NBER WORKING PAPER SERIES

COMPARABLE WORTH IN A GENERAL EQUILIBRIUM MODEL OF THE U.S. ECONOMY

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Working Paper No. 2090

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
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December 1986

This study was supported in part by a grant from the Alfred P. Sloan and Rockefeller Foundations to the National Bureau of Economic Research for the project "Women's Quest for Economic Equality." Partial support was also provided by the Center for Economic Policy Research at Stanford University. Data inputs and suggestions from Joyce Jacobsen and Leslie Perreault are also gratefully acknowledged. The research reported here is part of the NBER's research program in Labor Studies. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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ABSTRACT

This paper presents a computable general equilibrium model that simulates the effects on employment, output, wages, and economic efficiency of introducing comparable worth into the U.S. economy. The model calculates economy-wide aggregate impacts and disaggregated results for individuals grouped by sex, marital status, and education.

The effects depend on the hiring rules that would accompany comparable worth, the source of existing male-female wage differentials, the extent of coverage of comparable worth, the intra-household behavior of married couples, and demand and supply elasticities. If, after comparable worth is introduced, employers are constrained to employ men and women in historical proportions, the adverse effects on aggregate employment, output, and efficiency would be much larger than if the employment constraint is based on applicant proportions. If existing wage gaps are the result of sex differences in productivity, the adverse effects of comparable worth are relatively large; but if they are the result of discrimination, the efficiency losses are much smaller. If only part of the economy is subject to comparable worth, the efficiency loss is reduced under the productivity gap assumption, but increased if the wage gap is the result of discrimination.

The redistributive effects of comparable worth on married men and women are sensitive to assumptions about intra-household behavior and the size of the gains from marriage. By contrast, unmarried women appear to benefit from comparable worth under most sets of assumptions while unmarried men lose.

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1. Introduction

The 1960s were a period of significant changes in public policy with respect to gender issues in the labor market. In 1963 the Equal Pay Act outlawed separate pay scales for men and women performing similar jobs, and Title VII of the 1964 Civil Rights Act prohibited all forms of discrimination in employment. Despite these laws, the women/men wage ratio in 1979 showed little change from the level of about .6 that prevailed prior to the anti-discrimination legislation. Between 1979 and 1983 the ratio advanced five percentage points, but even after that gain the average hourly earnings of men were about 50 percent above those of women of comparable age, race, and education. Moreover, a sharp increase in the percent of women not married (and therefore not benefitting from a husband's higher income) and a relative increase in women's financial responsibility for children tended to offset the gains made by women in employment and relative wages (see Fuchs 1986).

In recent years numerous additional changes in public policy have been advocated in order to help women economically. They include affirmative action programs, paid maternity leaves, subsidized daycare services, and perhaps most significantly, equal pay for work of "comparable worth" (U.S. Commission on Civil Rights 1984). Advocates of comparable worth note that jobs held primarily by women pay substantially lower wages than jobs held primarily by men, even when education and other attainments of the women equal or exceed those of the men. They claim that jobs can be evaluated by objective standards such as educational requirements and degree of responsibility, and that wages should be set according to those standards. Numerous lawsuits have been brought under this theory, and some state and local governments have adopted the comparable worth approach in principle. Neither the federal government nor any state has yet attempted to enforce a comparable worth standard on the private sector, but that is the goal of many supporters of women's rights.

Economists have not been slow to address the issue of comparable worth (Livernash 1980). Attention has been directed to questions about the existence and magnitude of occupational segregation and discrimination (Treiman and Hartmann 1981), and the direct costs to employers of implementing comparable worth (Oi 1986; Remick 1984; Treiman, Hartmann and Roos 1984). Several papers set forth the theoretical case against comparable worth (Killingsworth 1985; Fischel and Lazear 1986), while some defend it on theoretical grounds (Bergmann 1985; Aldrich and Buchele 1986).

Largely missing from the debate are quantitative estimates of the employment, efficiency, or distributional consequences of comparable worth (however, see Johnson and Solon 1984; Sorensen 1986). Economic theory suggests that administratively determined wages are likely to be less efficient than those set by the interplay of demand and supply. But will the loss be small or large? What about the redistributions that would occur? Who would gain? Who would lose? And by how much?

This paper presents a general equilibrium model that makes possible the calculation of the effects on employment, output, wages, and economic efficiency of introducing comparable worth into the U.S. economy. We use a computable general equilibrium (CGE) model rather than relying on inferences from a theoretical model for several reasons. First, full implementation of equal pay for women and men would represent a very large discrete change from the current situation. The usual method of theoretical analysis through comparative statics is most applicable for small changes at the margin. Second, the model, though highly aggregated, does attempt to capture several complex interrelationships that it would be extremely difficult to sort out, *a priori*; e.g., the multiple effects on different industry sectors, types of jobs, and kinds of households.[1] Finally, the CGE approach is sufficiently flexible to permit comparison of results under a variety of assumptions.

Through simulations we estimate effects for the economy as a whole, and separately by production sector and for individuals grouped by sex, marital status, and education. We do not attempt to estimate the extent of discrimination (choosing rather to simulate the effects under alternative estimates), nor do we estimate the administrative costs of implementing a comparable worth policy. We do consider alternative hiring rules that would probably accompany a comparable worth wage policy, we examine the effects of introducing comparable worth into some sectors but not others, and we study the consequences of alternative assumptions about utility maximization in married households.

The next section provides a more complete discussion of the modeling issues. Then we present the model--its elements, structure, and assumptions. The simulation results follow, with emphasis on how effects depend on various policy rules, behavioral assumptions, and exogenous parameters. The final section discusses the implications of the results for public policy and for future research.

The model presented in this paper is highly aggregated and static. It is only a rough approximation to the "real world," but we believe that much can be learned about comparable worth from it. The process of model construction forces a consideration of issues such as hiring rules or the nature of the utility function in married households that have often been ignored in theoretical discussions. The general equilibrium properties of the model permit the investigation of the effects on employment, output, and the like after allowing for demand and supply responses to changes in relative prices and wages. We hold no brief for any particular assumption or result, but we believe that the simulations taken as a whole provide many useful insights concerning the possible effects of comparable worth on the U.S. economy.

2. Modeling Issues

General equilibrium calculations require a fully specified model of the economy. Each conceivable specification necessarily reflects different assumptions concerning the nature of economic behavior and institutions. In the context of a controversial policy issue such as comparable worth, it should not be surprising that there is little agreement concerning the validity of certain critical assumptions. We emphasize that computational general equilibrium simulations cannot resolve such disagreements. However, they do serve to clarify the links between assumptions and implications. Accordingly, this section discusses several critical modeling issues, and thereby provides background for the assumptions employed in section 4. The reader should bear in mind that we do not mean to endorse any particular assumption by including it in our analysis.

A. Pay Differentials

The object of comparable worth is to narrow or eliminate male-female pay differentials. To model the effects of this policy one must adopt some view as to why these differentials exist in the first place. This immediately embroils us in controversy.

Classical economic analysis attributes wage gaps to productivity differences. The sources of such differences may be quite subtle. For example, if women are more likely to leave the labor force (perhaps for childbearing), then firms may be reluctant to train women for jobs that require specific skills, and women would be reluctant to invest in such training. Women might then be forced to settle for lower wages, commensurate with their expected net marginal products. Under this view, women with strong attachments to the labor force are the victims of "statistical discrimination" (Phelps 1972). Alternatively, one might argue that wage gaps do not reflect differences in expected marginal products. This requires one to formulate an explicit theory of discrimination which accounts for the persistence of wage gaps and the failure of classical equilibriating forces.

In his seminal work, Becker (1971) developed various theories of discrimination based upon personal tastes. Under this view, the employment of certain individuals creates disutility for employers, co-workers, suppliers of capital, or consumers. In equilibrium, employers pay such workers their marginal products, net of external effects. This gives rise to pay differentials.

More recently, some analysts have devoted increased attention to the possibility that wage gaps are attributable to market imperfections arising from informational problems. One such theory has been dubbed the "invisibility hypothesis" (Milgrom and Oster 1984). Under this view employers have private information concerning the abilities of their employees. Promotion signals competence; promotion of a woman signals exceptional competence. Thus, an employer may prefer not to promote a competent woman in order to extract more surplus associated with her employment.

Other authors have suggested models of discriminatory hiring policies. For example, Bulow and Summers (1985) have argued that this phenomenon arises naturally whenever job terminations are used to discipline workers for shirking. In their model, men and women are equally productive, and therefore must receive the same wage. However, since women are assumed to be less averse to nonmarket activity, the threat of terminations will fail to induce satisfactory effort unless, in equilibrium, women have more difficulty finding new jobs once terminated.

Another set of theories envisions discrimination as the consequence of self-fulfilling prophecies (see, for example, section 4 of Arrow 1971).

Under this view, low compensation and poor employment prospects discourage women from expending effort or acquiring essential skills. Employers in turn pay women less and withhold promotions because women are less diligent or skillful. These theories have an interesting and important implication: policies which force employers to treat men and women equally may alter incentives for women, thereby causing women to perform on par with men. This creates a new self-fulfilling prophecy in which discrimination is nonexistent.

Unfortunately, these more recent models of discrimination do not lend themselves to a computational framework. Equilibria in models with uncertainty and private information tend to be extremely complex, and generally depend upon underlying distributions about which we have no information. When attributing wage gaps to discrimination, we will therefore adopt Becker's framework. In particular, we will assume that discrimination arises from the tastes of employers.

We acknowledge that this view is not entirely satisfactory. Specifically, if the preferences of employers are at all heterogeneous, it becomes very difficult to explain the persistence of discrimination. Nondiscriminatory firms clearly have lower costs of production. In the short run (with fixed capital and, consequently, decreasing marginal returns to labor), such firms will operate on a larger scale than their discriminatory competitors. In the long run, capital will flow to the lower cost firms and discriminatory employers will disappear entirely. Even if the bulk of capitalists discriminate as well, nondiscriminatory capitalists will earn higher returns and eventually dominate. Thus, wage gaps persist only if discriminatory firms have monopsony power. Theories of wage gaps based upon the preferences of consumers or co-workers also encounter difficulties, in that long-run equilibrium would tend to entail some appropriate degree of segregation.

Accordingly, Becker concluded that discriminatory pay differentials were likely to be relatively transient.

One need not, however, take the restrictive view that Becker's discrimination coefficients reflect only the innate preferences of employers or other groups. Rather, we prefer to think of these coefficients as stylized analytic tools for introducing wage gaps which are unrelated to productivity.

Various commentators have suggested that the adoption of comparable worth may hasten the erosion of discrimination against women, or may provide incentives which lead to the elimination of productivity differences (see the discussion of self-fulfilling prophecies above). We will briefly consider policy effects under such scenarios by assuming that discrimination coefficients or productivity differences change systematically subsequent to implementation.

B. Household Behavior

It is important to recognize that comparable worth might have a different impact on single individuals who are concerned only with their own market opportunities than on married individuals who also care about the market opportunities of their spouses. In order to shed light on this and associated issues we require an explicit model of household behavior.

One alternative, which we take as the standard case, is to assume that the household acts as a single utility-maximizing agent. It is possible to justify this assumption in at least three ways. First, spouses may bargain over possible actions. As long as bargaining always results in Pareto-efficient outcomes (a standard axiom in cooperative game theory), the household behaves as if it maximizes a single utility function. Second, under certain conditions, family members who are linked to a household head through operative resource transfers will act to maximize the utility of the head

(Becker 1974). Third, it may be customary for the household head to act effectively as a dictator.

There are, however, two significant drawbacks to modeling households in this way. First, unless one adds additional structure it is impossible to assess the effect of comparable worth on the well-being of married women as distinct from married men. Second, the adoption of comparable worth may alter the balance of power in the household's decision-making process, thereby invalidating the practice of using the household's current utility function for policy simulations.

To address these issues, we consider a second model of household behavior which imposes more structure upon decision-making. Specifically, we assume that spouses bargain over possible actions, and that the outcome of this process corresponds to Nash's two-person bargaining solution (Nash 1950). This implies that the household acts as if it maximizes

$$(U_M - U_M^*)^{\alpha}(U_F - U_F^*)^{1-\alpha} ,$$

where U_i is the utility of spouse i (i=M,F), U_i^* is the utility associated with spouse i's <u>threat point</u> (more on this below), and α is a parameter reflecting relative bargaining strengths. Nash derived this solution concept from more primitive axioms (he also imposed a symmetry axiom, which effectively implies that $\alpha = 1/2$). Other authors have since provided alternative justifications, based upon explicit models of the negotiation process (Rubinstein 1982). The Nash solution has previously been used in a wide range of applied contexts, including the study of household decision-making (Kotlikoff and Spivak 1981, Manser and Brown 1980, and McElroy and Horney 1981).

This framework allows us to differentiate between the impact of comparable worth on individual spouses. However, its implementation requires us to specify the parameter α, and the threat points, U_i^*. Throughout our analysis we assume that $\alpha = 1/2$. Essentially, this implies that husbands and wives are equally skilled at bargaining. It is doubtful that our results (which concern the effects of policy changes) are highly dependent upon the value of α (which determines levels of well-being). On the other hand, one might argue that α would change in response to comparable worth policies--as women become more successful in the labor market, they may also become more effective negotiators. By ignoring this possible effect, we may understate the desirability of comparable worth to married women.

Conceptually, spouses' threat points correspond to attainable utility when negotiations are abandoned. It is natural to think of this outcome as divorce. Household decisions, therefore, ought to depend both upon the economic opportunities available to single individuals,[2] and upon the costs of divorce. We identify two polar cases. In the first case, divorce is costless. Spouses' threat points then correspond to the levels of economic well-being which they could obtain as single individuals. Marriage alters economic well-being only to the extent it generates a surplus (perhaps through economies of scale in production): spouses bargain over the division of this surplus. In the second case, divorce is prohibitively costly, possibly because of emotional stress, loss of "marriage-specific capital," and/or social stigma. Economic status subsequent to marital dissolution is then of negligible importance in determining the allocation of resources within a marriage.

The specification of threat points turns out to be a critical modeling choice. When divorce is costless, a rise in women's wages necessarily benefits married women, since their threat points improve. This remains true even if men's wages fall simultaneously, as long as the economic surplus associated with marriage does not shrink too much. However, when the costs of divorce are prohibitive, a rise in women's wages may hurt married women and benefit married men. Indeed, this paradoxical result is quite likely to hold when women's wages rise and men's wages fall by roughly the same absolute amounts.

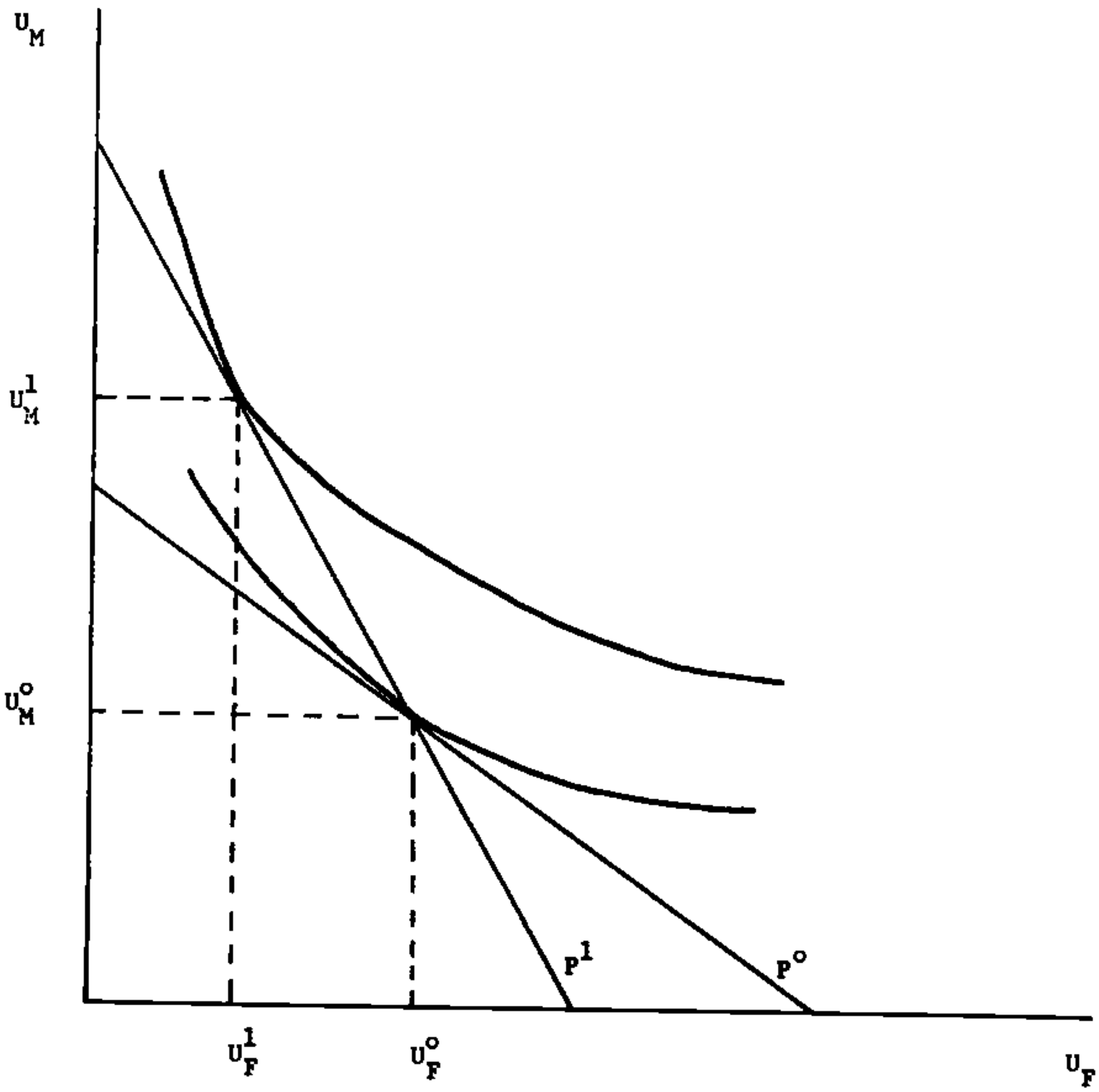
We illustrate this possibility in Figure 1. Suppose that the threat points are always given by $U_F^* = U_M^* = 0$ (the consequences of divorce are disastrous to both partners). Suppose further that, at initial wages, the utility possibility frontier is P^0. The pair (U_F^0, U_M^0), given by the tangency of P^0 with a rectangular hyperbola, represents the Nash bargaining solution. Now suppose the woman's wage rises and the man's falls. Maximum attainable utility for the man is higher than before (the woman works full time at a higher wage to support his leisure); for the woman, it is smaller. Thus, the utility possibility frontier rotates. If wage changes are such that it rotates around the initial solution (to P^1), then the new solution <u>necessarily</u> involves higher utility for the man and lower utility for the woman. Intuitively, this change raises the cost of providing utility (through leisure) to the woman and lowers the cost of providing utility to the man. The woman is worse off because she is compelled to increase her share of the family's market work.

C. <u>Implementation</u>

Some practical difficulties involved in the implementation of comparable worth have been widely discussed (see, for example, Raisian, Ward, and Welch 1985). First among these is the determination of an appropriate index of "worth" from a large set of relevant factors, including necessary qualifications, responsibilities, working conditions, and flexibility of hours. Second, there is the problem of enforcement: a conglomerate might, for example, circumvent a requirement that it pay truck drivers and textile workers equally by divesting itself of either firm. We abstract from these difficulties and assume that the standard of comparable worth under

Figure 1

Effect of a Wage Change on the Family's Bargaining Equilibrium



consideration is precisely defined and enforceable. We do, however, examine two other implementation issues, the first being the choice of a standard for fair hiring practices.

Some such standard is clearly necessary, since employers might otherwise attempt to circumvent comparable worth by hiring men exclusively. Discriminatory hiring practices are indeed prohibited under current laws; the issue is how these laws will be interpreted to identify firms engaged in such discrimination. While one could envision an enormous spectrum of possible standards, we will focus on two standards which seem particularly natural. First, courts might judge a firm in violation of the law if it hired men and women in proportions which were significantly at variance with application ratios. We will refer to this as the "applicant hiring rule." Second, courts might prevent firms from lowering the fraction of women hired in each occupation subsequent to adoption of the policy. We will refer to this as the "historical hiring rule." We suspect that courts' interpretations of statutes prohibiting discriminatory hiring practices will correspond more closely to the applicant hiring rule, and therefore adopt it as part of our standard case. We consider the results of the historical hiring rule primarily to illustrate that the effects of comparable worth are extremely sensitive to this aspect of implementation.

The second implementation issue we address is whether comparable worth standards, if adopted, would apply to the entire economy, or some significant subset of industries. Pressure for remedial legislation might, for example, be concentrated primarily in the government and manufacturing sectors. Indeed, some states have already moved to adopt standards of comparable worth for government employees. It is therefore important to consider cases in which the wage policy covers the entire economy ("full" implementation), as well as cases in which it applies to a limited number of sectors ("partial" implementation).

The potential importance of implementation issues can be illustrated by examining efficiency effects within a simple partial equilibrium setting. In Figure 2 we exhibit a standard supply and demand curve for some good, X, which the reader may interpret as female labor. In the absence of government intervention, the price of X equilibrates at P^*, and agents trade the amount X^*. Now suppose that the government artificially imposes a price floor, P_f (set equal to the comparable male wage). Since the short side of the market ordinarily determines exchange, agents will trade the amount X_f. However, suppliers will wish to sell $\bar{X}$ -- $(\bar{X} - X_f)$ represents unemployment.

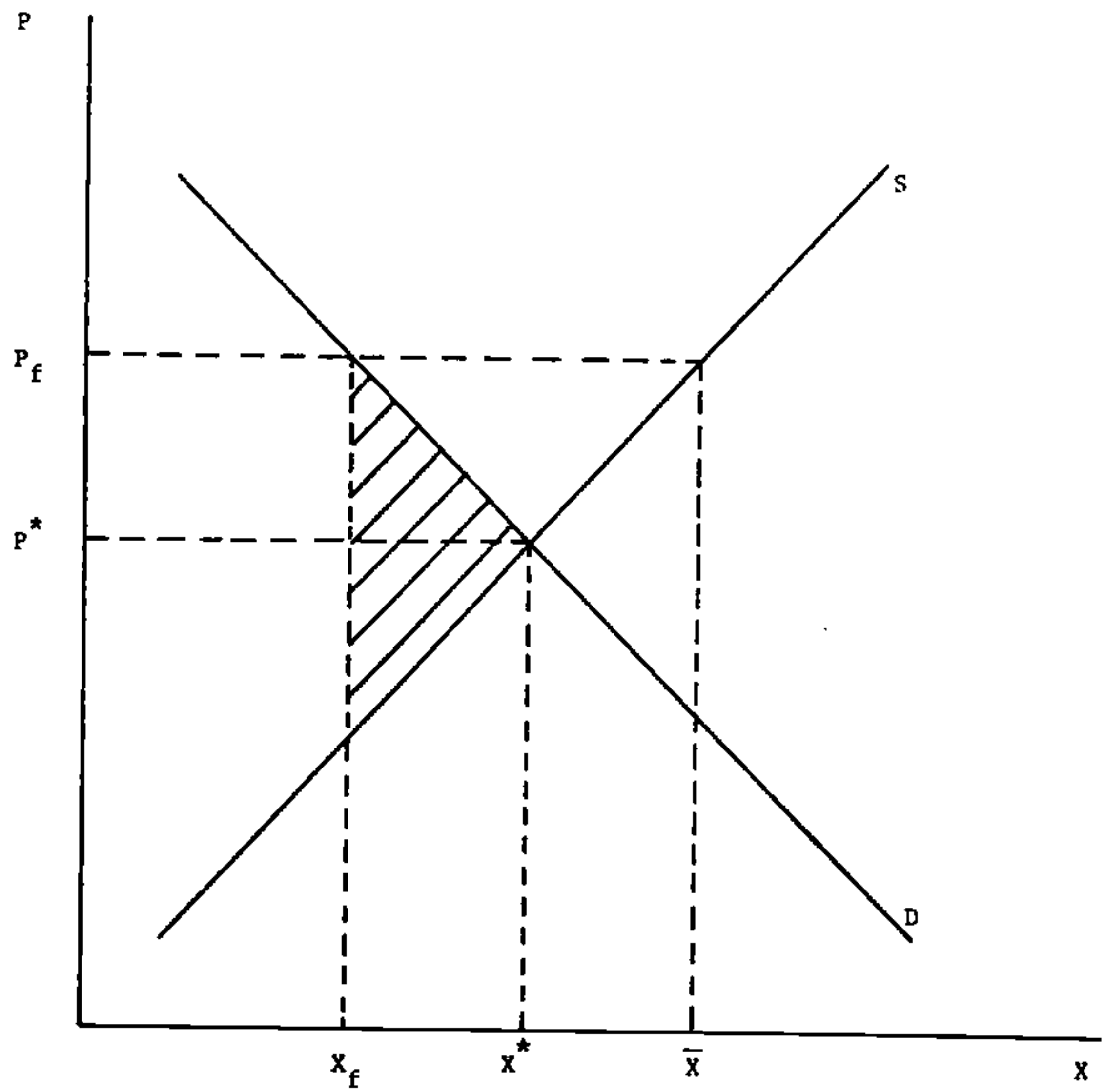
The deadweight loss associated with this policy depends on the allocation of demand among suppliers. First suppose that the allocation is efficient, in the sense that the lowest cost units are supplied first (e.g., because suppliers can freely trade the rights to sell units of output). Deadweight loss (DWL), which equals the sum of foregone consumer and producer surplus, is given by the area of the shaded triangle. Simple algebra reveals that

$$DWL \cong \frac{1}{2}\left(\frac{P_f - P^*}{P^*}\right)^2 (P^*X^*)\varepsilon_D(1+\varepsilon_D/\varepsilon_S),$$

where ε_D and ε_S are the elasticities of demand and supply, respectively. This formula bears a strong resemblance to the standard computation for excise taxes. The first two terms are, of course, the square of the price markup, and expenditures on X. In addition, note that DWL rises with ε_D, just as it does for an excise tax. However, note that DWL <u>falls</u> with ε_S, in sharp contrast with standard results on taxation. The intuition is, however, clear: since suppliers are rationed, ε_S does not affect X_f. A higher elasticity, therefore, simply reduces the producer surplus associated with the foregone units.

Figure 2

<u>Efficiency Effects of a Price Floor with Optimal Rationing</u>



Alternatively, if rationing is completely random (as it is in our experiments), some higher-cost suppliers participate in the market. Assuming for simplicity a linear supply curve with intercept $\underline{P}$, the average cost of production for selected suppliers increases to $(P_f + \underline{P})/2$. Thus, the deadweight loss associated with inefficient rationing is given by the shaded area in Figure 3. One should add this to our DWL measure, above.

From this simple analysis, we can draw two important lessons. First, any factors which dampen the demand response may reduce the distortions associated with comparable worth. Thus, hiring quotas may be a good second-best policy, and quotas which lead to greater demand for women (such as the applicant hiring rule) may be preferable. Likewise, it may be desirable to implement comparable worth on an economy-wide basis rather than partially, in order to reduce shifts of demand away from covered sectors. Second, note that the elasticity of labor supply is high whenever there are other profitable ways of employing labor. Thus, in contrast to our last remark, partial implementation may be preferable to full implementation, since uncovered sectors can absorb displaced workers; this argument is strengthened if the rationing is inefficient.

In the preceding discussion, we have implicitly assumed that purchasers do not discriminate against X. If discrimination is present, then the true marginal social benefit (MSB) of using X at any level of output is greater than the price at which consumers would just be willing to purchase that level of output. As shown in Figure 4, this increases the deadweight loss associated with imposing a price floor by an amount equal to the area of the shaded rectangle. Thus, in the presence of discrimination, it becomes even more important to impose quotas which require employers to maintain high levels of female employment.

Figure 3

Efficiency Effects with Stochastic Rationing

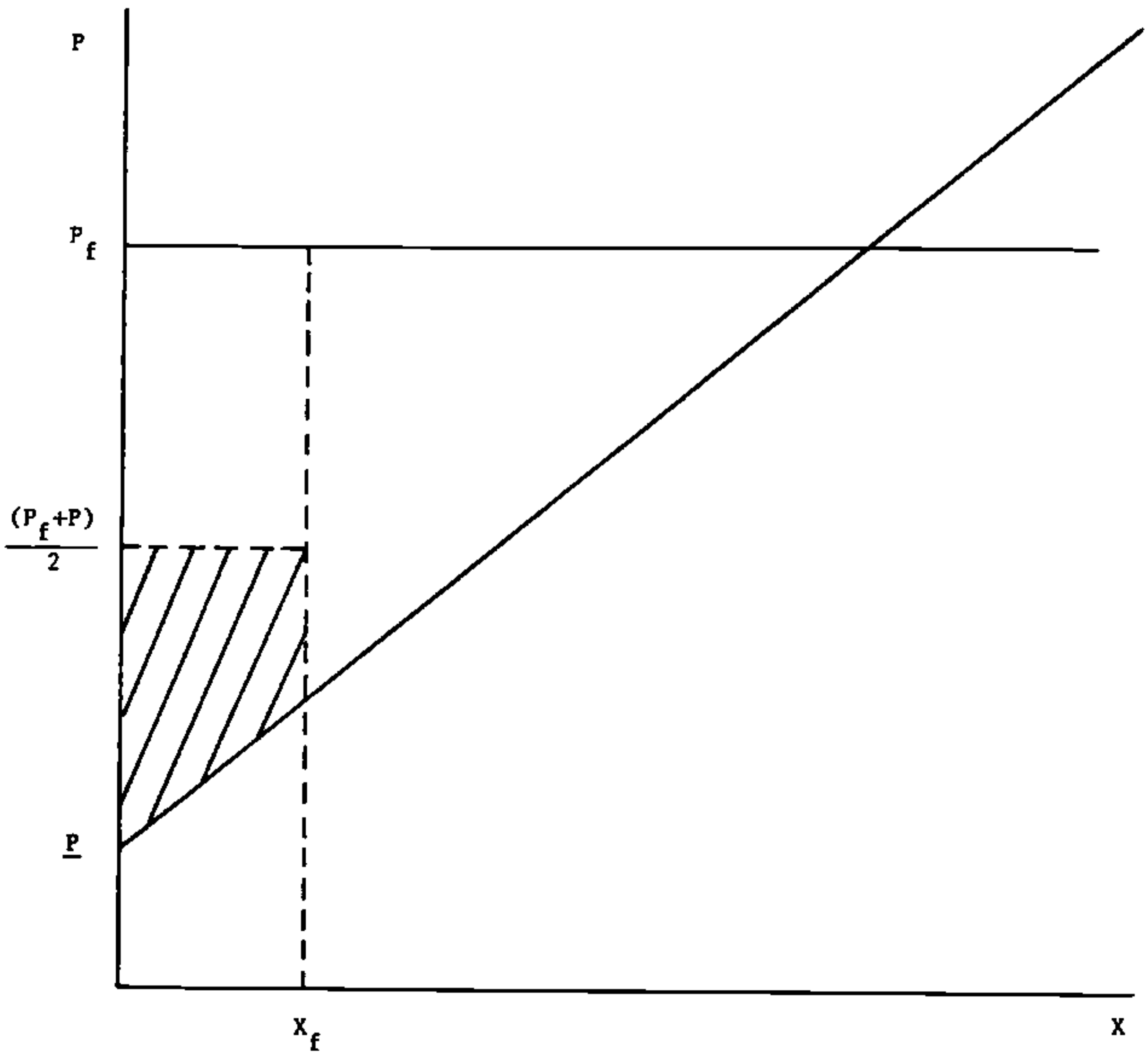
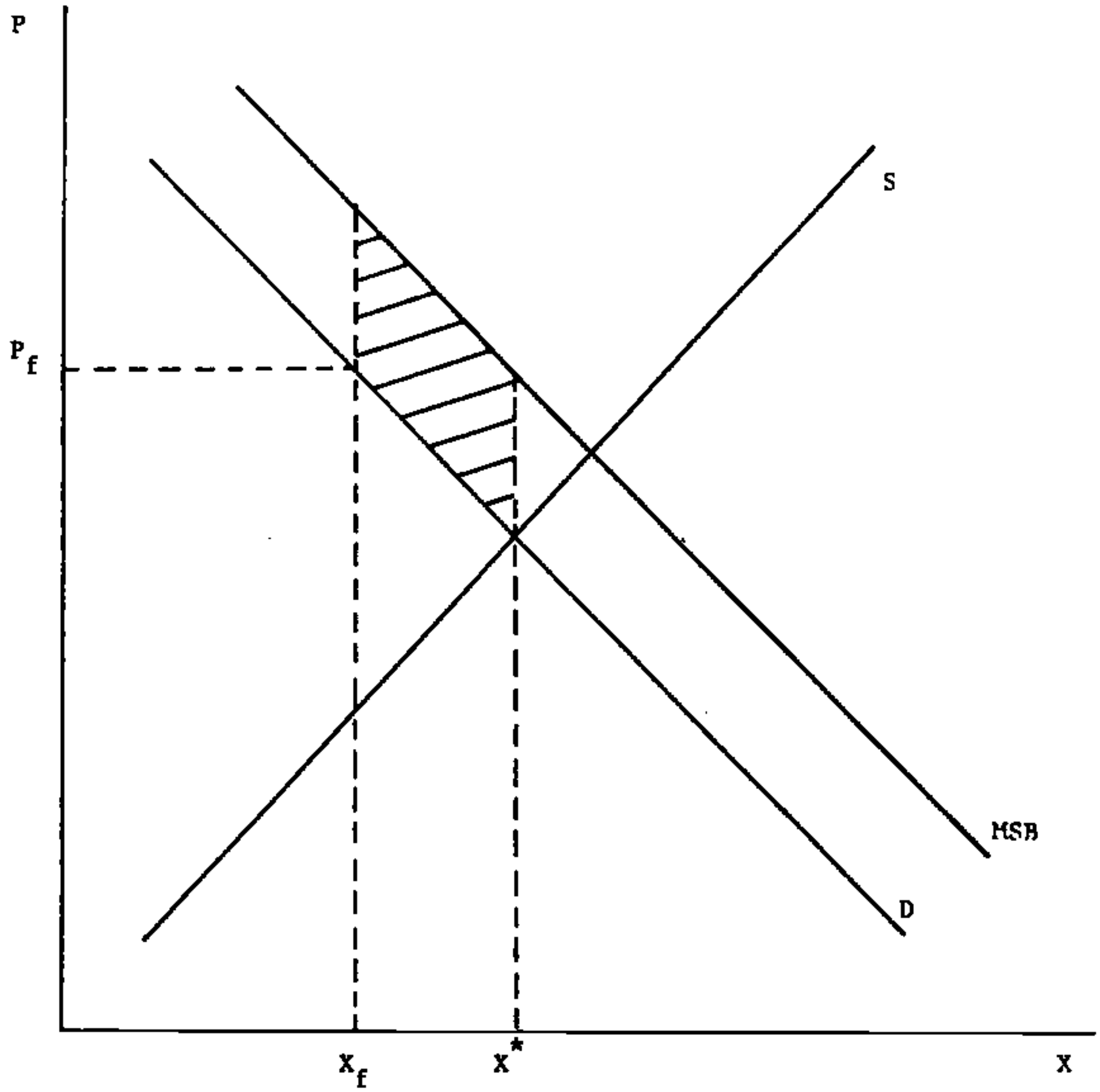


Figure 4

Effects of Discrimination on Efficiency Losses



Economists have long been aware that partial equilibrium analysis may be very misleading (see Harberger's [1961] seminal analysis of the corporate income tax). The reader may be struck by the similarity between a partial factor tax and a price floor on one factor input, especially when this floor applies only to employment in certain sectors. This analogy calls into question the robustness of conclusions based on partial equilibrium analysis, and underscores the importance of conducting general equilibrium simulations.

3. Model Description

To describe the implementation of our comparable worth experiments, we turn to the specific structure and features of the model. This section details the set of economic actors, the behavioral specifications, the alternative assumptions concerning the initial wage gaps, and finally the meaning of "labor market equilibrium" under comparable worth. A full technical description of the behavioral specifications is given in Appendix A, and our benchmark data set is provided in Appendix B.

A. Elements of the Model

As with all other computable general equilibrium analyses, we employ a highly aggregated framework. Our simplified U.S. economy contains five production sectors (each comprising one "representative" price-taking firm), one government, and eight representative households. There are four job types: "high-skill male-dominated," "low-skill male-dominated," "high-skill female-dominated," and "low-skill female-dominated." Each occupational category from the 1979 Census is placed in one of these four aggregates according to the majority sex of its workers and their median educational attainment (with 14 or more years of school used as the definition of "high-skill").[3] Our job definitions lead naturally to the specification of eight household types: there are four representative married households, classified by the skill levels of wife and husband, and four single types, defined by sex and skill level. The five production sectors are agriculture, goods (including manufacturing), trade and services, real estate, and government enterprises.

The inclusion of only four jobs, leading to just two wages under economy-wide comparable worth,[4] is a simplification imposed by computational requirements. More disaggregation of jobs would be desirable but it is not clear a priori that the estimated effects of comparable worth on efficiency are biased in a systematic direction. On the one hand, with a dichotomous skill level as the only dimension of "worth," the model overstates the extent of the restrictions on wage rates. On the other hand, actual employers would have more opportunities for substitution among the more numerous and narrowly-defined jobs, and it is these opportunities that produce efficiency losses to the economy.

Additional production sectors would not be a major computational burden; the motivation for parsimony here was data limitations. Given that the relative sectoral effects were not our primary interest, we sought to avoid increasing the number of required production function parameters. Preliminary analysis with a 20-sector model suggested that the macro and gender-related effects are probably not sensitive to the number of sectors.

The transactions between economic agents are as follows. Households purchase the outputs of the five sectors, and provide capital services and the four types of labor to these sectors plus government. The household objective is to maximize the utility obtained from leisure and consumption. Producers combine the factor supplies with intermediate inputs purchased from other sectors, so as to maximize profits from the sale of output to other firms, household consumers, and the government. Finally, the government produces public services using labor and goods purchased with revenues from household income taxes; the scenarios reported below are "equal-yield experiments" in which the marginal tax rates are adjusted so as to maintain constant real government output.[5]

We turn next to the functional specifications that drive these interactions.

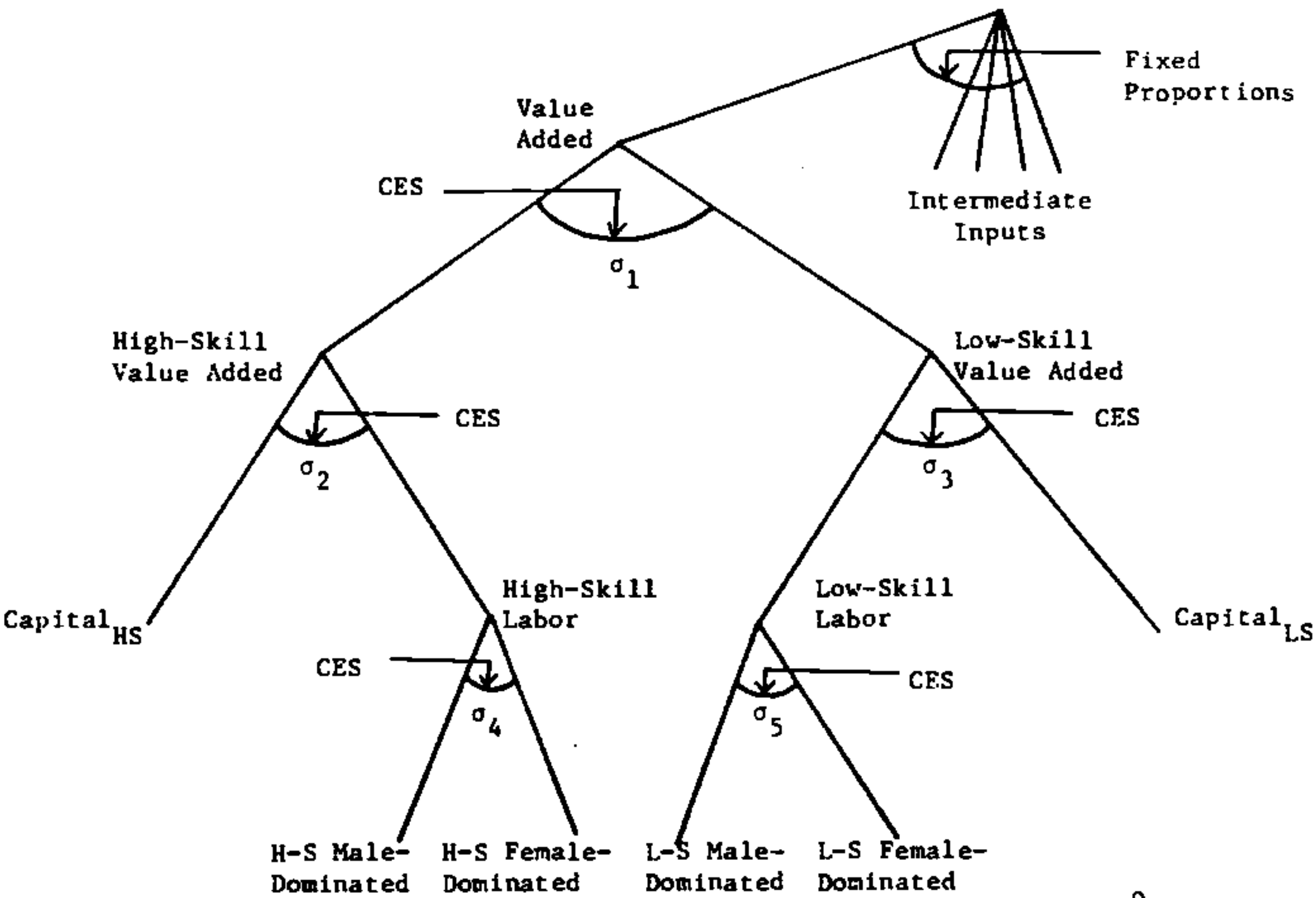
B. Behavioral Specifications

The responses of firms and the government to changes in market conditions are determined in accordance with their respective production functions. As illustrated in Figure 5, we assume a nested-CES function for value-added. In the innermost nests, composite high-skill and low-skill labor result from the hours supplied in the respective male- and female-dominated jobs. At the next level, these composite labor inputs are combined with capital to produce high- and low-skill value-added. The final CES stage aggregates these into value-added, which is then combined with intermediate goods in fixed proportions. The figure shows the substitution elasticities used in our standard case, and also the initial shares of "high-skill capital" that we assume in calibrating each sector's production function.

We also use a CES specification for utility in unmarried households; here, the CES function combines composite consumption and leisure, where "leisure" is defined as the difference between a maximum possible work week and actual market work time. Composite consumption is a Cobb-Douglas aggregate of the goods and services purchased from the five production sectors.[7] Note that each "representative" worker spends some hours in both the male- and female-dominated jobs at his or her skill level; thus "leisure" must also be some kind of composite that reflects the worker's preferences for allocating

Figure 5

Structure of Production, with Standard Assumptions



	σ_1	σ_2	σ_3	σ_4	σ_5	$\frac{K^o_{HS}}{K^o_{Total}}$
Agriculture	0.1	0.4	1.0	0.1	0.3	0.05
Goods	0.15	0.4	1.2	0.1	0.45	0.1
Trade and Services	0.6	0.7	1.0	0.4	0.8	0.2
Real Estate	0.6	0.7	0.7	0.2	0.8	0.5
Government Enterprises	0.6	0.5	1.2	0.5	0.75	0.3
General Government	0.6	___*	___	0.5	0.75	___

* See note 6.

time between the two jobs.[8] We make two assumptions here: that the maximum work week is divided between the two jobs in the same ratio as actual 1979 Census work hours for that type of worker;[9] and that composite leisure is again a Cobb-Douglas aggregate of leisure in each of the two jobs. Formally, using "L" for leisure, "T" for available hours, and "H" for hours worked,

$$L = (T_1 - H_1)^{\gamma}(T_2 - H_2)^{1-\gamma}$$

where $T_1 + T_2 = T_{tot}$ and $T_1/T_2 = H_1{}^{o}/H_2{}^{o}$.

For married couples, two alternative extensions of the single-person formulation are included. Our standard case defines "household utility" as a CES function of three terms--household consumption, husband's leisure, and wife's leisure (where each of these terms is again a composite). The merits and limitations of this representation were discussed in the previous section. In our alternative Nash-bargaining formulation, husbands and wives have distinct single-worker type utility functions, and agree to maximize the product of their benefits from marriage. As a crude representation of the various sources of benefits (e.g., economies of scale, love, children, etc.), we include a single utility bonus factor "g" (>1), which increases the utility of any combination of own consumption and leisure by a fixed percentage. The spouses' threat points (or bargaining positions) are determined by the utility they would attain if single, scaled by a term "τ" (≤ 1) representing the psychic and/or financial costs of divorce. Using "U" to represent the utility levels within the marriage, "V" to indicate the maximum attainable utility if single, and "h" and "w" subscripts for husband and wife, the formal problem is to maximize

$$(gU_h - \tau V_h)(gU_w - \tau V_w)$$

subject to the household budget constraint.

The substitution elasticities used in the household utility functions are derived from estimates of labor supply elasticities. The supply assumptions and resulting substitution elasticities for our standard case are given in Table 1. The income elasticity of labor supply is directly determined by the maximum work week parameter; in the standard set, we use 60 hours/week for everyone, with implied income elasticities as shown in the table. Table 2 provides the analogous figures (along with the capital ownership assumptions) for married couples in the Nash bargaining formulation, under our base assumptions $g = 1.2$ and $\tau = 1.0$ (i.e., a 20 percent utility bonus and costless divorce[10]).

C. Wage Gap Assumptions

According to Census data, women's wages in the four jobs are 18 percent to 39 percent below men's wages;[11] we assume that employers consider the sexes perfect substitutes in each job at the given wages.[12] As discussed above, these differentials can be explained in various ways; the model takes an agnostic position, allowing any fraction of the within-job gaps to be attributed to Beckerian discriminatory preferences by employers,[13] with the remainder specified as due to productivity differences between men and women. Of course, the source of the wage gaps between the male- and female-dominated jobs plays a major role in the comparable worth controversy. Here, the model is less flexible; we assume that these differences are solely the result of the balance between profit-maximizing demands and utility-maximizing supplies. If anything, this assumption understates the efficiency costs of comparable worth: whatever the source of the inter-job gaps, employers will shift away

Table 1. Standard household assumptions by household type.

Male skill level/ female skill level	Marrieds				Singles			
	High/ High	High/ Low	Low/ High	Low/ Low	High/ ___	Low/ ___	___/ High	___/ Low
Assumed labor supply elasticity	0.1	0.15	0.25	0.3	0.0	0.2	0.35	0.55
Resulting substitution elasticity	.572	.707	.843	1.011	.599	1.012	.785	.952
Labor income elasticity[a] implied by $T_{tot} = 60$	-.644	-.711	-.588	-.750	-.583	-.654	-.863	-1.070

[a]Elasticity with respect to pre-tax money income.

Table 2. Assumptions for husbands and wives in the standard Nash case.
($g = 1.2$, $\tau = 1.0$, $T_{tot} = 60$)

Skill level of husband/wife	High/High		High/Low		Low/High		Low/Low	
Share of household capital ownership	.6	.4	.7	.3	.5	.5	.6	.4
Assumed labor supply elasticity	0.0	0.35	0.0	0.55	0.2	0.35	0.2	0.55
Substitution elasticity	.518	.523	.566	.634	.961	.677	1.010	.752
Own-income labor supply elasticity	-.559	-2.149	-.628	-2.217	-.583	-1.777	-.837	-2.624
Spouse-income labor supply elasticity	-.005	-.057	-.004	-.329	-.025	-.017	-.037	-.340

from the female-dominated jobs when their relative wages rise, and this shift will have a greater output cost the more productive those workers are (i.e., the more the gaps are due to discrimination).[14]

The model also allows experiments in which initial efficiency gaps and/or discrimination coefficients disappear subsequent to the enactment of comparable worth. As explained above, such scenarios correspond to some recent theories of wage differentials. For productivity increases, the further question arises of whether these gains are at all costly to women workers (e.g., in terms of reduced energy available for nonmarket pursuits). Again, we take an agnostic position: any perceived cost between 0 and 100 percent of the efficiency gain is allowed in the model.

D. Constrained Equilibrium under Comparable Worth

Both within-job and between-job wage gaps are eliminated by the comparable worth wage rule, which specifies that all women and men of the same skill level be paid the same wage.[15] Given our assumption that the sexes are considered perfect substitutes at the initial within-job differentials, employers will prefer to hire men at any unisex wages. As noted in the last section, we impose one of two hiring constraints to represent existing equal-opportunity statutes: in the historical hiring rule, employers must continue to employ female and male labor in each of the four jobs in the same proportions as they did before comparable worth; under the applicant proportions rule, women and men must be hired in the ratios by which they come seeking employment. Without some such hiring rule to prevent employers from exchanging wage gaps for employment discrimination, the model would find a very high-wage equilibrium in which the demand for labor was reduced to a level that could be supplied by men alone.

Although firms are thus constrained in their responses _within_ each job, neither hiring rule affects their ability to substitute away from the female-dominated jobs, at a time when those jobs are becoming more attractive to workers;[16] thus neither rule produces full equilibrium in the labor market. The form of the imbalance may not be immediately clear: are wages high with some female-job aspirants unable to find desired employment, or do low wages prevent firms from finding enough male-job workers? The answer is the former; nothing prevents employers from raising wages to attract enough labor of any type, but an underemployed female-job worker has no comparable ability to bid the wage down, since firms must pay the same in both jobs and a below-market wage would cause them to lose all their male-job workers.

Therefore, both men and women will face employment constraints in the female jobs, under either hiring rule. With the applicant proportions rule, both sexes will face the same percentage constraint in these jobs, and both will be fully employed (i.e., face no constraint) in the male jobs, by construction. Under the historical rule, supply and demand sex-ratios will not coincide, and thus one sex (almost certainly women) will be constrained in the male jobs as well.

A worker facing a binding constraint on market hours in one job will compensate according to his or her utility function--in part by working more in the other job at that skill level (unless a binding constraint exists there as well), and in part by accepting more-than-desired leisure. (Married couples may also substitute more spousal work time.) Note that the model imposes the same constraints on all workers, rather than identifying some as completely unemployed under comparable worth, and others as able to work as many hours as desired.[17] We feel this is a reasonable representation, given the trend toward shorter work weeks (prompted in part by the decline of full-time homemakers, who can be expected to become even rarer under comparable worth).

The preceding describes the model implementation of economy-wide comparable worth; however, the model also allows "partial coverage" experiments in which the wage restrictions apply only to a subset of employment sectors. When there are covered and uncovered sectors, we model the rationing of the covered sector employment by a lottery; each worker is either a "winner" or a "loser" in each of his or her two jobs, and calculates desired hours accordingly. This all-or-nothing approach differs, but perhaps not unrealistically, from our treatment of unemployment under universal coverage. Note that with enough of the economy not covered, no unemployment occurs: the lottery percentages adjust to clear the covered labor markets, and the uncovered-sector wages adjust freely to clear the others.

In summary, a complete specification of an experiment with this model involves the selection of the wage rule (see footnote 15), hiring rule, efficiency/discrimination proportions in the intra-job wage gaps, continuation or disappearance of these two pay factors, utility formulation for couples, and sectors covered. In each case, the model solves for the wages, capital rental rate, equal-yield tax rate multiplier, and the relevant employment constraints.

Among the model's more important limitations is the absence of dynamics; we do not study the transition costs to the comparable worth equilibrium. The model also ignores possible effects on fertility or investment in physical or human capital; social and political changes that might result from comparable worth are also largely outside the scope of this paper.

4. Results

As is typical in research with computable general equilibrium models, we calibrate our model to reproduce exactly a benchmark data set, and report the counterfactual simulation results as changes from this base equilibrium. Before proceeding to the results, it may be useful to take a brief look at the benchmark labor market.

The first panel of Table 3 shows that slightly less than one-fourth of employment hours are worked in jobs which we classify as high-skill, and that the ratio of female to male wages in a particular job category ranges from 60 percent to 82 percent. Women get the lowest relative wage in the male dominated high-skill category. The second panel in the table shows the allocation of labor across sectors and the degree to which the labor force in each sector is male or female. "Trade and Services" and "Goods" each account for roughly 40 percent of total employment in the economy. Almost half of work hours in Trade and Services are performed by women, but the fraction is only one quarter in the Goods sector. Employment in the "General Government" sector is even more female intensive than in Trade and Services, with women's hours accounting for 52 percent of the total. The third panel shows that married women work slightly more total hours than single women, whereas married men provide a much greater share of total hours than do single men.

Tables 4 through 10 display the results for four sets of different specifications of the model and of comparable worth policy. Each set comprises two experiments: one in which the existing wage differentials within jobs are due to differences in productivity, and one where they are due to discrimination. (We have computed intermediate cases where the wage differential is due to some of each and the results closely approximate a linear combination of the two extreme cases shown here.) Table 4 contains the

TABLE 3
INITIAL WAGES AND EMPLOYMENT DISTRIBUTIONS

	HIGH SKILL MALE DOMINATED		HIGH SKILL FEMALE DOMINATED		LOW SKILL MALE DOMINATED		LOW SKILL FEMALE DOMINATED	
	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN
WAGE (1977 DOLLARS)	6.51	10.72	6.60	8.04	4.74	7.21	4.23	6.51
SHARE OF EMPLOYMENT HOURS	4.00	12.50	4.40	1.40	8.60	43.50	20.80	4.70

	AGRIC	GOODS	TRADE & SERVICES	REAL ESTATE	GOVT ENTER	GENL GOVT
WAGE (1977 DOLLARS)	7.00	6.83	6.57	7.55	6.63	6.72
PERCENTAGE OF TOTAL EMPLOYMENT HOURS	1.10	41.30	38.60	0.99	1.80	16.40
PERCENT OF HOURS WORKED BY WOMEN	14.10	24.70	47.10	40.80	27.00	51.90

	ALL	MARRIED WOMEN	SINGLE WOMEN	MARRIED MEN	SINGLE MEN
WAGE (1977 DOLLARS)	6.72	4.88	4.84	7.93	7.64
SHARE OF EMPLOYMENT HOURS	100.00	20.80	17.00	44.40	17.70

macro or aggregate results for percentage change in GNP and total work hours and the change in a measure of economic efficiency, while Tables 5 through 10 contain the microeconomic impacts in terms of employment, welfare, and output. Since it is difficult to explain the aggregate results without reference to the underlying allocational changes, we discuss these tables as a group rather than examining them sequentially. Our measure of efficiency is the traditional sum across households of Hicksian equivalent variations, expressed as a percentage of base GNP. This measure is strictly appropriate for a Benthamite social welfare function and is the construction universally used to measure costs in cost-benefit analyses.

As an arbitrarily chosen "standard case," we consider full (economy-wide) comparable worth, accompanied by a rule that hiring must be proportional to applicants, and with family behavior governed by a single utility function. Table 4 indicates that the macro effects of such a policy depend considerably on the cause of the existing wage differentials. Considering first the case in which they are due to efficiency differences, GNP and total work hours are predicted to fall by 3.5 percent and economic efficiency is found to decrease by almost two percent of GNP. Besides the direct deadweight cost illustrated in Figure 3, the loss in economic efficiency is increased by the tax wedge between the value of leisure and the social marginal productivity of work; with this tax wedge, any policy which reduces the market labor usage will tend to lead to a welfare loss.

The changes in GNP and economic efficiency calculated for the standard case with efficiency differences are large relative to the corresponding figures for other policies that have been explored with this type of model. For example, Harberger (1966) and Fullerton, King, Shoven, and Whalley (1981) find that the efficiency cost of the double taxation of corporate equity

TABLE 4
MACRO EFFECTS OF COMPARABLE WORTH

	EFFICIENCY GAPS ASSUMPTION			DISCRIMINATION GAPS ASSUMPTION		
	GNP % change	WORK HOURS % change	ECON EFFICIENCY % of GNP	GNP % change	WORK HOURS % change	ECON EFFICIENCY % of GNP
1. STANDARD CASE						
Full Comparable Worth, Applicant Hiring Rule, Family Utility Function	-3.51	-3.62	-1.96	-1.56	-2.57	-0.24
2. HIRING RULE						
Same as #1, except Historical Hiring Rule	-5.56	-9.14	-2.35	-5.32	-7.46	-2.69
3. COVERAGE						
Same as #1, but only sectors 2,5,6 covered	-1.41	-1.15	-1.36	-0.80	-1.09	-0.70
4. HOUSEHOLD SHARING						
Same as #1, except spousal Nash Bargaining	-2.50	-3.64	-1.08	-1.31	-2.21	-0.33

income (at both the corporate and personal levels) is roughly between half and one percent of GNP. Here, the efficiency cost figure is at least double that. It should be pointed out that the loss in economic efficiency in this case is not 1.96 percent of one year's GNP, but is equivalent to the annual loss of that percent of the value of output--i.e., a loss of roughly two percent of the total human and nonhuman capital in the economy.

If the wage gaps are due to discrimination, the GNP loss incurred with the introduction of comparable worth in our standard case is 1.5 percent and the loss in economic efficiency is just .24 percent. To understand why the macro results are so different, one must refer to Table 5 which shows that in both cases the composition of the labor force is significantly altered by comparable worth: women's labor supply increases roughly 8 to 11 percent and men's decreases about 10.5 percent. If women are as productive as men, as in the case where the wage gaps are due to discrimination, this substitution of women for men in the work force does not reduce GNP and efficiency as it would if the initial gaps were due to efficiency differences.

One might wonder why the discrimination gaps case does not show a significant increase in economic efficiency. The answer is that eliminating the discriminatory wage differentials does not nullify the employers' taste for discrimination. Firms now consider women more costly than men, and while they must obey the hiring rule in employing the sexes within each job, nothing prevents a demand shift away from those jobs and sectors that are female-intensive.[18] (This is equally true in the efficiency gaps cases.) Thus, the perception of a wage "gap" is not eliminated, but transferred from the supply side to the demand side; under the assumptions of our standard case, this leaves economic welfare largely unaffected.

The expected patterns of employment changes are found in the micro tables. Table 6 shows that the employment of both men and women declines in

TABLE 5
SPECIFIC EMPLOYMENT EFFECTS OF COMPARABLE WORTH
percentage change
top # refers to efficiency gap cases, bottom # to discrimination gaps

	ALL	WOMEN	MEN	MARRIED WOMEN	MARRIED MEN	SINGLE WOMEN	SINGLE MEN
1. STANDARD CASE							
Full Comparable Worth, Applicant Hiring Rule, Family Utility Function	-3.62 -2.57	7.65 10.60	-10.49 -10.59	24.57 28.33	-12.65 -12.94	-13.01 -11.06	-5.06 -4.70
2. HIRING RULE							
Same as #1, except Historical Hiring Rule	-9.14 -7.46	-15.78 -12.50	-5.09 -4.39	-11.34 -7.94	-5.35 -4.74	-21.21 -18.07	-4.43 -3.51
3. COVERAGE							
Same as #1, but only sectors 2,5,6 covered	-1.15 -1.09	3.79 4.22	-4.16 -4.34	15.52 16.18	-5.45 -5.67	-10.55 -10.38	-0.94 -0.99
4. HOUSEHOLD SHARING							
Same as #1, except spousal Nash Bargaining	-3.64 -2.21	-3.08 -0.27	-3.99 -3.39	0.64 3.28	-3.89 -3.37	-7.64 -4.61	-4.23 -3.44

TABLE 6
SPECIFIC EMPLOYMENT EFFECTS BY JOB AND SEX
percentage change
top # refers to efficiency gap cases, bottom # to discrimination gaps

	ALL	MEN				WOMEN			
		HS Male Dom	HS Fem Dom	LS Male Dom	LS Fem Dom	HS Male Dom	HS Fem Dom	LS Male Dom	LS Fem Dom
1. STANDARD CASE									
Full Comparable Worth, Applicant Hiring Rule, Family Utility Function	-3.62 -2.57	-4.86 -5.57	-11.49 -9.80	-8.68 -9.16	-41.94 -37.54	33.53 32.11	-5.70 -4.19	59.94 57.46	-16.09 -9.76
2. HIRING RULE									
Same as #1, except Historical Hiring Rule	-9.14 -7.46	-1.92 -1.44	-9.36 -8.11	-3.76 -3.52	-24.56 -19.24	-0.56 -0.18	-10.35 -8.93	-3.19 -2.95	-25.09 -19.59
3. COVERAGE									
Same as #1, but only sectors 2,5,6 covered	-1.15 -1.09	-2.32 -2.62	5.89 6.69	-5.30 -5.66	-1.57 0.01	12.27 10.76	-6.81 -6.13	31.61 28.89	-7.09 -5.02
4. HOUSEHOLD SHARING									
Same as #1, except spousal Nash Bargaining	-3.64 -2.21	-0.36 -0.34	0.74 2.60	-2.83 -2.63	-25.81 -20.47	16.85 16.62	-10.73 -8.75	31.66 28.24	-19.66 -13.51

TABLE 7
EMPLOYMENT RELATIVE TO DESIRED EMPLOYMENT

top # refers to efficiency gap cases, bottom # to discrimination gaps

	ALL	WOMEN	MEN	MARRIED WOMEN	MARRIED MEN	SINGLE WOMEN	SINGLE MEN
1. STANDARD CASE							
Full Comparable Worth, Applicant Hiring Rule, Family Utility Function	88.73 89.69	75.51 77.59	101.80 101.65	73.64 75.87	104.36 103.99	79.03 80.82	96.35 96.66
2. HIRING RULE							
Same as #1, except Historical Hiring Rule	82.55 83.32	58.15 59.79	106.78 106.78	51.77 53.30	111.83 111.70	70.03 71.78	96.01 96.27
3. COVERAGE							
Same as #1, but only sectors 2,5,6 covered	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
4. HOUSEHOLD SHARING							
Same as #1, except spousal Nash Bargaining	92.64 93.54	84.55 86.43	98.44 98.63	84.99 86.81	98.94 99.07	83.98 85.94	97.22 97.56

TABLE 8

EMPLOYMENT RELATIVE TO DESIRED EMPLOYMENT BY JOB

top # refers to efficiency gap cases, bottom # to discrimination gaps

		MEN				WOMEN			
	ALL	HS Male Dom	HS Fem Dom	LS Male Dom	LS Fem Dom	HS Male Dom	HS Fem Dom	LS Male Dom	LS Fem Dom
1. STANDARD CASE									
Full Comparable Worth, Applicant Hiring Rule, Family Utility Function	88.73 89.69	104.05 103.78	76.67 78.36	108.94 108.16	53.65 57.63	108.06 107.52	76.67 78.36	124.94 122.82	53.65 57.63
2. HIRING RULE									
Same as #1, except Historical Hiring Rule	82.55 83.32	105.99 105.91	77.99 78.78	113.54 112.89	69.20 73.68	78.65 78.23	71.20 71.65	74.30 73.51	47.30 50.26
3. COVERAGE									
Same as #1, but only sectors 2,5,6 covered	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
4. HOUSEHOLD SHARING									
Same as #1, except spousal Nash Bargaining	92.64 93.54	101.46 101.33	84.09 85.57	102.59 102.27	64.45 68.84	107.44 106.78	83.85 85.34	141.22 136.23	63.61 68.04

TABLE 9
SPECIFIC WELFARE EFFECTS OF COMPARABLE WORTH

percentage change
top # refers to efficiency gap cases, bottom # to discrimination gaps
figures in parentheses are standard deviations (in percentage points)

		MARRIED COUPLES **				SINGLE MEN		SINGLE WOMEN	
		H/H	H/L	L/H	L/L	HIGH	LOW	HIGH	LOW
1. STANDARD CASE									
Full Comparable Worth, Applicant Hiring Rule, Family Utility Function		-5.12	-5.55	-1.68	-1.05	-8.20	-5.14	4.73	5.29
		-3.68	-4.13	-0.28	0.21	-7.46	-4.27	5.80	6.38
2. HIRING RULE									
Same as #1, except Historical Hiring Rule		-5.60	-6.18	-2.35	-1.58	-7.82	-4.57	4.32	5.43
		-6.53	-6.83	-2.97	-1.63	-8.52	-4.55	3.29	5.28
3. COVERAGE									
Same as #1, but only sectors 2,5,6 covered		-2.85(1.85)	-3.11(1.60)	-1.25(2.84)	-1.27(2.25)	-3.15(0.85)	-2.76(0.44)	3.46(4.96)	2.32(4.09)
		-2.08(1.84)	-2.44(1.60)	-0.66(2.85)	-0.89(2.26)	-2.64(0.81)	-2.51(0.41)	3.97(4.95)	2.70(4.09)
4. HOUSEHOLD SHARING									
Same as #1, except spousal Nash Bargaining	husband/wife	-8.94/2.21	-8.79/2.61	-6.32/4.33	-4.84/4.02	-7.26	-4.52	5.87	6.45
	husband/wife	-8.63/2.43	-8.49/3.16	-5.63/4.53	-4.13/4.50	-7.11	-3.99	5.93	6.94

** H/L refers to a married couple with a high skill husband and a low skill wife and similarly for couples with a diferent composition.

TABLE 10
OUTPUT EFFECTS OF COMPARABLE WORTH
percentage change
top # refers to efficiency gap cases, bottom # to discrimination gaps

	ALL*	AGRICULTURE	GOODS	TRADE & SERVICES	REAL ESTATE	GOVERNMENT ENTERPRISES
1. STANDARD CASE						
Full Comparable Worth, Applicant Hiring Rule, Family Utility Function	-3.51 -1.56	-2.08 -0.51	-3.06 -0.93	-5.97 -3.41	-1.97 -0.56	-3.72 -1.45
2. HIRING RULE						
Same as #1, except Historical Hiring Rule	-5.56 -5.32	-3.84 -3.68	-5.45 -5.33	-8.63 -8.47	-3.12 -2.72	-6.04 -5.93
3. COVERAGE						
Same as #1, but only sectors 2,5,6 covered	-1.41 -0.80	-1.82 -1.36	-3.50 -2.80	0.64 1.43	-0.83 -0.65	-3.30 -2.54
4. HOUSEHOLD SHARING						
Same as #1, except spousal Nash Bargaining	-2.50 -1.31	-1.26 -0.32	-1.93 -0.69	-4.69 -3.10	-1.03 -0.10	-2.41 -1.07

* includes General Government output, which is held constant

the female dominated jobs in the standard case. Table 10 shows that the output of the Trade and Services sector, whose employees are almost half women, declines by the largest amount, significantly more than the other large employment sector, the Goods sector. A result of the comparable worth wages and the accompanying hiring rules is that single women, who desire to work more at their newly higher wages, actually end up working less. They are crowded out of employment by the very large increase in desired employment by married women. In the standard cases, single women end up supplying 11 to 13 percent less labor (Table 5), although they would like to work about 25 percent more hours than are made available by employers (Table 7).

Focusing further on the effects of the employment constraints, we now examine the results under the rule that hiring must be done in historical sex ratios. Table 4 shows that the loss in GNP, work hours, and economic efficiency would be significantly, and in most cases dramatically, larger than if an applicant rule were applied, under either explanation of the existing wage differentials. With historical hiring proportions, the labor demand for women is much lower. As before, the sectors and jobs which heavily utilize women's labor are those which shrink due to the increased cost of female labor. However, in this case women cannot increase their share of the work in other jobs, and therefore they are trapped in declining jobs and sectors and suffer significant unemployment. The later tables clarify this. Table 5 shows that the gender composition of the labor force is quite different with the historical ratio hiring rule. Both men and women work less with comparable worth under this regime, with the hours of single women now down about 20 percent. The loss in GNP is particularly great in the discrimination gaps case relative to what it would be with an applicant rule, because the many women who are unemployed in this case are as productive as their male counterparts.

Tables 6 through 8 further elaborate the differences between the results with an applicant hiring rule and a historical hiring rule. The first rows of Table 6 show a large shift of women between female-dominated jobs and male dominated jobs. For example, in the standard case with existing wage differentials due to discrimination, female hours in the low-skill female-dominated jobs decline by 10 percent while female hours in the male-dominated low skill jobs increase by almost 60 percent. With the historical hiring rule, this large increase in female employment in the low skill male dominated jobs is missing. Tables 7 and 8 show employment relative to desired employment by sex and marital status and also by job. Desired employment is the amount someone would choose to work if there were no constraints on that person or, in the case of married individuals, on the spouse. Table 7 shows that men actually work more than they would if the comparable worth wages were not accompanied by employment constraints; this is accounted for by married men, who try to compensate for the restrictions that prevent their wives from working as much as desired. This is particularly striking in the cases with the historical hiring rule, where Table 7 indicates that married women work only slightly more than 50 percent of their intended hours, and married men work almost 112 percent of their desired hours. Table 8 shows that women move from constrained to unconstrained jobs in the applicant hiring rule case, but that effectively all jobs are constrained for them in the historical hiring rule.[19]

We conclude that as a hiring regulation to accompany a comparable worth wage policy, the historical hiring rule is sharply inferior to the applicant rule. This was evident in the aggregate results of Table 4 and also shows up in the disaggregated welfare results of Table 9. Regardless of whether the existing differentials are due to discrimination or efficiency differences, all married couples are better off with an applicant rule than with a historical hiring rule, as are high-skill single women. Single men and low-skill single women lose somewhat less with the historical hiring rule under the efficiency gaps assumption, although even they would prefer the applicant rule under the discrimination gaps hypothesis. The reason that single men may do better under the historical rule is that they are protected from increasing competition from women in the male dominated jobs. Low-skill single women seek fewer work hours than their married counterparts, and thus are relatively less restricted by the absolute hour limits used with the historical hiring rule than by the proportional limits of the standard cases (see note 17). This less-burdensome constraint in the female job can be enough to compensate them for the restriction on hours in the male job.

Still concentrating on the specific welfare effects under the two alternative hiring rules, one major result in Table 9 is that only single women are made better off with comparable worth. The magnitude of the changes in welfare are considerable. With the applicant hiring rule, comparable worth legislation increases the welfare of single women from 4.7 to 6.4 percent while decreasing the welfare of single men roughly 4 to 8 percent. Married couples are almost always made worse off because the improvement in the wife's wage fails to overcome the deterioration of the husband's work situation.

Another notable feature of Table 9 is that high-skilled men, whether married or single, do much worse than low-skilled men, under either hiring rule. The same holds, less strongly, for single women. This is largely the result of our elasticity assumptions: we allow employers to shift from the female- to the male-dominated job more easily at the low-skill level than at the high-skill level (i.e., $\sigma_5 > \sigma_4$ in Figure 5); and we assume lower labor supply elasticities, hence less ability to substitute consumption for higher-cost leisure, for high-skill workers (see Table 1). This explanation is confirmed by a simulation not reported in the tables, in which these elasticity assumptions were reversed in the standard efficiency differentials case; these changes cut the high/low welfare effects gap to .3 percent for single men, and more than reversed the single women's gap, with the high-skilled workers benefiting 1.5 percent more than the low-skilled. (The welfare effects for single men (and married couples) are not more completely reversed in this experiment because switching the assumed labor supply elasticities is not equivalent to switching the model's consumption/leisure substitution elasticities: other variables from the base data set, such as capital income and hours worked, influence the derived substitution elasticities.)

We also examine in Tables 4 through 10 a case where comparable worth wage equality is enforced only in the Goods sector and in Government Enterprises and General Government. The aggregate results of Table 4 show that the efficiency loss almost equals the percentage decline in GNP for this case, in sharp contrast to the results of the other cases. The reason for this is that partial coverage opens a new sort of intersectoral inefficiency, namely that the wage costs differ between the covered and uncovered sectors. The strong output effects of this are shown in Table 10 where the Trade and Services sector, which is both labor intensive and female labor intensive, now grows rather than shrinks. Because there is an uncovered sector to absorb all those who want to work (at the relatively low wages which prevail there), aggregate employment falls very little in this case. Technically, then, there is no unemployment with partial coverage.

Recall that our formulation of the partial coverage cases allows those who get covered jobs to work as many hours as they choose, but rations access to these jobs. The resulting specific welfare effects are shown on the third set of rows in Table 9, with standard deviations given in parentheses. For instance, for the efficiency gaps assumption, high-skill single women on average gain 3.46 percent, but one standard deviation adds or subtracts 4.96 percentage points to that figure. Women who are unable to find any covered sector employment are unambiguously worse off than if no comparable worth policy existed.

The final case covered in the set of Tables 4 through 10 is not a variant of our model of comparable worth, but rather an alternative model of the family. Here we adopt the approach described above in which Nash bargaining determines the division of resources in marriages. In the cases shown in this set of tables, we assume the gains from marriage (perhaps due to economies of scale in consumption) are 20 percent. In this Nash bargaining framework we are able to examine the welfare consequences for husbands and wives separately.

The aggregate results of Table 4 are not too different in the Nash bargaining case from those in the standard case, although under the efficiency gaps assumption the percentage declines in GNP and aggregate welfare are now noticeably smaller. This is because the composition of employment is very different with Nash bargaining, as is evident in Table 5. Because of the bargaining arrangement, much less substitution of women's work for men's work takes place among marrieds. Overall, the labor force is more male intensive with the Nash bargaining model, and since men are more productive in the efficiency gaps case, GNP and total efficiency fall less. The specific welfare results of Table 9 show separate compensating variation figures for husbands and wives for the household bargaining model. In these cases, husbands lose and wives gain. In fact, husbands lose more than single men of the same skill level; this is because their threat points have weakened in their marriages relative to those of their wives.

In any simulation model, the results are a function of assumptions and parameters. This particular model is relatively complex and involves a large number of assumptions, prohibiting systematic sensitivity analysis. Nonetheless, we have examined the results of some alternative parameter values, and present the results in Tables 11 and 12. Two variants of the standard case with efficiency gaps are presented, one which raises the total hours to be allocated between work and leisure from 60 hours a week to 70 hours per week (with other parameters recalibrated so that the model still replicates the benchmark data in the base case), and the other triples the intra-skill elasticities of substitution (σ_4 and σ_5). Changing the total amount of time to be allocated affects the qualitative results of comparable worth not at all and the quantitative results only slightly. Tripling the substitution elasticities is a rather more drastic change in assumptions and hence causes some important qualitative changes in the results. Firms can now substitute male dominated jobs for female dominated ones much more readily, with the result that women are much more constrained in the amount of work offered them after comparable worth is implemented. Total work hours by women now decline, total work hours in the economy fall by over 7 percent and the decline in GNP and economic efficiency is correspondingly higher than in the standard case. Interestingly, Table 12 indicates that all households are worse off with the higher substitution elasticities, with the exception that low-skill single men are slightly better off. Of course, the high elasticities simply allow a wedge to cause greater distortions in the economy, as was described above.

We also increased elasicities (in this case the labor supply elasticities and all substitution elasticities in the Goods and Trade and Services sectors) in the standard case under the discrimination gaps hypothesis. Again, the higher elasticities lead to larger welfare losses and a greater reduction in labor market hours and GNP. The partial equilibrium analysis of section 2 predicted the opposite welfare result for the supply elasticities case; however, that analysis took as given the wage floor P_f. Here, the greater supply sensitivity means a greater increase in the share of women in the

TABLE 11
SENSITIVITY OF RESULTS TO ALTERNATIVE SPECIFICATIONS
percentage change
Economic Efficiency measured as a % of GNP

	GNP	ECON EFF	TOTAL HOURS	WOMEN HOURS	MEN HOURS	MARRIED WOMEN HOURS	MARRIED MEN HOURS	SINGLE WOMEN HOURS	SINGLE MEN HOURS
1. Standard efficiency gaps case	-3.51	-1.96	-3.62	7.65	-10.49	24.57	-12.65	-13.01	-5.06
1A. Same as #1, except that maximum work week raised from 60 to 70 hrs	-3.78	-2.11	-3.48	11.37	-12.54	31.24	-15.59	-12.91	-4.88
1B. Same as #1, except that intra skill substitution elasicities are tripled	-5.54	-3.45	-7.72	-5.47	-9.08	7.39	-10.41	-21.19	-5.74
2. Standard discrimination gaps case	-1.56	-0.24	-2.57	10.60	-10.59	28.33	-12.94	-11.06	-4.70
2A. Same as #2, except that all labor supply elasticities increased by .2	-2.68	-0.65	-4.05	12.42	-14.08	31.67	-16.38	-11.11	-8.30
2B. Same as #2, except that substitution elasticities doubled in sectors 2 & 3	-2.62	-0.97	-4.25	5.78	-10.46	22.12	-12.41	-14.19	-5.22
3. Nash bargaining efficiency gaps case	-2.50	-1.36	-3.64	-3.08	-3.99	0.64	-3.89	-7.64	-4.23
3A. Same as #3, except that threat points set at zero	-2.01	NA	-2.14	4.17	-5.98	14.04	-6.60	-7.88	-4.43
4. Nash bargaining discrimination gaps case	-1.31	-0.33	-2.21	-0.27	-3.39	3.28	-3.37	-4.61	-3.44
4A. Same as #4, except that marriage utility gain increased from 20% to 50%	-1.26	-0.32	-2.16	1.08	-4.14	5.84	-4.39	-4.72	-3.49

TABLE 12
SPECIFIC WELFARE EFFECTS FOR ALTERNATIVE PARAMETER SPECIFICATIONS
percentage change

	MARRIED COUPLES **				SINGLE MEN		SINGLE WOMEN	
	H/H	H/L	L/H	L/L	HIGH	LOW	HIGH	LOW
1. Standard efficiency gaps case	-5.12	-5.55	-1.68	-1.05	-8.28	-5.14	4.73	5.29
1A. Same as #1, except that maximum work week raised from 60 to 70 hrs	-4.83	-5.14	-1.65	-0.94	-7.62	-4.64	3.97	4.48
1B. Same as #1, except that intra skill substitution elasicities are tripled	-7.07	-7.58	-2.95	-1.87	-9.53	-5.00	3.11	3.84
2. Standard discrimination gaps case	-3.68	-4.13	-0.28	0.21	-7.46	-4.27	5.80	6.38
2A. Same as #2, except that all labor supply elasticities increased by .2	-4.16	-4.51	-0.69	-0.01	-7.56	-4.46	5.39	6.04
2B. Same as #2, except that substitution elasticities doubled in sectors 2 & 3	-3.66	-4.42	-0.53	-0.56	-7.04	-4.71	5.95	5.59
3. Nash bargaining efficiency gaps case	-8.94/2.21	-8.79/2.61	-6.32/4.33	-4.84/4.02	-7.26	-4.52	5.87	6.45
3A. Same as #3, except that threat points set at zero	1.79/-9.93	-1.48/-8.43	4.66/-6.28	4.01/-5.73	-7.75	-4.61	5.52	6.50
4. Nash bargaining discrimination gaps case	-8.63/2.43	-8.49/3.16	-5.63/4.53	-4.13/4.50	-7.11	-3.99	5.93	6.94
4A. Same as #4, except that marriage utility gain increased from 20% to 50%	-6.57/-0.62	-7.02/-0.21	-3.17/2.09	-2.08/1.77	-7.18	-3.97	5.90	7.00

** H/L refers to a married couple with a high skill husband and a low skill wife and similarly for couples with different composition.

work force, and hence a higher average wage perceived by employers. The qualitative result that the efficiency cost of comparable worth is much smaller if the existing differentials are due to discrimination remains, with the efficiency loss numbers remaining under one percent of GNP even in these cases with increased elasticities.

We have done two sensitivity analyses for the Nash bargaining cases. In the first of these, we set the threat points to zero for married couples in a case where the existing differentials are due to efficiency differences.[20] This effectively locks both spouses into the marriage and causes them to engage in the same type of female for male labor substitution that is observed with the model with family utility functions. In particular, Case 3A of Table 11 shows that married women work 14 percent more and married men 6.6 percent less after comparable worth. This substitution was not apparent in the base case where threat points were equal to a spouse's utility if single (i.e., with costless divorce). The most noticeable change caused by the removal of threat points (which is analytically equivalent to an infinite marriage bonus) is in the distribution of welfare within marriages. These figures are shown in Table 12. With a 20 percent marriage bonus, wives gain and husbands lose due to comparable worth; the women's gain arises from the strengthening of their threat points. With zero threat points, the women work more and therefore enjoy less leisure, while the husbands share in the income generated by the wives. In fact, the husbands in some cases end up significantly better off while all wives are worse off because of comparable worth. The second of the Nash bargaining sensitivity cases increases the marriage bonus or the degree of returns to scale in marriage from 20 percent to 50 percent, in a case where the existing wage differentials are due to discrimination. This change barely affects the aggregate results, although the labor substitution and the welfare transfers noted above are also apparent for this case.

In addition to the above experiments with various comparable worth specifications and parameter choices, we have conducted a third group of simulations in which the discrimination or effiency differences that produce male/female wage gaps in each job evaporate. We summarize the macroeconomic results here but omit the detailed tables, partly for brevity and partly because we don't feel that our model adequately captures the complexities of the labor market theories that predict this elimination.

Because discriminatory preferences affect the efficiency of resource use at the margin, while productivity gaps affect the value of all infra-marginal resources, the disappearance of the former should provide smaller gains than the elimination of the latter. The model confirms this: if pre-existing discrimination evaporates under comparable worth, GNP rises 2.2 percent and overall economic efficiency is boosted 1.6 percent of original GNP; for vanishing productivity differences, the corresponding gains are 5.3 percent and 7.5 percent. Even here, of course, the equality of wages between male- and female-dominated jobs imposed by comparable worth is inefficient; if discrimination or productivity gaps could be eliminated without comparable worth, the gain in economic efficiency would be 3.6 percent or 9.7 percent, respectively. (These latter figures are our model's estimates of the welfare costs of the intra-job wage differentials, under the two alternative assumptions concerning their origin.)

We also considered cases in which productivity differences evaporate, but at some cost to women workers through increased schooling, acceptance of less-preferred careers, a reduction in energy available for non-market activities, or the like. If women bear the full cost, then eliminating the productivity gaps leads to no change in economic welfare; in a smaller number of hours, women can produce as much as they did before for exactly the same total pay and at precisely the same disutility cost from working. If comparable worth is added to this situation, an efficiency loss of 1.0 percent is observed. These results are somewhat non-linear with respect to the "effort cost" assumption; for example, to equate the welfare change under the assumption that women bear a cost of 90 percent of the productivity improvement with a weighted average of the "full cost" and "zero cost" results, respective weights of about 93.5 percent and 6.5 percent are required.

5. Discussion

The simulations reported in this paper reveal that both the implementation of comparable worth and the analysis of its effects are extremely complex. The results are very sensitive to assumptions about the hiring rules that will accompany the wage constraints and the source of existing male-female wage differentials, the modeling of married households, and a number of behavioral parameters.

Consider the issue of hiring rules. Regardless of whether existing wage gaps are due to efficiency differences or to discrimination, the introduction of comparable worth on a large scale will cause employers to want to substitute away from women workers toward men. Thus some constraints on hiring are likely to be imposed. If, after implementation of comparable worth, employers are required to maintain the same sex ratio of employees as before the new policy (historical proportions), the adverse effects of the policy on employment, gross national product, and economic efficiency will be much greater than if firms are required to employ men and women in the same proportion as they appear in the pool of qualified applicants (applicant proportions).

Marital status and the assumptions about the nature of marriage are very important. The effects of comparable worth on employment, income, and utility of single men and women are relatively easy to discern: single women are big winners, although their employment falls. Single men are unambiguously big losers. The effects on married men and women, by contrast, are not easy to predict. They vary greatly depending on whether married couples are assumed to have a single utility function or to engage in bargaining. If the latter, the results are additionally sensitive to the ease or difficulty of divorce and the size of the gains from marriage.

If existing wage gaps between men and women reflect efficiency differences, comparable worth would have substantial adverse effects on the economy as a whole, although women as a group might benefit, and single women almost certainly would benefit under a variety of assumptions. If the wage gaps are entirely attributable to discrimination, comparable worth would have smaller effects on GNP, total employment and, particularly, aggregate welfare. The simulation results based on assumptions of zero discrimination or 100 percent discrimination can be regarded as providing upper and lower bounds of the effects of comparable worth within the limits of the model.

As might be expected, if comparable worth is introduced in only part of the economy (partial coverage), the effects in most respects are attenuated; however, if the wage gap is the result of discrimination, the efficiency losses are greater than they would be with full coverage. Also in line with expectations, the efficiency losses increase if employers' elasticities of substitution are larger.

Regardless of assumptions, the redistributive effects of comparable worth are likely to be substantial. Not only are men and women affected very differently, but there is an interaction between sex and marital status, and sex and skill level. Those who oppose comparable worth because they expect it to have adverse effects on aggregate economic well-being will find some support in these results, but those who favor comparable worth because of its redistributive effects will also find support.

The work presented here needs to be extended in a variety of ways. First, the model could be made more realistic by introducing more jobs, other wage-determining characteristics in addition to education, and more industrial sectors and firms. Whether a more finely tuned comparable worth policy imposed on a more disaggregated model would result in larger or smaller changes in GNP and economic efficiency is not clear a priori. The policy rule in our model, complete equality in pay between men and women (in the two types of jobs) is clearly an extreme version, and to that extent exaggerates the impact of comparable worth. On the other hand, our highly aggregated model understates the extent to which individual firms and industries could react to comparable worth by reorganizing production and substituting male for female labor. This reorganization and substitution tends to increase the efficiency losses. It is clear that greater disaggregation would tend to reduce the redistributive effects of comparable worth.

Second, a more detailed model should consider the effects of evasion (perhaps analogous to partial coverage), as well as the costs of enforcement designed to reduce evasion. In addition to outright defiance of the law (especially by small firms where enforcement would be extremely expensive), employers could resort to greater reliance on "temporary" labor, more purchased inputs, and similar restructuring that would tend to distort the effect of the comparable worth policy. These "quasi-legal" evasions would reduce the redistributive impact of comparable worth and probably increase its adverse effect on efficiency.

Third, it would be useful to analyze the transition to comparable worth. Wage parity between women and men requires a steep rise in women's wages or a steep fall in men's. The former is likely to be more politically feasible; therefore, if the policy were introduced all at once over the entire economy, the dynamic shock effects might be greater than those experienced when OPEC raised the price of oil in 1973. Fourth, research is needed that considers possible long-run effects of comparable worth on marriage, divorce, fertility, and educational attainment. All of these factors have been held constant in the simulations. Finally, this study clearly exposes the need for more precise understanding of intra-household behavior in marriage, the sources of existing wage gaps, and the demand and supply elasticities that help to determine the effects of comparable worth.

FOOTNOTES

1. Note that there is a striking similarity between implementing comparable worth in some subset of economic sectors, and imposing a partial factor tax on capital in the corporate sector (i.e., a corporate income tax). Previous studies of the corporate income tax have not only revealed the importance of general equilibrium effects (see Harberger 1961), but have also demonstrated the value of modeling the economy in detail, and employing computational techniques (see Fullerton, King, Shoven, and Whalley 1981). If anything, the effects of comparable worth are more complex. For example, while the interpretation of a tax wedge is unambiguous, one must consider several possible sources for male-female pay differentials.

2. Ideally, the opportunities available after divorce should include the possibility of remarriage. Such "marriage market" interactions are not considered in the present model, but are the subject of current study by the first author.

3. Other data sources include the 1977 Input-Output tables, the 1977 IRS tax tables, and the 1972-73 Consumer Expenditure Survey of the Department of Labor. More recent CES data are now available, but our sectoral classification is broad enough that updating the expenditure shares is unimportant.

4. We recognize that comparable worth would leave each firm free to use any conception of worth that could be shown not to be sex-biased; we assume within-skill-level wage equality across all employers covered by comparable worth simply as a consequence of long-run competition.

5. To accommodate the Input-Output data, we also have a rudimentary foreign sector: U.S. imports in the five production sectors and net capital

exports are both fixed in quantity terms, and U.S. goods exports adjust (in a given Cobb-Douglas pattern) to maintain aggregate balance.

6. Since econometric estimates of the precise parameters we need are generally unavailable, we have had to rely heavily on our own best guesses. The only recourse in such a situation is to conduct sensitivity tests, some of which are reported below. The government is assumed not to use any capital. This assumption was chosen due to a lack of available data on government capital ownership and use, and because it was not felt that the specification of the government production function had a central impact on our results.

7. Government spending does not enter explicitly into utility. Since our experiments hold the size of government fixed, this simplification has no effect on our conclusions. More generally, one could justify our approach by assuming that utility is separable in privately and governmentally provided goods.

8. Alternatively, we could have subdivided the households by the job as well as skill type of each worker. In this case, the model would require a description of the willingness of people to transfer from one job (and hence household category) to another, depending on wage and unemployment rates.

9. One should not interpret this assumption literally. It reflects an abstract restriction on our functional specification, which generates plausible behavioral responses. As discussed in the next section, our results are not sensitive to the assumed length of the maximum work week.

10. Although the model does have separate g and τ parameters, it can be seen from the Nash formula that only their ratio has any significance.

11. In the original data, the average wage paid to a worker of a given sex and job differs by employment sector. A number of factors may help explain this, ranging from compensating worker preferences to disequilibrium in the labor market, and almost certainly including differences by sector in the

composition of our four aggregate "jobs." We assume that the initial data do reflect an equilibrium; and rather than define a vector to represent worker tastes or employer requirements, we apply the economy-wide average wage to each sector, and adjust the number of hours accordingly. In the latter case of different equality mixes in different sectors, these adjusted figures can be thought of as the efficiency hours demanded in each sector.

12. This assumption follows naturally from the assertion that men and women are performing the same job. Of course, the jobs are only the same at the model's level of aggregation, since the sexes are distributed differently among the many occupations within each of our four jobs. The model does include imperfect substitutability between work hours in male- and female-dominated jobs; again, a more disaggregated model would be able to better approximate the correct substitution possibilities, but at high costs in computer time and presentational complexity.

13. More precisely, since there is no identifiable class of business managers in the model, we represent discrimination by capitalists, with the discrimination income distributed to households in proportion to their ownership of physical capital.

14. This conclusion needn't hold if comparable worth would eliminate the propensity to discriminate against female jobs, but not affect existing efficiency differences.

15. Two alternative wage rules of lesser interest are available: wages can be equalized within each of the four jobs, but not across jobs in a skill category; and wages within a skill category can be equalized separately for the two sexes.

16. High-skill women are an exception; since they are initially paid slightly more in the female-dominated job (see Table 3), comparable worth

makes that job slightly <u>less</u> attractive to them in relative terms. However, the higher real wages increase these women's desired employment in both jobs.

17. Note that an absolute hour constraint (e.g., 18.3 hours/week) may be binding on workers from one household type but not others. This is the type of constraint used with the historical hiring rule. Because of the "equal proportions" nature of the applicant hiring rule, it is more natural to formulate those constraints in percentage terms (e.g., 83 percent of desired hours); clearly, this type is simultaneously binding on all workers. (The obvious strategic behavior is not allowed.)

18. Under the applicant hiring rule, the female- or male-intensity of a sector depends on where the sexes choose to apply for work. For a given job, we assume that women and men distribute their applications in such a way as to increase (or decrease) the ratio of female to male hours worked by the same percentage in each sector; i.e., we assume that the <u>relative</u> pattern of the sectors' female-intensities will tend to persist under comparable worth.

19. In the first two rows of Table 8, the figures for the two female-dominated jobs are the same for men and women; this is no coincidence, but a direct result of the applicant hiring rule used in the standard cases. This equality does not obtain under the historical hiring rule.

Although the Nash bargaining experiments reported at the bottom of the table use the applicant proportions rule, women work a slightly smaller fraction of their desired hours than do men in the constrained jobs: the explanation is that in these experiments, "desired employment hours" are not identical with the requests for work actually presented to employers. Desired hours are calculated at the <u>hypothetical</u> resource allocation that would occur if there were no employment constraints, whereas applications seen by firms depend on the <u>actual</u> income division between husbands and wives, taking the constraints into account. Since the employment rationing in female-dominated jobs is more costly to wives, the Nash bargaining process partially compensates for this by increasing their share of household resources over what it would be with no constraints; this lowers the female labor supply seen by firms, who continue to accept equal proportions of actual labor applications from women and men.

20. We are unable to report an aggregate efficiency cost of comparable worth in this case. Recall that our efficiency measure in the sum of Hicksian equaivalent variations--i.e., the negative of the sum of the payments required to make each individual as well off as before comparable worth. In the other Nash bargaining experiments, it is possible to bring both marital partners back to their original utility levels by a suitable combination of payments to (or from) each spouse; these payments affect not only the aggregate income of the houshehold, but also the relative bargaining positions of the spouses. However, in the "no divorce" case, the outside prospects of the husband and wife are irrelevant to the household bargaining, and giving more income to one spouse or the other is equivalent to simply adding income to "the household." In general, and in our comparable worth experiment in particular, there is no change in household income that will simultaneously restore the base utility levels of both partners.

REFERENCES

Aldrich, Mark, and Robert Buchele. 1986. The Economics of Comparable Worth, Cambridge, MA: Ballinger Publishing Company.

Arrow, Kenneth. 1971. "The Theory of Discrimination," mimeo, Industrial Relations Section, Princeton University, Working Paper No. 30A.

Becker, Gary S. 1974. "A Theory of Social Interactions," Journal of Political Economy 82 (November/December), 1063-93.

Becker, Gary S. 1971. The Economics of Discrimination, Chicago: University of Chicago Press.

Bergmann, Barbara R. 1985. "The Economic Case for Comparable Worth," in Heidi I. Hartmann (ed.), Comparable Worth: New Directions for Research, Washington, DC: National Academy Press.

Bulow, Jeremy, and Lawrence Summers. 1985. "A Theory of Dual Labor Markets with Application to Industrial Policy, Discrimination, and Keynesian Unemployment," NBER Working Paper No. 1666 (July).

Fischel, Daniel R., and Edward P. Lazear. 1986. "Comparable Worth and Discrimination in Labor Markets," Hoover Institution, Working Papers in Economics (#E-86-15, April), Stanford University.

Fuchs, Victor R. 1986. "Sex Differences in Economic Well-Being," Science 232 (April 25), 459-464.

Fullerton, Don, A. Thomas King, John B. Shoven, and John Whalley. 1981. "Corporate Tax Integration in the United States: A General Equilibrium Approach," American Economic Review 71 (September), 677-691.

Harberger, Arnold C. 1961. "The Incidence of the Corporation Income Tax," Journal of Political Economy 70, 215-240.

__________. 1966. "Efficiency of Taxes on Income from Capital," in M. Krzyzaniak (ed.), Effects of Corporation Income Tax, Detroit: Wayne State University Press.

Johnson, George, and Gary Solon. 1984. "Pay Differences Between Women's and Men's Jobs: The Empirical Foundations of Comparable Worth Legislation," NBER Working Paper #1472 (September).

Killingsworth, Mark R. 1985. "The Economics of Comparable Worth: Analytical, Empirical, and Policy Questions," in Heidi I. Hartmann (ed.), Comparable Worth: New Directions for Research, Washington, DC: National Academy Press.

Kotlikoff, Laurence J., and Avia Spivak. 1981. "The Family As an Incomplete Annuities Market," Journal of Political Economy 89 (April), 372-91.

Livernash, E. Robert (ed.). 1980. Comparable Worth: Issues and Alternatives (1st ed.; 1984 2nd ed.), Washington, DC: Equal Employment Advisory Council.

Manser, Marilyn, and Murray Brown. 1980. "Marriage and Household Decision-making: A Bargaining Analysis," International Economic Review 21 (February), 31-44.

McElroy, Marjorie B., and Mary Jane Horney. 1981. "Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand," International Economic Review 22 (June) 333-49.

Milgrom, Paul, and Sharon Oster. 1984. "Job Discrimination, Market Forces and the Invisibility Hypothesis," Cowles Foundation Discussion Paper No. 708 (June).

Nash, J. F. 1950. "The Bargaining Problem," Econometrica 18, 155-62.

Oi, Walter Y. 1986. "Neglected Women and Other Implications of Comparable Worth," Contemporary Policy Issues IV (April), 21-32.

Phelps, Edmund S. 1972. "The Statistical Theory of Racism and Sexism," American Economic Review 62, 659-661.

Raisian, John, Michael Ward, and Finis Welch. 1985. "Comparable Worth: Issues, Evidence, and Impacts," mimeo, Welch Associates, Santa Monica (March).

Remick, Helen. 1984. "Major Issues in a priori Applications," in Helen Remick (ed.), Comparable Worth and Wage Discrimination: Technical Possibilities and Political Realities, Philadelphia: Temple University Press.

Rubinstein, Ariel. 1982. "Perfect Equilibrium in a Bargaining Model," Econometrica 50, 97-109.

Sorensen, Elaine. 1986. "Implementing Comparable Worth: A Survey of Recent Job Evaluation Studies," American Economic Review, Papers and Proceedings 76 (May), 364-67.

Treiman, Donald J., and Heidi I. Hartmann (eds.). 1981. Women, Work, and Wages: Equal Pay for Jobs of Equal Value, Final Report, Committee on Occupational Classification and Analysis. Washington, DC: National Academy Press.

Treiman, Donald J., Heidi I. Hartmann, and Patricia A. Roos. 1984. "Assessing Pay Discrimination Using National Data," in Helen Remick (ed.), Comparable Worth and Wage Discrimination: Technical Possibilities and Political Realities, Philadelphia: Temple University Press.

U.S. Commission on Civil Rights. 1984. Comparable Worth: Issue for the 80's, (Vol. I), A Consultation of the Committee on Civil Rights, Washington, DC.

APPENDIX A

Technical Specification of Agents' Economic Behavior

1. Firms

Intra-industry competition ensures that production takes place only at the cost-minimizing point along the efficient production frontier, given the prevailing wages and capital rental rate. Thus the representative firm sees its output price P and value-added price PVA as determined by the industry cost function, and chooses inputs of male and female labor (M and F) and of capital for high-skill and low-skill workers (KH and KL) to attain this least-cost solution while satisfying product demand. Let job subscripts 1 and 2 refer to the male- and female-dominated jobs, with 3 and 4 denoting the male and female low-skill jobs; and let LH and LL refer to composite high- and low-skill labor, respectively. Then the problem for sector i (i=1,5) can be stated as

$$\underset{M_{ij},F_{ij},KH_i,KL_i}{\text{MIN}} \quad \sum_{j=1}^{4} (WM_j M_{ij} + [WF_j + \bar{D}_j]F_{ij}) + r(KH_i + KL_i)$$

$$\text{S.T.} \quad Q_i = \theta_i\{\alpha_{i1}[\alpha_{i2}LH_i^{-\rho_{i2}} + (1-\alpha_{i2})KH_i^{-\rho_{i2}}]^{\rho_{i1}/\rho_{i2}} + (1-\alpha_{i1})[\alpha_{i3}LL_i^{-\rho_{i3}}$$

$$+ (1-\alpha_{i3})KL_i^{-\rho_{i3}}]^{\rho_{i1}/\rho_{i3}}\}^{-1/\rho_{i1}}$$

$$LH_i = \{\alpha_{i4}(M_{i1}+\varepsilon_1 F_{i1})^{-\rho_{i4}} + (1-\alpha_{i4})(M_{i2}+\varepsilon_2 F_{i2})^{-\rho_{i4}}\}^{-1/\rho_{i4}}$$

$$LL_i = \{\alpha_{i5}(M_{i3}+\varepsilon_3 F_{i3})^{-\rho_{i5}} + (1-\alpha_{i5})(M_{i4}+\varepsilon_4 F_{i4})^{-\rho_{i5}}\}^{-1/\rho_{i5}}$$

$$F_{ij}/M_{ij} = \gamma_j F^o_{ij}/M^o_{ij} \qquad (j=1,4)$$

where r = capital rental rate

WM_j, WF_j = male, female wage rates (j=1,4)

$\bar{D}_j$ = psychic discrimination costs (j=1,4)

Q_i = product demand

ε_j = relative efficiency of women to men (j=1,4)

$\rho_{ik} = 1/\sigma_{ik} - 1$ (k=1,5), where σ_{ik} is the substitution elasticity

α_{ik} = share parameters (k=1,5)

θ_i = production intercept

and $$\gamma_j = \begin{cases} 1, \text{ under the historical hiring rule} \\ [\sum_i M_{ij}/(\sum_i M_{ij} \cdot F^o_{ij}/M^o_{ij})] \cdot SF_j/SM_j, \text{ under the applicant hiring rule,} \end{cases}$$

where SF_j and SM_j are female and male labor supply, and superscript o refers to the base data.

Under comparable worth, $WM_1 = WF_1 = WM_2 = WF_2$ and $WM_3 = WF_3 = WM_4 = WF_4$; otherwise, market forces produce $WF_j = \varepsilon_j WM_j - \bar{D}_j$ for j=1,4. This latter relation leaves employers indifferent between hiring women and men, and thus willing to accept the sexes in the ratios they come seeking work. Therefore, the "applicant hiring rule" formula for γ is also imposed, as a non-burdensome market-clearing mechanism, in experiments without comparable worth, and on the uncovered sectors in the partial coverage cases. In the latter cases, the labor supply figures in the γ formula distinguish between workers in the covered and uncovered labor markets; also, the wage rates differ by sector, but sectoral subscripts are omitted here for clarity. The discrimination wages $\bar{D}_j$ are held roughly constant in real terms by indexing them to the male wage in job 1: $\bar{D}_j = \bar{D}^o_j \cdot WM_1/WM^o_1$. In text Figure 5, two substitution elasticities are given as 1.0; these are entered in the model as 1.001 to avoid degeneracy.

Product demand Q_i is the sum of the demands for net exports, final consumption by households and the government, and intermediate consumption by other producers. Imports are fixed in real terms; foreigners spend a part of their dollar receipts on a fixed quantity of U.S. capital service exports, and the rest on sectoral outputs in fixed (i.e., Cobb-Douglas) value shares. Demand by the government and each household type is also allocated in fixed value shares, and intermediate products are required in the same real proportions as in the base input-output data. The output prices to which demands respond are determined by the CES cost functions for value-added, augmented by the costs of intermediate inputs.

$$Q_i = \sum_{\ell=1}^{5} a_{i\ell} Q_\ell + FD_i$$

hence

$$Q_i = \sum_{\ell=1}^{5} b_{i\ell} FD_\ell, \quad \text{where } b_{i\ell} = [I-A]^{-1}\Big|_{i\ell}$$

$$FD_i = [\sum_{h=1}^{8} \beta_{hi} C_h + \beta_{Gi} C_G + \beta_{Ei} (\sum_{m=1}^{5} P_m \overline{IM}_m - r \cdot \overline{CAPEXP})]/P_i - \overline{IM}_i$$

$$P_i = \sum_{\ell=1}^{5} PVA_\ell b_{\ell i}$$

$$PVA_i = \left\{ \alpha_{i1}^{\sigma_{i1}} \left[\alpha_{i2}^{\sigma_{i2}} \left(\alpha_{i4}^{\sigma_{i4}} W_{i1}^{1-\sigma_{i4}} + (1-\alpha_{i4})^{\sigma_{i4}} W_{i2}^{1-\sigma_{i4}} \right)^{\frac{1-\sigma_{i2}}{1-\sigma_{i4}}} + (1-\alpha_{i2})^{\sigma_{i2}} r^{1-\sigma_{i2}} \right]^{\frac{1-\sigma_{i1}}{1-\sigma_{i2}}} + (1-\alpha_{i1})^{\sigma_{i1}} \left[\alpha_{i3}^{\sigma_{i3}} \left(\alpha_{i5}^{\sigma_{i5}} W_{i3}^{1-\sigma_{i5}} + (1-\alpha_{i5})^{\sigma_{i5}} W_{i4}^{1-\sigma_{i5}} \right)^{\frac{1-\sigma_{i3}}{1-\sigma_{i5}}} + (1-\alpha_{i3})^{\sigma_{i3}} r^{1-\sigma_{i3}} \right]^{\frac{1-\sigma_{i1}}{1-\sigma_{i3}}} \right\}^{\frac{1}{1-\sigma_{i1}}} \Bigg/ \theta_i$$

$$W_{ij} = \frac{WM_j + \gamma_j (F_{ij}^o / M_{ij}^o)(WF_j + \bar{D}_j)}{1 + \gamma_j (F_{ij}^o / M_{ij}^o) \varepsilon_j} \qquad (j=1,4)$$

where $a_{i\ell}$ = i,ℓth element of the proportional input-output matrix A

FD_i = final demand

$\beta_{hi}, \beta_{Gi}, \beta_{Ei}$ = household, government, and export value shares (h=1,8)

C_h, C_G = household, government consumption expenditures (h=1,8)

$\overline{IM}_i$ = imports (exogenous)

$\overline{CAPEXP}$ = capital exports (exogenous)

P_i, PVA_i = output price, value-added price

and W_{ij} = combined male-female perceived wage rate (j=1,4).

2. The Government

The specification of government behavior differs from that of firms in three ways: real output is exogenous and fixed, rather than demand-sensitive; value-added is again combined with aggregate intermediate inputs, but this aggregate is here a Cobb-Douglas composite; and no capital is used in producing value-added. Thus, the government's optimization problem is

$$\underset{M_{Gj}, F_{Gj}}{\text{MIN}} \sum_{j=1}^{4} (WM_j M_{Gj} + [WF_j + \bar{D}_j] F_{Gj})$$

$$\text{S.T.} \quad \bar{Q}_G = \theta_G \{\alpha_{G1} LH_G^{-\rho_{G1}} + (1-\alpha_{G1}) LL_G^{-\rho_{G1}}\}^{-1/\rho_{G1}}$$

$$F_{Gj}/M_{Gj} = \gamma_j F_{Gj}^o / M_{Gj}^o \qquad (j=1,4)$$

with the same definitions as above.

The "price" of government production is relevant to the calculation of equilibrium household tax rates:

$$P_G = PVA_G + C_G \prod_{i=1}^{5} (P_i/\beta_{Gi})^{\beta_{Gi}}$$

$$PVA_G = \left\{ \alpha_{G1}^{\sigma_{G1}} \left[\alpha_{G4}^{\sigma_{G4}} W_{G1}^{1-\sigma_{G4}} + (1-\alpha_{G4})^{\sigma_{G4}} W_{G2}^{1-\sigma_{G4}} \right]^{\frac{1-\sigma_{G1}}{1-\sigma_{G4}}} + (1-\alpha_{G1})^{\sigma_{G1}} \left[\alpha_{G5}^{\sigma_{G5}} W_{G3}^{1-\sigma_{G5}} + (1-\alpha_{G5})^{\sigma_{G5}} W_{G4}^{1-\sigma_{G5}} \right]^{\frac{1-\sigma_{G1}}{1-\sigma_{G5}}} \right\}^{\frac{1}{1-\sigma_{G1}}} \Bigg/ \theta_G$$

where C_G is the intermediate inputs ratio and W_{Gj} (j=1,4) is the average perceived wage in job j, as defined above.

3. Households

Households seek to maximize utility, which is a CES function of consumption and leisure; these in turn are both Cobb-Douglas aggregates. There are four types of married households, defined by the skill levels of husband and wife, and four types of single households, classified by sex and skill level. For convenience, let s index the household's four (two, for singles) work possibilities; the household type h determines the market job to which a given s corresponds. (For example, by numbering convention, h=3 refers to married couples with a low-skilled husband and high-skilled wife, and s=4 indicates the wife's work in her female-dominated job; thus the household wage W_{34} corresponds to WF_2--women's wage in the female high-skill job--in the previous notation.) Let C_{hi} denote household h's real consumption of good i, and $\bar{T}_{hs}$, L_{hs} and W_{hs} its (exogenous) available hours, actual work hours, and wage in job s. For single households (h=5,8), the objective then is to choose C_{hi} and L_{hs} to maximize

$$U_h \equiv \left\{\alpha_h\left(\prod_{i=1}^{5} C_{hi}^{\beta_{hi}}\right)^{-\rho_h} + (1-\alpha_h)\left[(\bar{T}_{h1}-L_{h1})^{\delta_h}(\bar{T}_{h2}-L_{h2})^{1-\delta_h}\right]^{-\rho_h}\right\}^{-1/\rho_h}.$$

Under the joint household utility formulation, the maximand for married couples is, similarly,

$$U_h \equiv \left\{\alpha_{h1}\left(\prod_{i=1}^{5} C_{hi}^{\beta_{hi}}\right)^{-\rho_h} + \alpha_{h2}\left[(\bar{T}_{h1}-L_{h1})^{\delta_{h1}}(\bar{T}_{h2}-L_{h2})^{1-\delta_{h1}}\right]^{-\rho_h} + (1-\alpha_{h1}-\alpha_{h2})\left[(\bar{T}_{h3}-L_{h3})^{\delta_{h2}}(\bar{T}_{h4}-L_{h4})^{1-\delta_{h2}}\right]^{-\rho_h}\right\}^{-1/\rho_h}.$$

In both cases, the household faces a budget constraint and possible employment constraints

$$\sum_i P_i C_{hi} \leq (1-t_{h2})\left[\sum_s W_{hs}L_{hs} + r(\bar{K}_h + DI_h)\right] - t_{h1} \equiv (1-t_{h2})Y_h - t_{h1}$$

$$L_{hs} \leq LMAX_{hs}.$$

Here DI_h is income from excess discrimination profits, distributed in proportion to each household's (exogenous) capital ownership,

$$DI_h = \left(\sum_j [\bar{D}_j \sum_i F_{ij}]\right)\bar{K}_h/\bar{K}.$$

The lump-sum tax rates t_{h1} are held roughly constant in real terms by pegging them to a consumption price index: $t_{h1} = t_{h1}^{o} \prod_i (P_i/P_i^{o})^{\phi_i}$, where ϕ_i is the value share of good i in base household consumption. The marginal tax rates t_{h2} are scaled up or down as needed to maintain government budget balance:

$$t_{h2} = t_{h2}^{o}\left(P_G\bar{Q}_G - \sum_k POP_k \cdot t_{k1}\right)/\sum_k POP_k Y_k t_{k2}^{o}.$$

In comparable worth experiments, the values of t^o_{h1} and t^o_{h2} used for single women's households (h=7,8) are not those from the base data set. Since this wage policy would tend to move single women into the same tax brackets as single men of the same skill level, in these experiments we apply the men's base tax rates as the starting points for single households of both sexes. Regrettably, the tax rates in the partial coverage experiments are not specific to each worker's luck in the covered-sector employment "lottery." $LMAX_{hs} = \infty$ (i.e., there are no binding constraints) in experiments without comparable worth, and in those with partial coverage. In the latter, access to employment in the high-wage sectors is rationed by the eight lottery ratios, which adjust to match the demand for workers in each job/sex combination; thus, each household type is divided into sub-types (16 for married couples, 4 for singles) with different combinations of covered and uncovered wages in the budget constraint.

With full coverage of comparable worth, $LMAX_{hs}$ depends on the hiring rule. Under the applicant hiring rule, neither sex faces any constraints in the male-dominated jobs (s=1 or 3); in each of the two female jobs, all workers are allowed to work the same fraction of hours they would have chosen in the absence of any employment constraints; again, the two fractions are chosen to match the levels of demand. Thus, each household optimization problem is solved twice: once taking only the budget constraint into account, to calculate "desired" hours, and the second time with the proportional limits imposed for s=2 and 4, to calculate the optimal adjustments in consumption and in hours worked in the male jobs. With the historical hiring rule, desired hours have no bearing on a household's $LMAX_{hs}$; all workers in a given job are given the same hour limit. This limit may not be a binding constraint in all households, but it is set to restrict enough workers so as to equate constrained supply with demand, given each sector's traditional sex ratio in that job. This hiring rule produces unemployment of one sex (always women, in our experiments) in the male-dominated jobs, as well as of men and women in the female jobs (as with the applicant hiring rule).

Under the Nash bargaining formulation, married couples choose an income transfer from one spouse to the other so as to maximize

$$(gU_{h1} - \tau V_{h1})(gU_{h2} - \tau V_{h2})$$

where g = marriage utility bonus

τ = divorce penalty

U_{h1}, U_{h2} = utility of spouses 1,2 after income transfer

V_{h1}, V_{h2} = maximum attainable utility of spouses 1,2 as singles.

U and V are calculated as for a single household; V requires assumptions on the spousal capital ownership shares and the tax brackets of each after divorce. The former are shown in text Table 2; for the latter, we assume that a divorced person would face the same tax bracket as a currently-single person of the same sex and skill level. (As noted above, only the skill level is relevant in comparable worth experiments, because we equalize the two sexes' single-household tax rates in those cases.)

APPENDIX B

Benchmark Data Set

As noted in the text, a benchmark economic equilibrium is used as the starting point for our comparable worth experiments. This appendix provides the complete reference data set and some brief comments on its derivation.

The two most important sources of data for our benchmark equilibrium are the 1977 Input-Output tables given in the U.S. Department of Commerce Survey of Current Business for May 1984, and the 1979 Census of Population 1/1000 (A) Public Use Sample. We aggregated the finer classifications of the I/O tables to obtain our five-sector figures for the flows of goods (except to household consumers) and payments to production factors, and sorted the Census data by the model's household and job types to derive initial figures for household characteristics and wage and employment patterns by job. The only Census data excluded from consideration were those for people under 18 or in institutions; non-workers were assigned a skill level on the basis of their own completed schooling, rather than by the median educational attainment in some occupation. Other sources included the 1972-73 Consumer Expenditure Survey (CES) and the 1977 federal income tax tables. Because these sources refer to various years and use divergent definitions, a number of adjustments were required.

The first step was to adapt the patterns of labor and capital income from the 1979 Census data to the factor payments of the 1977 I/O tables. The latter provides the total wage bill for each sector, but does not break this down into the eight job/sex categories, nor indicate actual work hours. We applied each sector's 1979 wage bill distribution by job and sex to the 1977 totals; and for the eight wage rates needed to calculate work hours from these wage bills, we again took the pattern (i.e., the <u>relative</u> wages) from the Census, scaled down by the 1977/1979 ratio of total labor income in the economy.

The resulting labor demands were summed over employers to obtain total hours worked by men and women in each of the four jobs. While the total value (at the scaled-down wages) of all 1979 work hours equaled the total value of these labor demands, the distribution by job and sex did not completely match. Therefore, we increased or decreased the population of each type of household so as to provide the required labor supplies by job/sex category, while maintaining the Census figures on the total work hours by a household of each type, and the relative contribution of each household type to each labor supply. These revised population figures were used in allocating the capital income from the I/O tables, again maintaining the Census pattern of capital ownership ratios between households of different types.

With factor incomes reconciled with the 1977 data, the next step was to adjust the household expenditure figures. The federal income tax tables were consulted to estimate a simple linear tax function for each household type; since the I/O government category includes state and local government, the tax parameters had to be scaled up so that total tax revenues equaled total government expenditures. Each type of household was assumed to allocate its after-tax income across the five production sectors in the value shares observed for households of that type in the CES 1972-73 interview survey. (The term "consumption" in this model includes savings; the I/O investment column was used to distribute savings "expenditures.")

The penultimate step was to scale up the I/O export figures to attain trade balance. Finally, the RAS procedure was applied to the inter-industry transactions matrix to accommodate the revised levels of household consumption and exports.

The results of this process are shown in the accompanying tables.

TABLE B1

INITIAL PRODUCTION FLOWS (million 1977 $)

Seller \ Purchaser	Agri.	Goods	Trade & services	Real estate	Govt. enter.	General govt.	Cons.	Exports	Imports	Totals
Agriculture	32.8	61.2	3.6	2.8	0.1	3.7	11.8	14.1	-3.0	127.1
Goods	34.0	888.1	143.7	46.4	8.1	136.4	687.7	114.5	-160.5	1898.4
Trade & services	10.3	178.4	147.9	26.1	1.2	45.7	499.5	17.8	-9.7	917.2
Real estate	3.7	8.2	17.7	16.7	0.1	4.0	210.0	3.9	-0.0	264.4
Govt. enterprises	0.5	14.0	9.4	2.1	0.3	2.2	8.8	1.3	-1.8	36.8
Labor	13.7	521.7	469.6	12.5	21.7	203.9				1243.1
Capital	32.2	226.7	125.3	157.8	5.2			23.5		570.6
Total value-added	45.8	748.4	594.9	170.3	26.9	203.9		23.5		1813.7

TABLE B2

INITIAL EMPLOYMENT DATA

Employment hours of women/men (billions per year)	High-skill jobs		Low-skill jobs	
	Male-dominated	Female-dominated	Male-dominated	Female-dominated
--By sector:				
Agriculture	0.01/0.09	0.003/0.001	0.18/1.56	0.08/0.02
Goods	1.47/6.45	0.09/0.09	7.95/48.48	9.35/2.47
Trade & services	3.31/11.77	3.09/0.71	5.45/21.02	21.80/4.35
Real estate	0.32/0.51	0.008/0.008	0.13/0.42	0.21/0.04
Govt. enterprises	0.04/0.16	0.007/0.003	0.49/2.07	0.35/0.16
General govt.	2.35/4.09	4.98/1.86	1.67/7.02	6.76/1.62
--Totals	7.49/23.07	8.17/2.68	15.86/80.56	38.54/8.67
Share of female hours in total	.245	.753	.165	.816
Female hourly wage	$ 6.51	$6.60	$4.74	$4.23
Male hourly wage	$10.72	$8.04	$7.21	$6.04
W_F/W_M	.606	.821	.658	.699

TABLE B3

INITIAL HOUSEHOLD DATA

Male skill level/ female skill level	Marrieds High/ High	High/ Low	Low/ High	Low/ Low	Singles High/ ___	Low/ ___	___/ High	___/ Low
Number of households (millions)	4.68	6.12	4.94	32.91	4.19	22.53	5.89	30.02
Man's weekly work hours								
--in male-dominated job	31.98	32.03	32.06	28.87	23.44	19.58		
--in female-dominated job	3.97	2.79	3.46	2.27	3.79	3.32		
Woman's weekly work hours								
--in male-dominated job	7.36	3.58	8.77	4.45			11.27	10.84
--in female-dominated job	8.88	11.80	10.47	10.02			4.56	11.31
Pre-tax income (1977 $)	41,087	33,608	30,428	20,102	20,394	10,063	15,330	6,718
--of which, capital income	16,060	11,109	10,753	5,267	5,742	1,679	7,792	3,108
Tax bill	12,913	9,241	7,913	4,043	5,018	1,757	3,293	894
Marginal tax rate	.487	.418	.418	.290	.371	.267	.313*	.215*
Consumption shares								
--Agriculture	.007	.008	.008	.009	.006	.008	.007	.011
--Goods	.508	.511	.516	.519	.405	.453	.443	.402
--Trade and services	.333	.339	.348	.348	.376	.367	.347	.370
--Real estate	.145	.136	.122	.117	.208	.166	.196	.209
--Govt. enterprises	.007	.006	.006	.006	.006	.006	.007	.007

*To partially accommodate the progressivity of the tax code, single women are assigned the higher tax rates of single men in the comparable worth simulations.