."

Estimation Issues

Comparable worth studies traditionally estimate an equation whereby wages (w) are a function of productive characteristics (P), job characteristics (effort, responsibility, and working conditions) (C), and the sexual composition of the job (F) such that

[6] These policies are, to a certain extent, mutually exclusive. If policies are enacted to raise wages in women's occupations to a level commensurate with their productivity and working conditions, this reduces the incentive for women to move into jobs previously held by men.

[7] See Polachek (1987) for an explanation of why this procedure is unable to distinguish adequately between human capital and occupational sex segregation explanations for sexual differences in earnings.

$$w_i = aP_i + bC_i + cF_i + u_i. \quad (1)$$

A number of issues must be addressed in the estimation of this relationship.

First, some authors (see Treiman and Hartmann, 1981; Treiman et al., 1984) have regressed average wages for men and women combined in an occupation on its characteristics as specified in Equation (1). Such a strategy, however, is inherently incapable of addressing comparable worth issues because it confounds male-female wage differentials that result from differences in pay according to sex composition with differences due solely to pay differentials within each occupation. Suppose women were paid 75 percent of men's earnings in each occupation no matter what its sex composition. It would still be the case that an occupation that was almost 100 percent female would have an average wage three-quarters of that for an occupation that was almost 100 percent male. Thus, separate equations for men and women must be estimated to determine whether the gender composition of an occupation affects earnings.

Second, in a comparable worth study it is especially incumbent on the researcher to be sure that the hedonic wage equations are properly specified. Consider the issue of omitted variables. Suppose that instead of Equation (1) a researcher estimated an equation of the form

$$w_i = c'F_i + u'_i.$$

A classic case of omitted variables bias then exists such that

$$c' = c + b[cov(C_i, F_i)/var(F_i)] + a[cov(P_i, F_i)/var(F_i)].$$

Thus, if P and C are measured so that the expected signs of a and b are positive, and if women have lower levels of the productive attributes or choose to enter occupations with fewer undesirable job characteristics that elicit compensating differentials—so that $cov(P_i, F_i)$ and/or $cov(C_i, F_i)$ are negative, c' will be less than c and estimates will overstate the negative impact of the proportion female on the average level of earnings in an occupation. Given that, as was discussed above, gender is likely to be causally related to a number of important characteristics of occupations through productivity and occupational choice considerations, little confidence can be placed on estimates of gender effects derived from equations that do not fully reflect the jobs under analysis. Given the complexity of occupations, this is a daunting task and ought to endow claims for perceived effects of an occupation's gender composition on its wages with a strong dose of agnosticism.

Third, comparable worth equations of the form of Equation (1) are in fact hedonic wage or price equations resulting from the interaction of worker's demand for and firms' supply of various job characteristics. As is typical in the compensating differentials literature, this relationship is estimated here using ordinary least squares (OLS). It must be recognized, however, that it is only in special cases that such estimates can be consistent (Epple, 1987). Although some recent empirical work has suggested that the available instruments that could be used to "solve" this problem in the context of compensating differentials studies are so poor as to render it impossible to reject statistically the accuracy of the OLS estimate, such a conclusion would raise serious questions were such studies to become the basis for legal actions rather than academic research.

Fourth, it is important to recognize that unless the hedonic wage equation is strictly linear in all its regions, there is no reason that returns to various factors should be the same for different groups even if wages for both were determined by a common function. Thus, an interpretation of differences in coefficients between male and female wage equations as indicating structural differences in how the sexes are treated in the

labor market, although frequently made, is fundamentally inappropriate.

Finally, it must be recognized that the estimated impact of gender composition on wages from Equation (1) overstates the potential effect of the adoption of comparable worth policies. The proposals for the United States, unlike the situation in Australia, do not require job comparability to be established across firms but rather within particular firms. Thus, to the extent that the gender impact represents different pay policies among firms, it is immune to comparable worth remedies.

The Data

This analysis combines data from a number of sources to obtain a more exhaustive portrait of the occupations and their incumbents than is available from any single data set. Earnings and personal characteristics for each three-digit occupation were derived from the 5 percent sample of the 1980 census.[8] Measures of working conditions, effort, and responsibility were obtained from the *Dictionary of Occupational Titles* (U. S. Department of Labor, 1977), the 1977 Quality of Employment Survey (Quin and Staines, 1979), the 1976 Survey of Time Use in Economic and Social Accounts (data tape provided by the Institute for Social Research, University of Michigan), and the May 1983 Current Population Survey (data tape provided by Bureau of the Census). Measures of personality were taken from a proprietary data set developed by the author in the mid-1970s (see Filer, 1981). Unionization is a 3-year moving average centered on 1980 taken from Kokkelenberg and Sockell (1985). The Duncan measure of occupational prestige (see Duncan and Stafford, 1980) and a measure of occupational deadendedness (Brown, 1982) were added. Finally, since the typical imputation of experience as age minus years of schooling minus six is not particularly useful for women, average levels of experience for women were computed for each occupation using the National Longitudinal Surveys (NLS) of Mature Women and Girls.[9] (See notes to appendix table for full data sources.)

Since job characteristics were observed for occupations and not workers, there would be no added variability from attributing these common measures to individual-level data. No micro-level data set contains sufficient measures of the concepts important for comparable worth to enable individual-level cross-sectional estimates. The process of integrating the data was complicated by the fact that the sources used several distinct sets of occupational codes that had to be mapped into the 1980 census scheme.[10] When small sample sizes meant that there

[8] Thus, the results presented here miss any of the substantial changes in the labor market status of women that have occurred since 1980.

[9] The procedure involved combining all of the waves of both panels into a single data set so that sample sizes would be large enough and then estimating for each census occupation an equation of the form: Experience = f (age, age^2, marital status, race, and the year of observation). Since all of the right-hand side variables in these equations are available in the census, the estimated coefficients could be used to obtain a predicted average level of experience for those women actually in any occupation in 1980. In theory, a similar procedure could have been followed for men; however, the improvement that this would offer over the more traditional approximation was judged not to be worth the additional computational effort.

[10] The Bureau of the Census double-coded a sample of occupations each time the codes were revised, thereby enabling each earlier-year code to be divided among one or more later-year codes according to population proportions. Similarly, the May 1981 Current Population Survey was double-coded using both 1970 census occupation codes and DOT codes. Thus, the DOT codes and the Filer data (which used DOT codes) could be merged into the 1970 census data. The Institute for Survey Research provided a matching of the codes used in the Time Use Survey with 1970 census codes. Thus, by appropriate chaining, each data set could be bridged into 1980 census codes. The method used was to compute average values for each variable in its "native" code and then to calculate values for the 1980 coding scheme as weighted averages of the native code values.

were too few observations in any three-digit code to enable reliable computation of average values for the characteristics, the average values were computed at the two-digit level[11] and then imputed back to the three-digit occupation.

The final data set contained over 225 measures of various characteristics of occupations and the workers who held them.[12] There are obvious difficulties with the inclusion of all 225 available job characteristics. Given that there are only 430 three-digit occupations in the final sample, the reduction in degrees of freedom if all possible explanatory variables were included would be substantial. Therefore, estimated results are reported in the appendix for a specification that maximizes the adjusted R^2 of the wage equation.

Estimated Wage Equations

The 5 percent sample from the 1980 census contains data on 6,490,318 men and 4,986,538 women who were employed for all or part of 1979. The average wage for men in this sample was $9.23 an hour and that for women was $5.87.[13] Thus, women in the sample earned approximately 64 percent of what men earned. The first adjustment that needs to be made recognizes that men and women typically work different numbers of hours.[14] Results are reported below only for full-time, full-year workers (those who averaged at least 32 hours of work per week for at least 45 weeks in 1979).

Results

Table 7-1 reports the results of a number of hedonic wage equations that forcefully illustrate the points made above in the discussion of estimation considerations. Results are reported for regressions using levels of wages as the dependent variable. Both this specification and a semilogarithmic one in which the dependent variable is the natural logarithm of wages are common in the literature. The results for levels of wages are reported because their interpretation is patently obvious. Results using the natural logarithm of wages do not differ in any significant way and are available from the author.

The first column in Table 7-1 reports the estimated impact on the wages in a job if it were to move from 0 percent female to 100 percent female as estimated from a combined sample of men and women. Columns two and three show results for men and women separately. Differences between them and column one represent the extent to which women's lower wages *within*

[11] Census provides a set of two-digit codes and their constituent three-digit codes for the 1980 scheme. After a conversation with John Priebe at the Bureau of the Census failed to uncover any similar amalgamations for the 1960 and 1970 censuses, they were created by the author following as closely as possible the groupings in the 1980 scheme. Generally, this procedure was invoked if there were fewer than 5 observations in any cell in which averages were computed or fewer than 50 observations in the NLS cells in which the equations for imputing female work experience were estimated.

[12] A complete list of the variables in the data set is available from the author.

[13] Wages were calculated as labor earnings (the sum of "wage or salary income in 1979," "nonfarm self-employment income in 1979," and "farm self-employment income in 1979" divided by the product of "weeks worked in 1979" and "usual hours worked per week in 1979"). Since, for confidentiality reasons, the Census Bureau codes all incomes in excess of $75,000 as $75,000, "top-coded" incomes were replaced by an estimate of the mean income among those earning over $75,000 (calculated by fitting a Pareto distribution to reported incomes for those earning less than $75,000 within each income category and occupation) before total labor incomes and average wages were calculated.

[14] Census data cannot be adjusted for the fact that the typical longer work week of men means that more of them are likely to have hit statutory limits requiring the payment of overtime. Weiler (1986) reports that comparisons of base pay of men and women rather than average hourly wages may eliminate as much as one-third of the apparent gender gap in earnings.

occupations bias the gender effect when it is estimated using a combined sample. To calculate. the impact of gender composition on wage differentials, one must calculate the' change in wages that would occur if each occupation exactly mirrored the proportion female in the work force. Forty-two percent of the workers in the 5 percent census sample were women. The average man was in a job that was 23 percent female and the average woman was in a job that was 68 percent female.

TABLE 7-1 Estimated Coefficients of Gender Composition on Wages, All Full-Time, Full-Year Workers

	Estimated Coefficient[a] (Standard Error)		
Equation Specification	Men and Women Combined	Women Only	Men Only
Gender composition only	-4.41	-1.73	-2.32
	(.38)	(.25)	(.42)
Gender composition and demographic variables	-3.30	-1.92	-1.38
	(.30)	(.19)	(.32)
Gender composition, demographic variables, and union coverage	-3.13	-1.59	-1.29
	(.30)	(.19)	(.32)
Gender composition, demographic variables, union coverage, effort, responsibility, and working conditions (maximum $R^{2)}$	-1.70	0.30	0.31
	(.31)	(.24)	(.32)
Gender composition, demographic variables, union coverage, effort, responsibility, and working conditions (all variables)	-1.35	-0.55	0.18
	(.50)	(.37)	(.53)

[a] The estimated impact of an occupation shifting from entirely male to entirely female composition. Multiply by the difference in the femaleness of the job held by the typical woman and that held by the typical man to obtain the estimated gender contribution to the gross wage differential.

Adding Demographic and Personal Characteristics

The first row of Table 7-1 shows the estimated effect of a job's being 100 percent female on the wages of full-time workers in that job if no other characteristics of either the worker or the job are taken into account. The most standard adjustment is to recognize that men and women do not, on average, bring the same levels of productive attributes to the labor market. Census data provide a limited set of personal and demographic characteristics that may capture these productivity differences and can be included in the regression. Among them are racial group, marital and citizenship status, education, and crude measures of the type of employer. In addition, estimated actual work experience (as discussed above) was included in this specification. Results from this estimation are reported in the second row of Table 7-1. Increased femaleness of an occupation still implies significantly lower wages after controlling for these characteristics. Moving from being 100 percent male to being entirely female would, according to these estimates, bring a reduction of $1.92 an hour in average wages for women and $1.38 an hour for men. The relationship is significant for both sexes, although, unlike results found by other researchers, it appears to be stronger for women than for men.

It is often asserted that one reason women earn less than men is their lower participation in unions that obtain higher than

competitive wages. The third row of Table 7-1 reports estimated gender coefficients for an equation including personal characteristics and the proportion of the occupation covered by a collective bargaining agreement. There is some support for the hypothesis that lack of female participation in unions contributes to the estimated gender impact on wages. When unionization is added, the gender impact in the female equation falls by almost 20 percent.

Due to space considerations, coefficients on other variables are not reported in full.[15] In general, however, they are as expected. Education effects are somewhat stronger than found in micro-level studies. An additional year of schooling is estimated to result in between 51 and 176 cents an hour in additional earnings. Estimated union effects are consistent with those from micro-level studies. The estimated benefits to joining unions are substantially greater for women than for men. This raises the question of why women's unionization rates have traditionally been lower than men's. The answer may lie in discrimination within unions, higher costs to women in joining unions, or the fact that women must amortize organizational costs over shorter expected periods of job tenure.

No relationship was found between the imputed average level of experience of women in an occupation and its wages. For men, a positive relationship was found. These findings provide at least partial support for the Polachek analysis noted above. Results regarding the impact of the ethnic composition of an occupation on its wages will be discussed below.

Adding the Full Set of "Comparable Worth" Factors

Even after the addition of census demographic characteristics, the effect of the proportion female in an occupation on its average wages remains substantial. We can turn now to the extent to which this is a statistical bias resulting from the omission of significant characteristics that are correlated with the proportion female in an occupation but which advocates of comparable worth recognize as compensable in their own right, such as a job's working conditions and levels of effort and responsibility.

The results of two versions of the "complete" comparable worth specification are presented. The fourth row of Table 7-1 contains estimates of the gender impact from an equation constrained to include the variables discussed in the previous section plus the job characteristics that maximized the adjusted R^2 of the linear hedonic wage equation for men and women combined (since there were slight differences in the set that was entered for the sexes separately). [16] The actual estimates for this equation are presented in the appendix. The reader is cautioned, however, that where there are several measures relating to any comparable worth factor, patterns of multicollinearity make interpretation of any one coefficient impossible. It is only the effect of the full set taken jointly that has meaning. What is of interest here is not the coefficients in and of themselves (for a discussion of their meaning see Filer, 1987), but rather the impact that their inclusion has on estimates of the

[15] They are available from the author.

[16] As an alternative method of data reduction, factor analysis was tried on the full set of raw variables. Even when rotated in several alternative ways, however, a large number of factors were required to capture even a moderate portion of the complexity in the data. Given the pattern of loadings on the factors, it proved difficult to assign any meaningful interpretation to them. An attempt was then made to group the variables on an ad hoc basis into 25 distinct sets based on what they apparently measured and then extract factors only within each set. Results from this experiment were highly ungratifying, and the resulting factors were of little use in explaining average wages in occupations. Thus, the decision was reached to retain variables in their raw form and reduce the number of variables used through a stepwise procedure.

effect of gender composition on wages in an occupation. Finally, the last row of Table 7-1 reports the result when all 225 job characteristics were entered into the wage equation.

The impact of adjusting for compensable job characteristics is striking. Once compensating differentials for a job's effort, responsibility, fringe benefits, and working conditions are taken into account there *is no significant relationship between an occupation's gender composition and its wages* for either men or women. What appears to be an effect in the combined equation results from lower wages for women within each occupation, which, to the extent that they represent other than legitimate compensation practices, can be addressed by equal employment laws but which are immune to comparable worth adjustments.

Some of the results for other variables in this equation are worthy of note. For a more thorough analysis, the reader is referred to Filer (1987). The pattern of the census variables remains the same. There is an approximately 25 percent reduction in the estimated impact of education on wages, although this coefficient is still highly significant. Examining comparable worth concepts such as effort and responsibility is complicated by the fact that there are several related and highly intercorrelated measures of each. When taken as a group (say by assuming a change of one standard deviation in each), the results suggest that occupations requiring more effort or responsibility, exposure to worse working conditions, or longer commutes pay higher wages for both men and women; while those with higher levels of fringe benefits, more interaction with other people, or employment in smaller establishments can pay lower average wages.[17]

Results for Other Ethnic Groups

It is important to remember that the principle behind comparable worth laws should apply to all groups who might have been the victim of discrimination, not just to women. Thus, the question to be asked is whether there is a significant relationship between the average wages in an occupation and the proportion of that occupation filled by ethnic groups, such as blacks, Hispanics, and Asians.

Table 7-2 reports the results of such estimates for a sample that includes all workers.[18] Once job characteristics are controlled for, the estimated ethnic impacts are not significant. Before controlling for the nature of the jobs and any compensating differentials but after standardizing for average levels of productive attributes, it would appear that occupations held by blacks and Asians paid higher wages than those held by whites. The reality, however, is that these groups have entered better paying but otherwise less attractive jobs. Thus, with respect to other protected groups, as with women, there is no evidence that there are compositional effects on wages that could be remedied by the adoption of comparable worth policies.

[17] Fringe benefits are one of the clearest cases for which compensating differentials theory suggests that wages will adjust to job characteristics. For example, a job that provides health coverage can attract workers at a lower wage than one that does not provide health benefits since workers will not have to pay for them out of pocket. Although one might alternatively add fringe benefits to wages to obtain a measure of full compensation, there are difficulties with this approach. Since fringe benefits are typically offered as a take-it-or-leave-it package, there can be no assumption that any given worker values them at their full cost to the employer (e.g., consider the value of maternity leave to a single man). Thus, the value of a fringe benefit package to employees is best established not by accounting costs but rather by the wage reductions workers are willing to accept in order to obtain the package.

[18] Thus, as was discussed above, these results include both the impact of the ethnic composition of an occupation and any within-occupation discrimination.

TABLE 7-2 Estimated Coefficients of Ethnic Group on Wages, All Full-Time, Full-Year Workers

	Estimated Coefficient[a] (Standard Error)		
Equation Specification	Blacks	Hispanics	Asians
Ethnic composition only	-19.39	-39.07	33.64
	(1.75)	(3.69)	(9.79)
Ethnic composition and	3.47	0.69	24.05
demographic variables	(1.30)	(3.84)	(7.21)
Ethnic composition, demographic	2.72	1.12	26.08
variables, and union coverage	(1.32)	(3.82)	(7.22)
Ethnic composition, demographic	.88	-6.05	4.41
variables, union coverage, effort, responsibility, and working conditions (maximum R^2)	(1.15)	(3.03)	(5.36)
Ethnic composition, demographic	.27	2.50	2.16
variables, union coverage, effort, responsibility, and working conditions (all variables)	(1.64)	(4.90)	(8.26)

[a] Results are from an estimating equation that combines men and women.

Changes in Sex Composition

To what extent are mobility patterns of women consistent with a labor market moving toward an equilibrium resulting in equality of wages? Women can be expected to enter those jobs for which pay is greatest for women, no matter what the extent of any discriminatory pay gap in that occupation.

Women can also be expected, all else being equal, to enter those jobs for which there is the least degree of penalty for being female. The size of such a potential gap can be estimated by comparing the actual earnings of women in an occupation with the earnings they would be predicted to have if they were rewarded in the same manner as men (the sum of the average levels of independent variables for women times the coefficients for men). If these predicted earnings are equal to their actual earnings, women in the occupation are being exactly compensated for their productive attributes, effort, responsibility, and working conditions heed. If predicted earnings exceed actual earnings, women are being under-compensated in that occupation (i.e., there is a discriminatory gap). The greater the gap, the greater should be the incentive for women to move out of that occupation and into ones in which they do not face such a disadvantage. Finally, if predicted earnings are lower than actual earnings, the incentive goes in the opposite direction, the discriminatory gap favors women, and women should desire to enter the occupation.

Thus, if occupational mobility is serving to equalize wages between men and women, a positive relationship between actual wages paid to women in an occupation and the movement of women into that occupation should be found as well as a negative relationship between the gap between predicted and actual wages and the rate of growth of female employment. Both of these results are seen. The correlation between the percentage increase in the proportion of workers in an occupation who were women between 1970 and 1980 and its average wage in 1980 was .24, a result that is statistically significant at a better than .0001 confidence level. Similar results are found when correlating growth in the percentage

female with women's average wages in occupations (r = .175; sig. = .005). In addition, there is the expected negative relationship between changes in the femaleness of an occupation and the size of its wage gap (calculated as [predicted wages for women—actual wages of women]/actual wages of women). Here the Pearson product-moment coefficient was-.094 (sig. = .06). Thus, it would appear that movements of women in the 1970s were in directions consistent with improving their labor market status. One can only speculate that the greater shifts of the current decade will be seen to have furthered this tendency when the 1990 census becomes available.

Summary and Conclusions

The results of this analysis should serve to give pause before the United States rushes to adopt the complex legal remedy of comparable worth to deal with a perception of gender effects on wages. Although the methodology has limitations, it provides a framework designed to capture far more gender effects than could be removed by the comparable worth laws advocated in the United States. Yet, even in this most favorable case, the results provide no evidence that once legitimate influences on wages (e.g., an occupation's effort, responsibility, fringe benefits, and working conditions) are taken into account there remains any detectable effect of its sex composition on the wages of either men or women in that occupation.

To the extent that such effects have been claimed from other studies, they may be due to an inability to include more than a limited array of job characteristics. When the characteristics included more fully capture the nature of the job rather than being limited by either data availability or the researcher's prior beliefs, the labor market appears to reward job attributes and worker productivity and not the race or sex of the worker.

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The appendix follows.

APPENDIX Estimated Results Including Personal and Job Characteristics

Variable[a]	Parameter Estimates (Standard Errors) for Women	Parameter Estimates (Standard Errors) for Men	Mean[b] (Standard Deviation)
PERSONAL CHARACTERISTICS			
Proportion female	−.30	.31	.31
	(.24)	(.32)	(.28)
Proportion black	2.34	.45	.09
	(.74)	(1.29)	(.06)
Proportion Hispanic	3.01	−5.03	.04
	(1.82)	(3.21)	(.03)
Proportion Asian	6.11	−3.13	.01
	(3.33)	(5.15)	(.01)
Proportion other nonwhite ethnic group	−2.40	10.67	.01
	(3.21)	(8.77)	(.01)
Proportion noncitizens	−3.02	−6.30	.03
	(2.85)	(4.74)	(.03)
Proportion having English difficulty	−7.06	.42	.02
	(4.41)	(5.06)	(.02)
Proportion married	.95	−1.62	.63
	(.53)	(1.40)	(.13)
Proportion having work-influencing disability	1.83	−12.61	.06
	(1.79)	(4.05)	(.02)
Proportion employed by federal government	.80	−.38	.05
	(.37)	(.47)	(.11)
Proportion employed by state and local governments	−.76	−1.52	.12
	(.28)	(.37)	(.20)
Proportion self-employed	−.90	.42	.08
	(.51)	(.55)	(.12)
Proportion working part-time	−.06	−.002	.11
	(.41)	(.006)	(.12)
Average years of education	.51	.76	12.39
	(.07)	(.09)	(1.84)
Average years of work experience[c]	.008	.16	16.76
	(.02)	(.03)	(4.86)
Proportion in a union (Kokkelenberg and Sockell, 1985)	1.40	.55	.27
	(.29)	(.41)	(.20)
Average number of children in workers' homes	−.41	1.66	1.12
	(.21)	(.57)	(.19)
FRINGE BENEFITS			
Average number of vacation days (Time Use Survey)	−.03	−.13	13.93
	(.01)	(.02)	(4.28)
Proportion having a K401 plan (CPS)	−.57	−2.60	.08
	(.67)	(.85)	(.07)
Proportion having employer-provided medical insurance (QES)	−.22	−1.15	.71
	(.45)	(.58)	(.20)
Proportion eligible for paid maternity leave (female workers only) (QES)	−1.19	−2.65	.07
	(.65)	(.84)	(.09)
Proportion having employer-provided life insurance (QES)	.76	1.81	.59
	(.49)	(.62)	(.22)
Proportion having employer-provided retirement program (QES)	−.62	−2.59	.63
	(.44)	(.56)	(.21)

Variable[a]	Parameter Estimates (Standard Errors) for Women	Parameter Estimates (Standard Errors) for Men	Mean[b] (Standard Deviation)
Proportion eligible for profit-sharing stock option or thrift plans (QES)	.13 (.37)	1.73 (.47)	.44 (.18)
EFFORT MEASURES			
Proportion of workday not working (Time Use Survey)	−8.20 (2.88)	−31.58 (3.80)	.16 (.03)
Proportion of workday "goofing off" (Time Use Survey)	21.72 (6.63)	63.83 (8.63)	.05 (.01)
Anchored work effort (Duncan and Stafford, 1980)	2.31 (.90)	5.18 (1.17)	.55 (.07)
Worker determines pace (1–5 scale, QES)	−.53 (.21)	−1.54 (.26)	3.78 (.29)
Enough time to do work (1–4 Scale, QES)	−.37 (.27)	−.45 (.34)	3.04 (.25)
Worker not asked to do "excessive" amounts of work (1–4 scale, QES)	.21 (.21)	.72 (.26)	2.84 (.26)
Self-reported effort (1–4 scale, QES)	.29 (.35)	−.84 (.45)	3.66 (.17)
Extra effort required (1–4 scale, QES)	−.03 (.26)	.79 (.33)	3.42 (.23)
RESPONSIBILITY MEASURES			
Many people affected (1–5 scale, QES)	−.31 (.19)	−.73 (.25)	4.16 (.33)
Have a lot of say about work (1–5 scale, QES)	.30 (.18)	.31 (.22)	3.31 (.58)
Worker feels personally responsible for work (1–5 scale, QES)	.35 (.31)	.46 (.40)	4.33 (.20)
PERSONAL RELATIONS FACTORS			
Average "friendliness" of workers in occupation (1–30 scale, Filer, 1981)	−.11 (.04)	−.14 (.05)	16.48 (1.27)
Co-workers take a personal interest in respondent (1–4 scale, QES)	.10 (.22)	−.34 (.28)	2.88 (.32)
Job requires a preference for dealing with things and objects (DOT)	.17 (.15)	.22 (.19)	.51 (.46)
Job requires a preference for contact with people (DOT)	.22 (.16)	−.40 (.20)	.27 (.42)
Job requires a temperament for dealing with others (DOT)	.31 (.17)	.98 (.22)	.38 (.46)
PHYSICAL WORKING CONDITIONS			
Proportion exposed to risk of attack by people or animals (QES)	1.22 (.34)	1.82 (.43)	.22 (.18)
Proportion exposed to dangerous work methods (QES)	.62 (.44)	.88 (.58)	.18 (.15)

Variable[a]	Parameter Estimates (Standard Errors) for Women	Parameter Estimates (Standard Errors) for Men	Mean[b] (Standard Deviation)
Proportion working both indoors and outdoors (DOT)	−.17 (.12)	−.27 (.16)	.20 (.34)
Proportion exposed to wet or humid environment (DOT)	.36 (.20)	.65 (.25)	.07 (.21)
Proportion exposed to noise or vibration (DOT)	.26 (.13)	−.15 (.17)	.24 (.36)
Proportion exposed to hazardous conditions (DOT)	−.23 (.14)	−.20 (.18)	.21 (.34)
INTELLECTUAL CHALLENGE			
Job requires a preference for routine activities (DOT)	.05 (.13)	.30 (.18)	.34 (.42)
Job requires a preference for abstract activities (DOT)	−.38 (.23)	−.52 (.28)	.05 (.20)
Average level of "thoughtfulness" of workers in job (1–30 scale, Filer, 1981)	−.02 (.04)	−.09 (.05)	19.72 (1.12)
WORKERS' SKILLS			
Job requires worker to learn new things (1–5 scale, QES)	.59 (.16)	1.29 (.20)	4.04 (.54)
Level of spatial aptitude required (population percentile, DOT)	.0004 (.002)	.004 (.004)	42.72 (20.89)
Level of finger desterity required (population percentile, DOT)	.0024 (.003)	.004 (.004)	36.65 (16.50)
Requirement for math ability (1–6 scale, DOT)	.17 (.06)	.14 (.08)	2.76 (1.21)
WORKERS' GOALS ARE MAINLY MONETARY			
Workers' lack of interest in power (1–11 scale, Filer, 1981)	.14 (.06)	.21 (.05)	8.73 (.73)
Workers' lack of interest in family life (1–11 scale, Filer, 1981)	−.19 (.07)	−.26 (.09)	2.90 (.60)
Workers' lack of interest in community activities (1–11 scale, Filer, 1981)	.18 (.07)	.26 (.09)	8.01 (.63)
Workers' lack of interest in job's contribution to society (1–11 scale, Filer, 1981)	−.04 (.05)	−.18 (.07)	6.35 (.82)
Workers mainly working for money (1–5 scale, QES)	.43 (.17)	.57 (.22)	3.04 (.57)
Workers have a lot invested in their job (1–5 scale, QES)	.05 (.14)	.84 (.18)	2.98 (.39)
LABOR MARKET CONDITIONS			
Worker is afraid of what might happen if he quit job (1–5 scale, QES)	−.33 (.14)	−.56 (.18)	3.18 (.40)
Worker reports shortage of similar jobs in area (QES)	−.62 (.31)	−.70 (.40)	.36 (.16)

Variable[a]	Parameter Estimates (Standard Errors) for Women	Parameter Estimates (Standard Errors) for Men	Mean[b] (Standard Deviation)
OTHER CHARACTERISTICS OF INTEREST			
Average travel time to work (in minutes, census)	.06	.09	23.37
	(.01)	(.01)	(4.75)
Proportion working in establishment of less than 100 (CPS)	-1.03	-1.15	.57
	(.23)	(.30)	(.22)
Deadendedness of job (Brown, 1982)	.68	1.68	.61
	(.33)	(.43)	(.16)
Worker has freedom to decide what to do on the job (1-5 scale, QES)	.26	-.38	3.24
	(.14)	(.18)	(.59)
Job has aggravated illness or physical condition (QES)	-1.09	-2.98	.05
	(.90)	(1.14)	(.06)
Intercept	-3.69	-2.57	
	(2.68)	(3.37)	
Adjusted R^2	.81	.89	

NOTE: The dependent variable is the average wage for all full-time, full-year workers in each occupation.

[a] Variables are from a 1980 Bureau of the Census data tape (5 percent sample) unless otherwise indicated. Other data sources are either keyed to the Reference list or identified as follows:

CPS = Bureau of the Census, Current Population Survey, May 1983 (data tape).

DOT = U.S. Department of Labor (1977).

QES = Quality of Employment Survey (Quin and Staines, 1979).

Time Use Survey = Survey of Time Use in Economic and Social Accounts, 1975–1976. Raw data tapes released by the Institute for Social Research, University of Michigan, Ann Arbor.

[b] For characteristics of occupations, means are the same for men and women in that occupation. For average characteristics of workers, the means presented are weighted averages of means for men and women in the occupation.

[c] Calculated for men as (age — schooling — six) from the 1980 census and for women as the mean predicted value using characteristics from the 1980 census and estimates performed using actual work experience from the National Longitudinal Survey.

COMMENTARY

James P. Smith

My comments address, first, the paper by Parcel and then the paper by Filer. Parcel's analysis is a replication of an earlier one on a similar theme using the 1970 census. Her current paper uses the 1980 census and deals with the basic empirical question posed in comparable worth research: Is the wage rate related to the proportion of women in an occupation? The dependent variable throughout is mean occupation-level earnings, converted to an annual full-time earnings equivalent. In Parcel's framework, occupational incomes reflect four types of factors: an occupation's intrinsic "worth," labor market conditions specific to an occupation, the human capital of the occupation's incumbents, and aspects of social organization that are not reflected in productivity difference.

Using a match of 1980 census data with data from the *Dictionary of Occupational Titles* (DOT) and factor analysis, Parcel derived five variables to measure worth. Occupational labor market conditions are measured by several variables, such as the occupation-specific unemployment rate, the reserve labor market pool (defined as the number of workers in that occupation who are out of the labor force divided by the experienced civilian labor force), and the number of government employees in an occupation. Parcel argues that, at least to some extent, there are distinct occupation-specific labor markets. In essence, skill differentiation produces labor market segmentation along occupational lines. The variables related to the quality of labor supplied are standard human capital ones—education and years of labor market experience.

The most important thematic concept, especially for comparable worth, is the variables put under the heading "dimensions of social organization." Parcel argues that these dimensions influence wage levels independent of productivity. Among these social organization variables, the paper includes "the comparable worth variable"—the percentage of workers who are women. The paper also extends this concept to other ethnic and racial groups, adding the percents black, Hispanic, and Asian as variables. The analysis also explores marital status effects. The maintained hypothesis is the higher the proportion of men in an occupation, the higher the wages. The op-

posite prediction is advanced for the percentage of married women.

The main emphasis of the paper, of course, concerns the variables measuring the demographic composition of the workers in an occupation. The comparable worth variable, percent female, has the predicted negative coefficient. Moreover, the magnitude of the effect is not small. An increase of 10 percentage points in the proportion female would reduce average earnings by $710.

The other demographic variables also matter. For example, a large proportion of married men increased incomes, but at least in this specification the proportion of married women was not statistically significant. The proportion who were black had no effect on wages, but the fraction who were Spanish speaking reduced incomes and the proportion of Asians in the occupation increased salaries.

In combination, Parcel interprets her results as indicating not only that dimensions of social organizations are important, but that there exists a richer array of these dimensions than simply the fraction of the workers in a job who happen to be women.

My criticisms of Parcel's paper relate to the interpretation of the factors, the worth variables, and the social organization variables. Some of the differences in interpretation may simply reflect disciplinary differences between Parcel and me. For example, instead of arguing that the occupation-specific unemployment rate (at least its long-term level) is a signal of excess supply, it seems more plausible to me that the causation runs in reverse. A number of studies show that low-skill and low-wage workers exhibit less attachment to their jobs and to the labor market in general. In this view, low wages are associated with high levels of job turnover and, consequently, high unemployment rates.

With respect to the worth variables, this study, like many others in this area, does not offer much confidence that occupational worth is being adequately measured by these proxies. For example, the additional explanatory power added by the "worth" variables is modest indeed—an increase in adjusted R^2 of only 1 percentage point. This finding is consistent with micro-level studies that show that only 1 to 5 percent of the variance in wages is explained by DOT-derived worth measures. Similarly, the magnitude of the effects estimated for these variables is quite small. A difference of one standard deviation in working conditions or substantive complexity, for example, raises wages by only $145. These results cause me to question seriously what seems to be an implicitly maintained hypothesis. Even putting aside whether the concept of intrinsic worth of an occupation has any meaning, can we seriously claim that we have meaningfully controlled for differences in the worth of an occupation?

My question is not a criticism of Parcel's work. Her construction of these worth variables was done with skill and good sense. My question instead is a more generic criticism of the research area as a whole.

My concerns with the social organization (or comparable worth variables) are also generic in that I have no particular difficulty with the way Parcel conducted her analysis. It's the interpretation placed on the results that troubles me. Does a variable such as the proportion of workers in an occupation who are women really add anything to our knowledge about how wages are set in labor markets or whether there is discrimination against any minority group? Although the inclusion of such variables has become standard (especially in papers centering around comparable worth), I am puzzled about its meaning.

Let me illustrate with an example. Consider two wage distributions, one for men and one for women. Although the distributions overlap, men are paid significantly more than women. All we know are the distributions, and for the moment we don't know what causes the wage distributions to differ. Now let's consider drawing lines separating segments of the distribution. Obviously, if I run a regression of the mean

wage in each segment on the proportion of women in the segment, I would get a whopping negative coefficient. If I call the segments occupations, I have the comparable worth regression.

But have I learned anything from this regression about why men and women are paid differently? Any difference in the distributions guarantees this result, and I have learned nothing more than what I started with—male wage distributions lie above female wage distributions.

Now, of course, we can control for other factors that contribute to sex disparities in wages, such as the worth and skill variables Parcel includes. Our wage distributions would obviously converge. But we also know that, in the end, the conditioned wage distributions will still indicate that male wage distributions exceed those of women. Given that, the same generic question can be raised: What do we learn about the causes of the remaining sex disparity by including a variable measuring the proportion female? As long as male wage distributions lie above women's (a fact that nobody disputes), the average wage (for women and men, separately or together) will be correlated with proportion female.

In one way, Parcel's paper may put an exclamation mark on my point. Her results indicate that an increasing proportion of Asians in an occupation raises wages. No one will seriously argue that occupations are more highly valued because they have more Asians in them. If not, are we going to be asymmetric in our interpretation of these demographic variables? If a protected minority group has a positive coefficient on a comparable worth variable, is it unobserved components of skill? And if it is a negative one, is it discrimination?

Filer's paper[1] deals with this same question, which has become the central empirical question posed in research on comparable worth: Is the wage related to the sexual composition of an occupation after you control for other relevant factors, including the productivity of incumbents, the amount of effort and responsibility involved, working conditions, and tastes?

Filer argues that a major shortcoming of previous work on this topic is that each existing micro-level data set contains only a subset of these relevant other factors that may matter. He tries to overcome this shortcoming (and he does so with a vengeance) by obtaining occupation-level data from a variety of sources. These data are subsequently merged, and the analysis is performed on the merged data set. For example, mean earnings and the characteristics of the incumbents in an occupation are derived from the 1980 decennial census; measures of working conditions, effort, and responsibility are derived from a variety of sources, including the DOT, the Quality of Employment Survey, the Current Population Survey, and the Michigan Time Use study; a measure of personality is derived from his own research; and so on. The end results were 400-odd occupational groups and 225 potential covariates.

The thematic regression in Filer's paper involves regressing the average occupation-specific wage on an ever-expanding list of variables. One variable that remains throughout is the proportion of workers in the occupation who are women. Indeed, the main exercise being performed is to track the estimated coefficient on the proportion female to see if it (1) goes away or (2) withstands the onslaught.

The correct answer is (2), but it does get a little battered in the battle. Filer summarizes his results very nicely in his Table 7-1. Starting with a coefficient of $4.41 for full-time, full-year workers (moving from an occupation with no women to one that says "ladies only"), the effect becomes progressively smaller. It falls to $3.30 when census-derived productivity variables (education,

[1] My comments are based on Filer's presentation of an earlier version of his paper at a Pay Equity workshop in September 1987 and have been somewhat revised to take into account some of the revisions Filer made in his paper.

experience, etc.) are added; falls to $1.70 when all variables are added subject to a statistical side condition of maximizing adjusted R^2; and to $1.35 when all 225 variables are included. All coefficients are statistically significant.

The last number, $1.35, implies that the actual difference between men and women in the sex composition of their occupations would explain roughly 20 percent of the wage gap. We may all react differently to this. My own reaction is that this still constitutes an impact of significant magnitude.

In the initial version of his paper, Filer argued that if this negative coefficient results from a crowding effect or because employers devalue occupations with lots of women in them, male and female members of an occupation should be similarly affected. With this in mind, the identical regression model was reestimated for men and women separately. In these regressions, percent female becomes small in magnitude and statistically insignificant.

Filer argues that this result shows that comparable worth is a solution for a problem that does not exist. Most of the female-male wage gap that remains after productivity and job characteristics are taken into account can be attributed to within-occupation sex differences.

Before getting into more substantive matters, let me ask why so much of the analysis on comparable worth is performed on the aggregate occupation level instead of the individual level. In both the Parcel and Filer papers, the dependent variable was mean wages in an occupation. Instead, the comparable worth variable (the fraction female) could simply be added to a standard, garden-variety wage function (much as Sorensen, in this volume, does). The interpretation of the comparable worth variable would be pretty much the same in either case. The advantages run in favor of the microapproach: It allows for richer possibilities of statistical testing, avoids problems of what is lost in the aggregation, and provides a firmer foundation (in terms of prior literature) for what to expect from other covariates. The absence of many variables in the micro-level data sets is no particular barrier either. The average characteristics (personality, working conditions) of occupations can simply be merged into a micro-level data set in much the same way Filer does. The use of richer variation in micro-level data would help us avoid some of the problems that Filer notices in his paper—the lack of any effect of work experience on wages for women, a small effect of work experience for men, and the large effect of schooling on earnings. When results go against well-established research results, I also become concerned about what else may be happening to other variables that we are taking quite seriously because they are statistically significant.

My first point about the method Filer used (as opposed to one that he did not) is the large number of independent variables. Although that may pose no problem if the objective is to test how much firepower the coefficient on percent female can withstand, it does create predictable problems with the believability of estimates for other things. Let me illustrate with some not-so-random selections. If everyone has difficulty speaking English, wages in an occupation rise by $11.52. Similarly, if we enter an occupation in which we all goof off, wages go up by $69 an hour, a whoppingly significant effect! (Perhaps the last two results go a long way toward explaining why economists are paid so well.) These are not isolated examples. My intent is to raise an issue concerning the central purpose of the paper. If it is simply to put the coefficient of percent female to the test, then most of what happens to other coefficients is not important. But our concern should increase if the coefficients of other variables are taken seriously. Then, the believability of the entire exercise is questionable. The former objective is more important; in this revised version of the paper, Filer has appropriately

deemphasized the structural wage function interpretations.

Let me now argue the other side of the issue. Clearly, the approach taken by Parcel in her paper is a much cleaner one. Instead of presenting every subcomponent, she first aggregates the worth variables into mega-groups using factor analysis. Instead of all the variables in Filer's paper, Parcel uses five. But Filer's approach actually opens up important issues underlying the comparable worth debate, issues that also tend to separate economists and sociologists. The question is how do we want to aggregate the subcomponents measuring worth into megabundles. Parcel's approach looks first only at statistical information within the sets of variables, but never looks at what impact the subcomponents have on market earnings. The problem with that approach is that variables that may win an internal statistical information battle may have little prominence in the marketplace. To an economist's eye (this one included), the weights attached in aggregate should bear some relation to market earnings. In Filer's approach, all the coefficients are related to market earnings because all variables enter the wage equation.

My second major point about Filer's paper relates to the "comparable worth variable," already discussed above for Parcel's paper. Let me make a few additional points on some extensions Filer puts forth.

Filer states, and correctly, that his finding that percent female in the male salary analysis is insignificant is provocative. It certainly is. Perhaps it is most provocative in that it runs counter to all the other estimates in the literature, including many of the other papers in this volume. If true, given my reservations about interpreting the comparable worth regression in any case, I would find this as stronger evidence of discrimination than the comparable worth result itself. In essence, this result suggests that men and women in the same occupation (i.e., the same percent female) are paid differently. The problem, of course, with this interpretation is that there is so much sex segregation that men and women may not really be in the same jobs, even when occupations with the same percent female are considered. Thus, Filer's interpretation that much of the problem is wage differences within occupations may be inaccurate, though the mechanism he describes in the final section of his paper (the movement of women into occupations in which the level of pay is higher and the female-male pay gap is lower) would work well for discrimination for any cause. Filer's public policy recommendations would thus be to encourage the job mobility of women.

PART III

COMPARABLE WORTH IMPLEMENTATION

8

Comparable Worth and the Structure of Earnings: The Iowa Case

Peter F. Orazem and J. Peter Mattila

Comparable worth pay plans have been implemented in several states since the early 1980s. To our knowledge, however, no study exists of the actual impact of such plans on the pay structure of state government. We examine the case of comparable worth in Iowa, both as proposed in 1984 and as actually implemented (in compromise form) in 1985. In particular, we identify the relative winners and losers from comparable worth by analyzing the impact on earnings for men, women, minorities, unionized employees, and particular occupational groups, such 'as supervisors and professionals. In addition, we are able to determine whether the relationships between the state pay structure and such variables as market wages, educational attainment, and work experience are altered by the plans.

After discussing the development of comparable worth in Iowa in the first section, we detail our hypotheses and the issues that motivated this paper. We then outline our methodology and data and present our results. In the final section we summarize our findings and discuss their applicability to other settings.

Historical Background

In 1983, the Iowa state legislature passed a bill stipulating that the state shall not discriminate in compensation between predominantly male and female jobs deemed to be of comparable worth. Toward that end, the state engaged Arthur Young and Company to evaluate the inherent "value" to the state of the more than 800 job classifications in the Iowa State Merit Employment System. Arthur Young was directed to ignore market wages in conducting its analysis because the market was presumed to reflect discriminatory practices of employers in the private sector.

The Arthur Young consultants elected to use a point system to establish the relative value of the jobs in the state system. Each job was assigned a point total based on information on the job's level of 13 job characteristics weighted by the importance of the characteristic to the state. Three factors measured skill, five measured effort, three measured responsibility, and the remaining two measured working conditions. (The specific factors are listed at the bottom

of Table 8-5). The unit of measurement for each characteristic was a subjective scale.

The evaluation was performed by four-person teams of employees, who had attended a 3-day training program in job evaluation. Each team had two men and two women, and an effort was made to balance the groups by age and location. The teams' evaluations were based on questionnaires that had been filled out by a sample of incumbents for each classification in the state merit system. Because earlier job evaluations may have undervalued the characteristics of female-dominated jobs, the questionnaire was specifically designed to identify aspects of jobs traditionally held by women. The consultants assisted the evaluation teams and tried to ensure that each team used the evaluation system in a consistent manner. The result was a measure for each of the 13 job characteristics for each job.

Arthur Young examined several methods for establishing weights for the different job factors. The procedure that ultimately proved to be the basis for the Arthur Young recommendations was to have a committee (composed of representatives from the Iowa legislature and the governor's staff) establish factor weights independent of the job evaluation. In fact, however, the committee modified the factor weights twice after examining their impact on the final results. According to Arthur Young's (1984:30) final report, these alterations were based, at least in part, on "the different impacts on male and female jobs" and "the ways the factors actually acted in determining the final point totals." Such changes may raise doubts concerning the objectivity of the pay analysis.

The factor points were multiplied by the factor weights and summed to obtain total points for each job. These total points were then translated into pay grades and pay for each job. The final recommendation (April 1984) proposed that 10,751 employees should be given pay increases and 7,300 should have their pay decreased. Of those covered by a union contract, 8,800 were to receive pay increases and 5,000 were to receive pay cuts. We estimate that the cost of implementing this plan would have been $16.6 million, with the pay reductions. Overall, 79 percent of female-dominated jobs were scheduled for increases, and 40 percent were to receive increases of more than two pay grades. In contrast, 53 percent of the male-dominated and 48 percent of the mixed classifications were to receive increases, and 17 percent and 19 percent, respectively, were recommended for increases of more than two pay grades. The committee also recommended, however, that employees' pay not actually be cut, but be "red circled" (i. e., they would receive no raises until their pay came into line with the recommendations). In this case, we estimate that the initial cost would have been $24 million per year.

The final recommendations were made shortly before contract negotiations began in July 1984 between the state and the American Federation of State, County and Municipal Employees (AFSCME). Due to the high cost of this proposal and union opposition to pay cuts, a political compromise was negotiated between the governor's office and AFSCME in September 1984. The compromise provided that no one would suffer a reduction in pay grade and that the size of the pay increases would be reduced by one pay grade and one step. The compromise was implemented in March 1985 at what we estimate to be a total cost of approximately $18.8 million per year.

The compromise plan was implemented in March 1985, although pay recommendations for higher grade jobs (especially upper-level supervisors) were not implemented until 1987. This created the possibility that some supervisors would be paid less than some of the employees they supervised. In addition, a relatively small number of employees who were not part of the merit pay system were not studied by Arthur Young and did not incur pay ad

justments in March 1985. Finally, the state and AFSCME agreed to an appeals process, which ultimately resulted in further modifications of pay grades in 1987.

Hypotheses

Although some view comparable worth as a straightforward application of common pay analysis procedures, the outcome in Iowa depended heavily on political expediency and union bargaining. Unlike private sector applications of pay analysis procedures, which routinely conduct market wage surveys in order to set wages in key jobs, the Iowa comparable worth plan ignored market wages totally. Ironically, by the time the dust had finally settled on the Iowa merit pay study, it was not at all clear what the ultimate impact of the effort had been. In particular, one presumes that women gained relative to men, but the extent of the gain is not clear. An important question concerns what would have happened to male and female earnings had the original comparable worth proposal been enacted and whether the implemented compromise plan benefited women to the same extent as the original plan.

A second question is how comparable worth alters the union/nonunion pay differential. Some unions, particularly AFSCME, have been strong proponents of comparable worth, even though the concept would seem risky on the surface. As the Iowa experience indicates, a large proportion of workers covered by union contracts could lose as a result of comparable worth. Do unions support comparable worth because the studies tend to increase returns to union status or do unions gain primarily by providing their members with protection against pay cuts, such as might have come to fruition under the original Arthur Young plan?

A third question concerns how comparable worth affects the pay of blacks, Hispanics, and other minorities. By increasing relative earnings for female-dominated jobs (e.g., clerical occupations), comparable worth plans may tend to decrease returns to characteristics of blue-collar jobs and other occupations with relatively high numbers of minority incumbents.

A fourth uncertainty in the comparable worth debate is how a comparable worth pay plan relates to market wages. Since the Iowa comparable worth study ignored market wages by construction, it should lower the impact of market forces on public sector wages. On the other hand, the compromise following the completion of the study could reverse those effects if the compromise was based in part on market opportunities.

A fifth important question concerns the impact of comparable worth on the returns to education and experience. There are several reasons why the returns to a year of education, tenure, or general labor market experience might fall. The first is that the comparable worth pay structure rewards the minimum levels of education or experience required for a job, not the actual level of education or experience of the incumbent. Although this is true in general of rigid pay structures based on job attributes rather than individual attributes, it is possible that the previous pay structure may have reflected the characteristics of individuals in the job as well as the characteristics of the job itself.

By rewarding only the minimum level of experience or education required to perform a given job, the comparable worth pay structure resembles the pattern of returns to education assumed in the job signaling literature (Spence, 1973). An implication of the signaling models is that specific minimum threshold levels of education (e.g., high school diploma, bachelor's, master's, or Ph.D. degree) will generate higher wages, but 1 year of education above the threshold level will have no value. This type of pay structure would therefore lower the returns to years of education or experience in general, but would tend to increase returns to

the attainment of the threshold levels. The returns to threshold levels of education would also increase if evaluators tended to put more emphasis on such credentials as a diploma, degree, license, or certificate than on the number of years of education or experience. The attainment of a degree, for instance, may be viewed as a more defensible requirement than requiring 11 or 15 years of education.

In addition, comparable worth may lower returns to education and experience simply because the process tends to put more weight on other factors. In Iowa, none of the 13 job factors was assigned a weight of less than 5 percent regardless of how unimportant it might be in explaining the existing pay structure. A goal of the Iowa study was to incorporate characteristics of female dominated occupations that may not have been rewarded in the past. By weighting some factors more heavily, some other factors must, by definition, diminish in relative importance.

A sixth question concerns how comparable worth affects specific occupations. Because of the above impact on education and experience, people often assume that lower skill, female-dominated jobs gain, but no consensus exists on other occupations. We will examine how a wide variety of broadly defined occupations were affected in Iowa. We will also examine how professional and supervisory jobs were affected.

Methodology and Data

The goal of this study is to explore the impact of proposed and implemented versions of comparable worth on the Iowa pay structure. It is important that this analysis be performed in a way that isolates the impact of the change in the pay system without simultaneously allowing other factors to change. If, for example, implementation of the new pay structure causes some employees to quit and other's to enter the state system, then a comparison of pay structures before and after implementation will be biased by differences in the sample of employees. Further, any methodology that takes a snapshot of the pay structure before and after comparable worth will run into problems of biases due to changes in other exogenous influences, such as business cycles and political elections, that may also alter the state pay structure. The snapshots would also fail to capture the full impact of comparable worth since the plans may be introduced gradually or may not be implemented in full, such as in Iowa.

We solved these problems by using the December 1983 pay schedule, which existed before the comparable worth study was initiated. By determining the individual's actual 1983 pay grade and the number of pay grades that the individual would have increased or decreased due to comparable worth, we could compute what the individual's corresponding biweekly earnings would have been in 1983 under each of the alternative plans. Given the recommended pay grades, we could compute three earnings rates for each employee: (1) the actual 1983 earnings, (2) the earnings rate associated with the final Arthur Young recommendations, and (3) the earnings rate associated with the implemented state/AFSCME compromise plan. In this way, our analysis avoids the biases associated with job entry and exit, business cycles, inflation, and other changes that occur over time.

To explore how comparable worth altered the earnings structure in the Iowa merit system, we used the standard earnings function approach pioneered by Mincer (1974). Earnings were presumed to be related to individual and job characteristics according to

$$\ln W^{k}_{ij} = a^{k}_{0} + b^{k}_{0} X_{i} + c^{k}_{0} Z_{j} + e^{k}_{ij} \quad (1)$$

where $\ln W^{k}_{ij}$ is the natural logarithm of the biweekly wage of individual i in job classification j in pay plan k, X_i represents a set of socioeconomic characteristics for individual i, and Z_j represents a set of job characteristics. For our purposes, elements

of the set of variables X_i are common elements of the standard human capital model of earnings, such as individual education, experience, and job tenure (see Willis, 1986, for a survey of this literature). The parameters a^k_0, b^k_0, and c^k_0 are specific to the pay plan k, and e^k_{ij} is the error term. The regression coefficients can' be interpreted as the percentage change in earnings associated with a one-unit change in a given characteristic, holding the other characteristics constant. One exception is the market wage variable, which was entered as the log of market wage. In this case, the coefficient can be interpreted as an elasticity, indicating the percentage change in the individual's earnings associated with a 1 percent change in the relevant market wage. The coefficients can be compared across pay schedules to determine how the percentage returns are affected by comparable worth.

Another way of making these comparisons is to explain the difference in pay between a comparable worth plan (W^k) and the actual 1983 pay plan (W^o), using the form

$$\ln W^k_{ij} - \ln W^o_{ij} = a^k_1 + b^k_1 X_i + c^k_1 Z_j + u^k_{ij}. \quad (2)$$

In this case, b^k_1 and c^k_1 measure the percentage increase in wages in the kth pay plan relative to the 1983 wage, W^o_{ij}, associated with a one-unit change in the characteristic. A positive coefficient implies that the characteristic "wins" as a result of comparable worth, and a negative coefficient means that the returns to the characteristic fall.

Our source of information on individual pay grades, job classifications, job step, pay plan, and biweekly pay in 1983 were obtained from the Iowa merit system payroll tapes. The tapes also yielded information on an employee's race, sex, marital status, age, and employment date with the state. Information on whether an employee held professional or supervisory status, whether the individual was covered by a union contract, and whether the individual paid dues to a union or professional society through payroll deductions was also available from this source. The merit employment department's personnel record files were the source of data on educational background and work history.

We randomly sampled from the personnel files and then merged those observations with the data from the payroll tape. Our final sample was 3,734 persons, roughly one-fifth of the state merit employees in December 1983. Regents system employees of the state universities were excluded from our sample.

The final report of the Arthur Young study (1984) yielded information on the factor points and on the pay grade recommendations for each job in our sample. The state provided tables of the 1983 pay schedule, the pay grades as implemented in 1985, and the number of male and female incumbents in each job as of early 1984. We used independent wage survey data (generally private sector) from the Job Service of Iowa (1984) to measure median market wages. For a few occupations for which national markets exist and for which Iowa data were limited, we used the median wage from the 1983 Current Population Survey (unpublished data). By matching job descriptions in the state merit system with occupational descriptions in the wage surveys, we were able to measure the opportunity cost of state employment as the wage of the market job most closely associated with the job in the state system. We were not able to account for differences between state and market fringe benefits, job security, or other variables, which as compensating differences, could explain, in part, the direct pay differentials. Nor can we account for cost-of-living differentials. This should not be a major problem because the great majority of state employees live and work in the Des Moines metropolitan area. Nor did the state or the Arthur Young study take living costs into account.

Table 8-1 provides descriptive statistics for the variables used in our analysis. Fifty percent of our sample are females, which

TABLE 8-1 Means and Standard Deviations of Wages and Individual Characteristics in the Iowa Merit System

	Means			Standard Deviations		
Variables	All	Female	Male	All	Female	Male
1983 pay	$636.14	$562.08	$719.70	$204.81	$154.77	$230.79
Arthur Young pay	$671.71	$625.53	$726.08	$173.97	$131.00	$209.56
1985 pay	$675.88	$613.39	$749.96	$197.45	$156.99	$177.74
[Arthur Young pay-1983 pay]	$35.57	$63.45	$6.38	$74.66	$64.66	$71.78
[1985 pay-1983 pay]	$39.74	$51.31	$30.27	$46.96	$52.09	$167.12
Education (yrs.)	13.27	13.05	13.56	2.377	2.045	2.679
M.S. degree	.0533	.0389	.0716	.2258	.1935	.2599
Ph. D. degree	.0121	.0037	.0246	.1091	.0606	.1548
License	.0653	.0815	.0528	.2472	.2737	.2236
Vocational	.1957	.2670	.1212	.4996	.5811	.3851
Military	.2180	.0158	.4190	.4149	.1247	.4967
Tenure (yrs.)	8.337	6.936	9.758	7.804	6.479	8.697
Experience (yrs.)	8.492	6.448	10.492	9.019	6.889	10.369
Years out	1.147	1.991	.291	3.273	4.343	.9806
Supervisor	.1320	.0926	.1735	.3386	.2899	.3787
Professional	.2051	.1615	.2607	.4039	.3681	.4391
Full time	.9769	.9672	.9855	.1149	.1361	.0914
Market wage	$7.887	$6.652	$9.260	$2.820	$2.238	$2.918
Union contract	.7740	.7764	.7560	.4183	.4167	.4296
Dues payer	.1524	.1194	.1787	.3594	.3244	.3832
Association dues payer	.0335	.0337	.0361	.1799	.1804	.1865
Single	.3385	.4129	.2644	.4733	.4925	.4411
Minority	.0206	.0231	.0178	.1421	.1504	.1321
Female	.4992	1.000	.0000	.5001	.0000	.0000
Percent female job	.4992	.7812	.2191	.3781	.2321	.2607

differs only slightly from the 47.3 percent prior to sampling. In contrast, private sector and local government units had work forces that were 42 percent female (in 1980). Two percent of our sample are minorities (black, Hispanic, or American Indian).

The average employee in our sample was 40.4 years old, had 13.3 years of education, 8.5 years of nonstate work experience, and 8.4 years of tenure with the state. Overall, 26 percent were college graduates, 5.3 percent had M.S. degrees, and 1.2 percent had Ph.D.'s. In our sample, 13.2 percent were supervisors and 20.5 percent were professionals. Because of problems encountered in generating biweekly equivalent pay for part-time workers, our sample is predominantly (97.7 percent) full-time workers. Overall, 6.5 percent had occupational licenses, 19.6 percent had some vocational training, and 21.8 percent had military experience. In total, 33.9 percent were single, and employees averaged 1.1 years out of the labor force after starting postschool employment.

We have three measures of union status. In the sample 77.4 percent were in non-supervisory jobs that were covered by union contracts. Approximately 15.2 percent paid dues to (nonprofessional) unions, and an additional 3.4 percent paid dues to professional associations through a payroll check off. On average, state employees in our sample were paid $636.14 biweekly in December 1983. This corresponds to an hourly rate of $7.95 and an annual rate of $16,540.

Table 8-1 also provides means and standard deviations separately for each sex. In 1983, women averaged 78.1 percent of the average biweekly male wage. This would have increased to 86.2 percent under the Arthur Young plan but increased to 81.8 percent upon actual implementation. Women averaged 13.1 years of school compared with 13.6 years for men. Men were much more. likely to have an M.S. or Ph.D. degree, and women were more likely to have a license or vocational training. Men averaged 9.8 years of tenure with the state and an additional 10.5 years of nonstate work experience. Women worked less; they had 6.9 years of tenure and 6.4 years of other experience, on average. Women had 2.0 years out of the labor force versus only .3 years for men. Men were more likely to be supervisors and professionals. Although men were no more likely than women to be covered by a collective bargaining contract, men were more likely to be dues-paying members. Women were much more likely to be single and were slightly younger (39.5 years old) than men (41.4 years old).

Using our measures of opportunity wages, women averaged a $6.65 market wage and men averaged $9.26. If these wages accurately reflect actual relative market opportunities, female employees would have been paid 28.2 percent less than men in alternative market jobs but were only paid 21.5 percent less in their state jobs in 1983. This may suggest that the state was less discriminatory toward women even before comparable worth, or that nonstate employers hire workers with a different set of personal characteristics. Female state employees were more likely to be concentrated in female jobs, as expected. The average value for "percent female job" was .78 for women and .22 for men.

Results

An examination of sample means indicates that public employees gain on average from comparable worth. Although some would have suffered pay cuts under the Arthur Young/committee proposal, the average employee in our sample would have gained $35.57 biweekly ($925 per year). In addition, the variance of pay across workers was reduced. Had the original plan been implemented, 10 percent of the employees would have gained $3,515 per year, and another 10 percent would have lost $1,380 or more per year. Women would have gained

$63.45 biweekly and men would have gained only $6.38 on average.

As discussed above, the state/AFSCME compromise of 1985 eliminated all pay cuts in' exchange for moderating the pay increases. On average, biweekly pay increased $39.74 ($1,033 annually); 10 percent received more that $2,850 annually. Recall that all of our analysis is in terms of the 1983 pay schedules so that these figures are estimates of real pay changes, not just nominal pay changes. Implementation tended to raise male gains to $30.27 biweekly and slightly reduce female gains to $51.31, compared with the more generous Arthur Young proposal. The compromise plan also tended to increase the variance in pay across workers relative to the proposed plan. Compared with the 1983 pay plan, the compromise appeared to increase the dispersion of pay within sex groups, but reduced the dispersion of pay overall.

Tabulations

Table 8-2 provides more detailed data on average pay changes tabulated by several demographic and human capital variables. Under both plans, women gained considerably more than did men. Jobs that were 41 percent female or higher gained substantially more than jobs that were only 40 percent female or lower. In fact, employees in the latter jobs would have lost pay, on average, had the Arthur Young recommendation been implemented. (The proportion female in the "100 percent female job" category differs slightly from 1.0 due to a 2-month mismatch between data sources.) As for the racial impact, the earnings gap between minorities and whites increased as a result of the implemented pay plan, but it would have been only marginally affected by the proposed plan. Clearly, any general conclusions regarding minorities must be drawn with caution because of the small number of minorities employed in the state system.

As expected, the least educated and those with the least tenure gained the most. Under the Arthur Young plan, college graduates would have lost income. A similar but less pronounced effect occurs for (nonstate government) work experience. There is also a clear tendency for those with the lowest paying market alternatives to gain the most. The compromise plan decreases the gains to the lowest wage occupations while benefiting higher wage occupations, but the pattern of larger relative increases for the lower paid occupations remains. Women are relatively more concentrated in the categories with the least tenure, experience, and education (except high school dropouts) and in the lowest paying jobs.

Workers in health, social work, clerical, and education consistently gained the most under both plans. Those occupations also had relatively high proportions of female incumbents. At the other end of the spectrum, workers in computation, finance, transportation, regulation, employment services, and law enforcement jobs would have lost income under the proposed plan and gained the least under the compromise plan. Those jobs tended to have higher concentrations of male incumbents. Supervisors and professionals would have gained the least under the Arthur Young plan but actually did better than their colleagues once the compromise plan went into operation.

Unions gained more under the proposed plan but did less well than nonunion workers under the compromise plan. Somehow, dues-paying union members did better than the average worker covered by the union contract or the average noncontract worker under both plans. It is also interesting that the pattern of shrinking wage differentials between high-and low-skill workers in the plan is similar to the typical effect of unions on wage differentials by skill level.

Although strongly suggestive, the simple averages reported in this section should not be overemphasized because no control variables were used. We now report the results

of our multivariate regression analysis, in which individual effects were estimated while holding other variables constant.

Human Capital Model

The basic results for Equation (1) are reported in column 1 of Table 8-3. The estimates are very consistent (at least in sign) with wage equations estimated by other economists. This implies that wage patterns for state government employees in Iowa do not differ fundamentally' from wage patterns typically studied in the private sector for the United States as a whole. In particular, the 1983 regression indicates that pay increases significantly with most of the educational and work experience variables, as well as with the market wage and union status. Overall, the human capital model performs very well, explaining 81 percent of the variation in the logarithm of the wage rates.

Women in Iowa state government earned 22 percent less than men, on average, without using control variables. Women, however, earned only 4 percent less than men after controlling for human capital and market wage variables, and 12 percent less than men after controlling for human capital variables except the market wage (see column 1 of Table 8-6). As found in other studies, women earned less primarily because they had less human capital on average and because they tended to be employed in lower paying jobs relative to men.

An identical model was estimated using cross-sectional data for both of the comparable worth pay plans (columns 2 and 3 of Table 8-3). The estimates are very similar in sign and significance. However, the R^2 drops, indicating that the human capital model is less useful in explaining the comparable worth plans. This not surprising in that variables such as market wages, education, and experience were given lower weights under the comparable worth plans.

It is easier to contrast the comparable worth pay structures with the original 1983 pay structure by examining estimates of Equation (2). These are presented in columns 4 and 5 of Table 8-3. The dependent variable is the difference between the proposed comparable worth pay level and the original 1983 pay level. The coefficients of column 4, in essence, summarize whether the corresponding coefficients increase or decrease (and by how much) as we compare column 1 and column 2. Likewise, column 5 contrasts columns 1 and 3.

Of most interest, women gain relative to the 1983 pay plan. As indicated by the dummy variable "female," the Arthur Young/committee plan would have narrowed the underpayments. by 2.8 percentage points while the 1985 compromise narrowed the gap by .7 points. The main explanation for the smaller relative gain for women in the compromise plan is undoubtedly the fact that no jobs (especially male jobs) suffered pay cuts on enactment of the plan.

Table 8-3 also provides insights concerning the relationship between the control variables and the pay plans. We hypothesized that comparable worth would deemphasize education and work experience, and the results support that expectation. The Arthur Young plan, as well as the 1985 compromise plan, reduced the magnitude of the education, experience, and tenure coefficients. On the other hand, there is evidence that the plans placed increased emphasis on credentials or diplomas as opposed to years of education. This is consistent with our expectation that comparable worth plans would tend to move the pay structure closer to the form typically assumed in the job signaling literature (e.g., Spence, 1973). This is particularly true for the Ph.D. and M.S. degrees and for licenses, and somewhat less so for vocational training.

Both plans significantly deemphasize the role of market wages as a determinant of government pay. The Arthur Young plan would have reduced the influence of market

TABLE 8-2 Average Annual Pay Change Relative to 1983 Pay

Subgroup	Arthur Young Committee	1985 Compromise	Percent Female
Females	$1,682	$1,360	100.0
Males	170	707	0.0
100 percent female job	1,822	1,491	98.4
81–99 percent female job	2,047	1,382	95.3
41–80 percent female job	1,444	1,397	61.8
1–40 percent female job	-244	380	15.1
0 percent female job	-145	723	0.0
Whites	925	1,037	49.8
Minorities	922	846	55.8
<12 yrs. school	1,653	1,328	35.7
12 yrs. school	1,403	1,181	57.0
13–15 yrs. school	833	1,022	53.6
16 yrs. school	-170	694	41.2
>16 yrs. school	-164	611	33.9
<2 yrs. experience	999	1,126	58.2
2–5 yrs. experience	1,064	1,092	55.4
6–10 yrs. experience	817	967	50.8
11–20 yrs. experience	958	1,015	46.3
21–30 yrs. experience	653	883	29.3
>30 yrs. experience	645	775	11.7
<2 yrs. tenure	1,331	1,180	54.6
2–5 yrs. tenure	973	1,039	54.9
6–10 yrs. tenure	982	1,036	56.5
11–20 yrs. tenure	563	896	42.6
21–30 yrs. tenure	395	955	25.3
>30 yrs. tenure	97	714	23.4
Part-time work	1,894	1,197	70.7
Full-time work	880	1,026	49.0
Health/medical	2,462	2,838	80.8
Social work	1,966	1,857	69.7
Clerical	2,146	1,128	96.7
Liquor stores	1,541	1,129	40.4
Education	459	894	67.1
Parks, agriculture	685	832	11.0
Crafts	709	739	4.7
Service	1,694	671	67.4
Law enforcement	-423	351	10.1
Employment services	-253	328	43.2
Regulation	-612	318	16.4
Transportation	-1,115	241	12.3
Tax/finance	-1,226	225	36.6
Computation	-2,398	160	34.4

wages by more than 50 percent relative to the 1983 plan. The compromise plan did reintroduce some of the market's influence, but the market wage coefficient still declined relative to the 1983 plan by one-third on implementation. However, the Arthur Young pay plan would still have retained a statistically significant relationship to market wages, with a 10 percent increase in the market wage associated with a 1.5 percent increase in state pay. In 1983, before the comparable worth study, the same 10 percent increase in the market wage was associated with a 3.5 percent increase in state pay.

Subgroup	Arthur Young Committee	1985 Compromise	Percent Female
<$5 market wage	2,911	2,109	68.5
$5–8 market wage	1,244	933	68.3
$8–11 market wage	337	865	26.8
$11–14 market wage	-1,078	541	25.7
>$14 market wage	105	438	14.9
Supervisors	387	1,323	26.0
Nonsupervisors	1,007	989	52.2
Professionals	91	1,193	38.5
Nonprofessionals	1,140	992	52.9
Union contract	1,020	1,012	50.4
No contract	598	1,107	48.1
Dues payer	1,268	1,175	39.9
Association dues payer	809	1,082	49.6
No dues	865	1,005	51.8

We hypothesized that unions would attempt to use the comparable worth process to their favor. This is not as clear for the Arthur Young plan, in which we see positive but small and insignificant effects. It is notable, however, that the plan implemented in 1985, which was a compromise between the governor and the union, significantly boosted the pay of those covered by union contracts. Dues-paying union members received an even larger increase above that going to union contract workers as a whole. There was a statistically insignificant increase for dues-paying members of professional associations. Interpreted literally, those both covered by union contracts and paying dues to the union gained up to 2.5 percentage points in pay as a result of the compromise.

The Arthur Young plan proposed placing greater emphasis on supervisory tasks, and this was also true on implementation. Professionals also gained increased importance on implementation, despite negative recommendations by the Arthur Young consultants.

Members of minority groups lost a little over 1 percent of their earnings relative to whites under both plans, although this result is not statistically significant. Military experience and full-time experience tended to be deemphasized by the Arthur Young plan, although there was no impact on implementation. Single employees and those with more years out of the labor force also appear to have suffered some reductions in pay as a result of comparable worth, but the magnitudes of the reductions are small.

TABLE 8-3 Human Capital Model

	Pay Levels			Pay Differences	
Variables	1983	Arthur Young	1985 Compromise	Arthur Young	1985 Compromise
Intercept	4.9198	5.5628	5.283	.643	.3632
	(.0266)*	(.0232)*	(.0276)*	(.0169)*	(.0131)*
Education	.0353	.0233	.0298	-.0119	-.0054
	(.0012)*	(.0011)*	(.0013)*	(.0008)*	(.0006)*
M. S. degree	-.0097	.0119	-.0064	.0217	.0034
	(.0108)	(.0094)	(.0111)	(.0068)*	(.0053)
Ph.D. degree	.0444	.1819	.0770	.1375	.0326
	(.0205)*	(.0179)*	(.0213)*	(.0130)*	(.0102)*
License	.0112	.0760	.0765	.0648	.0654
	(0096)	(.0084)*	(.0100)*	(.0061)*	(.004)*
Vocational	.0175	.0208	.0292	.0033	.0117
	(.0045)*	(.0039)*	(.0047)*	(.0029)	(.0022)*
Military	.0169	.0098	.0165	-.0072	-.0003
	(.0065)*	(.0057)	(.0067)*	(.0041)	(.0032)
Tenure	.0227	.0210	.0213	-.0016	-.0013
	(.0008)*	(.0007)*	(.0008)*	(.0005)*	(.0004)*
Tenure^2	-.0004	-.0003	-.0004	$.2 \times 10^{-4}$	$.2 \times 10^{-4}$
	$(.3 \times 10^{-4})$*	$(.2 \times 10^{-4})$*	$(.2 \times 10^{-4})$*	$(.1 \times 10^{-4})$	$(.1 \times 10^{-4})$
Experience	.0005	.0006	$.5 \times 10^{-4}$	.0001	-.0004
	(.0007)	(.0006)	(.0007)	(.0004)	(.0003)
Experience^2	$-.4 \times 10^{-5}$	$-.2 \times 10^{-4}$	$-.5 \times 10^{-5}$	$-.1 \times 10^{-4}$	$-.1 \times 10^{-5}$
	$(-.2 \times 10^{-4})$	$(.1 \times 10^{-4})$	$(.2 \times 10^{-4})$	$(.1 \times 10^{-4})$	$(.1 \times 10^{-4})$
Years out	-.0006	-.0008	-.0013	-.0002	-.0007
	(.0006)	(.0006)	(.0007)	(.0004)	(.0003)*
Supervisor	.0547	.0913	.0868	.0366	.0322
	(.0113)*	(.0099)*	(.0118)*	(.0072)*	(.0056)*
Professional	.1514	.1483	.1841	-.0058	.0300
	(.0096)*	(.0084)*	(.0100)*	(.0061)	(.0048)*
Full time	.1367	.1131	.1401	-.0237	.0033
	(.0191)*	(.0167)*	(.0199)*	(.0121)	(.0095)
Market wage	.3503	.1497	.2274	-.2006	-.1229
	(.0083)*	(.0073)*	(.0086)*	(.0053)*	(.0041)*
Union contract	.0270	.0300	.0409	.0030	.0138
	(.0076)*	(.0067)*	(.0079)*	(.0048)	(.0037)*
Dues payer	.0099	.0133	.0208	.0034	.0108
	(.0061)	(.0053)*	(.0063)*	(.0039)	(.0030)*
Assoc. dues payer	.0229	.0345	.0332	.0116	.0103
	(.0117)	(.0103)*	(.0122)*	(.0075)	(.0058)
Single	-.0053	-.0093	-.0067	-.0040	-.0014
	(.0045)	(.0040)*	(.0047)	(.0029)	(.0022)
Minority	.0006	-.0107	-.0123	-.0113	-.0128
	(.0147)	(.0128)	(.0152)	(.0093)	(.0073)
Female	-.0389	-.0113	-.0319	.0276	.0069
	(.0055)*	(.0048)*	(.0057)*	(.0035)*	(.0027)*
R^2	.815	.760	.763	.543	.373

* Significant at .05 level.

It must be emphasized that here we are analyzing the partial impact of an individual variable while holding other variables constant. Thus, when we refer to losses by more educated workers or by minority workers, for instance, we mean that those people received relatively smaller pay increases than did the less educated or whites.

It must be stressed that since the 1985 compromise eliminated all pay cuts, no workers faced immediate losses in absolute terms.

Comparable Worth Model

Comparable worth advocates might argue that a better specification of our earnings function would delete the market wage and add a variable that measures the proportion of each job classification that is female. According to this perspective, the market wage should be excluded because it reflects existing sex discrimination in the private labor market. Since the purpose of comparable worth is to eliminate sex discrimination, they argue that market wage information should be ignored in evaluating pay. Comparable worth models use a percent female variable as a proxy for discrimination that results from the classification of a job as being "female." In other words, with human capital held constant, the hypothesis is that female-dominated jobs will be paid less than male-dominated jobs.

It is interesting to observe the extent to which our conclusions are altered when we incorporate these two changes into the earnings equations. The results are presented in Table 8-4. In virtually all cases, our conclusions are reaffirmed. A few comments are appropriate, however. The R^2 for the 1983 pay structure drops from .815 to .769, indicating that market wages were an important determinant of government pay. In this formulation, it appears that the Arthur Young plan would have significantly improved the pay of union employees and dues payers. The earlier gains for professional workers resulting from the 1985 implementation no longer appear, and the gains for Ph. D's and the vocationally trained are no longer statistically significant.

The main interest in comaparing the earlier human capital regressions with this specification is in examining the implications for the pay of women relative to men. By excluding market wages and including the percentage of female incumbents on the job, the coefficient estimates on the female dummy variable in the pay-level regressions become positive but not significantly different from zero, and the comparable worth plans actually appear to lower the relative pay for individual women. However, the coefficients on percent female incumbents in the job classification are negative and quite large in absolute value. Taken literally, these coefficients in the 1983 pay structure imply that an increase of 10 percentage points in the percentage of women in an occupation lowers pay by 2.6 percent. This implies that women received lower pay because they were in "female jobs" that paid less. There was no evidence of additional discrimination against women as individuals since the coefficient on the female dummy variable is positive. The Arthur Young plan would have cut the reduction in pay (associated with a 10 point increase in the percentage of female incumbents in the job) to I percent, but the compromise plan cut the pay reduction to only 1.8 percent.

The comparison of the results of Tables 8-3 and 8-4 clearly illustrates the nature of the debate regarding the validity of claims that female-dominated jobs are systematically undervalued by the market. Proponents of human capital or market explanations could point to the results of Table 8-3 and claim that measured discrimination against women is very slight, controlling for human capital and labor market demand and supply factors. Proponents of comparable worth could point to the results of Table 8-4 and claim that large discrepancies in pay exist between men and women because women are concentrated in jobs that are paid below the value placed on comparable male jobs. The data support both claims, and therefore, any assessment that

one view dominates the other must rest on assumption and not statistical analysis. We can, however, conclude that the standard market explanation performs at least as well as the comparable worth explanation.

TABLE 8-4 Comparable Worth Model

	Pay Level			Pay Differences	
Variables	1983	Arthur Young	1985 Compromise	Arthur Young	1985 Compromise
Intercept	5.418	5.77	5.609	.353	.191
	(.028)*	(.023)*	(.027)*	(.017)*	(.013)*
Education	.048	.029	.038	-.020	-.010
	(.001)*	(.001)*	(.001)*	(.001)*	(.001)*
M. S. degree	-.022 1	.007	-.014	.029	.008
	(.012)	(.010)	(.012)	(.007)*	(.006)
Ph. D. degree	.098	.207	.111	.109	.013
	(.023)*	(.018)*	(.022)*	(.014)*	(.011)
License	.061	.097	.109	.035	.048
	(.011)*	(.009)*	(.010)*	(.007)*	(.005)*
Vocational	.041	.030	.045	-.011	.004
	(.005)*	(.004)*	(.005)*	(.003)*	(.002)
Military	.008	.007	.011	-.002	.002
	(.007)	(.006)	(.007)	(.004)	(.003)
Tenure	.026	.023	.024	-.004	-.003
	(.001)*	(.001)*	(.001)*	(.001)*	(.0004)*
Tenure^2	-.0005	-.0004	-.0004	$.6 \times 10^{-4}$	$.5 \times 10^{-4}$
	$(.3 \times 10^{-4})$*	$(.2 \times 10^{-4})$*	$(.2 \times 10^{-4})$*	$(.2 \times 10^{-4})$*	$(.1 \times 10^{-4})$*
Experience	.003	.002	.002	-.001	-.001
	(.001)*	(.001)*	(.001)*	(.0005)*	(.0004)*
Experience^2	$-.6 \times 10^{-4}$	$-.4 \times 10^{-4}$	$-.4 \times 10^{-4}$	$.2 \times 10^{-4}$	$.2 \times 10^{-4}$
	$(.2 \times 10^{-4})$*	$(.2 \times 10^{-4})$*	$(.2 \times 10^{-4})$	$(.1 \times 10^{-4})$	$(.1 \times 10^{-4})$
Years out	-.001	-.001	-.002	.0003	-.0004
	(.001)	(.001)	(.001)*	(.0005)	(.0004)
Supervisor	.021	.078	.065	.057	.044
	(.013)	(.010)*	(.012)*	(.008)*	(.006)*
Professional	.226 *	.180	.230	-.046	.004
	(.010)*	(.008)*	(.010)*	(.006)*	(.005)
Full time	.245	.159	.211	-.086	-.035
	(.021)*	(.018)*	(.021)*	(.013)*	(.010)*
Union contract	.014	.026	.032	.012	.019
	(.009)	(.007)*	(.008)*	(.005)*	(.004)*
Dues payer	-.021	.001	.0006	.022	.021
	(.007)*	(.006)	(.007)	(.004)*	(.003)*
Assoc. dues payer	.054	.048	.053	-.006	-.0008
	(.013)*	(.011)*	(.013)*	(.008)	(.006)
Single	-.004	-.009	-.006	-.005	-.002
	(.005)	(.004)*	(.005)	(.003)	(.002)
Minority	-.012	-.016	-.021	-.004	-.009
	(.016)	(.013)	(.016)	(.010)	(.008)
Female	.009	.0006	.003	-.008	-.006
	(.008)	(.006)	(.007)	(.005)	(.004)
Percent female job	-.258	-.094	-.175	.164	.083
	(.010)*	(.008)*	(.009)*	(.006)*	(.005)*
R^2	.769	.742	.742	.472	.284

* Significant at .05 level.

Human Capital-Job Attributes Model

As an additional sensitivity test, we reestimated the earnings equations by adding to our original model both the percent fe-

male variable and the 13 job factors developed as part of the Arthur Young study. The job factors attempt to measure attributes of each job, such as working environment, responsibility, physical and mental demands of the job, and minimum requirements in terms of education and experience. Comparable worth advocates would tend to emphasize these variables in that they believe that salaries should be pegged to attributes of the job rather than only to attributes of the individuals. Job factors are also important to the extent that government bureaucracies and civil service agencies downplay individual characteristics except in relationship to job characteristics. By holding constant job attributes and percent female, we can determine whether our conclusions regarding the effects of comparable worth on individuals are sensitive to the inclusion of these variables. With a few exceptions, our conclusions do not change.

Some might question our strategy of regressing proposed wage rates on job attributes in the sense that Arthur Young generated their pay proposals from these same job attributes. The 13 variables should explain most of the variations in pay under their proposal. On the other hand, this should not be a problem for the 1983 pay structure since it existed prior to the Arthur Young study. Nor should it be as much of a problem for the 1985 implementation since political compromises partially distorted the relationship between factor points and pay. Nevertheless, it is important to keep in mind that these regressions will yield information on the changes in marginal returns to personal characteristics above and beyond the changes due directly to the formal comparable worth process of measuring and weighting job factors. Because personal characteristics are undoubtedly correlated with (and perhaps causally related to) the level and weights attached to the job characteristics, the earlier estimates are better measures of the gross changes in marginal returns to personal characteristics. The equations in Tables 8-3 and 8-4 also avoid overparameterization and the introduction of spurious regressors that may artificially explain the wage differential between men and women.

Our estimates are presented in Table 8-5. The regression for 1983 pay is in column I and may be contrasted with the comparable estimates of Tables 8-3 and 8-4. First, it is clear that even in 1983, the job attributes add a lot to the explanatory power. The R2 rises from .815 to .932, and 12 out of 13 job attributes are statistically significant. It is also interesting that all have positive coefficients except physical effort and pace of work. Interpreted literally, the 11 positive job attributes appear to be measuring aspects of the job that are undesirable or costly to acquire and that require compensation in order to attract applicants, whereas physical effort appears to be a desirable job attribute. Of course, we must modify this to the extent that political or other non-economic forces created the pay structure. We also note that the complexity and the scope of the job have the largest positive impact on pay.

Many of the human capital and personal characteristic coefficients decline in absolute value while retaining their sign and significance. This is not surprising in that some of these variables compete with certain job attribute variables. For instance, the minimum education job attribute (JED) competes with the years of education and the credential variables. Further, the comparable worth pay plans represent a conscious effort to downplay individual characteristics and emphasize job characteristics. Still, few significant sign reversals occur. The supervisor variable changes from positive to negative when the supervisory job factors are added. The association dues-paying member and the vocational training variables tend to change from positive significance to negative insignificance. The only other coefficients that change sign are those

TABLE 8-5 Human Capital-Job Attributes Model

	Pay Level			Pay Differences	
Variables	1983	Arthur Young	1985 Compromise	Arthur Young	1985 Compromise
Intercept	5.4189	5.5016	5.354	.0827	-.0652
	(.0255)*	(.0234)*	(.0230)*	(.0204)*	(.0143)*
Education	.0073	.0065	.0057	-.0008	-.0017
	(.0009)*	(.0008)*	(.0008)*	(.0007)	(.0005)*
M.S. degree	.0054	.0150	.0033	.0096	-.0021
	(.0066)	(.0061)*	(.0059)	(.0053)	(.0037)
Ph. D. degree	.0127	.1256	.0215	.1129	.0088
	(.0127)	(.0116)*	(.0114)	(.0102)*	(.0071)
License	.0164	.0229	.0245	.0065	.0081
	(.0061)*	(.0056)*	(.0055)*	(.0049)	(.0034)*
Vocational	.0019	-.0001	.0052	-.0020	.0033
	(.0028)	(.0025)	(.0025)*	(.0022)	(.0016)*
Military	.0002	-.0008	$.8 \times 10^{-4}$	-.0011	-.0001
	(.0039)	(.0036)	(.0035)	(.0031)	(.0022)
Tenure	.0179	.0183	.0177	.0004	-.0002
	(.0005)*	(.0005)*	(.0004)*	(.0004)	(.0003)
Tenure^2	-.0003	-.0003	-.0003	$-.7 \times 10^{-5}$	$-.2 \times 10^{-5}$
	$(.2 \times 10^{-4})$*	$(.2 \times 10^{-4})$*	$(.1 \times 10^{-4})$*	$(.1 \times 10^{-4})$	$(.9 \times 10^{-5})$
Experience	.0012	.0014	.0010	.0002	-.0002
	(.0004)*	(.0004)*	(.0004)*	(.0003)	(.0002)
Experience^2	$-.3 \times 10^{-4}$	$-.2 \times 10^{-4}$	$-.2 \times 10^{-4}$	$-.5 \times 10^{-8}$	$.8 \times 10^{-5}$
	$(.1 \times 10^{-4})$*	$(.1 \times 10^{-4})$*	$(.1 \times 10^{-4})$	$(.9 \times 10^{-5})$	$(.7 \times 10^{-5})$
Years out	-.0004	$.8 \times 10^{-4}$	-.0002	.0005	.0002
	(.0004)	(.0004)	(.0004)	(.0003)	(.0002)
Supervisors	-. 0598	-.0374	-.0172	.0223	.0425
	(.0086)*	(.0079)*	(.0078)*	(.0069)*	(.0048)*
Professionals	.0612	.0294	.0358	-.0317	-.0254
	(.0062)*	(.0058)*	(.0057)*	(.0050)*	(.0035)*
Full time	.0942	.0830	.0854	-.0112	-.0087
	(.0119)*	(.0109)*	(.0107)*	(.0095)	(.0066)
Market wage	.1248	.0391	.0404	-.0857	-.0844
	(.0080)*	(.0073)*	(.0072)*	(.0064)*	(.0045)*
Union contract	.0245	.0060	.0106	-.018	-.0139
	(.0048)*	(.0044)	(.0043)*	(.0039)*	(.0027)*
Dues payer	.0192	.0074	.0127	-.0118	-.0065
	(.0039)*	(.0035)*	(.0035)*	(.0031)*	(.0022)*
Assoc. dues payer	.0053	-.0013	-.0049	-.0066	-.0102
	(.0073)	(.0067)	(.0066)	(.0058)	(.0041)*
Single	-.0019	-.0048	-.0013	-.0029	.0006
	(.0028)	(.0025)	(.0025)	(.0022)	(.0015)
Minority	-.0076	-.0025	-.0086	.0050	-.0010
	(.0089)	(.0082)	(.0080)	(.0071)	(.0050)
Female	-.0086	-.0078	-.0109	.0008	-.0023
	(.0041)*	(.0038)*	(.0037)*	(.0033)	(.0023)
Percent female job	-.1459	.0016	-.0582	.1475	.0877
	(.0070)*	(.0065)	(.0063)*	(.0056)*	(.0039)*
JED	.0192	.0251	.0418	.0059	.0225
	(.0018)*	(.0016)*	(.0016)*	(.0014)*	(.0010)*
JEX	.0091	.0011	.0203	-.0080	.0112
	(.0020)*	(.0018)	(.0018)*	(.0016)*	(.0011)*
JCPX	.0567	.0354	.0372	-.0213	-.0195

for the M. S. degree, military, and years out of labor force variables. For the most part, these coefficients remain insignificant. Even controlling for the percent female job variable, the individual female variable is still negative and significant, albeit small in magnitude.

	Pay Level			Pay Differences	
Variables	1983	Arthur Young	1985 Compromise	Arthur Young	1985 Compromise
	(.0031)*	(.0028)*	(.0028)*	(.0025)*	(.0017)*
JGD	.0220	.0193	.0285	-.0026	.0066
	(.0032)*	(.0029)*	(.0029)*	(.0026)	(.0017)*
JCON	.0137	.0175	.0221	.0038	.0084
	(.0016)*	(.0014)*	(.0014)*	(.0012)*	(.0009)*
JPH	-.0237	.0355	.0314	.0592	.0551
	(.0022)*	(.0020)*	(.0020)*	(.0018)*	(.0012)*
JMV	.0144	.0181	.0181	.0036	.0036
	(.0030)*	(.0027)*	(.0027)*	(.0024)	(.0017)*
JSUP	.0195	.0311	.0150	.0116	-.0045
	(.0018)*	(.0016)*	(.0016)*	(.0014)*	(.0010)*
JSCP	.0322	.0235	.0323	-.0087	$.5 \times 10^{-4}$
	(.0032)*	(.0029)*	(.0029)*	(.0026)*	(.0018)
JIMP	.0179	.0326	.0290	.0146	.0111
	(.0029)*	(.0027)*	(.0026)*	(.0023)*	(.0016)*
JENV	.0167	.0038	.0094	-.0130	-.0074
	(.0031)*	(.0028)	(.0028)*	(.0024)*	(.0017)*
JHAZ	.0065	.0101	.0226	.0035	.0161
	(.0022)*	(.0020)*	(.0019)*	(.0017)*	(.0012)*
JPAC	-.0029	.0079	.0066	.0107	.0095
	(.0022)	(.0021)*	(.0020)*	(.0017)*	(.0013)*
R_2	.932	.903	.935	.735	.708

NOTE: The job factors are JED, the minimum education required for the job; JEX, the minimum time required to gain the knowledge necessary for the job; JCPX, the complexity of the job; JGD, the guidance or supervision available; JCON, the number of personal contacts; JPH, physical effort and fatigue; JMV, mental and visual coordination; JSUP, supervision exercised; JSCP, scope and effect of duties; JIMP, impact of errors; JENV, working environment; JHAZ, unavoidable' hazards and risks; JPAC, work pace, pressures, and interruptions.
* Significant at .05 level.

The market wage response elasticities decline in magnitude once the job factors are added. In 1983, a 10 percent increase in market wages increased state pay by only 1.2 percent (versus 3.5 percent from Table 8-3). It is not surprising that once the institutional factors that determine pay are included, the impact of the market pay variable declines. Nor is it surprising that each comparable worth plan reduced the impact of market wages even further (a .4 percent impact in Table 8-5).

It is clear that both the individual attributes and the job attributes contribute to the explanation of variation in 1983 pay levels. Tests of the joint significance of the coefficients on individual attributes and on job characteristics easily rejected the null hypothesis of no effect. This strongly implies that both external competitive markets and internal pay determination are important.

As before, estimates of the percent female coefficient imply major gains for female jobs under the comparable worth plans relative to 1983. Whereas a 10 percent increase in the percentage of women in the job reduced pay by 1. 5 percent in 1983, this is narrowed

to .6 percent less on implementation. The Arthur Young plan would have totally eliminated the pay gap between jobs, although individual females would have been paid .5 percent less, which is slightly smaller than the .9 percent estimate for 1983.

Comparable worth still tends to reduce the importance of years of education and experience as measured by the individual characteristics, and to increase the importance of credentials. Several of the coefficients, however, are no longer statistically significant, probably due to competition from the job factors. Supervisors still gain from comparable worth, but professionals lose relative to nonprofessionals.

A major change occurs for the union variables. In the earlier estimates, it appeared that those covered by a union contract and those paying union dues gained, at least from the 1985 compromise. Once the job factors are added, however, union workers appear to lose relative to nonunion workers. All six pay difference coefficients are negative in Table 8-5 and five are significant. This suggests that the union gains occurred primarily through the establishment and weighting of the job factors. We should emphasize that our earlier estimates obtained from the human capital earnings equation yield more meaningful estimates of the gross gains to union members as a result of the comparable worth process in that the coefficients on union status include gains that resulted from the factor point system. Table 8-5 provides estimates of the net impact of union status after holding job attributes constant. If one wants to ask what is the overall impact on unionized workers after controlling only for other personal and human capital characteristics, the earlier tables are more appropriate.

Overall, adding the job factors reaffirms our previous conclusions. The market wage is significantly reduced in importance by the comparable worth process. Years of education and experience are also reduced but credentials gain in importance. Female jobs gain a lot relative to male-dominated jobs.

Predicted Pay Ratios

As an alternative method of measuring the impact of comparable worth on the female-male pay gap, we used a standard procedure introduced by Oaxaca (1973) and others. The first step in this procedure is to estimate the human capital model separately for males and separately for females. This generates an estimated pay equation (1) for each sex. The second step is to plug the individual personal and human characteristics of, say, women into the estimated male equation. This yields a prediction of the amount ($\hat{W}_F$) that women would have been paid given their actual characteristics but according to the male earnings structure. By comparing womens' actual wage rates (W_F) with their predicted wage rate ($\hat{W}F$), we can calculate a ratio ($WF/\hat{W}_F$) that one can interpret as the female to male wage ratio adjusted for differences in individual characteristics between men and women. Alternatively, one could plug the male characteristics into the estimated female equation to predict male pay ($\hat{W}_M$) according to the female pay structure. Dividing $\hat{W}_M$ by actual male pay (W_M) yields a ratio ($\hat{W}_M/W_M$), which also is an estimate of the adjusted female to male wage ratio. In principle, either ratio is legitimate. However, some have a preference for using the male equation to predict female pay because they believe, in part, that the male coefficients are more stable and precisely estimated and less likely to reflect discrimination.

Our results are summarized in Table 8-6. As a base for comparison, row 1 presents the average female to male wage ratio as computed without controlling for any personal or human capital characteristics. In 1983, women, on average, earned 78 percent of the average male earnings in Iowa state government. The uncorrected ratios indicate that the Arthur Young proposal would have increased the ratio to 86 percent and the actual implementation raised it to 82 percent.

TABLE 8-6 Ratio of Female to Male Earnings

Ratio	1983	Arthur Young	1985 Compromise
Unadjusted			
$\frac{W_F}{W_M}$	.781	.862	.818
Adjusted for human capital model (Table 8-3)			
$\frac{W_F}{\hat{W}_F}$	.944	.998	.962
$\frac{\hat{W}_M}{W_M}$	.987	.999	.989
Adjusted for comparable worth model (Table 8-4), excluding percent female job			
$\frac{W_M}{\hat{W}_F}$	.877	.957	.913
$\frac{\hat{W}_M}{W_M}$	.895	.959	.926
Adjusted for human capital-job attributes model (Table 8-5), excluding percent female job			
$\frac{W_F}{\hat{W}_F}$	.918	1.007	.955
$\frac{\hat{W}_M}{W_M}$	.965	.993	.986

Rows 2 and 3 of Table 8-6 show the female to male wage ratios controlling for the human capital model using variables identical to those shown in Table 8-3 (with the deletion of the female variable since each equation is estimated by sex). Controlling for these variables eliminates most of the pay gap even in 1983, before the comparable worth process began. In 1983, women were only paid 1 to 6 percent less than comparably skilled men, on average. The Arthur Young proposal would have eliminated all of the gap, and the comparable worth adjustments introduced in 1985 would have narrowed the gap to 1 to 4 percentage points.

We also estimated the pay ratios while controlling for the comparable worth model and for the human capital-job attributes model. Both specifications excluded the female dummy variable and the percent female in the job. The results are reported in rows 4 and 5 and rows 6 and 7 of Table 8-6, respectively. Our conclusions are notaltered in principle. Use of the various specifications results in adjusted pay gaps of at most 12 percent and as little as 3.5 percent in 1983. As before, the Arthur Young plan would have eliminated most of the pay gap using the specification of Table 8-5, but would have left a 4 percent gap adjusting only for the variables in the comparable worth specification. Implementation in 1985 eliminated one-third to one-half of the 1983 pay gap.

The results of this exercise strongly reinforce our previous conclusions. First, although women were paid less than men in 1983, the pay gap in Iowa state government was small, especially after human capital and other personal characteristics were held constant. Second, both comparable worth plans raise female pay relative to male pay, but the 1985 compromise plan was less generous to women than the Arthur Young plan.

Conclusions

Our results strongly support our expectations concerning comparable worth. Although the 1985 political compromise moderated the size of the pay increases and eliminated any pay cuts, both the original Arthur Young plan and the actual plan implemented in 1985 increased the pay of women relative to that of men. This was accomplished by raising pay in the predominately female jobs. Although the Arthur Young plan would have eliminated virtually all of the underpayment gap, the compromise plan only eliminated a portion of that gap.

Although the majority of state employees gained from the additional funds allocated in 1985 to implement comparable worth, certain groups gained more than others. Most notably, our uncontrolled tabulations suggest that low wage earners and those with the least education and experience gained the most. These gains occurred in the health, clerical, and social service departments of state government, where wages

were low and women tended to predominate. This suggests that low-wage women tended to gain more than high-wage women. On the other hand, minorities may have lost slightly relative to higher paid whites, although it should be stressed that Iowa has very few minority employees. Most of these conclusions are reinforced in the controlled regression models. For instance, the comparable worth model deemphasized education, experience, and market wages.

A few higher paid employees tended to gain relative to others. In particular, supervisors gained relative to nonsupervisors. In addition, those having credentials, such as a license, vocational training, or a Ph. D., came out ahead. This suggests that comparable worth evaluators tend to stress credentials and deemphasize years of education and experience.

It is less clear whether union members gained relative to nonunion employees. Our basic human capital model suggests that they did gain from comparable worth. This conclusion is also supported by the comparable worth model in which the market wage is eliminated. Although the addition of job factors to the human capital variables reverses the sign on the union impact, we tend to discount the importance of this result. In our view, union gains came through the job factors, so it is inappropriate to control for those job factors if one wants to measure the total impact of the union. In total, unionized workers gained relative to nonunionized workers. Similar comments apply to such groups as supervisors and professionals.

Both comparable worth plans tended to reduce the role played by market wages in the state pay plan. However, neither plan was so radical as to eliminate totally a role for market wages, as measured in our regressions. Even after controlling for job factors and for the percent female, market wages and human capital variables still significantly explain a proportion of the post comparable worth variations in pay rates.

As we emphasized above, no state employee lost pay in absolute terms in the short run as a result of comparable worth, even though some employees lost in relative terms. In the long run, however, the losses in relative pay may eventually become absolute losses. The reason is that the costs of implementing the comparable worth plan were substantial, particularly in the face of significant budget problems at the state level in Iowa. This would imply that future overall pay growth in the Iowa state merit system may be constrained due to the added costs of the comparable worth adjustments. If, indeed, pay growth in the Iowa public sector slows relative to pay growth in the private sector, the real earnings for those suffering relative reductions in earnings may eventually fall.

As a final point, we can only speculate as to whether the conclusions obtained in the Iowa case can be generalized to other states or localities. There are several reasons why the Iowa case would seem to be typical of comparable worth plans in general. First, the methodology used by the Arthur Young consultants was quite standard in the area of job analysis, and in fact, Arthur Young has been quite active in performing such analyses in other states. Second, AFSCME is the largest public sector union and has been quite active in the comparable worth debate in other states. It seems likely that some type of compromise would occur, such as that struck in Iowa, to prevent pay cuts. On the other hand, it is clear that the comparable worth process in Iowa was openly, and perhaps uniquely, influenced by economic and political factors and the subjectivity of committee-assigned factor weights. We have no basis for judging whether this experience is common to other settings. We would not be surprised, however, to discover that economics, politics, and the values of those involved in the evaluation pro-cess would be very important in shaping the outcomes of pay analyses done else-where. Governmental budget constraints,

for example, would tend to cause pressure toward moderation on the parties. We would anticipate that the issue of pay cuts and reallocation of resources would arise and lead to opposition (especially from unions representing men, who might lose). This implies that in order to build support for a comparable worth plan, the scope of the plan (in terms of dollars, number and type of jobs analyzed, and potential size of pay increases or decreases) may have to be limited *ex ante* . Clearly, such compromises need not take the exact form as in Iowa, but the potential for pressure to compromise at some stage in the comparable worth process would exist in all states.

Acknowledgments

The authors would like to thank the National Research Council for funding. Jeff Greig and Kyle Stevens provided able research assistance. Members of the Iowa State departments of Transportation, Personnel, and Revenue and Finance provided invaluable assistance in obtaining and interpreting the data. We would also like to thank our colleague Jim Prescott, workshop discussant Cathy Schoen, and members of a September 1987 Pay Equity workshop for their comments and suggestions.

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9

The Impact of Pay Equity on Public Employees: State of Minnesota Employees' Attitudes Toward Wage Policy Innovation

Sara M. Evans and Barbara J. Nelson

The origins of any social reform are woven into the fabric of the society in which it occurs. The dates when reform becomes widely visible reflect the points at which problem recognition and concerted response coalesce. This coming together occurred in the comparable worth movement during the early 1970s, when the members of the American federation of State, County and Municipal Employees (AFSCME) began to work for equal pay for work of comparable value for employees of the state of Washington.[1] Their efforts and the strike of municipal workers in San Jose, California, encouraged the Minnesota AFSCME and the Minnesota Council on the Economic Status of Women to propose legislation requiring pay equity (as it is called in Minnesota) as the principle for remuneration of state employees. The State Employees Pay Equity Act was passed in 1982 and implemented over 4 years beginning in 1983. Minnesota thus became the first state to have completely implemented a pay equity wage policy.

Minnesota's fully implemented pay equity policy offers an important opportunity for examining the consequences for employees of adopting this wage policy. Most discussions of pay equity have been abstract, theoretical, and focused on macroeconomic issues. The labor relations issues associated with pay equity have been the object of some speculation, but little systematic information has been available with which to ascertain the accuracy of those views, in part because so few workplaces have adopted the policy. Advocates suggest that pay equity will contribute to employee self-esteem, encourage job satisfaction, and reduce friction in the workplace (Gold, 1983; Grune, 1984). Opponents suggest that pay equity will disrupt the workplace with jealousy and decrease the job satisfaction of women workers by encouraging men (through

[1] Many states and localities (including the state of Minnesota and its local jurisdictions) call their comparable worth policies "pay equity," a 'term that conveys the goal rather than the process. Many advocates now prefer to define pay equity as "the goal of eliminating wage discrimination" (American Association of University Women, 1987). In this paper we use comparable worth and pay equity interchangeably to mean equal pay for work of equal value (Nelson, 1985; Treiman and Hartmann, 1981). A formal definition is provided later in this section.

higher wages) to enter traditionally female occupations (Cowley, 1984; Gold, 1983; O'Neill, 1984; Seligman, 1984). None of these assertions has been researched.

As part of a larger study of the initiation and implementation of pay equity in several states and localities, the University of Minnesota's Comparable Worth Research Project undertook a survey of state of Minnesota employees to determine employee responses to pay equity. The survey charted new ground, making available the first information about employee reactions to this salary innovation. The research reported here focuses on three sets of questions derived from the survey data: *support and knowledge questions* (Who supported the concept of pay equity? Who had heard of the policy? How detailed was the knowledge?); *experience questions* (Who reported and who actually received pay equity raises?); and *impact questions* (What long-term consequences did employees see arising from the adoption of pay equity? How did pay equity affect job satisfaction?). To answer these questions, this paper presents a brief history of the Minnesota pay equity policy; a discussion of the consequences of wage changes on labor relations; a presentation of data, methods, and findings; and interpretations drawn from the survey and from interviews with policy makers in Minnesota.

Policy History

Employees' responses to the implementation of pay equity are best understood in the context of the history of this policy in Minnesota, the specific content of the law, and the process of its negotiation and implementation. The contemporary history of pay equity in Minnesota was initiated in the 1970s by two groups —Council 6, AFSCME's local for state of Minnesota employees, and the Council on the Economic Status of Women. Council 6 negotiated a job evaluation study in 1974 because of the relatively low wages of clerical workers compared with janitors. Although the study was never funded, it constituted the first movement for pay equity.

In 1976, the Council on the Economic Status of Women was established by the legislature. By 1981 the council had documented that women in state employment earned 73.8 percent of what men in state employment earned, and the average man entering state service began at a salary higher than the salary of the average woman worker with 20 years of experience in state employment (Council on the Economic Status of Women, 1982:17; Rothchild, 1985). The pay equity initiative grew out of these anomalies and the fact that the Equal Pay Act and Title VII of the Civil Rights Act would never address these structural sources of wage differences (interview with Linda Berglin, 1987).

Content

In 1982, the State Employees Pay Equity Act was passed with the strong support of AFSCME and the Council on the Economic Status of Women (Evans and Nelson, 1986).[2] The law declared that it was the state's policy "to establish equitable compensation relationships between female-dominated, male-dominated, and balanced classes of employees in the executive branch." The legislation specified that pay equity raises were to be appropriated separately from general salary increments. The first portion of the money for pay equity raises was appropriated the next year.

Within the limits of the special appropriation for pay equity, the dollar amount of the raises going to each eligible job classification was negotiated through collective bargaining immediately following regular

[2] The Minnesota Council on the Economic Status of Women became the Commission on the Economic Status of Women in 1983. Originally, it was a joint legislative-public body. Currently, it comprises only members of the legislature.

contract negotiations. Full implementation over 4 years required appropriations from two biennial legislative sessions and two rounds of negotiation. Pay equity added $21.7 million to the personnel costs of the state, which totaled 3.7 percent of the wage bill (Commission on the Economic Status of Women, 1985).[3]

The wage policy established by the State Employees Pay Equity Act conformed more closely to the theory of equal pay for jobs of equal value than did the policy of any other jurisdiction that has implemented pay equity. Defined formally, equal pay for jobs of equal value is a wage policy requiring equal pay within a jurisdiction or firm for job classifications that are valued equally in terms of skill, effort, responsibility, and working conditions. In practice, implementing this policy requires the application of a single job evaluation system to all job classifications within the jurisdiction or firm. This single job evaluation system measures in detail the skill, effort, responsibility, and working conditions of every job classification and combines the scores in each area to produce a single, overall score for every classification. Job classifications with equal overall scores are considered to have equal value to the jurisdiction or firm. Under a pay equity wage policy, classifications of equal value are paid equivalently (Nelson, 1985).

Pay equity is more than pay for points, however. The principle guiding pay equity is that jobs held primarily by women or minorities are paid less than jobs held primarily by men or whites in part because the incumbents of the jobs are women or minorities (Feldberg, 1984; Treiman and Hartmann, 1981). Using this reasoning, the jobs held primarily by men or whites receive wages that do not reflect this legacy of lowered wages due to the devaluation of the incumbents of the jobs. Under a pay equity policy, male or white wage practices. become the norm for setting wages in jobs held predominantly by women or minorities.[4]

Implementation

Implementation of the Minnesota law was based on an existing point factor job evaluation system for state employees and an existing technical pay equity analysis of that system. In 1979, Hay Associates (now Hay Group), a consulting firm, completed an examination of the state's personnel policies and practices. An analysis of the Hay Associates job evaluation data by the Council on the Economic Status of Women showed that at the same point value, female-dominated jobs always paid less than the average for male-dominated jobs.[5] The male wage line was then used in implementing comparable worth.

The Minnesota Department of Employee Relations compared the wages of predominantly male and female jobs at equivalent point values (see Figure 9-1). If the female job paid less, the wage rate for the female occupation was adjusted upward to the wage rate of the male occupation. The state did not alter the pay of balanced classes below the male wage line. Neither did the state undertake an analysis of the racial and ethnic composition of job classifications. Only 3.8

[3] In 1984, the legislature passed a second, slightly different pay equity statute requiring all cities, counties, school boards, and other public employers to use a pay equity standard when setting wages. So far, localities have paid for the implementation of pay equity without assistance from the state. The survey does not include employees of local jurisdictions.

[4] For an alternative methodology based on the same principles, see Steinberg (1984, 1989).

[5] The econometric literature on pay equity debates whether the full difference between the male and female job lines can be explained by structural discrimination. These arguments are less important in single-firm analyses of comparable worth, in which firm size and sectorial differences in the employment of men and women have, by definition, been held constant. See Aaron and Lougy (1986), Aldrich and Buebele, (1986), and Bielby and Baron (1987).

percent of the state work force comprised racial and ethnic minorities, a percentage slightly higher than the population average for the state as a whole.

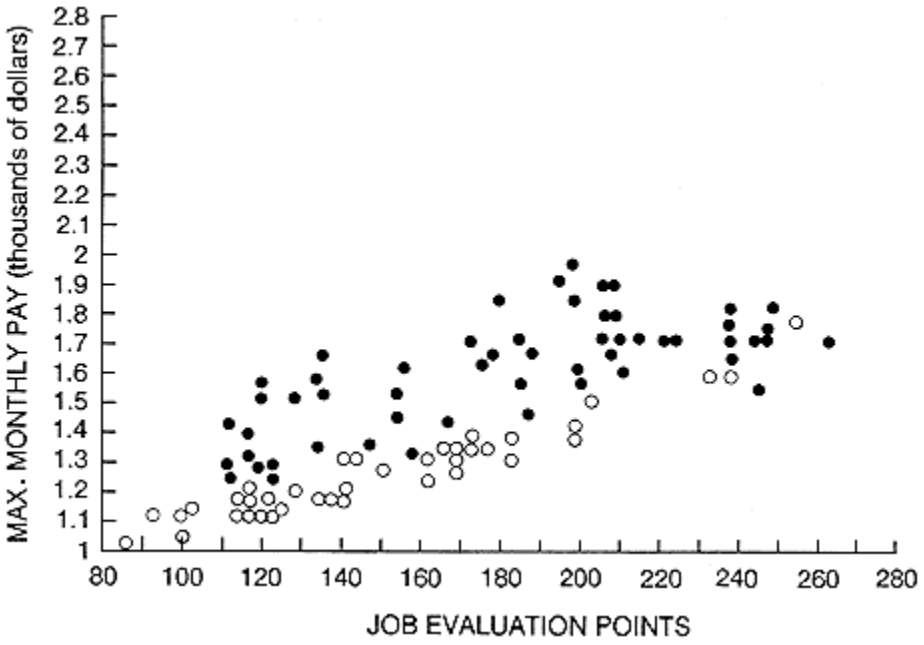

Figure 9-1
Minnesota state government wages for male-and female-dominated jobs: Before pay equity. Note: • = male-dominated job class (80 percent or more male incumbents); o = female-dominated job class (70 percent or more female incumbents) (balanced job classes not indicated). Source: Commission on the Economic Status of Women (1985).

As with the technical analysis, much of the education of employees about pay equity occurred before or during the legislative process. AFSCME had a particular interest in educating its members about the issue because it represented 62 percent of all state employees, including 75 percent of women working for the state, and almost 85 percent of the employees receiving pay equity raises (AFSCME Council 6, News Release, July 25, 1983; Council on the Economic Status of Women, 1982). In the two predominantly female bargaining units (health care nonprofessional and clerical), the union actively promoted pay equity. In the four predominantly male bargaining units (craft, service, technical, and correctional guards), the union quietly responded to worker unease that pay equity would come out of the general salary increment. Other bargaining organizations paid scant attention to the issue because few of their members would benefit.[6]

After the legislation passed, employees did not get much information about how pay equity would affect them. Employees who were eligible for pay equity raises did not receive official notification from unions or the state. Changes in one's paycheck formed the major "notification" of pay equity, a notification that did not distinguish between regular pay raises of approximately 3 to 4.5 percent per year and the additional

[6] A number of labor organizations, like the Minnesota Association of Professional Employees, supported the policy of pay equity but did not publicize it among their members.

increment available through pay equity raises.

The state took 4 years to implement fully the pay equity raises. The average raise totalled $2,200, with $1,600 added to wages in the first 2 years and $800 added the last 2 years. Approximately 8,500 employees, 90 percent of whom were women, received pay equity raises out of a total state work force of 34,000 (Commission on the Economic Status of Women, 1985).

The Department of Employee Relations and AFSCME reported receiving only a very few complaints about the policy and its implementation (1987 interviews with Peter Benner, James Lee, and Lance Teach-worth). The only major problem that arose was salary compression. The Minnesota Association of Professional Employees (MAPE) reported that its members resented the fact that the salaries of nonprofessional employees (say, accounting clerks) were now considerably closer to salaries for professional employees (say, entry-level accountants). MAPE also believed that the salaries of balanced classes should also have been raised to the salaries of equivalently valued male-dominated positions, an action that the state chose not to take. MAPE has sought to resolve the problem through salary negotiations.

The relative ease with which Minnesota implemented the policy rested on three factors. First was the atmosphere of respectful and relatively calm labor relations. Second was the state's smoothly running personnel system. Minnesota has an excellent compensation staff as well as computerized salary and personnel information. Both of these capacities allowed for the easy calculation of pay equity raises and their rapid inclusion in paychecks. Third was the prior existence of a job evaluation study unrelated to the pay equity debate and the implementation of raises. It is job evaluation that has proved to be the most controversial aspect of implementing pay equity in other jurisdictions (Evans and Nelson, 1989a,b).

Wage Changes and Labor Relations

The advocates and opponents of pay equity who have speculated about its consequences in the workplace have emphasized its effects on job satisfaction and employee relations. In their speculations they have simply assumed that pay equity would be well known to employees, personally salient both to those receiving and not receiving the raises, and a major contributor to actual and perceived differences in work experiences. The history of pay equity in Minnesota, however, and the larger body of research about labor relations lead us to expect somewhat different consequences from implementing pay equity.

Given the long-standing controversy over whether and when employees attempt to maximize wages, it is remarkable how little research has investigated what employees actually know about the direct and indirect financial rewards of their labor. Two types of information are available from this small body of research: estimations by college students of the salaries available in various occupations, and less scholarly work on employee knowledge of benefits. The studies of salary knowledge indicate that both college women and men have an equal, and not particularly accurate, knowledge of the salaries of both traditionally male and traditionally female occupations (Yanico and Hardin, 1986; Yanico and Mihlbauer, 1983). In studies of men and women with the same college majors, but not necessarily the same career aspirations, women also believe that they will have lower entry salaries and lower peak earnings than their male counterparts (Major and Konar, 1984). The reports generated by the business community on encouraging employee appreciation of benefit packages suggest that employees know very little about the specifics of their benefits and that union members are no more knowledgeable than nonunion members (Cuthbertson, 1984; Findlay, 1984; Forbes, 1984; Hourihan, 1983).

The literature offers few guideposts to hypothesizing about the effects of a change in wage policy on workers' knowledge of their own financial situations. We suggest that employees who are better off materially, in terms of salary and education, and employees who are more powerful organizationally, especially managers and professionals, will have greater accurate knowledge about pay equity policy and practices. This general relationship will be mediated by the salience of the issue to individuals. We expect that employees in traditionally female-dominated occupations eligible for raises will be more attentive and hence more knowledgeable. But we must also caution against "over determining" employees' responses to pay equity. Pay equity is only one part of the financial situation of employees, and remuneration is only one part of the work environment. Even those who might be advantaged most by the policy change would reasonably have a limited interest in the topic, especially when information is provided selectively, as it was by AFSCME in Minnesota.

There is a much richer research tradition concerning job satisfaction. This literature shows that job satisfaction is the product of several related qualities of work life: the intrinsic nature of the work; the "convenience" aspects of the work, including working conditions in the broadest sense; financial rewards, including salary, fringe benefits, and security; relations with co-workers; ability to develop a career; and adequate resources to do the job (Kalleberg, 1977:128; Chelte et al., 1982; Crosby, 1982; Mottaz, 1986; Staines and Quinn, 1979). Overall, people with higher salaries and more intrinsically interesting work (which often involves a good deal of independent judgment) are more satisfied with their jobs.

The process by which individuals determine job satisfaction is somewhat more complicated, however. Individuals determine job satisfaction by comparing the job traits they value with the job traits that are rewarded in their firm. Expectations about rewards, type of occupation, and gender-based socialization to work roles are especially important in understanding expectations of work satisfaction. Most studies show that women are at least equally as satisfied with their work as are men, but women's satisfaction is believed partly to be a function of low expectations and low rewards, especially for women in nonprofessional, female-dominated occupations (Campbell et al., 1976; Kalleberg, 1977; Mottaz, 1986; Murray and Atkinson, 1981).

One of the problems with the job satisfaction research is that it stops short of proposing how *changes in the workplace* affect satisfaction. Although Kalleberg (1977) and Kalleberg and Griffin (1978) discuss how *changes in the economy* affect job satisfaction, the majority of the research on job satisfaction uses cross-sectional data to discuss current satisfaction differences between groups of employees. If one stays within this paradigm, one is brought to the untenable position that a change in monetary expectations and an "equivalent" change in monetary rewards results in no change in the total amount of job satisfaction, thus denying the effects of experiencing changes in expectations and rewards.

The introduction of a pay equity wage policy in the state of Minnesota offers the opportunity to rethink and test, in a very preliminary way, the consequences of wage changes on employees' job satisfaction. The important theoretical question is, Does pay equity change expectations, and if so, how and with what results? As a policy, pay equity says that the work traditionally done by women is more valuable than the pay available for it has reflected. To the extent that individuals know about pay equity and believe its premises, the policy has the power to change expectations, where expectations reflect both altered perceptions of deserving higher salaries and wanting them (Crosby, 1982). If individuals know about the policy and also receive the raises,

they will have increased their expectations and increased their rewards, possibly increasing their job satisfaction. Likewise, if individuals know about the policy and thus increase their expectations but do not receive pay equity raises or do not know about their pay equity raises, they may be less satisfied with their work overall. We suggest that the *process* of expectations and rewards affects overall satisfaction with work.

Clarifying assumptions about context is crucial when presenting a process approach to job satisfaction. We suggest that raised expectations and raised rewards will yield greater job satisfaction because the pay equity policy and the implementation process in the state of Minnesota were not very conflictual. The policy was implemented in an atmosphere of good labor relations and thus was not attached to any other grievances that might color employees' knowledge of or response to it. Similarly, the job evaluation was done prior to and completely separate from the implementation of the raises. Because the state of Minnesota separated job evaluation from pay equity analysis and policy, the implementation process reflects the impact of wage change, not job comparisons.

Data and Methods

Survey Design

The data used in this analysis are from the Public Employee Survey of 493 state of Minnesota employees fielded by the Minnesota Center for Survey Research in June 1985. Before fielding the survey, the Comparable Worth Research Project discussed the survey with the Department of Employee Relations and every public union and labor organization representing state employees. The survey design integrated a mailed questionnaire and telephone survey methodology.

A sample of 1,000 employees was contacted by two letters at work. Those who returned a postcard indicating their willingness to be interviewed were contacted at home. Respondents were quota-sampled at the telephoning stage to make certain that the final sample represented the 16 bargaining units in appropriate proportions. The response rate to the letters requesting participation was 65 percent. Backstrom and Hursh-Cesar (1981) consider a 70 percent completion rate for a mailed questionnaire extraordinary. Analysis of the characteristics of the 493 individuals finally interviewed by telephone and those not interviewed but mailed initial letters found that the two groups were quite similar in terms of gender, job locations, and bargaining units.

Variables

The telephone survey asked 176 questions on work history, attitudes toward public employment, employee experiences in the workplace, worker satisfaction, information and attitudes about pay equity, experience with Minnesota's pay equity policy, political beliefs, use of social programs, and socioeconomic and demographic information. The analysis presented here uses a specific set of questions designed to determine respondents' support for, knowledge about, receipt of, and reactions to pay equity, as well as a number of variables that measure material and organizational position and ideological beliefs.

Support

All respondents were asked a question to ascertain their support for the pay equity concept. It read, "If studies showed the work of delivery van drivers and clerk typists required the same level of skill, training, responsibility, and so forth, should an employer pay these types of positions the same?" The delivery van driver and clerk typist positions were equally rated in the Hay Associates job evaluation study conducted in Minnesota.

Knowledge

To ascertain knowledge of pay equity, all respondents were asked, "Have you heard anything about pay equity or comparable worth?" To determine the accuracy and depth of respondents' knowledge of pay equity, respondents were asked if they agreed or disagreed with the statements, "Only women can get pay equity raises" and "Pay equity will increase the state retirement benefits of people getting these raises."

Experience

Respondents were also asked, "Did you receive a pay equity or comparable worth raise in 1984?" This information was later cross-checked against the official list of job classifications eligible for pay equity raises. Respondents gave information on the size of their pay equity raises for contract year 1984, which was just ending. This information was also cross-checked against the state's salary schedule.

Perceived Impact

Reactions to the long-term consequences of pay equity were determined through two kinds of questions. First, we asked respondents who knew about pay equity whether they agreed or disagreed with two statements expressing possible negative consequences of the policy. The statements were, "Pay equity causes many problems in the workplace" and "Pay equity will result in some salaries being frozen." Second, we asked all respondents about job satisfaction with the question, "Within the last year, have you felt that your work is a satisfying experience very often, occasionally, or rarely?"

Material Position

Material position was defined as a combination of social location and individual resources measured by sex, age, education, and salary. Using 1985 salary data available from the Department of Employee Relations, we calculated 1984 salaries as 4.5 percent lower than 1985 salaries, 4.5 percent being the average raise AFSCME employees received for 1985.

Organizational Position

Years employed by the state of Minnesota, type of occupation as measured by the three-digit census code, and full-or part-time work were used to measure organizational position. Questions about department, union membership, intensity of union activity, and bargaining unit were asked, but they showed little variation and were not predictive and are thus not presented in this analysis.

Ideological Beliefs

Ideological beliefs were measured by a question forcing respondents to identify themselves as liberal or conservative[7] and a question inquiring about support for the women's movement. The latter question was, "In terms of achieving equal rights and opportunities for women, do you feel that the women's movement in this country has not gone far enough, has gone about as far as it should go, or has already gone too far?"

Sample Characteristics

Before discussing the specific findings about pay equity, it is useful to present some general information about the state of Minnesota's work force as reflected in this sample. As mentioned before, the state employs 34,000 full-time workers,

[7] Twenty-five respondents volunteered that they were "moderates." The background, beliefs, and behavior of moderates were virtually identical to those of liberals, and they were coded with them.

86 percent of whom are represented by 11 unions. Bargaining occurs through the 16 functionally defined bargaining units.[8] Not surprisingly, the state employs well-educated workers: 4 percent had not graduated from high school, 28 percent were high school graduates, 31 percent had some college work, and 37 percent had a bachelor's or advanced degree. The 68 percent of state workers with at least 13 years of education compares with the 35 percent of the adult population in Minnesota (as measured by those 25 years or older) that has the same level of education (Minnesota Department of Employee Relations, 1987).

By and large Minnesota employees like working in the public sector and like the type of work they do. Specifically, 83 percent of the respondents said the government is one of the best employers to work for and 62 percent reported that they wished to remain doing their current type of work. Two-thirds of state workers had worked for the state for 7 years or more, but only half of these long-term employees had worked at the same job within state employment for 7 or more years. Like most public employers, the state of Minnesota has a strong internal labor market.

State of Minnesota employees are fairly well paid, in, part because they are so heavily unionized. The mean salary in contract year 1984 was $22,500. But the distribution of salaries was highly dependent on gender. Whereas 60 percent of all employees made more than $20,000, there were significant gender differences in those who earned $20,000 or less. Just over a quarter (27 percent) of male employees earned $20,000 or less, but just over half (55 percent) of female employees earned that wage.

Findings

Support

Within this setting, the first task of the analysis is to answer the questions on employees' support for the concept of pay equity and its application in their workplace. Employees gave the concept of pay equity overwhelming support: 81 percent reported that if studies found the positions of delivery van driver and clerk typist equivalent, the two positions should be paid equivalently (Tables 9-1 through 9-3). Political attitude research has consistently found that Americans are much more willing to support general equity or liberty questions than they are willing to support specific equity or liberty questions. More people, for example, support the idea of free speech than support an atheist speaking at the public library (Aberbach et al., 1981; McClosky and Brill, 1983; Wynia, 1974). Thus, support for specific comparisons between jobs indicates strong support for pay equity.

Most groups in our survey gave the concept of pay equity strong support, even those who have been hypothesized by opponents to oppose the policy. For example, 79 percent of managers supported equal pay for drivers and typists, as did 78 percent of conservatives. More liberals (86 percent) supported pay equity than conservatives, but the high level of conservative support for the policy is the most striking feature of the ideological comparison.

It was women and those who believed that the women's movement had not gone far enough who were especially strong supporters of the concept of pay equity. Almost 87 percent of women in the sample agreed with paying drivers and typists the same, compared with 76 percent of men. Likewise, 87 percent of the respondents who reported that the women's movement had not gone far enough supported paying drivers and typists equally, compared with 66 percent

[8] The University of Minnesota was chartered before Minnesota became a state, and thus, university employees are not state of Minnesota employees and are not counted in the tally of state of Minnesota workers.

TABLE 9-1 Support, Knowledge, and Impact of Pay Equity, by Material Variables

Support, Knowledge, and Impact	Total	Sex		Age			Education (yrs.)				Salary (in $1,000s)		
	Population	Male	Female	≤30	31–45	≥46	≤12	13–15	16	≥17	≤20	>20–30	>30
Support and knowledge													
Drivers and typists paid equivalently: % agreed	81.2	75.8	86.9	81.9	83.5	77.9[a]	77.8	87.4	81.9	76.9	81.6	84.3	70.4[b]
	(484)	(248)	(236)	(94)	(218)	(172)	(153)	(151)	(72)	(108)	(196)	(217)	(71)
Ever heard of pay equity: % yes[c]	81.5	81.2	81.9[a]	76.8	85.8	78.8[a]	67.7	78.6	91.8	98.2	72.9	84.9	95.9
	(493)	(239)	(254)	(95)	(218)	(179)	(155)	(154)	(73)	(111)	(198)	(220)	(74)
Pay equity only for women: % disagreed[d]	94.4	92.1	96.9[a]	97.3	94.5	92.8[a]	96.1	95.8	89.4	94.4[a]	95.8	95.6	88.6[a]
	(395)	(202)	(193)	(74)	(183)	(138)	(103)	(119)	(66)	(107)	(144)	(181)	(70)
Pay equity means better pensions[d]: % agreed	82.7	83.4	81.9[a]	65.2	82.0	92.4	80.8	84.8	83.6	81.6[a]	72.9	87.2	90.8
	(370)	(193)	(177)	(66)	(172)	(132)	(99)	(112)	(61)	(98)	(133)	(172)	(65)
Perceived impact													
Pay equity causes many problems[d]: % agreed	35.9	38.2	33.5[a]	37.5	34.1	37.7[a]	44.7	39.8	34.8	24.1[b]	35.7	35.2	38.6[a]
	(395)	(204)	(191)	(72)	(185)	(138)	(103)	(118)	(66)	(108)	(143)	(182)	(70)
Pay equity means some frozen salaries[d]: % agreed	59.2	60.6	57.8[a]	64.4	58.8	57.0[a]	54.0	61.9	56.1	63.2[a]	62.0	56.7	60.0[a]
	(390)	(203)	(187)	(73)	(182)	(135)	(100)	(118)	(66)	(106)	(142)	(178)	(70)
Job satisfaction[c]: % very satisfied	57.4	55.9	59.0[a]	46.3	60.1	59.8[a]	52.9	60.4	61.6	58.8[a]	55.8	57.7	60.8[a]
	(493)	(254)	(239)	(95)	(218)	(179)	(155)	(154)	(73)	(111)	(283)	(167)	(43)

NOTES: N's in parentheses. The X^2 statistic for each distribution is significant at the .01 level unless otherwise indicated.

[a] X^2 is not significant at the .05 level.

[b] X^2 is significant at the .05 level.

[c] Controlled variable population totals are smaller than uncontrolled variable population totals due to missing data.

[d] Only asked of those who had heard of pay equity.

TABLE 9-2 Support, Knowledge, and Impact of Pay Equity, by Organizational Variables

Support, Knowledge and Impact	Total Population	Years Employed by the State			Occupation[a]									Full-Time Work	Part-Time Work[a]
		0–7	8–16	17+	Manag.	Prof.	Tech.	Cler.	Protect. Serv.	Other Serv.	Farm, Fish, Forestry	Precjs. Prod.	Opera-tives		
Support and knowledge															
Drivers and typists paid equivalently: % agreed	81.2	83.2	79.2	80.9[b]	79.9	77.4	89.2	81.5	94.1	74.0	93.8	80.8	100.0[b]	80.8	85.7[b]
	(484)	(196)	(178)	(110)	(76)	(93)	(37)	(130)	(17)	(50)	(16)	(52)	(10)	(447)	(35)
Ever heard of pay equity: % yes	81.5	78.8	84.4	81.7[b]	97.4	88.4	79.5	84.0	100.0	49.1	87.5	65.4	80.0	83.3	57.1
	(493)	(198)	(180)	(115)	(77)	(95)	(39)	(131)	(17)	(53)	(16)	(52)	(10)	(456)	(35)
Pay equity only for women[c]: % disagreed	94.4	98.1	93.9	89.0[d]	93.3	89.2	93.1	96.3	93.8	100.0	92.9	100.0	100.0[b]	94.4	95.0[b]
	(395)	(156)	(148)	(91)	(75)	(83)	(29)	(108)	(16)	(26)	(14)	(33)	(8)	(373)	(20)
Pay equity means better pensions[c]: % agreed	82.7	73.4	85.4	93.1	86.8	80.8	82.1	82.5	86.7	73.1	71.4	90.9	87.5[b]	96.7	88.9[d]
	(370)	(139)	(144)	(87)	(68)	(73)	(28)	(103)	(15)	(26)	(14)	(33)	(8)	(305)	(63)
Perceived impact															
Pay equity causes many problems[c]: % agreed	35.9	28.8	37.3	45.7[d]	29.3	38.6	37.9	35.5	35.3	30.8	38.5	41.2	62.5[b]	35.9	35.0[b]
	(395)	(153)	(150)	(92)	(75)	(83)	(29)	(107)	(17)	(26)	(13)	(34)	(8)	(373)	(20)
Pay equity means some frozen salaries[c]: % agreed	59.2	62.3	58.2	55.6[b]	58.9	61.4	50.0	56.6	66.7	69.2	57.1	64.7	37.5[b]	58.8	63.2[b]
	(390)	(154)	(146)	(90)	(73)	(83)	(28)	(106)	(15)	(26)	(14)	(34)	(8)	(369)	(19)
Job satisfaction: % very satisfied	57.4	55.6	58.9	58.3[b]	58.4	60.0	61.5	62.6	64.7	41.5	50.0	51.9	60.0[b]	57.5	60.0[b]
	(493)	(198)	(180)	(115)	(77)	(95)	(39)	(131)	(17)	(53)	(16)	(52)	(10)	(456)	(35)

NOTES: N's in parentheses. The χ^2 statistic for each distribution is significant at the .01 level unless otherwise indicated.

[a]Controlled variable population totals are smaller than uncontrolled variable population totals due to missing data.
[b]χ^2 is not significant at the .05 level.
[c]Only asked of those who had heard of pay equity.
[d]χ^2 is significant at the .05 level.

of those who said that the women's movement had gone too far. Interestingly, men and women expressed the same strong support for the women's movement.

TABLE 9-3 Support, Knowledge, and Impact of Pay Equity, by Ideological Variables

				Support for Women's Movement[a]		
Support, Knowledge, and Impact	Total	Ideology[a]		Not Far	As Far	Gone Too
	Population	Liberal	Conservative	Enough	As Should	Far
Support and knowledge						
Drivers and typists paid equivalently: % agreed	81.2 (484)	86.4 (213)	78.1[b] (256)	87.3 (228)	81.0 (163)	66.2 (77)
Ever heard of pay equity: % yes	81.5 (493)	89.4 (216)	76.5 (260)	88.7 (230)	73.9 (165)	76.3 (60)
Pay equity only for women[c]: % disagreed	94.4 (395)	96.8 (189)	91.9[d] (197)	98.5 (202)	91.7 (121)	87.9 (58)
Pay equity means better pensions[c]: % agreed	82.7 (370)	78.3 (175)	86.7[b] (188)	84.2 (190)	78.1 (114)	85.1[d] (55)
Perceived impact						
Pay equity causes many problems[c]: % agreed	35.9 (395)	28.8 (190)	42.6 (197)	30.0 (200)	34.71 (121)	57.4 (61)
Pay equity means some frozen salaries[c]: % agreed	59.2 (390)	61.0 (187)	57.9[d] (195)	60.0 (200)	56.3 (119)	64.4[d] (59)
Job satisfaction: % very satisfied	57.4 (493)	54.6 (216)	60.0 (260)	55.7 (230)	60.0 (165)	53.7[d] (80)

NOTES: N's in parentheses. The X^2 statistic for each distribution is significant at the .01 level unless otherwise indicated.
[a] Controlled variable population totals are smaller than uncontrolled variable population totals due to missing data.
[b] X^2 is significant at the .05 level.
[c] Only asked of those who had heard of pay equity.
[d] X^2 is not significant at the .05 level.

Regardless of their position on the women's movement, women retained strong support for the concept of pay equity. Almost 82 percent of women who thought that the women's movement had gone too far supported pay equity compared with only 55 percent of men with similar opinions.

Knowledge

Just as the concept of pay equity was well supported, the actual policy was well known: 82 percent of state employees had heard of pay equity or comparable worth. As with all the questions of fact in this survey, respondents with more organizational power and greater informational and economic resources were more knowledgeable. In this instance, higher salary and higher status employees, e.g., managers and professionals, were more knowledgeable. In contrast, service workers were notably unknowledgeable about the policy: only 49 percent had heard of pay equity or comparable worth. For our interests, those who had not heard of pay equity are particularly important to define. Of those who had not heard of the policy, 59 percent earned $20,000 or less

per year (compared with 40 percent of the sample), 30 percent were service workers (compared with 11 percent of the sample), and 17 percent were part-time employees (compared with 7 percent of the sample).

Having heard of pay equity or comparable worth does not indicate what specifically employees knew about it. Respondents who replied that they had heard about the policy were asked two questions about policy content. The first question inquired about the common misconception that pay equity raises were available only to women, rather than to all incumbents of female-dominated occupations. Almost everyone (94 percent) understood that pay equity raises went to men as well as women.

The second question determined whether respondents believed that pay equity would increase the state retirement benefits of those receiving this kind of raise. Here, too, employees were quite knowledgeable—83 percent knew that pay equity raises would also raise pension benefits. Virtually all employees with at least 17 years' or more tenure with the state, regardless of age or income, correctly understood that pay equity would improve pensions.[9] This suggests that state employees who are beginning to think about retirement know at least the rudiments of the formula that determines retirement benefits.

Experience

In terms of the consequences of pay equity for employees and for the success of the pay equity reform movement, the most important questions in the survey deal with the experience of employees with pay equity—specifically, who thought she or he got a pay equity raise and who actually received one. When asked about receiving a pay equity raise, 24 percent of respondents reported receiving one, 58 percent reported not receiving this raise, and 19 percent never heard of the policy and so were not asked.

TABLE 9-4 Experience with Pay Equity: Reported Versus Actual Pay Equity Raises

Group	Received Raise	No Raise Received	Row Total
Raise	75.7	24.3	100.0
reported	[56.9]	[8.6]	
(N)	(87)	(28)	(115)
No raise	12.0	88.0	100.0
reported	[21.6]	[74.2]	
(N)	(33)	(242)	(275)
Never heard	37.1	62.9	100.0
of pay equity	[21.6]	[17.2]	
(N)	(33)	(56)	(89)
Column total	[100.1]	[100.0]	
(N)	(153)	(326)	(479)

NOTE: Both row and column percentages presented; column percentages are in brackets. X^2 is significant at the .01 level.

The results of a cross-tabulation of subjective and actual raises reveal very important findings (Table 9-4). On the one hand, 76 percent of those who reported receiving pay equity raises an 88 percent of those who reported not receiving raises were accurate in their reports. On the other hand, if we examine those who actually received a pay equity raise, only 57 percent knew they received it. Almost 22 percent reported not receiving a raise, although they received one, and almost 22 percent never heard of the policy, even though they received a raise. The social movement potential of pay equity is certainly unfulfilled if approximately 43 percent of the people who benefit from the policy are unaware of their benefits.

The information from Table 9-4 can be displayed and analyzed in another form. Respondents can be divided into six groups representing their subjective and objective pay equity raise situation, as shown in Tables 9-5 through 9-7. Groups 2 and 4 were

[9] Seventeen years of tenure with the state is approximately one-half a standard deviation above the mean tenure.

TABLE 9-5 Experience with Pay Equity Raises, by Material Variables (in percentages)

	Percent of Population in Each Experience Group	Sex (N = 479)		Age (N = 478)			Education (yrs) (N = 479)				Salary (in $1,000s, N = 479)		
Group	(N = 479)	Male	Female	≤30	31–45	≥46	≤12	13–15	16	≥17	≤20	>20–30	>30
Group 1: Yes reported, no raise	5.8 (28)	46.4	53.6	21.4	35.7	42.9[a]	39.3	32.1	14.3	14.3	50.0	42.9	7.1
Group 2: No reported, no raise	50.5 (242)	75.2	24.8	12.9	51.5	35.7	20.2	19.8	21.1	38.8	18.2	57.4	24.4
Group 3: Never heard, no raise	11.7 (56)	76.8	23.2	17.9	37.5	44.6	50.0	37.5	8.9	3.6	48.2	50.0	1.8
Group 4: Yes reported, yes raise	18.2 (87)	6.9	93.1	28.7	40.2	31.0	39.1	46.0	10.3	4.6	67.8	32.2	0
Group 5: No reported, yes raise	6.9 (33)	9.1	90.9	24.2	45.5	30.3	27.3	57.6	3.0	12.1	75.8	21.2	3.0
Group 6: Never heard, yes raise	6.9 (33)	6.1	93.9	33.3	30.3	36.4	60.6	36.4	3.0	0	81.8	18.2	0

NOTE: The X^2 statistic for each distribution is significant at the .01 level unless otherwise indicated.

[a] X^2 is significant at the .05 level.

TABLE 9-6 Experience with Pay Equity Raises, by Organizational Variables (in percentages)

	Percent of Population in Each Experience Group (N = 479)	Occupation (N = 477)												Full-or Part-Time Work (N = 475)	
		Years Employed by the State (N = 479)							Protect. Serv.	Other Serv.	Farm, Fish, Forestry	Precis. Prod.	Operatives		
Group		0–7	8–16	17+	Manag.	Prof.	Tech.	Cler.						Full	Part
Group 1: Yes reported, no raise	5.8 (28)	49.9	25.0	32.1	10.7	25.0	7.1	14.3	7.1	14.3	7.1	7.1	7.1	92.9	7.1
Group 2: No reported, no raise	50.5 (242)	31.8	40.9	27.3	27.8	26.6	7.5	9.1	6.2	2.9	5.0	12.4	2.5	96.3	3.7
Group 3: Never heard, no raise	11.7 (56)	41.1	30.4	28.6	3.6	16.1	1.8	8.9	0	30.4	3.6	32.1	3.6	96.4	3.6
Group 4: Yes reported, yes raise	18.2 (87)	49.4	37.9	12.6	3.5	4.7	9.3	75.6	0	7.0	0	0	0	95.4	4.6
Group 5: No reported, yes raise	6.9 (33)	57.6	33.3	9.1	0	18.2	6.1	51.5	0	24.2	0	0	0	84.4	15.6
Group 6: Never heard, yes raise	6.9 (33)	57.6	30.3	12.1	0	6.1	18.2	45.5	0	30.3	0	0	0	60.6	39.4

NOTE: The X^2 statistic for each distribution is significant at the .01 level.

TABLE 9-7 Experience with Pay Equity Raises, by Ideological Variables (in percentages)

	Percent of Population in Each Experience Group (N = 479)	Ideology (N = 464)		Support for Women's Movement (N = 462)		
				Not Far	As Far	Gone Too
Group		Liberal	Conservative	Enough	As Should	Far
Group 1: Yes reported, no raise	5.8 (28)	44.4	55.6[a]	52.0	28.0	20.0
Group 2: No reported, no raise	50.4 (242)	51.3	48.7	53.0	30.1	16.9
Group 3: Never heard, no raise	11.7 (56)	27.5	72.5	37.0	46.3	16.7
Group 4: Yes reported, yes raise	18.2 (87)	46.4	53.6	49.4	38.6	12.0
Group 5: No reported, yes raise	6.9 (33)	42.4	57.6	56.3	28.1	15.6
Group 6: Never heard, yes raise	6.9 (33)	25.8	74.2	12.5	56.3	31.3

NOTE: X^2 statistic for each distribution is significant at the .01 level unless otherwise indicated.

[a] X^2 is significant at the .05 level.

accurate in their reports; groups 1 and 5 were inaccurate; and groups 3 and 6 were unknowledgeable.

Accuracy increased markedly with each increase in salary and educational level. Only 53 percent of those earning $20,000 or less, and 55 percent of those with 12 or fewer years of education accurately reported their pay equity raise situation. In comparison, almost 94 percent of those earning at least $30,000 and 91 percent of those with at least 17 years of education accurately knew their pay' equity raise status. (This last finding was jointly a function of the fact that these groups were disproportionately composed of men and the fact that, overall, only 7 percent of men in the sample received raises.)

The composition of each of the pay equity raise groups tells us a great deal about the organization of the state's labor force. Looking first at the accurate groups, group 2 (no reported, no raise) comprises mostly men in high-prestige, male-dominated occupations that were not eligible for pay equity raises. Group 4 (yes reported, yes raise) comprises mainly longer tenured women in clerical occupations.

Turning to the inaccurate groups, group 1(yes reported, no raise) was not particularly distinctive; its only notable feature was that most of the men who reported inaccurately were located in this group. Group 5 (no reported, yes raise) was similar to group 4 (yes reported, yes raise) in that it was pre-dominantly composed of women (90 percent), but this inaccurate group had more service workers' and fewer technical and clerical workers. Group 6 (never heard, yes raise) was the least well-educated and well-paid of those getting raises. In many ways, these were the most marginal female employees in state employment. Just over 30 percent were service workers, and 39 percent were part-time employees. In terms of social, organizational, and ideological positions, those who had no knowledge of pay equity but received pay equity raises were the hardest to reach.

Accurate knowledge of the amount of one's pay equity raise was understandably rarer than accurate knowledge of receiving the raise. Of those who reported receiving a raise (N = 115), more than a third did not know the amount of the raise. Of those reporting receiving a raise and attaching an amount to it (N = 73), 71 percent (N = 52) actually received a raise. Of those correctly reporting a raise and volunteering its size, 18 percent (N = 9) were correct within ± 15 percent of the real pay equity raise.

It is clear from this analysis that state employees had better information about pay equity as a policy than they did about the policy's financial consequences for individuals. The fact that almost half of the recipients of pay equity raises did not know that they received them and even fewer could correctly name the amount is one consequence of the implementation process in the state of Minnesota.

Perceived Impact

We also wanted to know what employees thought would be the long-term impact of the pay equity policy (Tables 9-1 through 9-3). To determine the long-term effects, we asked respondents who had heard of pay equity whether they agreed or disagreed with two negative scenarios posited by opponents of pay equity. The first question asked whether pay equity causes many problems in the workplace: 36 percent agreed that pay equity caused many problems, while 64 percent disagreed with the statement. Men and women were similar in their views: two-thirds of both groups believed that pay equity did not cause many problems. Most material and organizational variables were poor predictors of employees' beliefs about pay equity causing problems. Of these variables, only tenure with the state differentiated beliefs. Almost 46 percent of those with 17 or more years tenure thought that pay equity caused problems. Many of these respondents did not support the women's

movement in general or pay equity in particular.

Indeed, ideological variables were the most consistent predictors of beliefs about pay equity causing problems. Those who thought that the pace of the women's movement was appropriate or too slow did *not* think pay equity caused problems in the workplace. In contrast, those who thought the women's movement had gone too far believed that pay equity caused many problems in the workplace. Although it is possible that the response to the question about problems in the workplace might be a result of experiences with the implementation of pay equity, it is unlikely that views on the women's movement are a result of pay equity policies. In the absence of serious or widespread complaints about the consequences of pay equity, it appears that respondents fitted their expectations (and perhaps experiences) to their prior beliefs.

The second negative question elicited a different pattern of responses. We asked individuals whether they agreed or disagreed that pay equity would result in some salaries being frozen. As previously discussed, this did not occur. No salaries were frozen or lowered due to pay equity. Nonetheless, 59 percent of respondents believed that pay equity would result in some frozen salaries. Roughly 60 percent of every material, organizational, and ideological group harbored this fear. No zero-order distributions distinguished this finding.

Fear of frozen salaries may be linked to employees not being aware that there was a separate salary appropriation for pay equity. State employees might also have reacted to a much more complicated policy environment. A local government pay equity act had been received more negatively, and nationally, the Reagan administration had made its opposition to pay equity more vocal (Steinberg, 1989).

The impact of pay equity on employees is found not only in their explicit beliefs about its consequences but also in the more indirect consequences of the policy on the interpretation of the work experience. Job satisfaction is one such measure. As we discussed before, job satisfaction is the result of the expectations and rewards associated with several qualities of work life. The kind of global measure of job satisfaction reported here reflects an individual's overall assessment of those qualities and does not have the specificity of a measure asking about satisfaction with the financial aspects of one's job (Nelson, 1981). Likewise, cross-sectional data provide a current snapshot of job satisfaction without explicit reference to past levels of satisfaction.

Mindful of these characteristics of the measure and the data, the survey found that state of Minnesota employees were quite satisfied with their employer and with their jobs. In the year prior to the interview, 57 percent found their jobs satisfying very often, 34 percent occasionally found their jobs satisfying, and 9 percent rarely found their jobs satisfying. This pattern remained the same for men and women, high-and low-salary employees, average and well-educated workers, and people of every organizational experience and ideological persuasion.

The only distinctive pattern of job satisfaction was associated with the accuracy of reporting and receiving pay equity raises. Table 9-8 shows that the most satisfied employees were those who had accurately known about their pay equity raises (group 4), 68 percent of whom found work satisfying very often. Those who knew about the pay equity policy but not about their own raises were among the least satisfied employees. Only 39 percent of group 5 (no reported, yes raise) reported being satisfied with their jobs very often. In fact, group 5 had *lower* job satisfaction than group 6 (never heard, yes raise), 55 percent of whom reported being very satisfied with their jobs.

The pattern of much higher levels of job satisfaction in group 4 (yes reported, yes raise) than in group 5 (no reported, yes raise) held constant when the cross-tabulation was separately controlled for sex, job

tenure, education, and salary. In a very modest way, these results suggest that increasing expectations (in the form of knowledge about a new wage policy) and increasing rewards related to those expectations (through pay equity raises known to individuals) increase job satisfaction. Similarly, increasing expectations and not communicating rewards decrease job satisfaction.

TABLE 9-8 Perceived Impact of Experience with Pay Equity Raises on Job Satisfaction

Perceived Impact	Very Satisfied	Occasionally Satisfied	Rarely Satisfied	(N)
Group 1: Yes reported, no raise	53.6	42.9	3.2	(28)
Group 2: No reported, no raise	57.9	30.2	12.0	(242)
Group 3: Never heard, no raise	60.7	37.5	1.8	(56)
Group 4: Yes reported, yes raise	67.8	25.3	6.9	(87)
Group 5: No reported, yes raise	39.4	48.5	12.1	(33)
Group 6: Never heard, yes raise	54.5	42.4	3.0	(33)

NOTE: X^2 significant at the .05 level.

Discussion

Pay equity is now completely implemented for state of Minnesota employees. In human terms, the adoption of this policy meant that the base pay of an entry-level clerk increased $2,256 over 4 years, quite apart from the $1,753 basic salary raises negotiated for this job during the same time. From 1981 to 1986, the ratio of female wages to male wages rose from 74 percent to 82 percent (Minnesota Department of Employee Relations, 1987:5). These salary changes reflect in large part a change in the relationship of wages in female-and male-dominated occupations receiving the same point value in the state's job evaluation system, although some part of the increase may also be due to increased representation of women in high-paying professional jobs. Through political organization and technical analysis, pay equity supporters made available to state employees in traditional female occupations some of the monopoly rents traditionally available to organized male production workers in other oligopolistic sectors (Edwards and Podgursky, 1986; Edwards, 1979).

The vast majority of the employees experiencing this change supported the concept of equal pay for work of equal value and knew about the general existence of the policy. Over four-fifths of those who had heard of pay equity knew that it would improve the pensions of those who received the raises, and knew that pay equity was not just for women.

Beyond issues of knowledge and support, the interpretation of employees' responses to pay equity is somewhat more complicated. At the legislative level, AFSCME chose an institutionally sensible strategy of promoting pay equity in' the predominantly female bargaining units and merely responding to the worries of employees in predominantly male bargaining units, a policy that the Department of Employee Relations implicitly supported as well. From AFSCME's perspective, too much publicity would have raised concerns not applicable to the implementation of pay equity for state employees, concerns focusing on whether the raises of women workers came from what might otherwise have been a larger general salary settlement.

At the implementation level, however, AFSCME simply did not notify people of the pay equity raise, nor did the union make any distinction between pay equity raises and general raises. This strategy, and the lack of information in newspapers and other public sources about how the policy affected specific jobs, led to a situation in which

almost half of those receiving raises did not know about them, either because they thought they had not received a pay equity raise or because they had not heard of the policy.

The paradox of AFSCME's strategy is that in order to dampen opposition the union implicitly chose to dampen support. This is especially evident when assessing the impact of receiving raises on job satisfaction. Although job satisfaction was relatively high for all employees, those who correctly reported receiving pay equity raises were the most satisfied with their work. Those who knew about the policy but did not know that they had received a pay equity raise were the least satisfied with their jobs. AFSCME's strategy traded off the potential increase in satisfaction arising from all the beneficiaries knowing about their benefits against the potential increase in dissatisfaction of nonbeneficiaries arising from negative perceptions of the policy if it were more widely known.

The strategy seems wise in light of the beliefs held by some employees about the long-term consequences of pay equity. Employees maintained some negative expectations's for the policy. Slightly over one-third believed pay equity caused serious problems in the workplace, and almost two-thirds thought that some salaries would be frozen. Those who believed that the women's movement had gone too far were the most likely of any group to believe that pay equity caused problems. Knowing that formal complaints were uncommon, it appears that individuals fit their views on this innovation into their existing ideological frameworks. The importance of the finding about widespread concern over freezing salaries is that it existed, even though no salaries were frozen at any point in the process, nor was there ever any discussion of freezing salaries. Ironically, it was just this kind of concern that AFSCME wanted to discourage.

One of the conclusions that can be drawn from this analysis is that the strategy used by labor or management in presenting pay equity to employees greatly affects how employees will respond. In essence, unions and employers make explicit or implicit political decisions affecting how easy or difficult the implementation process will be. If either actor wants to generate concern and mistrust, it is very easy to do. As is the case in many political situations, conveying accurate information specific enough to change peoples' expectations, if not their consciousness, is much harder, especially if the information is technical.

In Minnesota, AFSCME chose to target the employees most affected by pay equity and those most likely to support it, while not spending their limited resources trying to convince those least affected and most likely to be wary. AFSCME could use this strategy because it represented nearly two-thirds of the work force, including employees who would and would not receive pay equity raises. The union was clearly successful, nurturing the good will of state employees toward equal pay for jobs of equal value. At the same time, however, some negative expectations persisted despite a positive experience.

The strategy for and outcome of implementing pay equity might be very different in a work force not dominated by one union, or where pay equity is opposed by management. In these situations employee responses to pay equity could take one of two tacks. Unions might fight among themselves, each reflecting its concern that its members not lose their relative wage positions; or unions might form coalitions to present a united front to managers less supportive than those in the state of Minnesota. The choice of rivalry or coalition would itself depend on the power and interests of all the parties involved.

Acknowledgments

We would like to thank Nancy Johnson for research assistance, Lavon Anderson and Linda Harris for computational assistance,

and Debra Tornes Leon and Ellen Carlson for preparing the manuscript. We would also like to thank Steven Hoenack, Morris Kleiner, Kay Schlozman, and Linda Waite for their helpful comments. This research was supported by grants from the National Academy of Sciences, the Northwest Area Foundation, and the University of Minnesota. University support was made available through the Office of the Academic Vice President, the Center for Urban and Regional Affairs, the Graduate School, the Conflict and Change Center, and the Hubert H. Humphrey Institute of Public Affairs.

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10

Women's Pay in Australia, Great Britain, and the United States: The Role of Laws, Regulations, and Human Capital

R. G. Gregory, R. Anstie, A. Daly, and V. Ho

The 1970s were a remarkable time for women. Labor force participation rates increased markedly throughout the Organization for Economic Cooperation and Development (OECD) (Mincer, 1985), and in most OECD countries the pay of women relative to that of men increased significantly. Two of the largest changes in the pay ratio occurred in Australia and Britain (figure 10-1). In Australia women's pay increased 30 percent relative to that of men. In Britain the pay ratio increased about 20 percent. The United States seems to be an exception to the general trend in that the relative earnings of women did not increase. [1]

At the beginning of the 1970s, the ratio of women's to men's earnings, which we will call the female earnings ratio, was similar in Australia and the United States. Women in Britain fared relatively worse. By the end of the decade', Australia had joined those countries that pay women well, relative to men; Britain had caught up to the United States, but both ranked low among countries grouped by the female earnings ratio. A considerable amount can be learned from comparing the three labor markets, which encompass the range of experiences of the decade. We focus on three sets of questions.

First, why is the female earnings ratio so different in the three countries? In 1981, for example, adult women who worked full time in Australia earned about 79 percent of the full-time average earnings of men. In Britain and the United States the female earnings ratios were about 64 and 60 percent, respectively. How much of these differences can be explained by human capital models?

Second, why was it that two of the countries—Britain and Australia—exhibited sudden and sharp changes in female pay? What explains the speed of the changes and their extent? What has been the role of equal pay laws and regulations? These questions are addressed by assessing the importance of institutions.

Third, what are the relationships between changes in the female earnings ratio and

[1] A more detailed discussion of the U.S.-Australian comparison can be found in Gregory and Ho (1985). The British-Australian analysis is developed further in Gregory et al. (1986).

changes in the employment and unemployment of women? What can we learn about supply and demand elasticities for female labor from a comparison of countries with such different wage experiences? We address these questions in a discussion of employment and unemployment in the three countries.

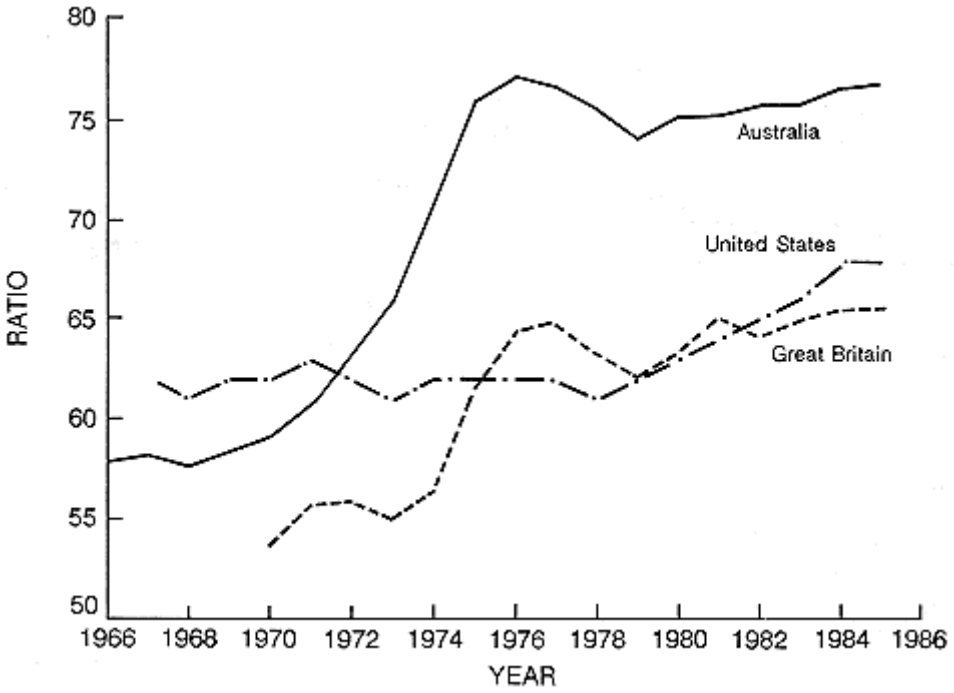

Figure 10-1
Ratio of female to male average weekly earnings. Notes: Australia: Average weekly earnings for full-time (more than 35 hours) adult nonmanagerial employees in the private sector. Australian Bureau of Statistics, *Earnings and Hours of Employees*, Cat. No. 6304. United States: Median usual weekly earnings for full-time (more than 35 hours) wage and salary workers, May 1967 to May 1978, and second quarter, 1979 to 1983. U.S. Department of Labor, Bureau of Labor Statistics, *The Female-Male Earnings Gap: A Review of Employment and Earnings Issues*. September 1982. Report 673, pp. 9–10. Washington, D.C. Great Britain: Average weekly earnings for full-time (more than 30 hours) males age 21 and over and females 18 and over. Department of Employment, *The New Earnings Survey* . London.

Relevance of the Human Capital Model

Method of Analysis

There are many reasons why men and women are paid at different rates within a country. These reasons may include differences in the quality of workers, the distribution of workers across industries and occupations, the degree of pay discrimination against women, and the relative demand and supplies of labor. The usual way to measure the contribution of these factors is to fit earnings equations to the data for each sex. The most common earnings equations adopt a human capital framework and hypothesize that the differences in the earnings of men and women can be explained primarily in terms of differences in human capital, as measured by years of schooling, work experience, marital status, and so on (Mincer, 1974; Oaxaca, 1973).

For simplicity, we can add the male and female earnings equations that are derived

from human capital theory and form one equation, which can be written as

$$E_i = \sum_{j=1}^{n} B_j X_{ij} + \sum_{j=1}^{n} \gamma_j X_{ij}^F + U_i \qquad (1)$$

where E_i is the log of the earnings of the *i*th person and X_j are human capital and experience variables. The superscript F refers to female individuals. Consequently, male workers earn B_j for each attribute and female workers ($B_j + \gamma_j$). U_i is an error term.

Once Equation (1) is fitted to the data the earnings gap between males and females is usually decomposed into two components; one component is attributable to the difference in human capital endowments of men and women, the X variables, and the other component is attributable to the difference in the estimated coefficients for men and women, γ^F_j. With the information derived from the estimation of (1) the female earnings ratio can be written as

$$\overline{E}^F - \overline{E}^M = \sum_{j=1}^{n} \hat{B}_j (\overline{X}_j^F - \overline{X}_j^M) + \sum_{j=1}^{n} \overline{X}_j^F \hat{\gamma}_j \qquad (2)$$

where the superscript M refers to males. The first term on the right-hand side of (2) captures the contribution of the difference in endowments, and the second term captures the contribution of the difference in coefficients.

As a general rule, both differences in endowments and differences in coefficients are important contributors to the earnings gap. The contribution of endowment differences is explained in the context of the human capital model. Human capital endowments generate labor productivity in the marketplace, and to a large extent, workers choose the optimal amount of human capital that they wish to invest. Women are paid less, according to this theory, because they invest less and are therefore less productive.

The contribution of coefficient differences to the earnings gap is not explained by the human capital model. This effect is usually referred to either as pay' discrimination, to be explained largely by noneconomic factors, or within the human capital framework, as a measure of our ignorance of the factors that cause the earnings gap. This ignorance is usually assumed to stem primarily from two sources: mismeasurement, as a result of data deficiencies, and omission of relevant variables from the regression equation.

Over the past decade, considerable work has been done, particularly in the United States, to extend the list of variables that may be included in regression equations, such as Equation (1), and to refine the data so that the contribution to the earnings gap of the differences in coefficients, the unexplained contribution, is reduced. At this stage, however, progress has been slow in the United States so that the contribution of the differences in coefficients to the earnings gap is still usually around 50 percent (Blau and Ferber, 1986:233, 235; Daymont and Andrisani, 1984). In Britain and Australia the differences in coefficients also contribute to at least half of the earnings gap, although the size of the gap is very different in each country (see Greenhalgh, 1980, for Britain; Chapman and Mulvey, 1986, for Australia). In Britain the earnings gap is similar to that for the United States. In Australia the earnings gap is very small.

The human capital approach for explaining the female earnings ratio within a country may also be used to explain differences across countries (Gregory and Ho, 1985). In each country, for example, the estimated coefficients may be similar, but the earnings gap may be generated by differences in the relative endowments of human capital. Alternatively, there may be the same relative stock of human capital endowments of men and women in each country, but the relative rewards for the endowments of men and women may be different. In the latter case the' human capital model would have noth-

ing to contribute to explaining the difference in the female earnings ratio across countries. What would be needed is a theory to explain why the coefficients are different in each country.

To use the human capital model to explain the different pay ratios across the countries, our analysis would proceed in the following steps:

1. Fit earnings equations for men and women in each country; see Equation (1).
2. Calculate the female earnings ratio from Equation (1) and derive the differences in the ratios between the countries. The differences provide the cross country earnings gaps to be explained. If the female earnings ratio is 66 percent in Britain and 78 percent in Australia, for example, we would attempt to explain the 12 percentage points difference.
3. Calculate the contribution of differences in relative endowments of men and women to the cross country earnings gaps. This might be best explained by considering two countries, say Britain and Australia, for which we have identified in step 2 a cross country earnings gap of 12 percentage points. In step 3 we substitute the average endowments of male and female workers in Britain into the Australian earnings equation to derive the earnings of British workers if they were paid according to the Australian pay structure. A comparison of this hypothetical British earnings ratio with the Australian earnings ratio will provide a measure of the contribution to the cross country earnings gap of the different relative endowments of men and women (that is, the calculation for Britain and Australia uses identical coefficients taken from the Australian equation). For example, if the hypothetical British earnings ratio and the Australian earnings ratio were equal, then we would know, on the basis of the Australian coefficients, that the cross country earnings gap cannot be explained by the different relative endowments of men and women in each country. All the earnings gap would be explained by the difference in coefficients in each country. In this instance, the human capital theory would make no contribution to an explanation of the cross country earnings gap. The calculations of step 3 can be repeated using the coefficients of Britain.
4. Finally, find the difference between the original British earnings ratio, calculated from the British equation, and the hypothetical ratio, using the Australian coefficients. This residual might be interpreted a number of ways. It might be interpreted as the difference between the two countries in the level of pay discrimination against women. Alternatively, it might be interpreted as the outcome of different biases in the coefficients of each country. These biases may have arisen either by variables being omitted from the regression equations or from the mismeasurement of the included variables.

Results from the Earnings Equations

The sample is restricted to full-time wage and salary earners. The Australian data (N = 17, 100), for workers aged 15 to 54 years old, are drawn from the 1981 Households Sample File of the Australian Bureau of Statistics' Census of Population and Housing (Australian census). The British data (N = 7,018), for workers aged 16 to 54 years, are drawn from the 1981 General Household Survey (data tape available from Her Majesty's Stationery Office, London). The U.S. data (N = 13,949) are from the March 1982 Current Population Survey (data tape available from Bureau of the Census) and refer to the labor force status of individuals in 1981.

The regression equations are as in Equation (1), with the addition of a constant term. The dependent variable is the natural log of weekly earnings. We use weekly earnings because the Australian data do not provide good estimates of hourly earnings.

In each country a full-time worker is employed 35 hours or more per week. The coefficients of Equation (1) are interpreted as the percentage changes in earnings in response to a one-unit increase in the value of the independent variable.

The constant terms measure the average log of weekly earnings of a male high school graduate, of urban residence, never married, working full time, and in his first year in the labor market. The coefficients for the variables estimate the additional payoff for men over and above the constant term. Thus, an estimate of the average earnings of a male university graduate, with all the other attributes included in the constant term, is given by the addition of the constant term to the estimated coefficient, *B*, attached to the graduate dummy variable. The estimated earnings of a female university graduate, with all the other attributes of the constant term, is given by the addition of the constant term to the sum of the university graduate coefficients *B* and γ. By presenting the data in this way the *t* statistics for the γ's indicate whether the female coefficients are significantly different from the male coefficients. (The definitions of the variables are given in the appendix.)

The individual coefficients from the earnings equations for each country are mostly as expected and will not be discussed in any detail (Table 10-1). Among full-time workers in each country those with more education earn more. Women also earn less than men in each educational category.[2] Other coefficients indicate that married women earn less than married men, and women with children earn less than those without children. For the workers of each country more potential experience increases earnings and, once again, there is a difference between men and women. For women, the earnings experience profile is less steep.

One difficulty that we share with many other researchers (e.g., Johnson and Solon, 1986) is that the experience variable is not correctly measured. We use potential experience (age minus years of school minus six). The correct measure would be actual experience but such data are not available for cross country comparisons. The use of potential experience limits our ability to make comparisons between men and women within a country, because for women as a group actual experience is so much less than potential experience. Across countries, however, the problem should be much less serious in that relative to males the overstatement of female experience in each country should be similar.[3] In other words, there should be a close correlation across countries in the ranking of the unobserved ratios of actual experience of men and women and the ratios of potential experience that are used in our calculations.

The fit of the earnings equations is similar in each country; the R^2 is .49 for Britain, .46 for Australia, and .36 for the United States. Our first conclusion, therefore, is that within each country, and at a point of time, the human capital model seems to perform reasonably well, and to a similar degree, as an explanation of the variation of earnings among men and women. Within each country, however, the coefficients attached to the human capital variables are different for each sex. As indicated earlier, other studies suggest that the human capital model, on average, can explain only about half of the pay gap within each country.

We now turn to an investigation of the

[2] The British sample is not as large as that for Australia, and in some cells the sample size is quite small. This may explain why the female coefficients in the higher education categories are not significantly different from those of men.

[3] There are some differences in labor force participation rates for women across the countries, and a more extensive study would attempt to take those differences into account, especially because they may affect the gaps between potential and actual experience. At this stage, however, we do not believe that our inability to measure actual experience is a significant source of error.

cross country earnings gaps. The basic data are presented in Table 10-2. Row 1 lists the calculated earnings ratio in each country using the coefficients from the British earnings equations but the own endowments from each country. Similarly, the data listed in row 2 are derived from the U. S. earnings equation, and those in row 3 from the Australian equation. The cells along the principal diagonal represent the earnings ratio calculated for each country using its own regression equation. A comparison of these numbers produces the earnings ratios to be explained. The earnings gaps relative to Australia are listed in row 4.

Proceeding down the principal diagonal, the first point to emerge from Table 10-2 is the 'similarity of the earnings ratios between the United States and Britain. On the basis of these data, female workers in Britain earn 64.2 percent of the average weekly earnings of males; in the United States the ratio is 61.7 percent. This produces a relatively small earnings gap of 2.5 percentage points between Britain and the United States.

The second point to emerge is that Australia is obviously different. Women are relatively well paid compared with their U.S. and British counterparts. The earnings gap between Australia and Britain is 15.1 percentage points; between Australia and the United States, 17.6 percentage points (row 4).

Finally, the human capital endowments of women, relative 'to those of men, seem to be much the same in each of the countries. This is illustrated by the fact that there is little difference in the earnings ratios across the columns. Proceeding across row 1, for example, if workers with the average level of endowments of U.S. workers are paid according to the British pay structure, then the female to male ratio of average weekly earnings would be 64.0 percent, an earnings ratio very similar to that in Britain. Similarly, male and female workers with the same level of endowments as the average of Australian workers, when paid according to the British pay structure, would receive an earnings ratio of 68.6 percent, again a ratio quite close to that of Britain.

This finding, that the human capital endowments of women, relative to those of men, are similar in each country, is a general one. It holds whichever set of country coefficients is used to calculate earnings. For example, if British and American workers were paid according to the Australian pay structure (row 3), their earnings ratios would be 76.3 and 77.6 percent, respectively. These are earnings ratios that are quite close to those prevailing in Australia.

It follows from the fact that the relative endowments of human capital are so similar across countries that most of the difference in relative earnings, especially with regard to the difference between Australia and the others, flows from differences in coefficients and not from differences in endowments. Our second major conclusion is that the simple human capital model, as usually specified, cannot explain the difference in earnings ratios across countries. Only a small fraction of the earnings gap between Australia, on the one hand, and the United States and Britain, on the other, can be explained by different endowments of human capital.

The next major question, therefore, is why is Australia different? Why does Australia pay women so well?[4] To answer these questions it is necessary to provide some institutional background to the Australian

[4] Some of the difference in the earnings ratios across countries might be explained by differences in the average hours worked by men and women in each country. From other data sources (see Gregory and Ho, 1985: footnote 10), it is apparent that the ratio of full-time weekly hours worked by men and women is much the same in Australia and the United States. In Britain,' women's hours relative to men's hours are lower than in the other two countries, so some adjustment should be made for this fact. The adjustment required, however, does not seem to change the results to any significant degree (see Gregory et al., 1986:11).

TABLE 10-1 Earnings Equations for Australia, Great Britain, and the United States (standard errors in parentheses)

Measure	Australia	Great Britain	United States
Education[a]			
Dropout	-0.1463	-0.1433	-0.3053
	(.0086)	(.0145)	(.0107)
High school	—	—	—
Postsecondary qualification[b]	0.0663	0.0015	0.1228
	(.0091)	(.0167)	(.0098)
	0.2213	0.2106	
	(.0130)	(.0178)	
University degree	0.4664	0.4368	0.3035
	(.0121)	(.0248)	(.0107)
Postgraduate degree	0.6011	0.6382	0.3791
	(.0220)	(.0504)	(.0114)
Female × dropout	-0.0717	-0.1135	-0.0705
	(.0159)	(.0252)	(.0258)
Female × high school	-0.0700	-0.1192	-0.1375
	(.0127)	(.0247)	(.0220)
Female × Postsecondary qualification[b]	-0.1883	-0.1448	-0.1128
	(.0364)	(.0440)	(.0232)
	-0.1616	-0.0727	
	(.0200)	(.0296)	
Female × university	-0.0861	-0.0381	-0.1265
	(.0201)	(.0522)	(.0237)
Female × postgraduate	-0.0682	-0.2443	-0.0182
	(.0404)	(.1733)	(.0268)
Experience[c]			
Experience	0.0469	0.0484	0.0428
	(.0013)	(.0020)	(.0015)
Experience^2	-0.001	-0.001	-0.0008
	(.00003)	(.00005)	(.00004)
Female × potential experience	-0.0016	-0.0109	-0.0106
	(.0022)	(.0033)	(.0024)
Female × potential experience^2	-0.0001	0.0002	0.0001
	(.00004)	(.0001)	(.0001)
Area			
Rural	-0.1217	-0.0122	-0.110
	(.0102)	(.0098)	(.0070)
Female × rural	0.0307	-0.0239	-0.0194
	(.0199)	(.0178)	(.0114)
Urban	—	—	—
Marital Status			
Spouse present	0.1577	0.2128	0.1734
	(.0106)	(.0159)	(.0129)
Other marital status	0.0852	0.1145	0.1298
	(.0158)	(.0282)	(.0161)
Female × spouse present	-0.1049	-0.1588	-0.1453
	(.0165)	(.0247)	(.0187)
Female × other marital status	0.0123	-0.0576	-0.0724
	(.0241)	(.0417)	(.0226)
Single, never married	—	—	—
Children	-0.0117	-0.0165	-0.0160
	(.0087)	(.0127)	(.0088)

labor market. This will give rise to a new and related question: Why is it that the pay ratios have changed in some countries but not in others?

Measure	Australia	Great Britain	United States
Female × children	-0.1691	-0.0946	-0.1154
	(.0154)	(.0241)	(.0135)
Constant	5.0126	4.1867	5.311
	(.0079)	(.0168)	(.0145)
R^2	.46	.49	.36
Dependent variable, In week-ly earnings			

[a] See the appendix for definitions of the education variables.
[b] For Australia and Britain, this group has been divided into two parts; the first coefficient relates to those who completed trade qualifications, and the second to those with other postsecondary qualifications.
[c] See the appendix for the definition of experience for each country.
SOURCES: Australia: Australian Bureau of Statistics, 1981 Census, Household Sample file, full-time wage and salary earners, ages 15 to 54. Great Britain: 1981 General Household Survey (data tape available from Her Majesty's Stationery Office), full-time wage and salary earners, ages 16 to 54. United States: Bureau of the Census, Current Population Survey, March 1982 (data tape), full-time wage and salary earners, ages 15 to 54.

The Importance of Institutions

Australia

In Australia the female earnings ratio is vitally affected by a complex network of federal and state tribunals that evolved in the early years of this century. The tribunals set minimum rates of pay, referred to as awards, for each occupation. The pay of university professors is fixed along with that of bus drivers, laborers, fitters and turners, storemen, and so on. Before 1975 the tribunals adjusted downward the award rates of pay for women, relative to the pay of men. Occupations were categorized as to whether they were filled predominantly by males or females: blacksmith was a male occupation, for example; milliner was a female occupation. When an occupation was determined to be male, the tribunal calculated the man's wage—what he needed to support himself, his wife, and his children living in "a civilized community"—and then added a margin for, the work value of the occupation. When an occupation was determined to be female, the tribunals made the calculations as though it were a male occupation and then adjusted the notional rate of pay downward.

From 1950 to 1969 the markdown in pay for a female occupation was usually to 75 percent of the notional male wage for each occupation. Because women work fewer hours and are disproportionately represented in low-paying occupations and because men often earn significantly more than the minimum rates of pay, the 75 percent rate produced an aggregate weekly earnings ratio of full-time workers of about 60 percent.

Before 1970, it was clear that the tribunals believed that they were discriminating against women, and so did the community at large, although there seems to have been no explicit questioning as to what the market pay relativity might be if the tribunals were not an active participant in pay setting. Consequently, although there was explicit discrimination according to tribunal criteria, the question was never posed as to whether the prevailing pay ratio could be thought of as discrimination relative to a national free market for labor.

The 6 years between 1969 and 1975 wit-

nessed a very great change. On June 19, 1969, the federal tribunal, following the lead of four of the six state tribunals, ruled that the sex of the worker was not to be used as a wage criterion in those jobs that were neither predominantly male nor predominantly female. By 1972 there should be equal pay for equal work." It would become illegal, for example, to pay graduates in the public service different starting salaries based on their sex. Similarly, in the private sector, beginning bank tellers would be paid the same whether they were male or female. Women working in female occupations, such as nursing and secretarial work, were to be excluded from "equal pay for equal work" provisions.

TABLE 10-2 Explaining the Pay Gap Among the United States, Great Britain, and Australia: The Ratio of female to Male Full-Time Average Weekly Earnings

Measure	Great Britain	United States	Australia
Aggregate			
British pay structure	64.2	64.0	68.6
U.S. pay structure	60.6	61.7	63.6
Australian pay structure	76.3	77.6	79.3
Earnings gap to be explained (compared with Australia)	15.1	17.6	
Attributable to Endowments	4.4	1.9	
Coefficients	10.7	15.7	

SOURCES: Australia: Australian Bureau of Statistics, 1981 Census, Household Sample file, full-time wage and salary earners, ages 15 to 54. Great Britain: 1981 General Household Survey (data tape available from Her Majesty's Stationery Office), full-time wage and salary earners, ages 16 to 54. United States: Bureau of the Census, Current Population Survey, March 1982 (data tape), full-time wage and salary earners, ages 15 to 54.

Then, in 1972, the federal tribunal decided that the concept of equal pay for equal work should be widened to "equal pay for work of equal value" or approximately in U.S. terms "comparable worth." This wider concept was to be introduced in three uniform steps over the period to June 1975. After 1975 award rates were to be determined without regard to the sex of workers (Niland and Isaac, 1975).

Finally, between 1950 and 1974 the federal tribunal had maintained a "basic wage," which was the minimum wage that any full-time worker could be paid within any award determination. Over this period the basic wage for females was 75 percent of that of males. Because the basic wage is such a large fraction of the average wage, this formula tended to produce average award wage relativities between men and women that were very close to 75 percent. In 1974, the federal tribunal decided to extend the male minimum wage to females, and this reinforced the substantial pay increase for low-paid women on the bottom of the pay scales in female occupations. As a result, a substantial pay increase for all women was ensured no matter what the outcome of the "equal pay for work of equal value" decision in each individual instance. (See Niland and Isaac, 1975, for a fuller discussion.)

The changes in award rates of pay are presented in column 1 of Table 10-3. After almost two decades of constancy, the relative awards began to increase in about 1970, and by 1977 they were 29.6 percent higher than 9 years earlier. Most of the large increase in awards occurred from 1972 onward, so it is evident that the "equal pay for work of equal value" and the basic wage decisions were the important factors.

The arbitration system determines *minimum* awards and does not directly determine the earnings that are paid. Many workers, particularly men, receive over-award payments. There is no reason, therefore, why changes in relative award rates should necessarily be reflected in changes in relative earnings. After the equal pay decisions, male workers could systematically seek over-award payments to offset the change in the award relativities.

The impact of the award rate decisions on earnings is shown in columns 2 and 3

of Table 10-3. Earnings increased by 30 percent over the 1970 to 1977 period, so there was remarkably little slippage from the tribunal decisions. Award changes were fully translated into earnings.

TABLE 10-3 Female to Male Awards and Earnings Ratios

	Australian Ratios			British Ratios		
Year	Awards	Earnings, Private Sector	Awards/ Earnings 1976 = 100	Awards, Manual Workers	Earnings, Manual Workers	Awards/ Earning (1976 = 100)
1964	72.0	59.2	98.6	83.1	59.8	101.0
1969	72.0	58.4	97.2	83.3	59.5	100.1
1970	73.2	59.1	96.8	82.6	60.1	102.1
1971	74.6	60.7	97.6	84.9	60.6	100.1
1972	77.4	63.2	99.6	85.6	60.7	99.4
1973	79.4	65.9	99.5	87.4	62.5	100.3
1974	85.2	70.9	99.7	92.1	67.0	102.1
1975	90.8	75.7	100.0	95.1	68.0	100.3
1976	92.4	77.1	100.0	100.0	71.3	100.0
1977	93.2	76.6	98.6	100.0	71.8	100.2
1979	92.1	74.1	96.5	100.0	70.7	99.2

NOTES: Australia: Awards = adult average minimum award rates for a full week's work, all industry groups, average of four quarters to December 31 each year (Gregory et al., 1985). Earnings = adult average weekly earnings for full-time (more than 30 hours) nonmanagerial employees in the private sector (Gregory et al., 1985). Great Britain: Awards = weighted average of minimum rates laid down in collective agreements (Tzannatos and Zabalza, 1984). Earnings = relative hourly earnings of full-time manual workers (Tzannatos and Zabalza, 1984).

The data in Table 10-3, are interesting because they illustrate the effectiveness of the equal pay decisions, and as is evident in Figure 10-1, they show that it is only after discrimination has been removed from the Australian pay structure that the earnings ratio increases relative to the 1981 earnings ratios of Britain and the United States. This raises two interrelated questions.

First, could it be argued that the current British and U. S. pay structures reflect the discrimination that used to prevail in Australia? Could we go a little further and argue that with respect to pay Australia is now a discrimination-free country but the others are not? This is a position that is at least consistent with the results of the earlier section, which indicate that the difference between the pay relativities across countries relates to differences in coefficients and not differences in human capital endowments.

Second, given that labor market institutions have been so important in changing the pay relativities in Australia, what has been the role of labor market institutions in Britain and the United States?

Britain

British labor market institutions appear to be similar to those that prevail in Australia. Trade union membership is large and national agreements set minimum rates of pay in a wide range of industries. A relatively small number of collective agreements determine the minimum rates of pay of a very large number of workers. The four largest agreements cover almost one-fifth of the work force.[5]

The network of wage agreements in Britain, however, is not as extensive as the coverage of federal and state awards in Australia. In Australia 90 percent of female workers are directly covered by the award

[5] This section draws heavily on Zabalza and Tzannatos (1985).

wage system. In Britain 41 percent of female workers are directly covered by agreements.

As in Australia, before 1975, the British labor market institutions explicitly recognized pay discrimination. Different rates of pay for men and women who performed the same job were written into wage agreements, and before the 1970s it was common not to provide equal pay for equal work. An attempt was made to remove this explicit discrimination by the introduction of The Equal Pay Act of 1970, which was to become effective by December 1975.

The act included three important clauses. First, it sought to institute "equal pay for equal work" within establishments. This clause might be thought of as the equivalent of the main clause in the Equal Pay Act or the Civil Rights Act in the United States. Second, the act provided for a pay change if a female job had been given equal value to a different male job by means of a job evaluation. At the broadest level this would provide for "comparable worth" or, in Australian terms, "equal play for work of equal value." The act did not require job evaluations, however. Third, and perhaps most important, if a female pay rate with no male equivalent was included in a wage agreement, the act provided that the female pay rate must be at least equal to the lowest level of the male pay provision in the agreement. From the point of view of changing the pay relativities, this clause could be loosely thought of as the equivalent of the 1974 Australian basic wage judgment, although the level of the minimum pay in Britain would differ from one wage agreement to another.[6]

On the basis of the Australian evidence it might be expected that the provisions of the British Equal Pay Act would be fairly easily carried into the labor market by the extensive set of wage agreements and the large degree of unionization. Some indication of the success of the legislation is seen in column 4 of Table 10-3, which refers to the covered sector in Britain. It lists the average ratio of female to male minimum rates of weekly pay for full-time manual employees covered by wage agreements. The story is similar to the Australian experience. After very little change over two decades, the minimum rates of pay suddenly began to increase in the early 1970s, and by 1977 the index was 21.6 percent greater than in 1969.

In column 5 we list the actual earnings of British manual workers for the economy as a whole, that is, the aggregation of the covered and uncovered sectors. It is evident from column 6, which compares minimum awards for the covered sector to average earnings for the economy as a whole, that there was no significant slippage between changes in minimum rates of pay for the covered sector and changes in average earnings for the economy as a whole. Over the period 1969 to 1977 the ratio of the average earnings of female to male manual workers increased by about 24 percent, marginally more than the minimum rates of pay. The parallels between Australia and Britain are remarkable (see Figure 10-1). The earnings ratios increase in tandem.

In Australia the "equal pay for equal work" decisions of the federal tribunal probably increased female pay by less than 5 percent. In the United States, if the Equal Pay Act had any effect at all, it is likely that it changed the female earnings ratio in aggregate by considerably less than 5 percent. Why then was the British Equal Pay Act, which did not require comparable worth or equal pay for work of equal value, so effective? It seems to us that the institutional structure—trade unions and national wage agreements—provided the essential pre-

[6] "An agreement may lay down a rate of pay for women workers only in a particular category while making no provisions for men in the same category, because, for example, there are at the time, no men doing that kind of work. In such a case, if a rate of pay applying to women only is lower than the lowest rate of pay applying to men in the agreement, the Committee is required to raise the rate applying to women to the level of the lowest rate applicable to men" Zabalza and Tzannatos (1985:100).

condition, but it was the adoption of the simple rule that the lowest pay in any agreement must be shared by men and women that was the crucial consideration.[7] It was this clause that extended the British Equal Pay Act, somewhat loosely, into the domain of comparable worth. As in Australia, the large pay increase for women was not the result of detailed analysis of appropriate pay rates for women but the result of the adoption of a simple, across-the-board rule.

Some indication of the possible importance of this clause in the British Equal Pay Act may be found in Table 10-4, where we present the pay distributions for full-time adult workers in Britain in 1970 and 1985. The data were collected from enterprises and refer to those who work a full week.

A number of points are immediately apparent from Table 10-4. First, before Britain's Equal Pay Act, 67.4 percent of women who worked full time earned less than 60 percent of the male wage. For men the proportion was 10.9 percent. Consequently, it might be expected that a rule that the lowest award rate of pay should be shared by men and women would be very effective in increasing the pay of women.

Second, we can see the impact of the Equal Pay Act by comparing the British pay distributions of 1970 and 1985. After the Equal Pay Act in 1985, there was a slight worsening in the male pay distribution—14.1 percent of men now received less than 60 percent of the average male wage, whereas the rate in 1970 was 10.9 percent. The situation for women, however, improved-considerably. The proportion of women below this wage threshold was reduced from 67.4 percent to 48.1 percent, a reduction of 29 percent.

The experience of Britain and Australia suggests the following important judgments. First, in each country, and before the official interventions, the labor market institutions—trade unions and national pay agreements—explicitly recognized pay discrimination and built it into the pay structure. As a result, it was relatively easy to identify where pay discrimination occurred. In addition, given the desire, it was relatively easy to remove that which was identified as pay discrimination and, as a result, to affect dramatically the pay relativities between the sexes. The mechanism with the largest quantitative impact was the adoption of a simple rule that extended across firms and stated that within each pay agreement there should be a common rate of minimum pay for men and women.

Second, in each country the pay changes occurred so quickly in response to official interventions that it is clear that the human capital framework is not useful in explaining changes in the earnings ratios in the two countries. For the work force as a whole human capital attributes change very slowly and therefore played no significant role in bringing about the sudden pay change (Gregory and Duncan, 1981; Zabalza and Tzannatos, 1985). To explain changes in pay we really need to know more about how institutions impinge on the labor market.

Third, the concerns that equal pay initiatives would be frustrated by the marketplace proved to be unwarranted. It is evident from the large increase in the earnings ratios listed in Table 10-3, and the parallel movement of the earnings and the award ratios, that there was no widespread development of job reclassifications to women's disadvantage and no widespread development of secondary or uncovered markets. At this stage the equal pay interventions appear to have been effective and the pay impact evenly spread across all female workers.

United States

The United States introduced legislation in an attempt to achieve equal pay for equal work well before Britain and Australia. Equal pay was introduced under the Equal Pay

[7] For a list of the degree to which the minimum rates of pay of men and women diverged by industry and occupation, see Department of Employment (1975).

TABLE 10-4 Income Distribution, Great Britain and Australia

	Great Britain[a]								
	1970			1985			Australia, 1985[b]		
	Males	Females	All	Males	Females	All	Males	Females	All
Percent with <60 percent of mean male wage	10.9	67.4	20.0	14.1	48.1	24.6	5.2	14.2	7.8
Percent with <70 percent	22.0	79.3	36.8	25.6	63.8	37.4	17.7	40.9	24.4
Percent with <80 percent	35.3	86.9	48.7	38.1	75.0	49.5	33.3	62.9	41.9
Percent with <90 percent	48.2	90.3	59.1	50.0	n.a.	n.a.	47.4	76.7	56.0
Percent with <100 percent	61.1	93.8	69.6	61.0	n.a.	n.a.	58.8	85.1	66.4

[a] Gross weekly earnings for full-time workers ages 21 + from the public and private sectors and whose pay for the survey period was not affected by absence. Full-time workers are defined as those employees with normal basic hours exceeding 30 hours per week or those described as full time by the employer, including teachers or academics working 25 + hours per week.

[b] Gross weekly earnings for full-time adult employees ages 21 + for the public and private sectors and paid for a full week. Full-time workers are defined as those whose standard (or rostered) weekly hours of work were at least 30. Some employees (aircrews, teachers, and university lecturers), although paid for a weekly attendance of less than 30 hours, were classified as full time.

SOURCES: Great Britain: Department of Employment, New Earnings Survey, April 1970 and April 1985, London. Australia: Unpublished Australian Bureau of Statistics data, similar to data found in Distribution and Composition of Employee Earnings and Hours, Australian Bureau of Statistics Cat. No. 6306.0, May 1985, but including full-time managerial workers.

Act, 1963, and Title 7 of the Civil Rights Act, 1064. There is no nationwide comparable worth legislation, although there have been a number of initiatives in individual states, particularly in the public sector.

The outcomes of the equal pay initiatives in the United States, however, were very different from the British and Australian outcomes. The general consensus seems to be that the U. S. initiatives have had a minimal effect on relative earnings (Blau and Ferber, 1986:266). It is evident from Figure 10-1 that unlike the Australian and British experience there is no change in relative earnings that is detectable by the naked eye.[8]

This contrasting experience with Australia and Britain is very important. The U.S. experience, for example, led some economists to suggest that the Australian and British initiatives would be ineffective (Blandy, 1963; Chiplin et al., 1980). We need to pursue further just what it is that is different in the labor markets of each country.

Three broad conjectures may explain the ineffectiveness of equal pay initiatives in the United States. First, it could be that equal pay already existed before the legislation and therefore the legislation was redundant. This argument suggests that in the United States, before and after the Equal Pay Act, the labor market treated men and women equally if they performed equal work. It also suggests, by implication, that the institutional structures of Australia and Britain, with their emphasis on regulated wages, may have been responsible for the lack of equal pay in those countries. The institutional component of wage setting in Australia and Britain, however, is concerned with minimum rates of pay. Employers may always pay more. The fact that they did not do so suggests that the institutions were not holding the female earnings ratio at a low level.

Second, it could be conjectured that the institutions in each country did not affect the pay ratio before the equal pay legislation—that is, all countries produced the same unequal treatment of women—but the difference among the institutions was their ability to make legislative changes effective. The reason for this might be that the Australian and British institutional structures enabled the "market" pay differentials to be recorded and made explicit. The award rates of pay codified the "market" discrimination by adopting male and female pay scales with different rates of pay for the same job. As a result, it was clear what had to be done to remove "discrimination" and the pay scales could be easily changed.

Third, it could be that differences in legislation, and in the nature of the tribunal judgments, led to the different outcomes in each country. According to this conjecture, it is not so much that attempts at intervention in the labor market differed in their effectiveness, but rather that the interventions, by the wording of the laws and judgments, were designed to achieve different ends.

At this stage, it has not proved possible to choose among these conjectures with any certainty. It is important to note, however, that although each country requires equal pay for equal work, there are still systematic differences across the countries with respect to the earnings of women in male occupations, where it might be expected equal pay would prevail.

In Table 10-5 we present female earnings in male and female occupations expressed as a ratio of average male earnings. In each country, the few women who work in male occupations are better paid than other women, but the ranking of the earnings ratios in male occupations across the countries

[8] Beller (1979) suggests that Title 7 may have narrowed the sex differential in earnings by about 7 percentage points. This evidence would be consistent with the Australian experience, although it seems a little high, and it is strange that the change is not detectable in Figure 10-1.

TABLE 10-5 Job Segregation and Earnings Ratios by Occupational Groups

	Great Britain (1982)		Australia (1981)		United States (1981)	
	M	F	M	F	M	F
Job segregation: percent of work force						
Female occupations	5.0	62.8	7.8	55.3	3.9	53.7
Male occupations	82.0	3.1	73.0	8.8	77.5	17.6
Mixed occupations	13.0	34.1	19.2	35.9	18.6	28.8
Total	100	100	100	100	100	100
Weekly earnings ratios: female/male						
Aggregate						
Female occupations	73.5		74.2		67.8	
Male occupations	80.3		87.9		70.8	
Mixed occupations	74.1		77.6		53.7	
As a ratio of average male earnings						
Female occupations						
Male earnings	82.0		96.2		82.6	
Female earnings	60.3		71.4		56.0	
Male occupations						
Male earnings	102.8		101.3		103.0	
Female earnings	82.6		89.0		72.7	

NOTES: Female occupations = 70 percent or more of workers are female; male occupations 30 percent or less of workers are female; and mixed = between 30 and 70 percent of workers are female.
SOURCES: Great Britain: Department of Employment, *New Earnings Survey* for 1982. London; males 21 +, females 18 +. Occupations are based on the Department of Employment, *List of Key Occupations for Statistical Purposes* (KOS), published in *Classification of Occupations and Directory of Occupational Titles*. Vol. 1. London: Her Majesty's Stationery Office, 1972. Australia: Australian Bureau of Statistics, 1981 Census, Household. Samples File, ages 18 to 54. Coding for occupations is broken down to three-digit level. United States: Bureau of the Census, Current Population Survey, March 1982 (data tape). Occupation is broken down to 984 three-digit occupations.

reflects the rankings of the aggregate earnings ratio. In the early 1980s, women in male occupations received 89.0 percent of the average male wage in Australia, 82.6 percent in Britain, and 72.7 percent in the United States. This gap between the United States and the other countries leads us to suggest, somewhat tentatively, that perhaps it is true that the Equal Pay Act in the United States was ineffective, not because equal pay already existed before the act, but because the nature of the act and the institutional framework of the labor market in the United States prevented the equal pay initiative from being effective.

Employment and Unemployment

The sudden and dramatic change in the female earnings ratio in Britain and Australia was not reflected in a sudden and dramatic change in relative employment growth. The ratio of total hours worked in the labor market by women to the total hours worked by men is given in Figure 10-2 for the three countries. The vertical scale is plotted as a log of the employment ratio so that the slope of these lines is a measure of the growth rate of the female to male hours worked.

In each country women have increased their share of total hours worked. In Australia the increase of female to male hours worked between 1970 and 1984 was 25 percent. The increase was 27 percent in Britain and 31 percent in the United States.

The growth of female employment relative to that of males has been greatest in the United States, where the female pay relativities have not increased; but the surprising feature of these data is 'that each of the employment series is dominated by a trend. There is no noticeable break in the trends for Britain and Australia despite relative pay increases on the order of 20 to 30 percent. This suggests a very low elasticity of substitution between men and women in the production process—for example, an elasticity of one, that implied by a Cobb-Douglas production function, should have led to a 20 to 30 percent fall in female hours worked relative to male hours worked. Nothing like that occurred. The slow upward trends persisted.

Alternatively, there could have been shifts in the demand for female labor at the same time as the pay increases so that the effects of the relative cost changes are undetectable in a simple diagram such as Figure 10-2. We do not believe that this is an important phenomenon because it requires both that the unusual shifts be confined to the period of the pay changes and that the shifts just offset the effects of the pay change. It all seems so unlikely, especially because the trend in the United States toward female employment is also fairly smooth. At this stage, we prefer to think that the elasticity of substitution between men and women in production is very low because the labor market is so segregated into male and female jobs (Table 10-5).

The insensitivity of the relative employment growth in Figure 10-2 need not mean that there are no employment effects at all. We have not investigated the macroconsequences of the pay changes, that is, the degree to which male and female employment together may have been reduced. If, as a first approximation, male and female labor can be thought of as being used in fixed proportions, then it would be total employment that is affected. An increase in female wages would increase the total wage bill, in real terms, if the increase in female pay is not offset by a reduction in male pay.

Finally, a cursory glance at relative unemployment rates also suggests that the impact of the large change in pay relativities on female demand and supply must have been marginal (Figure 10-3). In Britain female unemployment is not well measured. The statistics are based on recipients of unemployment benefits and many married women are ineligible; consequently, we compare unemployment only for Australia and the United States. The data are col-

lected from household surveys. During and after the period of the equal pay initiatives in Australia, the unemployment of women continued to fall relative to that of men and appears not to have been affected by the pay changes to a great degree. In both countries female unemployment has been marginally above that of male unemployment for most of the period and subject to a strong downward trend. It is remarkable how highly correlated the relative unemployment series is across the two countries. Again, there is no evidence of Australian women being seriously disadvantaged after the equal pay judgments.

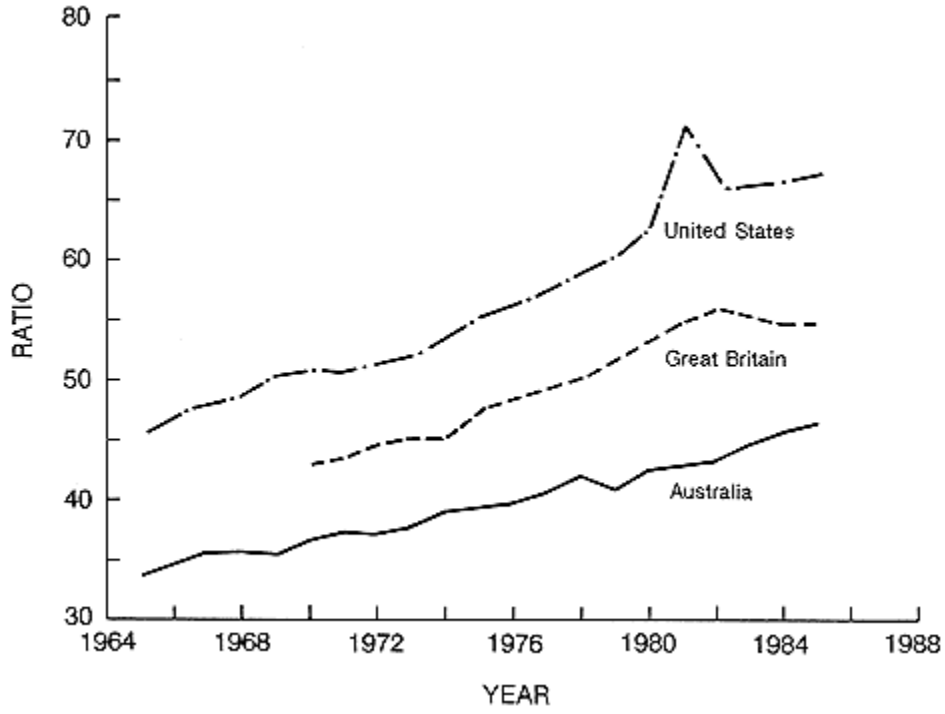

Figure 10-2
Ratio of female to male aggregate weekly hours worked. Sources: Australian Bureau of Statistics, *Labour Force*, Cat. No. 6303, August. U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings Monthly Bulletin*, annual averages. Great Britain, *Annual Abstract of Statistics*, mid-June.

Conclusions

In the three countries female employment, relative to that of males, has grown strongly over the past decade and a half. The history of the pay gap between men and women in each country, however, has been different. There was a significant narrowing of the pay gap in Britain and Australia during the 1970s, but there was no change in the United States. Recently, there has been relative constancy in Britain and Australia, but a more moderate narrowing of the pay gap in the United States.

This analysis has focused on the pay gaps of the 1970s and leads to the following major conclusions. First, an application of the usual human capital model cannot explain pay gaps across countries. In 1981 the relative endowments of human capital of men and women seem to be much the same in each of the three countries. Within a human capital framework the variation in the pay gap among these countries stems from differences in coefficients rather than from differences in endowments.

Second, between 1969 and 1976 the ratio of female to male pay increased about 30

percent in Australia and by 20 percent in Britain. The human capital model cannot explain these large pay changes, which flowed from official intervention in the labor markets. The pay changes followed two decades of relative constancy. The Australian and British experience, therefore, was different from that of the United States, where, during the early 1960s, official intervention in the form of the Equal Pay Act and Title 7 of the Civil Rights Act proved to be ineffective. These results suggest that research in this area must place increased emphasis on institutions and the impact of the law.

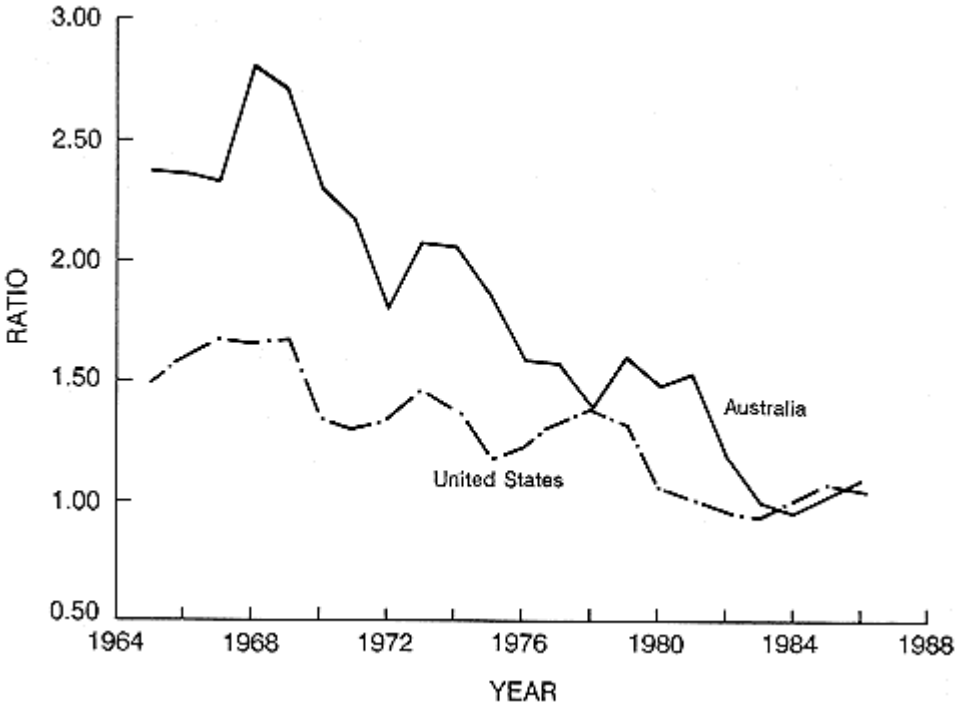

Figure 10-3 Ratio of female to male unemployment rates. Sources: Australian Bureau of Statistics, *The Labour Force, Historical Summary*, Cat. No. 6204, August. U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings Monthly Bulletin* , annual averages.

Third, we are not sure why official intervention was effective in Australia and Britain but ineffective in the United States. The labor markets of Britain and Australia possessed institutional features within which change was easily effected. The key feature seems to have been national wage agreements, which, before the large pay changes, explicitly discriminated between men and women by giving them different rates of pay for the same job. As a result, some part of pay discrimination was easily identified. This, however, seems to be only a small part of the answer. The fraction of the female work force covered by "equal pay for equal work" is not sufficient to bring about directly such large changes in the pay ratio. A larger part of the explanation probably relates to the fact that the interventions in Australia and Britain went beyond equal pay for equal work by adopting simple, across-the-board rules. In Britain these simple rules related to setting equal the male and female minimum rates of pay within each wage agreement. In Australia, there was one minimum wage—the basic wage—and that, too, was set equal for men and women.

Fourth, currently, Australian women are much better paid relative to men than their British or U.S. counterparts. An important

reason for this is the pay ratio in female occupations. In the three countries between 62. 8 and 53.7 percent of women work in occupations in which 70 percent or more of the workers are female. In Australia, these women, on average, are paid 71.4 percent of the average male weekly wage. In Britain and the United States the ratio is 60.3 and 56.0 percent, respectively.

Fifth, in Britain and Australia it appears that all women shared in the large pay increases. There is no evidence of a significant development of uncovered sectors, nor of groups of full-time workers whose working conditions deteriorated as the working conditions of those covered by equal pay improved. It does not appear that the labor market is evolving toward two classes of women, although there has been a faster rate of growth of women working part time in Britain and Australia.

Finally, in Britain and Australia the experience of large pay changes seems to suggest that the *relative* employment response is not large. To a significant degree, women do not seem to lose jobs *relative* to men. In fact, the *relative* employment of women increased in all three countries during the 1970s. We have not undertaken an analysis of aggregate employment growth, in which an important consideration would be who pays for the female wage increases. If there is an offset in male wages, then the employment response in aggregate is likely to be much less than if men maintain their real wages and comparable worth acts as a profit tax.

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Appendix: Definition of Variables Used in the Regression Equations

The results relate to full-time workers, that is, those working more than 35 hours per week. In Australia the sample was men and women aged 15 to 54 years; In Britain, 16 to 54 years; and in the United States, 15 to 54 years.

Australia

Education Variables

Dropout—Age on leaving school was less than or equal to 15; no further qualifications.

High school—Age on leaving school was greater than or equal to 16, but the person had no postsecondary qualifications.

Postsecondary—Trade certificate or other postsecondary certificate.

University degree—completion of a bachelor's degree.

Postgraduate—higher degree level.

Experience

Age minus years of schooling minus six.

Children

A dummy variable taking the value of 1 if children under the age of 18 were present in the household and were the responsibility of the head of the household or spouse.

Area

Rural—Those living in a community of less than 1,000 people.

Urban—Those living in a community of more than 1,000 people.

Marital Status

Spouse present—Currently married and living with spouse.

Other marital status—Widowed, separated, and divorced individuals.

Single—Never married.

Great Britain

Education Variables

Dropout—Those with no qualifications or with ungraded or grades 2 to 5 of a Certificate of Secondary Education.

High school—The person had one of the following: a Certificate of Secondary Education grade 1, school certificate, one or more General Education Certificate "0" levels or the Scottish equivalent (Scottish Leaving Certificate of Education), or clerical and commercial qualifications.

Post secondary—trade apprenticeship, GCE "A" level or other postsecondary qualifications.

University—completion of a bachelor's degree.

Postgraduate—higher degree level.

Experience

Age—Age on leaving full-time education.

Children

A dummy variable taking the value of 1 if children under the age of 16 were present in the household and were the responsibility of the head of the household or spouse.

Area

Rural—Those living in rural local authority areas.

Urban—Those living in urban local authority areas or in the conurbations (e.g., Greater London).

Marital Status

Spouse present—Currently married and living with spouse.

Other marital status—Widowed, separated, and divorced individuals.
Single—Never married.

United States

Education Variables

Dropout—Completed less than 4 years of high school.
High school—Completed 4 years of high school.
Postsecondary qualifications—Completed 1 to 3 years of college.
University degree—Completed 4 years of college.
Postgraduate degree—Completed 5 or more years of college.

Experience

Age minus years of schooling minus six.

Children

A dummy variable taking the value of 1 if children under the age of 18 were present in the household and were the responsibility of the head of the household or spouse.

Area

Rural—Those living in communities of less than 1 million people.
Urban—Those living in central cities or other communities of more than 1 million people.

Marital Status

Married spouse present—Currently married and living with spouse.
Other marital status—Widowed, separated, and divorced individuals.
Single—Never married.

COMMENTARY

Ronald G. Ehrenberg

At the start of the 1970s, the average weekly earnings of employed women relative to the average weekly earnings of employed men (which I henceforth call the *female relative wage*) was approximately equal in the United States and Australia and somewhat lower in Great Britain. During the decade, however, the female relative wage rose substantially in Australia and Great Britain, but remained roughly constant in the United States. As a result, by the early 1980s, the female relative wage in Australia exceeded that for the other two countries and the relative wage in Great Britain had reached roughly the same level as the relative wage in the United States.

With these facts as background, the Gregory, Anstie, Daly, and Ho paper addresses four questions. First, why do female relative wages differ across countries in the early 1980s—do the differences reflect differences in relative (female/male) human capital endowments or differences in labor market institutions across countries? Second, why did women achieve such large relative wage gains vis-à-vis men in Great Britain and Australia during the 1970s? Third, what is the implication of the experience in Australia and Great Britain for the debate over comparable worth in the United States and elsewhere? Finally, what can we learn from the Australian and British experiences about the effects of such relative wage changes on employment and unemployment of women?

To answer the first question, the authors use the now standard Oaxaca decomposition method to determine whether differences in female relative wages across countries are due to differences in relative (female/male) human capital endowments or differences in wage equation coefficients across countries. "Comparable" micro-level data sets from household surveys are used for each country, and log weekly earnings equations for men and women are specified to be a function of education, potential labor market experience (age minus years of schooling minus six), marital status, the presence of children in the home, and rural/urban location.

The estimates (found in Table 10-1) are used to compute the extent to which the female relative wage in a country changes when one substitutes the mean value of male and female characteristics from either

of the other two countries into its wage equation to arrive at a predicted female relative wage. By substituting the mean characteristics of British workers into the Australian wage equations, for example, one can compute what the female relative wage in Australia would look like if Australian workers had the same human capital endowments as British workers. In fact, the authors find (Table 10-2) that the predicted female relative wage in each country appears to be quite insensitive to which country's characteristics are used. Thus, they conclude that most of the difference in female relative wages across the three countries is due to differences in the wage structures (coefficients of the wage equations); human capital differences are relatively unimportant.

To answer the second question, why female relative wages rose in Australia and Great Britain during the 1976s, the authors focus on the unique labor market institutions that exist in each country and the fundamental changes that took place in them during the decade. Turning first to Australia, minimum wage rates are set there by occupation through a system of federal and state tribunals. Prior to the early 1970s, minimum wages in male-dominated occupations were set by determining some minimal living standard for a family and then adding to that a premium for the "work value" of the occupation. Minimum wages in other occupations were similarly determined, but in female-dominated occupations an explicit downward adjustment was then made (usually 25 percent during the 1950–1969 period). Discrimination against women, then, was *explicit* in Australia.

Between 1969 and 1975, two very important changes occurred in the tribunal's behavior. First, by 1972 the federal and most state tribunals had ruled that the sex of a worker should not be used as a criterion in setting wages in those jobs that were neither predominantly male nor predominantly female (equal pay for equal work). Second, between 1972 and 1975, the tribunals introduced the concept of "equal pay for work of equal value" by eliminating in three stages the downward adjustment of wages in female-dominated occupations. Thus, something akin to comparable worth was mandated by the federal government for all workers in Australia. As these changes occurred, the female relative wage in Australia rose from roughly 60 percent in 1970 to 75 percent in 1979 (Table 10-3).

Turning next to the British experience, the British labor force, as is well known, is heavily unionized; the four largest national agreements cover almost one-fifth of the work force. Prior to 1975, *explicit* sex discrimination in pay (different pay rates for men and women doing the same job) was built into the agreements. The Equal Pay Act of 1970, which was to become effective in 1975, required equal pay for equal work within a firm, equal pay for jobs of equal value within a firm *if* a job evaluation was undertaken, and that women's wages be at least equal to the lowest male wage rate in the firm. The authors conclude that the act appeared to be effective: The female relative earnings of manual workers rose from roughly 60 percent in 1970 to 71 percent in 1979.

The authors next address the third issue, the implications of these findings for the comparable worth debate. They point out that in both Great Britain and Australia pay discrimination was explicit, and it was thus easy to identify where discrimination was occurring. Given the unique labor market institutions in each country, government intervention could be direct; they observed that "the marketplace" did not appear to frustrate the equal pay efforts.

For the future, the authors see little room for expansion of comparable worth in Australia (effectively, a variant is already in place). An Equal Pay Act amendment in Great Britain (effective January 1984) now permits British women to bring claims through the judicial process if they believe they are not receiving equal pay for work

of equal value. The amendment's ultimate effects will depend on the judicial process.

The authors also claim that although the introduction of comparable worth in the United States in the state and local sectors has led to considerable initial pay changes (although some economists would dispute this claim), the decentralized wage determination process in the United States is likely to make the overall effects of any larger comparable worth policy much smaller (due to likely incomplete coverage and employment of women in low-paying establishments).

Finally, the authors address the issue of whether the female relative wage changes that have occurred in Australia and Great Britain have had any adverse employment and unemployment effects. They note that during the 1966–1984 period 'women increased their share of hours worked in all three' countries, and that the increase was greatest in the United States. They claim a growth trend was dominant in all cases, and no sharp slowdown in growth was observed in Great Britain or Australia after those countries implemented their antidiscrimination policies. They assert (without proof) that this is due to small elasticities of substitution between male-and female-dominated occupations. A cursory glance at the pattern of female relative unemployment rates in each country over time similarly leads them to the conclusion that there is no evidence that the relative wage changes affected these rates either. They note, though, that they have not analyzed the effect of the female wage adjustments on total employment, on male wages, or on corporate profits.

My reaction to this paper is mixed. On the one hand, it represents one of the few serious efforts I know of to place discussions about comparable worth in a comparative perspective and to bring evidence from other countries' experiences into the debate about policy in the United States. For this the authors should be resoundingly applauded. On the other hand, I am left with the feeling that they have not pushed their empirical analyses as hard as they might have, and because of this, in places they may have drawn some inappropriate conclusions. My discussion will elaborate on this latter theme.

Consider, first, the analyses of the determinants of intercountry differences in the female relative wage differentials. Although the authors, probably justifiably, conclude that the differences are due to differing coefficients of wage equations across countries, not to differences in human capital endowments, they do not attempt to explain why the coefficients found in Table 10-1 might differ across countries. The presence of children in the home, for example, appears to have a much larger negative effect on women's wages in Australia than it does in the United States. Is this because Australian families have more children than U.S. families, or because the lack of child-care facilities in the former makes it more likely that women will leave the labor force temporarily to care for children? To take another example, the return to potential experience for women appears to be greater in Australia than in the United States (Table 10-1). When one takes into account the higher labor force participation rates of adult women in the United States, it is likely that potential experience (age minus years of schooling minus six) systematically overstates actual experience by more in Australia than in the United States and, thus, that the actual returns to female labor market experience are certainly greater in Australia. I wish the authors had provided an explanation for this, as well as for other findings.

Consider, next, their analysis of how female relative wages changed after the passage of the antidiscrimination laws in Australia and Great Britain. They base their analysis here on casual analysis of observations on annual data from 1964 to 1979. I am troubled by their conclusion (comparable-worth-type policies caused relative

wage changes), for a number of reasons. First, their data inexplicably end in 1979. Given the availability (presumably) of data for another 5 or 6 years, they could have studied whether the trends they observed in the data continued. Second, one must question their failure to estimate a multivariate model that would permit other forces, such as aggregate demand pressures, to influence the female wage ratio; their conclusions are implicitly based on simple correlations of policy changes and wage ratio changes. Third, they implicitly treat the policy changes as exogenous. No thought is given to the possibility that social or economic pressures that might lead female relative wages to rise might also lead to the policy changes and tribunals' decisions. Put another way, they may have the direction of causation backwards. Indeed, their Figure 10-1 suggests that the female relative wage started to rise in both Australia (1965–1969) and Great Britain (1970–1971) prior to the implementation of the policies that they describe.

The conclusion that female relative wage changes have had no effects on female relative employment and unemployment levels is similarly based solely on cursory examinations of trends in the data. Since Gregory and Duncan's earlier paper (*Journal of Post-Keynesian Economics* , 1981) estimated relative (male/female) employment equations for Australia for the 1938–1978 period and found some role for relative wages (in the aggregate a-.3 elasticity of substitution with respect to relative wages), *after* controlling for trend terms and macro-level conditions, one wonders why a similar structured analysis was not done here. At the very least, such an analysis would provide some comparative data on elasticities of substitution between men and women. To do this correctly, of course, would require a formal model of employment and labor force behavior.

Ignoring my concerns about the nature of their empirical evidence, I take away a message from this paper that is a simple but important one: It is likely to be much easier to improve the female relative wage rate by a comparable-worth-type policy in a world in which wages are set centrally and discrimination is overt than it is in a decentralized market economy in which we still argue over whether labor market discrimination occurs. Proponents of comparable worth in the United States should take heed. Widespread comparable worth initiatives here are unlikely to improve the female relative wage by as much as they did in Australia and Great Britain.

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