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Together and Unequal: Nonlinear and Interaction Effects of Occupational Sex Composition on Men's and Women's Wages.

by

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Abstract

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Neoclassical economics and intergroup conflict explanations for the gender wage gap are considered, and used to make predictions about the shape of sex composition effects and the wage gap across the range of occupational sex composition. Sex composition wage effects are explored for a nationally representative sample of men and women workers. Effects for men and women are found to be distinct, and non-linear. Blalock's proportional intergroup conflict theory is found to be most useful in predicting the findings. The divergent wage contours across occupational sex composition indicate the wage gap increases in highly integrated occupations. When there are relatively few women in occupations, their wages most closely match those wages of men in these occupations. Implications for research and policy are explored.

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Introduction

Remedies to address the continuing wage gap between men and women rest on theories attempting to explain its causes. Different policy initiatives follow from different theories. Strategies that seek to equalize skill levels are grounded in analyses that focus on individual work-related attributes (Blau and Ferber 1992). Other efforts seek to reduce occupational sex segregation, which has been identified by substantial research as a crucial factor in the wage gap (Reskin and Roos 1990). Comparable worth strategies seek to make female and male dominated women's occupations equitably compensated (Hill and Killingsworth 1989). Thus the potential effectiveness of each policy rests on the accuracy of the underlying theory in explaining the wage gap.

The neoclassical economics paradigm has been widely used to generate a set of explanations for the wage gap. While variations of neoclassical theory specify different explanatory mechanisms, underlying them is a model of labor market forces that function in a gender-neutral way so as to reward individual skills. Continuing gender wage inequalities are said to reflect general economic processes and result from gender differences in job preferences, acquisitions of labor market skills, and patterns of labor market entry and exit. Accordingly, policies based on neoclassical economic analysis emphasize equalizing skill levels through training programs that target women, for example. (Blau and Ferber 1992). In general, the relevance of gender to neoclassical explanations of the wage gap is limited to differences between men and women regarding such labor market related behaviors and attributes.

In contrast, many sociological analyses of the wage gap emphasize the continuing salience of gender to the social processes of hiring, promotion and compensation of workers, apart from such labor market attributes. According to these processes, gender is implicated in organizational structure (e.g. the shape

of hierarchies), status group conflict, and fact-to-face interactions on the job, which in turn shape the allocation of rewards.

According to this general orientation, at their core allocative processes are *not* gender-neutral, and policies that stem from such assumptions will fail to create the desired effects. One body of sociological research and theorizing about the gender wage gap puts emphasis on intergroup power relations between men and women. Contrasting most sharply with the neoclassical model, this framework suggests that shifting forms of inequality will result when women acquire the skills, experience and other attributes to better compete with men in labor markets.

Due to data limitations and the complexity of hiring, mobility and compensation processes, it is often difficult to adjudicate between these (and other) perspectives in interpreting quantitative findings regarding the wage gap. Many studies identify variables associated with the gender gap, but leave great interpretive latitude as to the mechanisms through which these variables affect wage outcomes. Accordingly, the area continues to see an outpouring of studies that offer contradictory claims about the processes at work.

Theories explaining the wage gap are most compelling when they offer accurate predictions regarding the many labor market processes from which the wage gap emerges. Similarly, they gain credibility if they can offer strong accounts linking differential wage outcomes to other labor market outcomes. This study makes a contribution to the cumulative evidence regarding neoclassical economic and intergroup conflict explanations. It does so by comparing these theories' respective predictions against findings about a previously unexamined relationship between occupational sex composition and the wage gap. The empirical links that the present analysis draws between sex composition and the wage gap are relevant to current theoretical questions

and also suggest new directions for research.

The male-female wage gap and occupational sex composition effects are two major themes of research about gender and labor market stratification. The prevalence and effect of occupational sex segregation are central to discussions of the male-female wage gap. Studies indicate that over the past 20 years, occupational sex segregation has diminished in some cases (managers) and remained about the same in others (carpenters), while certain occupations (heavy equipment mechanics) have seen an increase in sex segregation (Reskin and Roos 1990; see also Jacobs 1989a, 1989b, 1995, Reskin and Jones 1990). In part because of this shifting terrain, the overall degree of workplace segregation at various levels continues to be the focus of research and disagreement. The impact of occupational sex segregation on wages has been somewhat clearer: predominantly male occupations pay more than predominantly female occupations. Beyond this broadly accepted finding, however, there are gaps in the knowledge about aspects of this relationship. While virtually all studies using national samples have found a positive relationship for both men and women between working in a predominantly male field and wages, the nature of this positive relationship has received little scrutiny.

To address this gap in the research, I examine the contours of the relationship between occupational sex composition and wages, and then show how that relationship strongly affects the wage gap. In doing so I test whether predictions generated by neo-classical economics or those from sociological models of inter-group conflict best account for the findings. Following this I consider the implications for theory, future research and policy.

The Nature of the Occupational Sex Composition Effect

One set of unanswered questions concern the shape of the occupational sex composition effect on wages. Is the relationship between the proportion of men and wages a linear one? Or rather, are there thresholds of effects, or "tipping points?" How does the effect

for *majority* male occupations (such as 55%) compare to the effect for *predominantly* male occupations (more than 80%)? Might there be effects for

various categories of this sort that are masked by regressions using models that incorporate only a linear association between sex composition and wages? Similarly, does moving from a 10% male occupation to one with 35% male representation have the same wage consequences as moving from 50 to 75% men?

A second set of questions concerns comparisons between the effects on men and women. How does the relationship between sex composition and wages vary in *magnitude* for each group across the spectrum of sex composition? Furthermore, does the relationship take the same *shape* for men and women across occupations although it may vary in size? In short, do men and women receive similar benefits while the proportion men is increased among occupations in which women are a majority and those in which women predominate (more than 80%)? Are these wage effects similar to those resulting from increases in female representation among male occupations?

Third, possible differences in the sex composition wage effects for men and women may impact the male-female wage gap. Does the wage gap vary across the continuum of occupational sex composition? If so, does it display a pattern that informs how we understand the processes that cause the wage gap?

In general, gender differences in threshold effects of occupational sex composition on wages have not been captured by either existing research, in which the sex composition is modeled as a linear or an additive effect. As Tomaskovic-Devey states, "It is well established that the earnings of both males and females fall as the percentage of females in an occupation rises" (1993b, p. 111). The lack of attention to nuanced compositional dynamics is somewhat surprising, especially given the widespread use of indices of occupational sex segregation, a proportion-based indicator. Nonetheless, research has not yet directed much attention to these aspects of the composition effect, and can not answer the preceding questions.

Previous Research

This study follows previous research regarding the effects of occupational sex segregation on wages. Some earlier studies have taken Census occupations as the unit of analysis in research using nationally representative data (Ferber and Lowry 1976, England et al 1982, O'Neill 1983, Aldrich and Buchele 1986, Treiman and Hartmann 1981). While comparing results from these studies is useful, it is also inexact due to significant variation in data and control variables used. With limited controls for occupational characteristics, Ferber and Lowry found that men's median annual wages decreased by an average of approximately $5,000, and women's wages by $1,400, if they worked in an almost exclusively female occupation. England et al (1982), employing similar procedures and more control variables (job characteristics such as cognitive skill demands, perceptual skill demands, etc.), found that the annual wage decrease for moving from an all male to an all female occupation was $3,000 and $1,700, respectively, for men and women. In their widely-cited analysis, Treiman and Hartmann found that male incomes fell by about $3,000 per year working in a female occupation as opposed to male occupation, while women's incomes dropped by about $1,600. O'Neill reported wage losses of 15% for men and 16% for women when working in female as opposed to male occupations.

Two recent studies by England (1992) and England and associates (1994) were performed using a large number of control variables. England (1992) found that moving from an all male to all female occupation, men lost between $0.50 to $1.00 per hour while women lost between $0.40 to $0.60 per hour. England et al (1994) report a wage loss of between $1.28 to $1.88 for men and between $0.58 and $0.67 for women for a similar occupational shift. Filer's study (1989) is alone in finding no negative effect for percent female on male and female wages (see England 1992 for a review of Filer's methods). Thus virtually all studies of this type have found a negative relationship between percent women and wages for

both men and women (see Sorenson 1989 for a detailed discussion of these studies). However, the size of this effect has been found to vary greatly in terms of explaining the wage gap. While this is not central to the current study, the percentage of the wage gap explained by sex composition effects ranges from a low of 5-11% (England 1992) to a high of 35-40% (Treiman and Hartmann 1981) in the research reviewed here.

A second predominant type of research about sex composition and wages, more directly relevant to the design of this study, uses national samples of individual workers as the unit of analysis. A strength of this design is that human capital variables can be included in the earnings equation. Overall, these studies have also consistently found a significant negative relationship between the percent women in an occupation and wages for both men and women (Johnson and Solon 1986, England et al 1988, Sorenson 1989, Kilbourne et al 1994, Cotter et al 1995). Johnson and Solon, using 1978 Current Population Survey data and employing detailed industry but limited human capital measures, found that men's wages dropped 17% moving from almost exclusively male to almost exclusively female occupations. Women's wages dropped 9% for the same change. In their longitudinal fixed-effects analysis of NLS data, England et al (1988) found that white women, white men and black women all suffered a wage decrease of between 8-11% by moving from all female to all male occupations. Sorenson (1989) found that for a 1984 Panel Study of Income Dynamics sample of workers both male and female wages dropped 23% moving from all male to all female occupations.

Kilbourne et al (1994), also using a longitudinal fixed effects model with NLS data, reported that women workers would suffer a 10% wage loss in all female jobs as compared with employment in all male jobs. However, they found a much smaller and non-significant effect for men. In the only individual level study that incorporates controls for "specialized human capital," Tam's (1997) results

conflict with previous studies by finding a wage penalty for neither men nor women in female occupations.

A third type of research has utilized data specific to a particular firm, industry, or region, and is typically concerned not only with occupational sex composition but with job and firm-level sex segregation. Though largely limited to the public sector, these studies support the dominant perception of sex composition wage effects: female jobs pay less than male jobs even when controls for other factors are utilized (Baron and Newman 1990, Tomaskovic-Devey 1993, Acker 1989). Using firm-level data, Bielby and Baron (Baron and Bielby 1980, Bielby and Baron 1984, 1986) have emphasized that higher levels of sex segregation at the level of jobs and firms lead to sex composition effects paralleling those for occupations.

Methods of analysis, the control variables that are included in equations, and the interpretations of statistical results vary substantially across these studies. To sum up this research, there are consistent findings of gender difference in the size of the absolute wage "bonus" attached to occupations with greater proportions of men, while estimates of these differential wage effects vary from study to study. There is mixed evidence regarding gender differences in percent increase or decrease in individual wages due to occupational sex composition. O'Neill (1983), England et al (1982) and Sorenson (1989) seem to suggest no gender difference, but Johnson and Solon (1986) and Kilbourne et al (1994) do find male/female differences in percent wage change. While research incorporating nonlinear and gender-specific sex composition effects has been applied to other dependent variables (Cohen, Broschak and Havemen 1998, Tolbert et al 1995, South et al 1982, Kanter 1977) there has been no published research examining the contours of such effects on wages and the consequences for the wage gap. Overall, this body of empirical literature suggests no clear predictions regarding non-linear or gender-interaction effects. Nor has theory addressed it directly. However, a few studies hint at the relevance of sex composition proportions on wages. Ranson and Reeves (1996) report that in a sample of computer professionals, women earn more in organizations when they are few in number, and earn notably less where there are many women workers. The study by Kilbourne et al, (1994), which found sex composition effects for women but not men, also indicates that there may be differential effects for men and women that have not yet been captured by the appropriate data or design. Tomaskovic-Devey's analysis of a random

selection of North Carolina workers found that in contrast to Kilbourne et al, men's wages experience a decline of 3% with every 10% increase in women workers while women's wages decline only 1% (1993).

These apparent discrepancies suggest that common characterizations of shared sex composition effects for men and women may not be accurate, and signal the need for further research into these relationships. In this study I closely examine the effects of occupational sex composition on men's and women's wages. I limit myself to questions about these relationships, and do not try to determine causality in the overall relationship between sex composition and wages. Nor do I assess the relative contribution of sex composition to the male-female wage gap. I compare the utility of neoclassical economics and intergroup conflict perspectives in predicting findings about the contours of wage effects and the wage gap. I will now situate questions about sex composition effects on wages within these larger perspectives by describing and synthesizing relevant theory and generating predictions from each framework.

Theoretical Perspectives

Neoclassical Economics and the Human Capital Perspective

Neoclassical economic theory presumes utility-maximizing behavior by firms and individuals (Farkas and England 1986, Ehrenberg and Smith 1997). Such behavior is expected to lead to efficient matching of workers and jobs based on the skills needed and rewards offered. Hiring and compensation practices are conceived as reflecting the productivity of workers. To address the male-female wage gap and differential wage profiles for men and women, neoclassical theorists have generated a number of hypotheses that follow from these and other core assumptions of the theory. These include predictions about the effects of discrimination, crowding, statistical discrimination, and human capital investments of different types.

The effects of discrimination have been the topic of extensive neoclassical analysis.

Employment and wage differences between equally able groups of workers that have been caused by discrimination are expected to disappear over time due to profit-seeking competitive pressures. Becker (1971), for example, argues that even if a majority of employers have a taste for discrimination, and are thus willing to pay a wage bonus to members of a favored group, a minority of employers without such a taste would make such discrimination unsustainable. The latter's use of lower-wage minority workers will maximize profit, force other competing employers to cut labor costs, and thus raise demand and wages for minority workers. Thus according to this view, over time discriminatory practices in both hiring and compensation will disappear due to this demand-side process.

M.D.R. Evans and associates (1991, 1988) have modified this position based on their mixed findings regarding its predictions. They report that competition does *not* force employers to change their practices, but that minorities nonetheless receive the same returns for education as majority group members. Goldberg (1982) has also advanced the idea that market pressures will not eliminate promale discrimination if employers value this above the costs of this preferential "taste." Relatedly, Akerloff has shown that market forces also exact costs for eliminating discrimination, and that the market forces which act to limit discrimination can be disrupted by even a small percentage of traders willing to penalize anti-discriminatory firms (Akerloff 1985).

The *crowding* hypothesis as generated by Bergmann (1974, 1986) modifies this perspective regarding discrimination. It identifies particular market effects caused by discrimination and posits that these may account for the origin and persistence of wage gaps between men and women. Specifically, past or present employer preferences for male workers (i.e., discrimination) for some jobs create artificially high supplies of female workers for other, typically female jobs. The skewed supply curve exceeds demand and drives the market wage for female

occupations downward. According to this theory, it is female workers in relation to male workers that are devalued, not female occupations or female work in general.

The utility-maximizing model of firm behavior central to neoclassical economics has been used to generate a distinct demand-side account of how occupational segregation and the male-female wage gap could, in the short term, reflect economically rational behavior. Rather than responding to individual or company prejudices, firm behaviors that lead to sex segregation and wage inequality could be based on rational calculation based on economic interests. According to the theory of *statistical discrimination* employers make hiring and compensation decisions based on perceived productivity for groups of workers, and may use both *achieved* (such as educational level) and *ascribed* (e.g., gender and race) statuses to define groups (Thurow 1975, Aigner and Cain 1977, England 1992). One version posits that employers focus on the average productivity of group members. If even minimal differences in average productivity exist (or are perceived to exist) between men and women, employers may use gender as an efficient criterion for hiring, placement, mobility and pay decisions (Arrow 1973). Another version emphasizes employers' concern not with the mean group productivity but with group variances in productivity. Risk-averse employers will choose members of groups perceived to vary less in their productivity (Phelps 1972). Thurow's (1975) model of statistical discrimination puts particular emphasis on employers' perceptions of anticipated training costs. He argues that in contrast to standard neoclassical theory, wages are downwardly inflexible, and that productivity inheres in jobs more than in workers. Employee training is thus the crucial mechanism by which latent capabilities are translated into productivity. Hiring workers who require less training is thus an important efficiency strategy, and gender may be used in assessments of the training requirements of individual workers. According to proponents of each of these views, wage differentials could result

from economically rational choices even if groups have similar productivity *averages* (also see Lundberg and Startz 1983, Bielby and Baron 1986).

Neoclassical economics has also produced the *human capital* perspective (Becker 1964, 1985, Mincer 1958, 1974, Mincer and Polachek 1974) as a supply-side account for occupational segregation and male-female wage differentials. In this view, the human capital attributes of individuals – such as formal education, on-the-job training, and firm-specific skills – are central determinants of worker productivity. Some workers are paid more than other workers are because they have more skills, experience, and longer tenure with the firm. The theory suggests that occupational choices and work-related investments in training respond to both market incentives and preferences regarding immediate versus deferred returns.

A predominant version of this theory emphasizes that individuals' preferences and investments are gendered in that they are shaped by marital roles (Becker 1981, 1985).
This "new household economics" proposes that marital households maximize their economic gains through male and female labor specialization. Women specialize in domestic work and invest more time in domestic-related skills and activities, while men invest in market-related skills. Due to child-rearing and other domestic labor activities, women are seen as more likely to desire flexible work hours and entry into and out of the labor force. Accordingly, women pursue work that may offer lower wages over the course of a career and less opportunity for advancement but higher immediate wages, greater flexibility and other compensating differentials (Mincer and Polachak 1974, Polachak 1979, 1981; see Glass 1990 and Jacobs and Steinberg 1990, 1995 for empirical research testing these propositions). Patterns of occupational sex segregation are thus seen as reflecting rational behavior by women and men acting as members of

utility-maximizing households. These supply-side choices are taken to explain the low wages for female jobs that sustain much of the male-female wage gap.

A final human capital model incorporates occupational attributes in an account of wage differentials between male and female occupations. The *specialized human capital* hypothesis emphasizes that human capital investments are often not generic labor-market investments but rather have utility only in a particular occupation (Becker 1964, Tam 1997). This view argues that occupations requiring such investments rationally need to offer higher returns on these specialized investments, which also simultaneously motivate such investments. According to Tam, wage differentials between male and female occupations that are perceived to stem from sex composition effects may in fact reflect differences in specialized human capital. This view does not account for why male occupations require more specialized human capital, but focuses solely on addressing occupational wage effects. This view has some resonance with Thurow's job queue model regarding the process of labor supply and demand (1975), in that Thurow argues productivity is an attribute of jobs, and that individuals use human capital attributes to secure good positions in the queue for desirable jobs. While the specialized human capital hypothesis retains a focus on individual attributes, it explicitly models their wage payoff as resulting from the interaction between *narrowly defined* supply and demand queues. High occupational wage desirability correlates with large supply-side investments in very particular skills.

Neoclassical Predictions

Only limited predictions about the effects of occupational sex composition can be found in these models of demand and supply-side behaviors. While the standard neoclassical view of discrimination suggests that competitive pressures will erode discrimination and lead to the inclusion of women in previously male occupations, it has no theory to account for wage differences across sex

composition once other factors are controlled. The crowding hypothesis suggests that women in male occupations are forced to accept lower wages than men in order to gain entry. As more women enter an occupation, women's bargaining position would presumably rise and with it, wage inequality should diminish. Over time, as women gain entry into formerly male occupations, generalized demand for female labor should rise, along with relative compensation for female occupations. However, no further predictions about the shape of sex composition effects follow from this hypothesis.

The statistical discrimination model similarly offers no explicit predictions about sex composition effects, or about differences in their impact for male and female workers, but some implications seem apparent. In occupations where women are a sizable percentage of the workforce, the perceived utility of gender as a screening criterion would be obsolete. Thus, while high levels of segregation across all occupations may sustain overall male-female wage inequality, wage differentials *within* more integrated occupations should be relatively small. Moreover, the logic of the theory implies that women in predominantly male occupations might experience particular wage boosts. As "atypical" women who have overcome the male bias of the job queue, their presumedly high skill levels may interact with high-productivity jobs to produce extremely high productivity and correspondingly high wages.

The human capital model suggests that individual work-related attributes determine wages, and as such it has little to say about sex composition effects. Following this model, however, there is no reason to predict differential effects for men and women when controlling for human capital and other appropriate variables. Likewise, there is no rationale for nonlinear or nonmonotonic effects across the continuum of occupational sex composition. Similarly, the effects of occupational variation in specialized human capital, suggested to be the cause of wage differences erroneously attributed to sex composition, should apply equally to men and women and be gender-neutral in form across the occupational sex composition continuum.

There is no single set of predictions generated by the class of neoclassical models discussed above regarding the possible variation of sex composition effects for men and women and resulting effects on the wage gap. Some more directly address the former effects, and some the latter. In this and the following section, I group theories using wage gap predictions as the primary criteria. As predictions for the sex composition effect on the wage gap are overall better specified than predictions regarding effects on male and female wages, this allows more consistent standards of comparison. Grouping by wage gap predictions also reflects underlying substantive and theoretical priorities. Using this schema, two types of predictions are evident. First, both the crowding hypothesis and the theory of statistical discrimination seem to suggest that wage inequality between men and women will be the lowest for those in gender integrated occupations. From within the neoclassical paradigm, this has some intuitive appeal; whatever market forces create inequality between individual men and women and male and female occupations, they would be most diminished where there is integration. I will refer to this as the *equality with integration* hypothesis. Note also that regarding women in predominantly male occupations (i.e., those with only minimal integration), the statistical discrimination model implies that such women realize wage gains, while crowding predicts they have to accept lower wages to gain entry into male occupations.

In contrast, human capital models suggest that wage effects of sex composition should be the same for men and women, regardless of whether an occupation is predominantly male, female, or integrated. Furthermore, these models offer no reason to expect non-linearities in that relationship, given that it has no clear theoretical basis in neooclassical economic thought. The specialized human capital hypothesis similarly makes no predictions about variation of wage effects for men and women stemming from this additional "occupational" variable. This

set of more supply-side predictions, either by emphasis or by default, thus suggests similar and linear wage effects for men and women across the continuum of occupational sex composition. I will refer to this as the *similar effects – human capital* hypothesis.

These two hypotheses are obviously in tension with one another, and do not represent a unified neoclassical position. Nonetheless, they represent the predictions generated under the neoclassical framework. I include them both here to most accurately represent the potential neoclassical interpretations of the findings. As we shall see, intergroup conflict theories also lead to varying predictions.

Intergroup Conflict Theories

Sociological theories that highlight conflict between groups in explaining occupational sex segregation and the male-female wage gap have fundamentally different premises than neoclassical explanations. In contrast to gender-neutral market forces that drive hiring, promotion and compensation in the latter models, intergroup conflict theories posit that status attributes are implicated in these processes in a variety of ways. Intergroup conflict theories do not deny that human capital and market forces fundamentally shape these labor market processes, but conceptualize these factors as less important than gender status attributes in producing sex segregation and the wage gap.

Assumptions about the ongoing and systemic saliency of gender as a marker of status group membership deviate starkly from neoclassical assumptions. Recall that for the neoclassical theorists, workers' gender status is relevant only as potential information used by employers to efficiently screen for workers who represent good investments (statistical discrimination), as an indicator of household vs. market human capital investments (the new home economics), or as a target of economically irrational discrimination by individual employers. In the conflict perspective, the relevance of workers' gender status is not incidental or limited to particular contexts but rather inscribes the process through dominant and subordinate group membership.

Conflict theories assert that the ways in which gender influences wage differentiation are explicitly or implicitly linked to social competition between men and women. While other frameworks could be included under this rubric, two main sets of intergroup conflict theories are selected for consideration here: the *status composition* and *social closure* perspectives. This ordering of sociological analyses of sex segregation and workplace inequality is drawn from Tomaskavic-Devey's work (1993a, 1993b, 1995), though here it is modified. *Status composition* models primarily focus on the way in which the typical gender occupants of occupations influence value attached to the occupation. *Social closure* models examine the ways in which dominant social groups act to restrict access by subordinate groups to valued jobs.

Status composition perspectives posit that occupations are differently compensated depending on the gender status of typical occupants. The most general form of this view asserts that a cultural devaluation of women's work accounts for the low pay of female occupations relative to male occupation. This cultural devaluation hypothesis may focus on the devaluation of women's occupations because women fill these jobs (Treiman and Hartman 1981, Cockburn 1988, Acker 1990) or because these jobs utilize nurturance skills culturally associated with women (Steinberg 1990, England 1992). Some versions of this hypothesis emphasize that this devaluation either may be in response to the status of workers in an occupation or may be part of the process by which women are placed in low-status occupations.

The link between devaluation and male-female competition is indirect in some versions of the status composition perspective, because "biased" perceptions by men in decision-making positions may not necessarily be linked to *conscious* motivations to maintain male power and privilege (indeed, some would not consider these "conflict" analyses). Other theorists emphasize the protection of male privileges and power in characterizing the process by which occupations are stereotyped as women's work and treated as - and sometimes transformed into- low status work (Tomaskovic-Devey 1993a, Cohn 1985). However, virtually all status composition perspectives maintain that men's dominant status influences their perceptions of the value of female workers and their work. The centrality of gender to such cognitive processes is usefully described in

Ridgeway's interactional account of the continuation of labor market inequality (Ridgeway 1997). In this model, mixed-gender workplace interactions heighten the relevance of gender for men, stimulate identification with men as a group, and combine with other factors to lead men to act in "the interests of their gender" in an occupational context. Moreover, men's status, organization power, and placement in management positions allow them to put their perceptions into practice.

Theories of social closure state that dominant groups *actively* seek to maintain positions of power by protecting employment opportunities and other key resources (Parkin 1979, Murphy 1988). Status attributes are used to exclude members of subordinate groups from jobs preferred by dominant workers. This outcome may result from occupational segregation, control over mobility, or influences on other aspects of labor market dynamics. One outcome is that dominant group workers maintain wage advantages over other groups. A concrete example of social closure is unionization, a formal process where employment access is restricted. Informal processes such as vigorous resistance to potential co-workers of the "wrong" status group also fit under the theory.

With origins in Weber's analysis of credentialization as a means of restricting labor opportunities (1968), the concept of social closure has been utilized under a variety of analytical perspectives and applied to equally varied issues. Most common have been analyses of job protection by white and male workers against black and female workers, respectively (Beck 1980, Milkman 1987, Cohn 1985). Within the sex discrimination literature these dynamics are often identified as "monopoly discrimination" (Madden 1973) or more broadly as evidence of "patriarchy" (Hartmann 1976, Strober 1984), while race-oriented research has emphasized "split" or "segmented" labor markets" (Bonacich 1972, 1976).

Simply excluding subordinate competitors from desired jobs is the most straightforward closure strategy. However, Reskin (1988) argues that sex segregation is the predominant contemporary strategy by male workers given legal and other constraints on outright exclusion. Sex segregation may occur at occupation, firm and job levels, and there is significant evidence suggesting substantial latitude in the placement of workers into specific positions within an occupation or even within a specific job (Baron and Bielby 1980, Wolf and Fligstein 1979, Levine 1998). Given this, sex segregation does seem to be an effective means through which social closure can be

successfully, if not completely, enacted. However, the theory also strongly suggests that male workers will act to protect organizational power, wage privileges and other workplace resources through a variety of additional mechanisms apart from sex segregation.

One well-specified theory of closure is Blalock's model of intergroup relations (1967). While it has only been minimally applied to the gender wage gap, Blalock's model is particularly relevant to this study because it makes predictions about the overall level of intergroup conflict resulting from various minority-majority proportions. Blalock focuses his analysis on movement into putatively desirable "majority areas," – i.e., male jobs – and does not explicitly consider the other end of the proportional spectrum, where in this case women outnumber men in many occupations. Thus his theory originally applies to dynamics in occupations ranging from the extreme "male" end of the continuum to some undefined point among integrated occupations. For this range, the general prediction is of greater amounts of conflict in occupations with higher percentages of female workers.

According to Blalock, *competitive* pressures drive this conflict. When women are only a small percentage of workers in an occupation, i.e. "tokens" (Kanter 1977), competitive pressures are minimal. However, they increase dramatically with a large percent increase in the amount of female workers in an occupation, such as from 10 to 20%. If successful, men's efforts to respond to that threat will generate significant wage differentials. As closure practices that ensure this wage gap will already be in place, additional female workers do not constitute similarly competitive economic threats. The competitive threat will level out, increasing at a decreasing rate. The underlying idea is that some sort of threshold level exists at which male workers will seek to differentiate their wages from those of women. With a smaller number of women workers, there is no such need to take particular steps to monopolize positions or opportunities. Beyond the threat threshold, increasing differentiation will restratify the occupation as the percent of women increases. Regarding such a situation, Blalock states that " the larger the minority percentage the greater is the average gap between the two groups" (1967, p. 148). Logically, such effects would not extend into male-female

relations in predominantly female occupations. Presumedly men are not trying to keep women out of such occupations, given that they are generally associated with low status and pay.

Blalock's model is literally about change in occupations over time, but the precision of his theory makes it clear that the *outcomes* of competitive pressures should be captured in wage variation at the individual level. These grounds for applying his theory to recent cross-sectional data are further supported by the fact that not only have large numbers of women long-since participated in the workforce, but that sizeable numbers of women have entered traditionally male occupations (Reskin and Roos 1990, Bianchi and Spain 1986, Roos and Jones 1995). Change is still occurring, but wage-differentiating impacts of women's entry into formerly male domains should now be evident if the theory is accurate, and if men are successfully maintaining stratification.

Blalock states that token-related dynamics favorable to women in male dominated occupations will be evident in contexts where men have an interest in presenting an open and non-discriminatory appearance. Token women– those in occupations where the percentage of women is below the threat point - will thus receive demonstrably good access to resources. Subsequent women in these occupations, whose entry causes the proportion female to constitute a threat, are expected to find fewer opportunities available and experience declining positions and outcomes.

Regarding these strands of closure theory, the question of who is enforcing such occupational closure has been answered in various ways. Male workers and managers may share interests in restricting opportunities to women. Conversely, managers may be in some conflict with workers regarding the desirability or shape of gendered social closure processes. I find most compelling Tomaskovic-Devey's view that social closure dynamics involve male workers and managers alike in protecting opportunities for men (1993a, see also Hartmann 1976 and Walby 1986 for analysis

of these actions as forms of "patriarchy"); however it is extremely difficult to disentangle statistical findings to gain a clearer picture of these dynamics.

Intergroup Conflict Theory Predictions

A number of general predictions about the shape and variation of sex composition wage effects can be drawn from these theories of intergroup conflict. In general, both variants of the status composition / devaluation hypothesis (i.e. "female workers" as distinct from "female skills" effects) predict that both male and female workers would equally benefit or suffer from the wage effect associated with an occupation's sex composition. This analysis would suggest there *may* be variation in the value and compensation accorded gender-mixed occupations due to the ambiguity about how to type the gender of the "typical occupant." However, any variation should affect both men and women equally in a given occupation. I will refer to this as the *similar effects- conflict* prediction.

Following Tomaskovic-Devey's (1993a) recent use of social closure theory, pressures for closure are expected to go up as the value of the job increases. There will be little exclusion of women from low status and low wage work, and great efforts to exclude them from high status and well paid work. The level of segregation should increase as well with rises in job status and compensation (1993a, p. 68). Given that women's large-scale access to occupations in the labor market has historically been limited to those occupations generally low in status or declining in status, it is reasonable to cautiously treat the percent male occupancy as an indicator of the desirability of jobs to full-time, year round male workers. In other words, if a job is desirable, sizable numbers of men would be expected to use their resources to acquire employment in that field and protect access to its wage privileges and other benefits. Thus, in jobs that are more "male," we would expect vigorous attempts by men to enact social closure. As this study does not examine the exclusion of women per se, and occupational sex composition is the focal independent variable, sex composition obviously cannot

be included here as an indicator of closure. If operative, closure processes should generate wage differentials between men and women even within occupations. Where men most predominate, they will most forcefully act to protect their privileges through the establishment of large wage differences between men and women (as well as other means). Thus the social closure theory predicts that the greater the percent men in an occupation, the larger the expected wage gap between men and women. I call this the *increasing differentiation* prediction.

Blalock's intergroup relations theory predicts a positive concave relationship between percent female in an occupation and the level of competitive conflict between men and women. Differentiating dynamics will be most evident among occupations in which women are a significant, but not predominant, percentage of the workforce. Wage differentials will be a product of this differentiation and are expected to be largest in these gender-mixed occupations, increasing across this range as percent female increases until the percent female has reached a substantial proportion. Token women in very male occupations generate little competitive conflict and their wages should most closely match male wages in these occupations. This theory predicts that the wage gap should be relatively small in male occupations and larger in mixed occupations. I refer to this as the *proportional conflict* prediction.

Summary of Predictions

My predictions are thus the following:

1. The *similar effects – human capital* hypothesis suggests that to the degree that there are wage effects from occupational sex composition, they should be similar for men and women across the continuum of sex composition.
2. The *equality with integration* hypothesis generated by crowding and statistical discrimination theories suggests diminished wage inequality between men and women in gender-mixed occupations. These theories have divergent predictions regarding wage effects for women in predominantly male

occupations. Crowding predicts that the wages of such women will continue to be below men's wages. Statistical discrimination predicts higher productivity that will result in higher wages relative to other women, and a diminished male-female wage gap.

3. The *similar effects- conflict* hypothesis from status composition theories predicts that wage effects reflecting gender-informed valuation of occupations should affect men and women similarly across occupations. Two contrasting theoretical frameworks thus generate the same prediction regarding sex composition wage effects: both the human capital and status composition models suggest a fundamental similarity of effects for men and women across sex composition. Given the scope of the data I use, I could find no way to introduce elements that would allow adjudication between these two. Whether this will be a confounding factor in interpreting results depends on the results of the analysis conducted below.
4. The *increasing differentiation* hypothesis stemming from social closure theory predicts that male-female wage differentials will increase, the more "male" the occupation.
5. The *proportional conflict* hypothesis generated by intergroup relations theory predicts that there will be less of a wage gap in very male occupations, and that wage differentials will increase in more mixed occupations as the percent female rises, until reaching a point where women are a substantial, perhaps predominant proportion of workers.

Data and Measures

I use three different data sets in this analysis. The primary data are individual level cases drawn from the National Longitudinal Survey of Youth (NLSY) for the year 1993. The NLSY constitutes a national probability sample of individuals age 14 to 22 in 1979, the first year data were gathered. This group has been surveyed every year since 1979 on a wide variety of employment related measures. The original sample contained over 6,000 cases each for men and women respectively.

Blacks and Hispanics were oversampled. Following general conventions, I kept in the sample those individuals who worked more than 35 hours a week and at least 50 weeks a year (England 1992, Sorenson 1989).

I merged the NLSY individual level data with data about occupations drawn from the 1990 Census EEO File and a data set constructed by England and Kilbourne (1989). These two files provide information about the number of women and men in each of the 512 Census occupational categories. I added the percentage of men in each individual's occupation as a new variable to the individual's case. Due to changes in the occupations used by the 1990 Census, some reassignment of occupations into 1980 occupational categories was done to match the 1980 occupational codes employed by the NLSY.[1]

The dependent variable for my analysis is the natural log of hourly wage, and my regression is thus a model of the effects on wages. The hourly wage variable is an NLSY-created variable that uses hours worked and income. Like other employment-
related data sets, the NLSY suffers some problems with data on yearly earnings. Some cases (fewer than 75) reported hourly earnings below a plausible minimum. I used a combination of bottom-coding (to a $4 an hour wage) and deletion to handle these cases. Values for the original (non-logged) variable then ranged from $4 to $100, with a mean of $13.52 and a standard deviation of $8.38. After the transformation, the logged measure conforms well to OLS requirements for a normally distributed dependent variable.

[1] Some occupational classifications merely changed numbers between 1980 and 1990, and will not be listed here. Some 1980 codes were split into multiple 1990 categories, while some sets of categories were condensed into one 1990 code. I will identify these substantive reclassifications by occupational title, and list census codes in parentheses. Three types of 1990 manager occupations (Census code 17, 21 and 22) were merged into one 1980 manager classification (17). Three 1990 classifications of child care workers were coded into one 1980 child care worker classification. A broad 1990 category of cooks (436) was recoded into one of three 1980 cook classifications (436). Workers coded in the 1990 communication equipment operators classification (353) were coded into one of two 1980 communication equipment operators codes (353).

Independent Variables

The variables in my analysis include standard control variables for wage equations appearing in the economic and sociological literature. Various explanatory variables also comprise subsets associated with competing theories of wage determinants. They are identified below in blocks that correspond both to these theories and to their order of inclusion (as blocks) in the model. Means and standard deviations for these variables are presented below in Table 1.

Individual Variables

Individual sociodemographic variables constitute the first block of variables and include age in years, marital status (married or non-married), race (black, white and other) and gender. Age, white racial status, and male gender status are predicted to have a positive effect on wages (Tomaskovic-Devey 1993a). Being married is expected to have a positive effect on men's wages but a negative effect on women's wages (Polachak 1979).

Human Capital Variables

Human capital variables constitute the next block of variables in the model, and include years of education, tenure with the current employer in weeks, and tenure with employer squared. Years of education is topcoded so that more than 20 years are coded as twenty. The tenure and tenure squared terms are centered about the mean. These variables are expected to have a positive effect on wages (Becker 1964, 1985, Mincer 1958, 1974).

Table 1. Means and Standard Deviations

Variable	Mean	S.D.
Sociodemographic Variables		
Age	33.00	2.23
Married (=1)	0.58	..
Gender (1=M)	0.59	..
White (0,0 =	0.68	..
Black other)	0.26	..
Human Capital Variables		
Education (in years; +20 coded as 20)	13.47	2.41
Tenure w/firm (mos.)	69.51	227.46
Tenure w/firm squared (mos.)	2713.48	3506.42
Firm Level Variables		
Multiple firm sites		
(1=yes)	0.69	..
#Employees at other sites	0.63	..
Labor Market Variables		
Low local unemp rate (Hi is ref)	0.37	..
Medium local unemp rate	0.41	..
In SMSA (ref - not in SMSA)	0.30	..
In SMSA Cntr Cty (ref-not in SMSA)	0.13	…
In SMSA but not in CCity	0.38	..
Urban (0=rural)	0.81	..
Region NC (west	0.23	..
Region NE is ref)	0.16	..
Region SO	0.41	..
Mobility & Occupational Variables		
Training Oppty (1=yes)	0.56	..
New Occupation W/Firm (1=yes)	0.49	..
Professional Work (ref is labor)	0.27	..
Sales/Clerical	0.30	..
Craft/Blue Collar	0.13	..
Gender Demographic of Occupation		
Percent Male in Occ	0.57	0.29
Percent Male Sqd (centered)	0.08	0.08

* Data are unweighted.
N = 4109.

Firm Level Variables[2]

Firm level statistics included two dichotomous indicators of size; a variable indicating whether the firm has employees at another location, and a measure indicating whether there were more than 1,000 employees at another job location.[3] These variables reflect predictions from *new structuralist* economic theories, which emphasize that wages are higher in large, capital-intensive, and highly profitable firms. Although this effect is theoretically associated with "core" or "peripheral" economic sectors in some models and with "primary" or "secondary" labor markets in others, size is expected to have a positive effect on wages (Doeringer and Piore 1971, Averitt 1968, Hodson and England 1986, Tolbert, Horan and Beck 1980; see Cain 1976 and Hodson and Kaufman 1982 for reviews).

Labor Market Conditions

Controls for labor market conditions were included via measures for local unemployment rate, Standard Metropolitan Statistical Area (SMSA) status, region, and urban. Local
unemployment rate is available in NLSY as a categorical variable which I condensed into a dummy variable with low, medium and high local unemployment areas. SMSA values reflect categories of residency in SMSA central city, residency in SMSA but not in central city, residency in SMSA with an unknown central city, and outside a SMSA. South, West, Northeast and North Central are the regional variables. Urban or rural is a dichotomous variable for residence. As incomes are lower in rural areas and in the south, working in these labor markets should have a negative effect on wages compared to other regions and more urban labor markets (Levy 1987). Demographic research suggests that metropolitan workers not in the center city -i.e. those in suburbs – will have higher earnings than city residents (Schnore 1965, Guest 1978, Levy 1987).

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[2] Mean substitution was done for a substantial number of cases for both measures of firm size. Other than this, means comprised less than 4% of any and all other variables for which means were substituted.

[3] The number of employees at employees job site was originally included, but found not to be significant and was dropped from the model.

Neoclassical economic theory suggests that local unemployment rates should be inversely related to wages (Ehrenberg and Smith 1997)

Mobility and Occupational Characteristics

These variables are intended to be indicators of the mobility prospects of the respondent and /or their position. An educational opportunities variable is a dichotomous measure of access to work-related educational opportunities (including work-sponsored training and tuition reimbursement for outside training). Whether respondents had started a new job with the current employer in the last year is included as a dichotomous measure. Individuals' occupations were categorized using a dummy variable as being professional, sales / white collar, skilled blue collar, or unskilled labor. On the job training, as an indicator of increasing human capital and productivity, is expected to have a positive effect on wages (Thurow 1975, Duncan and Hoffman 1979, Corcoran and Duncan 1979, Sandell and Shapiro 1978). Receiving a new job within the firm, a direct indicator of mobility (Rosenbaum 1980, DiPrete and Soule 1988), should also be associated with an increase of wages. Similarly, professional status rank is expected to be associated with positive wage effects, while unskilled labor should yield the lowest relative wages (Blau and Duncan 1967, Bielby 1981).

Focal Independent Variable

The focal independent variable for this analysis was the occupational attribute indicating the percentage of men in the respondent's occupation. In models not presented here I explored various categorizations of this variable, such as a three-category measure utilizing the following: occupations 70% or more men ("Male occupations"), occupations with a 30-70% mix of men and women ("Gender Neutral"), and those with less than 30% men (Female professions). A five-category operationalization was also explored. Neither improved on the results presented here. In addition to percent male, I also include a percent male squared term to capture quadratic effects. Both percent male and the squared term were centered to avoid multicollinearity. Mean substitution was performed for missing variables in the model. To illustrate the distribution of sex composition for the 512 Census occupations used in this analysis, Figure 1 represents the

distribution of occupations by the percent men in these occupations. Figure 2 illustrates the distribution of individuals in the sample into occupations by the percent men in these occupations.

To test for systematic differences between effects for individual men and women, a number of terms representing interactions between gender and other variables are included in the model. In particular, terms for interactions between gender and education explore for differing effects of human capital, while interactions between gender and percent men variables examine possible variation in sex composition effects for men and women.

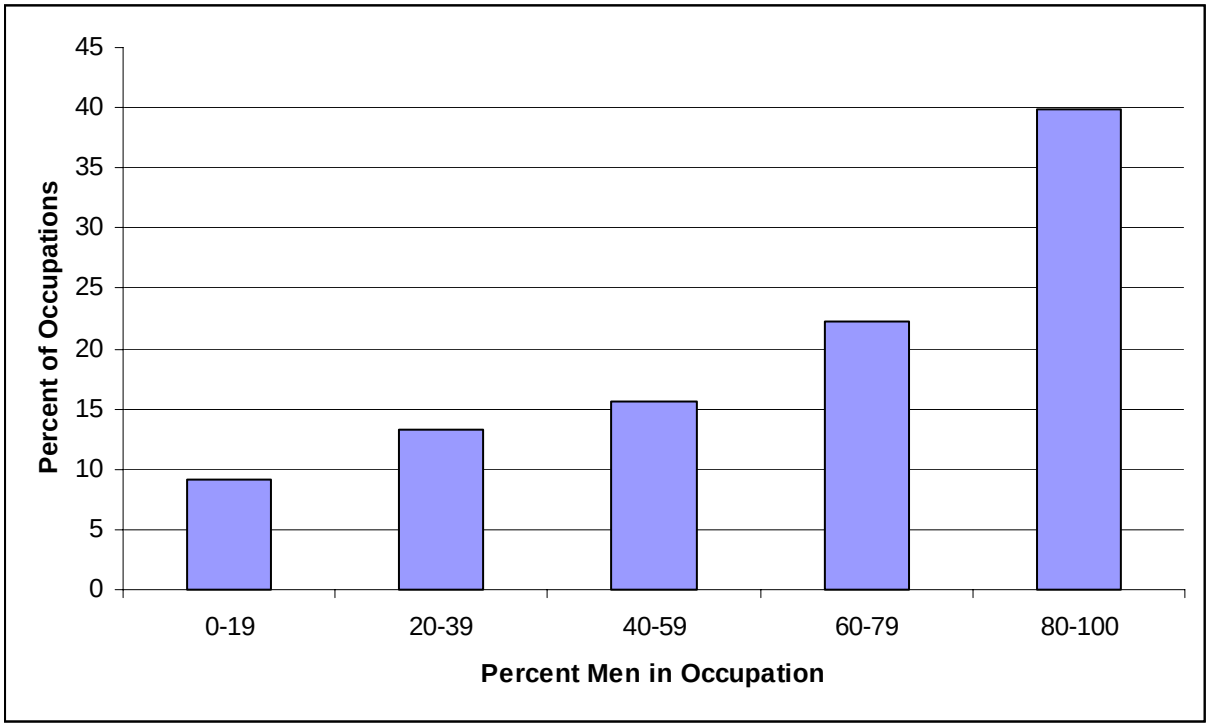

Figure 1. Distribution of 1990 Census Occupations by Sex Composition of Workers. N = 512 Occupations.

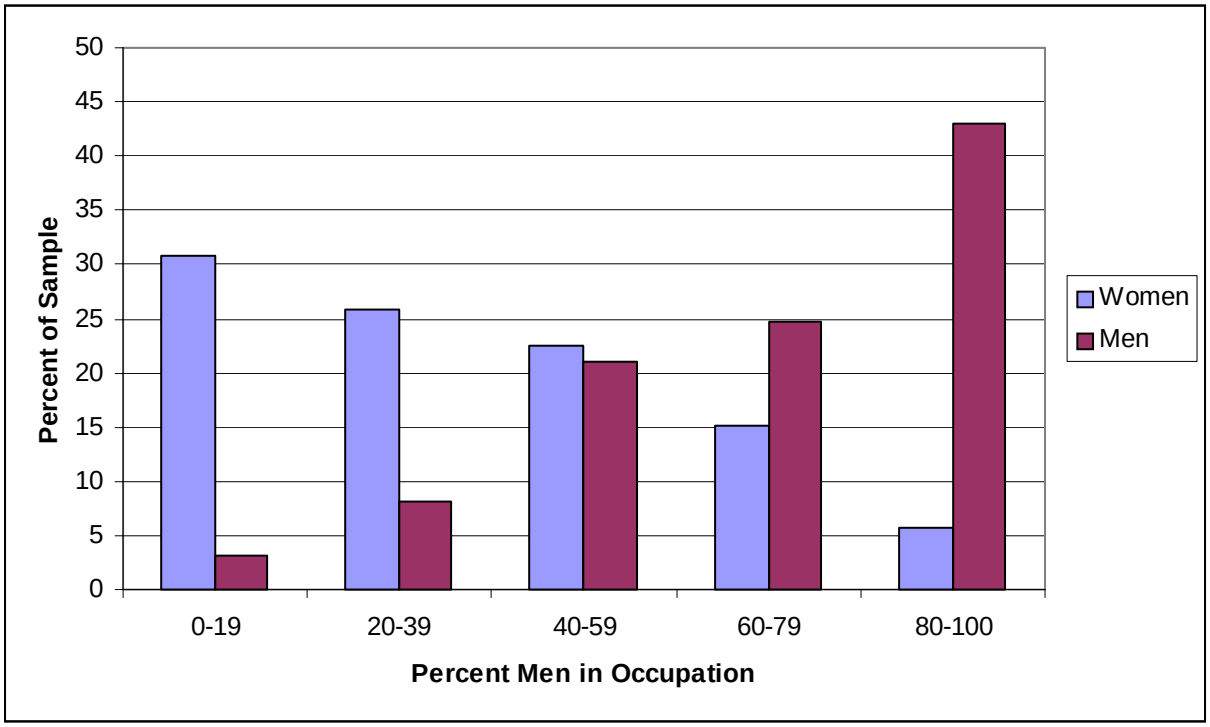

Figure 2. Distribution of 1993 NLSY Sample by Sex Composition of Occupations. N=4109.

Results of the Analysis

I used Ordinary Least Squares regression in my analysis, regressing the natural log of hourly wage on the variables in the model. I sequentially entered variables in the blocks indicated above, thus comprising six models. The inclusion of interaction terms adds an additional model. The results are presented in Table 2 below.

Models 1-5 show results that are consistent with findings reported elsewhere. The effect on model fit for each of the various blocks of variables is significant. The blocks associated with human capital and structuralist theories, respectively (blocks 2 and 3), showed positive effects on wages as each theory suggests (Mincer 1958, 1974; Doeringer and Piore 1971, Averitt 1968). The patterns of effects for individual variables are generally stable across models. Age, gender, married status and education exhibit positive effects on wages. Tenure and the tenure squared term had significant, but opposing effects. Extremely long tenure begins to reduce the positive effects of tenure on wages.

Workers in large firms benefited from a positive effect of firm size on wages, providing some support for new structuralist arguments about dual economic sectors. However, the effects were quite modest. Overall, labor market effects were unsurprising. Workers in the South and the North Central, outside of SMSAs, and in rural areas all earned less than those in other locations did. Suburban residents of metropolitan areas, as expected, had higher earnings than those in the center city (Levy 1987). However, living in an area with low unemployment did not have a positive effect on wages in comparison to the referent group of those living in a high unemployment area. Medium unemployment areas, as expected, did have a positive effect.

Receiving access to work-related training or educational opportunities increased wages, suggesting the importance of on the job training for wages (Thurow 1975). Moving into

a new occupation within the firm had a small positive effect. Working in professional, and unskilled labor occupations respectively yielded the highest and lowest wages, with workers in sales / clerical, and skilled blue collar occupations experiencing occupational wage effects between these two extremes.

Model 6 introduces the occupational sex composition variable. The impact of the percent male of one's occupation has a very substantial positive effect on wages (b = .360). Men's occupations do seem to pay more when all other factors are equal, increasing wages by 1% for every 3% percentage point increase in percent men. The squared term also has a positive effect on wages, indicating that the effect is not linear. Not only is working in a male field advantageous, but in very male dominated occupations the wage gain is increased. The main effect of gender (1 = male) decreased by approximately 36% from model 5 to model 6. Effects for other variables were generally constant across these two models.

The interactions introduced in model 7 change this overall story. Interactions between gender and age, education, and marital status, respectively, indicate different effects on men and women for those three variables. Men benefit more than women from increasing age and being married, while women gain a larger wage return on each year of education. The most noteworthy finding in model 7 is the differential impact of sex composition on men and women. Whereas in model 6 the percent male in an occupation and the accompanying squared term showed powerful positive impacts on wages, model 7 reveals that this is parceled out differently to men and women.

Initially I entered only the gender X percent male term into model 7. Under this specification, sex composition effects were significant for women but not for men. Because subsequent versions including a quadratic interaction term improved the overall fit of the model, the former model is not shown here. Yet the initial finding of no linear sex composition effect for men is an important one. It

corroborates Kilbourne's previous findings (1994); however, the findings below underscore the importance of examining for quadratic effects. I will return to this later in my discussion.

Regarding women's wages, the interactions in model 7 make it clear that women gain more by working in a more male occupation. The sex composition coefficients, now representing effects for women, depart substantially from the estimates for model 6 by increasing from .360 to .488. For every two percentage point increase in relative numbers of men in an occupation, women's wages increase by almost 1 percent. Furthermore, adding the squared term reveals additional gains by women. The squared coefficient is substantially larger than the simple percent male coefficient (.637 and .488, respectively). This effect has a substantial impact on wages, however, only in occupations with high percentages of men. In predominantly male occupations, the positive impact of sex composition on women's wages *increases* with more men.

The percent male-gender interaction coefficient capturing the difference between the linear effect for men and women was only marginally significant at ($P<.057$). While its b value is negative, the overall linear effect of sex composition is still positive for men [.488 + (-.132) = .356]. Thus in contrast to the initial findings suggesting no sex composition effects, men's wages do increase with percent men. However, coefficients for the squared term further show that this relationship flattens with higher percentages of men. The sizeable and significant negative interaction effect of the squared sex composition term results in a slightly *negative* effect [.637 + (-.691) = (-.054)] of percent male squared on men's wages. Thus while the size of women's wage effects increase with a rise in percent men, gains for men are leveling when men predominate in an occupation.

These findings suggest that the relationship between the percent men in an occupation and wages is not a simple one. Previous research has not captured it,

and broad references to the effects of sex composition may sometimes misrepresent these complex associations. Discussions and assertions about this effect likely require more nuance than has yet been available from empirical research. While wages increase for both men and women with increasing proportions of men in an occupation, these effects vary significantly by gender, and have distinctive nonlinear forms.

To translate these findings into dollar amounts for individuals, I use the regression results to predict wages for men and women. The predicted values thus refer to predicted outcomes for hypothetical workers as the sex composition of their occupation is varied, while all other variables are set at the sample means. Using pooled means is appropriate for the purposes of theory testing rather than descriptive analysis of subpopulations. These procedures are well within conventional practices, but nonetheless they should not be confused with a direct analysis of occupations. To simplify the comparisons, predicted wages are calculated for white men and women only. These predictions are presented in Table 3.

I use the equation below to calculate wages for six different values of the percent men variable. Predicted Ln (hourly wages) = $e^{a + \Sigma b_i x_i}$ using all variables in Model seven.

Figures 3 and 4 illustrate the effects reported in Table 3 of occupational sex composition on male and female wages. I will now examine the respective wage profiles represented by these predicted values.

Table 3. Sex Composition of Occupations and Male and Female Wages
(Predicted from Table 2, Model 7)

	Percent Male	0	20	40	60	80	100
Women	Predicted Y (Nlog)	2.08	2.06	2.08	2.15	2.29	2.56
	Predicted Hourly Wage ($)	8	7.8	8	8.6	9.87	11.69
Men	Predicted Y (Nlog)	2.19	2.41	2.49	2.56	2.62	2.69
	Predicted Hourly Wages ($)	8.96	11.41	12.08	12.95	13.86	14.74

Male and Female Wage Profiles

Table 3 shows that wages for women decrease slightly when moving from occupations in which there are a negligible percentage of men to those with 20% men. Wages slowly rise as the percent men rises above 20%; women's wages in occupations with 40% men are equivalent to their wages in all female occupations. Clearly, increasing percentages of men do *not* lead to increasing wages for women among occupations with less than 40% men. A gradual rise is observed as the percentage men increases to 60%, after which women's wages increase more dramatically. Moving from occupations with 60% men to those with 80% men, and from the latter to those filled almost exclusively by men, women's wages increase sharply.

The effects of sex composition on the wages of white men across the continuum of occupations exhibit a notable pattern. Starting at a predicted wage that is higher but comparable to that of white women, male workers see a sharp rise in pay across the

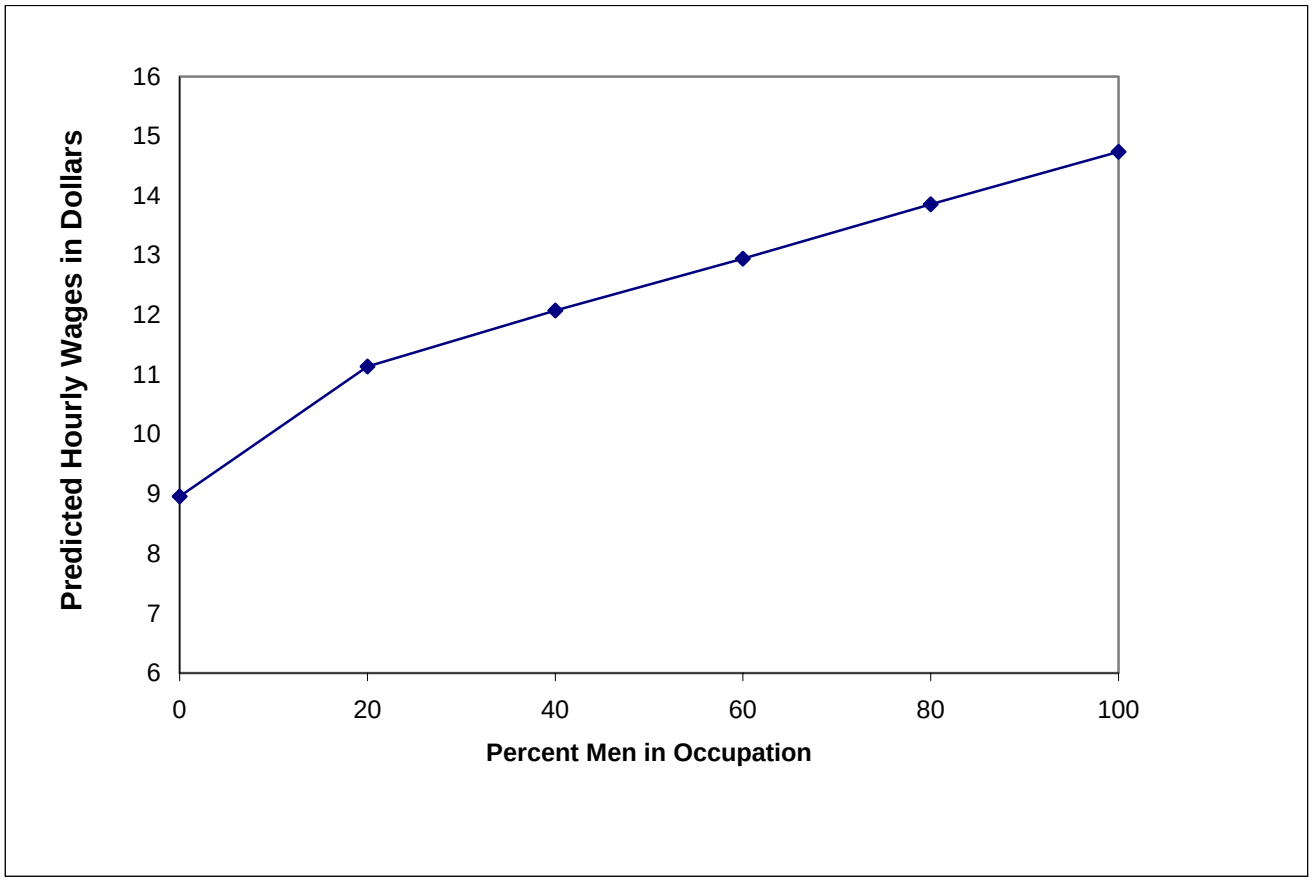

Figure 3. Sex Composition of Occupations and Men's Wages

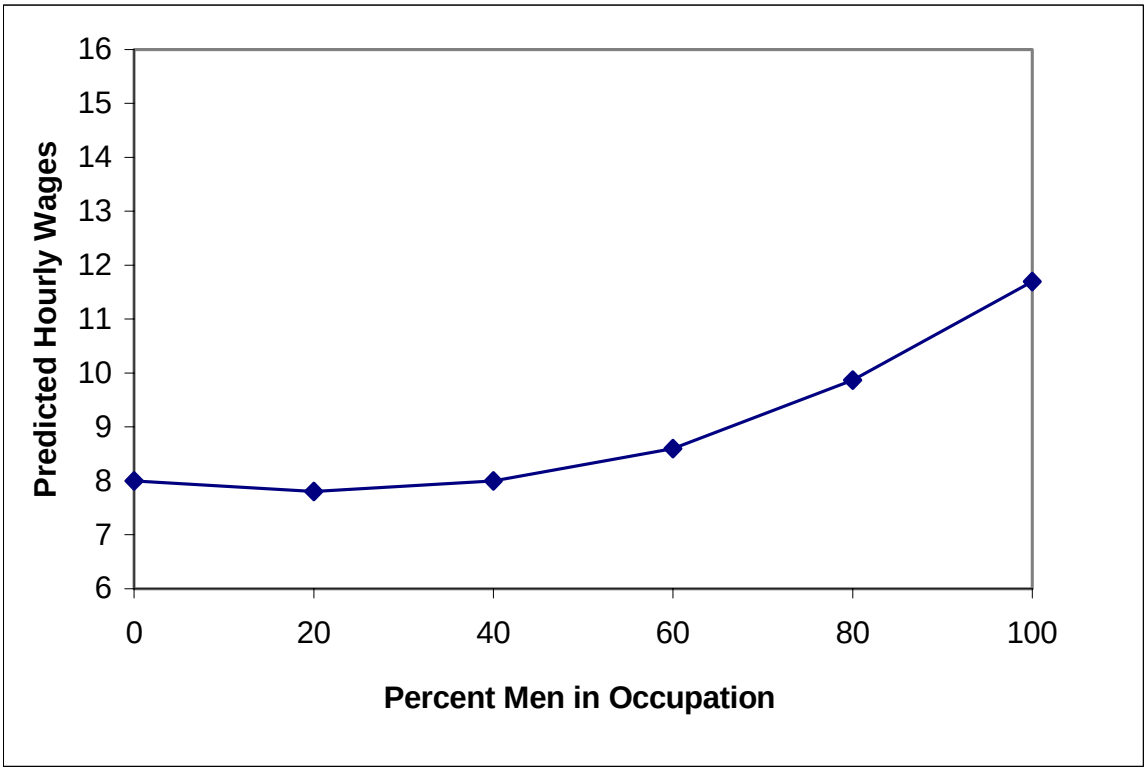

Figure 4. Sex Composition of Occupations and Women's Wages

occupations with those containing up to 20% men.. Moving from occupations with 0% men to those with 20% men, men's wages are expected to rise from just under $9 to over $11 per hour. As the percent men is further increased, subsequent changes are characterized by generally uniform increases in predicted values, but at a diminished magnitude compared to the first quintile.

Table 4 reports the increase in predicted hourly wages and percentage increase in wages across successive quintiles of sex composition for men and women workers.

Table 4. Wage Changes Across Occupational Sex Composition
(Predicted from Table 2, Model 7)

	Percent Male	0	20	40	60	80	100
Women	Change in $	NA	-0.20	0.20	0.60	1.27	1.82
	Change as % Increase	NA	-2.5	2.5	7.5	14.7	18.4
Men	Change in $	NA	2.18	0.94	0.87	0.91	0.88
	Change as % Increase	NA	24.0	8.0	7.2	7.0	6.3
Ratio: Women's Wage Effects to Men's Wage Effects (W:M)	Ratio of change in $	NA	-0.09	0.21	0.69	1.39	2.07
	Ratio of change in % increase	NA	-0.01	0.32	1.04	2.1	2.92

Table 4 shows that for those in occupations with a sex composition of fewer than 40% men, male workers benefit more from increasing proportions of men both in terms of real dollars and as a percentage increase in wages. Percentage gains in wages by women due to increasing occupational concentrations of men reach parity with men only in the move from 40 to 60% percent male. Here women gain slightly more in terms of their percentage wage increase (the female/male ratio is 1.04) although the ratio of actual wage increases is still only .69. When the sex composition reaches approximately 70% male, women gain the same amount in real dollars as do men. Beyond this

point, both the female/male ratio of % wage increases and the female/male ratio of real wage gains increase dramatically; compared to men, women gain more in dollars and in percent wages if they work in occupations comprised of at least 70% men. In short, the male sex composition effect is larger for women in predominantly male occupations than in integrated or majority female occupations.

Analysis of Gender Wage Gap Across Occupations

The predicted wage profiles of white men and women across occupations of varying sex composition invite closer inspection of the gender wage gap. Table 5 lists the predicted wage gap in dollars and the percentage of women's wages to men's wages at six points along the continuum of occupational sex composition. Figure 5 displays the shape of the wage gap as the percentage of women's wages to men's wages.

Table 5. Sex Composition of Occupations and Relative Male-Female Wages (Predicted from Table 2, Model 7)

Percent Male	0	20	40	60	80	100
Male Wage Advantage in $	0.96	3.34	4.08	4.35	3.99	3.85
Women's Wages as % of Men's	0.89	0.70	0.66	0.66	0.71	0.79

Figure 6 illustrates how the variations in the wage gap are due to the distinct and nonlinear wage contours for white men and white women across the continuum of occupational sex composition. The curve representing women's wages takes a convex shape in which wages increase substantially with percent men only among occupations

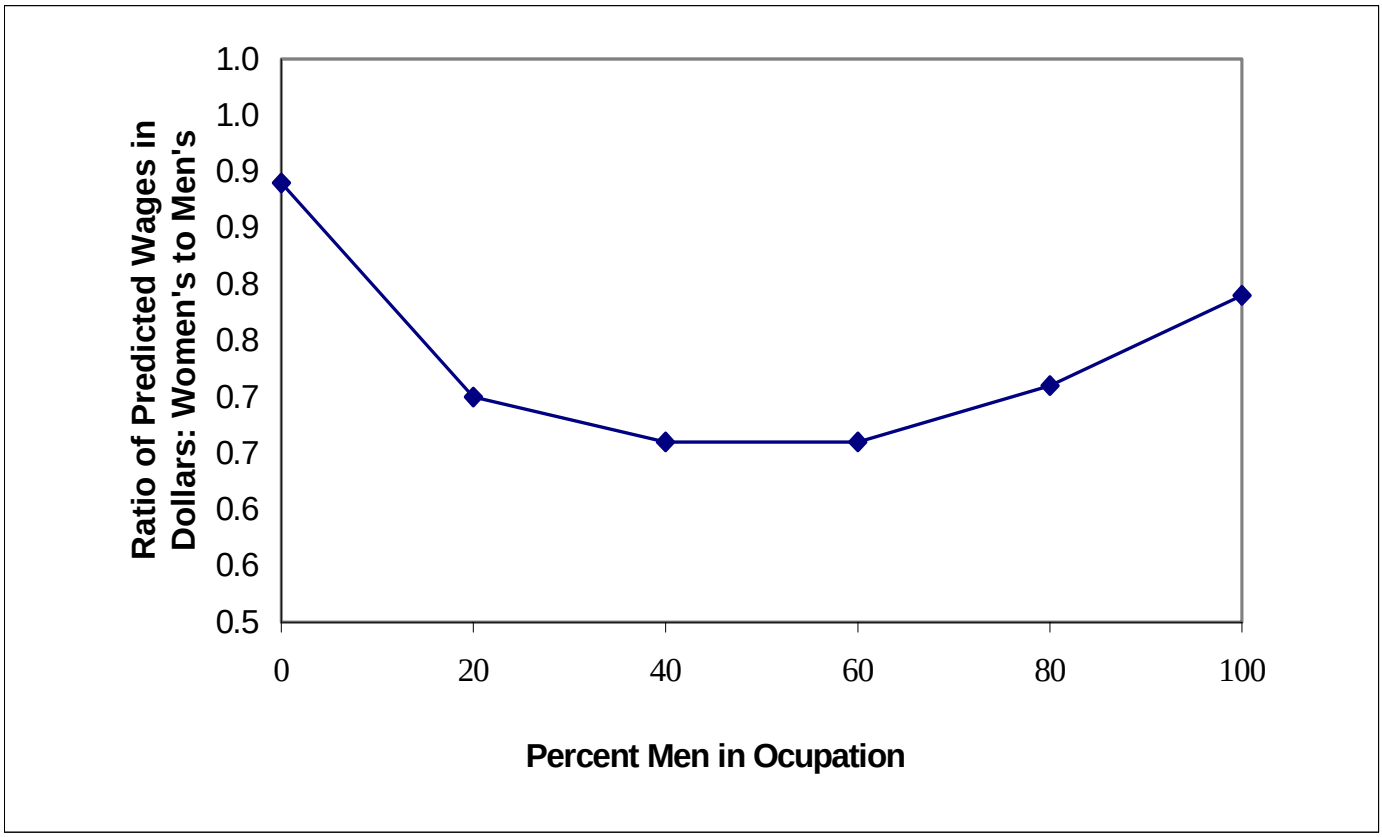

Figure 5. Women's Wages as a Percent of Men's Wages

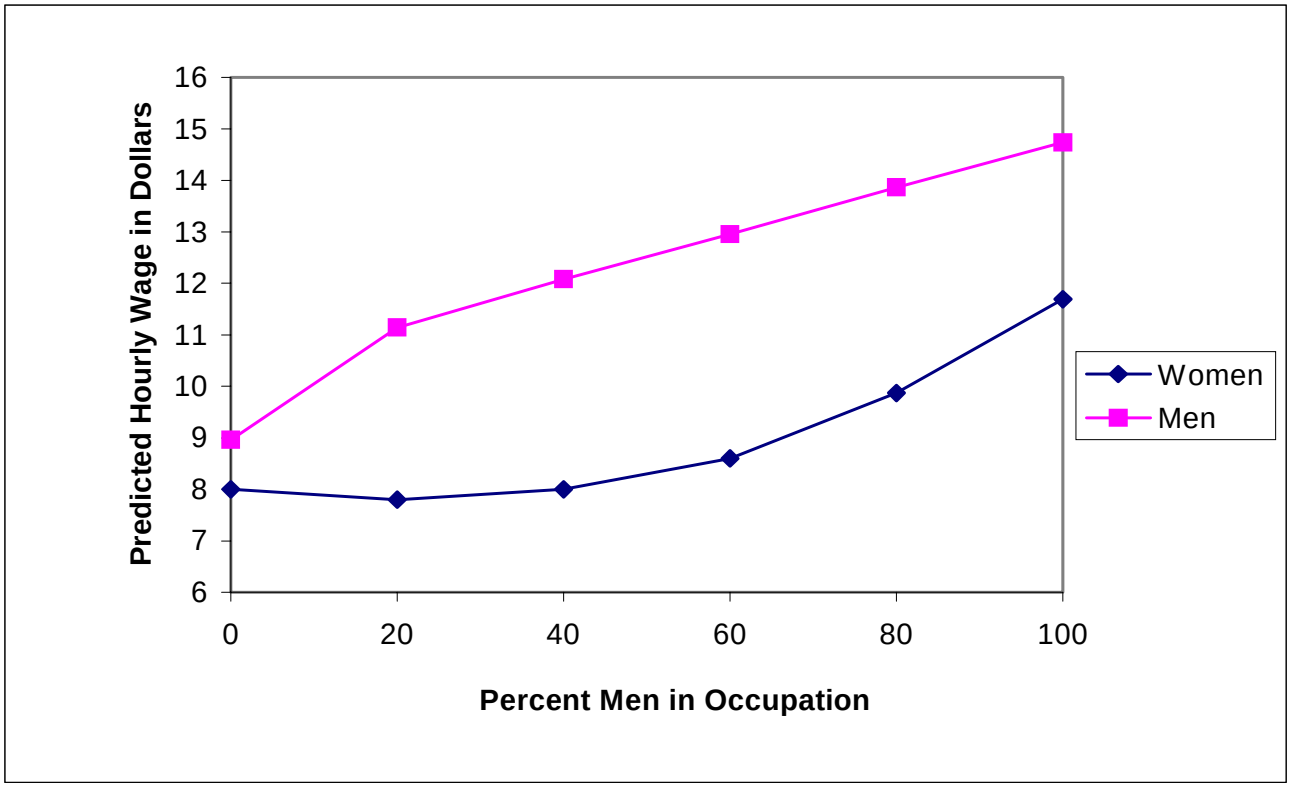

Figure 6. Sex Composition of Occupations and Men's and Women's Wages

with greater than 60% men. While the curve representing men's wages has a flatter profile, the two curves loosely mirror one another. Among predominantly female occupations, men's wages increase sharply as percent men rises, and then increase at a lower and consistent rate across the rest of occupations. Together these two wage contours produce the large wage gap found in the mixed gender occupations and the smaller wage gaps at each end.

Discussion

These findings are striking in two respects. First, they reveal a dissimilarity of occupational sex composition effects on male and female wages, respectively. The results of an earlier model, which includes only a linear term for the gender x sex composition effect, indicate a nonsignificant effect for men. This finding supports Kilbourne et al's finding (1994) of no significant effects of sex composition on men wages when modeled as a linear relationship. The current study goes beyond previous research to describe divergent effects for men and women. The majority of wage benefits women receive from increasing percentages of male workers are limited to occupations with greater than 60% men, with more dramatic effects among predominantly male occupations. In contrast, men see positive wage effects in mixed occupations, but diminishing wage premiums in predominantly male occupations. In short, the present findings indicate that common assertions suggesting "the more male, the more pay," may misrepresent complex relationships between worker's gender, occupational sex composition and wages. Subsequent research should take these effects into account.

Secondly, the results show that the male-female wage gap varies in a distinctive pattern across the range of occupational sex composition. This pattern provides empirical findings against which to evaluate the respective neoclassical and intergroup conflict predictions. As the same dynamics underlie both the sex composition effects and the resultant wage gap pattern, I will discuss the implications of my findings for both of these phenomena in the section below.

Hypothesis 1: The similar effects – human capital hypothesis suggests that to the degree that there are wage effects from occupational sex composition, they should be similar for men and

women across the continuum of sex composition. No relationship is expected between sex composition and variation in the wage gap.

Based on the gender interaction effects for percent male and percent male squared, the findings do not support this hypothesis. Calculations based on predicted male and female wages reveal that the effects are substantially dissimilar in terms of percentage increase in wages (Table 4). Furthermore, the sex composition effects do vary across the range of sex composition, and differently for men and women (Figures 3, 4, and 6). The nonlinear effects of sex composition and the wage gap profile shown in Figures 5 and 6 do not support this hypothesis.

Hypothesis 2: The equality with integration hypothesis suggests diminished wage inequality between men and women in gender-mixed occupations.

The patterns visible in Figures 5 and 6 clearly provides no support for this hypothesis. Rather, wage inequality is greatest in the range of gender-mixed occupations. This strongly suggests that the size of the wage gap is related to the proportion of men and women in occupations, and that gender-mixed occupations are sites of greater rather than lesser wage inequality.

Hypothesis 3: The similar effects- conflict hypothesis predicts that wage effects reflecting gender-informed valuation of occupations should affect men and women similarly across occupations.

The same prediction as hypothesis 1, this hypothesis receives also receives no support from the findings.

Hypothesis 4: The increasing differentiation hypothesis predicts that male-female wage differentials will increase the more "male" the occupation.

For the range of occupations having between 1 - 60% male workers this hypothesis receives some support. For such occupations, the predicted wage gap in dollars and as a ratio of women's to men's income increases as the percent men rises (Table 4). However, women's wage gains relative to men's do not decline in magnitude for occupations having more than 60% male workers as social closure theory would lead one to expect. Here the findings suggest a diminishing wage gap and increasing sex composition wage benefits for women. This hypothesis receives very weak support.

Hypothesis 5: The proportional conflict hypothesis predicts that there will be less of a wage gap in very male occupations, and that wage differentials will

increase as the percent female rises until they are a substantial, perhaps predominant proportion of workers.

This hypothesis receives substantial support from the findings for those in occupations best fitting the original theory's scope – integrated and male occupations. Regarding these occupations, the wage gap is smallest for "token" women in heavily male occupations and largest in the most mixed occupations. Based on regression coefficients as well as the predicted wages, token women benefit most from a sex composition effect as suggested by the theory. This finding matches well with Blalock's prediction that such token effects will be particularly evident when employers have an interest in presenting an appearance of fairness, a criterion that employers in 1993 (the year of the data) likely fit. Men in predominantly male occupations see a leveling of sex composition effects. Furthermore, women's wages as a ratio of men's wages are highest in the most female and most male occupations, and lowest in mixed occupations. Notably, the ratio of women's wages to men's wages is stable across the middle range of sex composition (Table 5). While the theory is vague regarding the threshold at which conflict-generated wage differentials might diminish (when moving from integrated to predominantly female occupations), the findings regarding more female occupations are not inconsistent with the theory. Again however, effects for this range of occupations are somewhat unspecified by the theory. Overall, this hypothesis receives substantial support from the findings.

Alternative interpretations of these findings are possible. For example, the processes described by other hypotheses might operate in ways that do not show up at the level of occupations. Another set of critiques would require strong assumptions that unmeasured attributes are distributed in a particular and unequal pattern between men and women. For example, Tam's *specific vocational preparation* variable (SVP) is not included in this study and could account for the

predicted wage gap patterns, but only if the relationship between SVP and percent male is different for men and women.

Conclusions

This study uses more recent data than other studies of sex composition effects. It is based on a nationally representative sample of individuals, and employs a straightforward wage analysis using an extensive set of control variables. The findings are robust and stable across models. Overall, the findings endorse the proportional conflict hypothesis, and provide weak or no support for other hypotheses.

These findings have clear implications for analyses of the labor market dynamics, wages, and the wage gap. They suggest that the wage advantages that men have do not simply result from gender-neutral processes or differences in productivity-related skills. Furthermore, studies that assume equal and linear effects of sex composition on wages for men and women will fail to capture important interactions and nonlinearities in these effects. This study suggests that one cannot understand wage effects for men or women, or the wage gap between them, without seeing how these phenomena are embedded in a dynamic of competition between male and female workers. Given that sex segregation is widely viewed as a primary cause of the wage gap, this analysis is a significant contribution to research in this area.

Many different mechanisms could account for the translation of the competitive pressures identified by Blalock into wage differentials between men and women in mixed occupations. Within these occupations, women could be individually routed into lower-paying jobs (allocative discrimination), as a group routed into low status specializations - or, alternately, their specializations could be devalued - or they simply could receive direct discrimination by being paid less than men for the same job (Peterson and Morgan 1995). In their analysis of labor queues, Reskin and Roos (1990) provide compelling evidence of such processes

within newly integrating occupations. Their findings and those of others drive the continuing interest in identifying the degree of segregation and its effects at the level of firms and jobs. Such dynamics may analytically complement rather than compete with the occupation level focus of this research. Thus while the devaluation and social closure hypotheses did not receive support at the occupational level, they may have analytical usefulness at other levels.

The studies that have used firm, industry and regional data consistently report that job and firm-level sex segregation is much higher than occupational segregation (Bielby and Baron 1984, 1986, Peterson and Morgan 1995, Tomaskovic-Devey 1995). Their findings support the idea that allocative or valuative processes that heighten the male-female wage gap are available as "resources" to male workers and managers in mixed gender occupations (although these opportunities may not be constant; see Cockburn 1988). The competitive pressures stemming from the presence of women in numbers above token levels may activate these processes. For example, Bielby and Baron found that for a sample of California businesses, "as detailed occupations become mixed, intra-occupational segregation within and across work settings becomes more prevalent." (1986, p. 788) Bielby and Baron argue that sex segregation increases as job tasks are differentiated from one another. Bielby and Baron predict these segregation effects will continue across workers' careers, because " authority hierarchies and career ladders are likely to be segregated as well." (p. 790). Multiplying job titles and categories likely allows greater opportunity for closure even with formalized mobility procedures (Roos and Reskin 1984, Bridges and Nelson 1989). Closure could also be implemented via informal processes which influence allocation and advancement, such as the within-firm network effects on mobility identified by Podolny and Baron (1997) and Burt and Celotto (1992).

A number of interactional and social psychological dynamics heightened in gender-mixed settings are also consistent with this view, although they generally are not theorized as having direct effects on wages or intergroup competition. South et al (1982) report that within government work settings, female workers' contact with male workers, social support received from male workers, and encouragement from supervisors for promotion all decrease with a rise in female workers. Wharton and Baron (1984, 1986) report that men in mixed occupational settings report the lowest

satisfaction, and in interpreting this result speculate about the presence of gender-based conflict in such contexts. As already noted above, Ridgeway (1997) presents a detailed theoretical model about the process by which men come to act on their collective self-interests when gender is made salient by competition and interaction. These studies and models suggest mechanisms through which the outcomes described by Blalock and found in this study may occur.

Further empirical tests of these findings could be done incorporating SVP, a human capital variable not included in this study. Research could also be designed to examine the proportional conflict hypothesis using authority relations or measures of reward other than wages. At the theoretical level, future work might use insights from this study to amend labor queue theories (Reskin and Roos 1990), analyses of the ways in which organizations and labor processes are gendered (Acker 1988, 1989, 1990), and studies of how hiring and promotion procedures may influence sex segregation and resulting wage inequalities (Kirschenmann and Neckerman 1991, Bielby and Baron 1987).

Amid ongoing disagreements about how much women have gained in terms of job access and compensation, the current study casts further doubt on decreasing occupational sex segregation as an sign of fundamental progress (Jacobs 1995). Previous research has found that women's inroads into formerly male occupations has not led to a narrowing of the earnings gap between men and women (Reskin and Roos 1990). My results suggest that occupational integration may restructure rather than eliminate inequalities (see also Stone 1995, Cockburn 1991).

The results of this study have strong implications regarding public and private policies to encourage equality between male and female workers regarding wages, other benefits, and workplace resources. They indicate the inadequacy of policies that fail to take intergroup competition into account. Such policies may merely promote a shift in the mechanisms that create and sustain inequality rather than reduce or eliminate it. While constructing policies that can effectively address these dynamics in the private sector is clearly a difficult task, one approach this study gives support to is that of comparable worth. In the long run occupational and job integration may have positive effects on wage equality, but in the short

term such integration has resulted from male flight from occupations declining in status, and, as this study reports, is associated with substantial wage inequality. Attempts to ensure that women's occupations get fairly compensated are thus essential to addressing the wage gap. Additional possibilities for action may rest in non-governmental hands, such as current union campaigns which aim to incorporate female and ethnic minority workers in greater numbers. The bottom line suggested by this study is that skills and occupational integration alone will not gain earnings equality for women.

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Table 2

Regression Model of 1993 Earnings (natural log of hourly wage). NLSY. N= 4109[s]

	Model						
Variable	1	2	3	4	5	6	7
Sociodemographic Varia							
Age	.017***	.011***	.012***	.011***	.011***	.011***	.002
	(.003)	(.003)	(.111)	(..003)	(..003)	(.003)	(.004)
Married (=1)	.081***	.046***	.045***	.060***	.048***	.045***	-.038*
	(.015)	(.014)	(.014)	(.013)	(.013)	(..013)	(.019)
Gender (1=Male)	.147***	.189***	.193***	.184***	.209***	.129***	-.218
	(.015)	(.014)	(.013)	(.013)	(.013)	(.015)	(.194)
White (Reference is	.098**	-.013	-.012	.020	.018	.003	.013
non-black , non-w	(.033)	(.030)	(.029)	(.029)	(.028)	(.028)	(.028)
Black	-.072*	-.157***	-.170***	-.112***	-.075*	-.082**	-.076**
	(.035)	(.031)	(.031)	(.031)	(.030)	(.030)	(.029)
Human Capital Variables							
Education (in years; +2		.083***	.080***	.075***	.055***	.054***	.062***
years coded as 20)		(.003)	(.003)	(.003)	(.003)	(.003)	(.005)
Tenure w/firm (mos.)		.001***	.001***	.001***	.001***	.001***	.001***
(Centered)		(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Tenure sqd (mos.)		-.001***	-.001***	-.001**	-.001*	-.001*	-.001*
(Centered)			(.000)	(.000)	(.000)	(.000)	(.000)
Firm Level Variables							
Multiple firm sites			.102***	.106***	.068***	.058***	.056***
(1=yes)			(.014)	(.014)	(.014)	(.014)	(.014)
# of Employees at			.077***	.065***	.044**	.042**	.037*
other sites			(.017)	(.016)	(.016)	(.015)	(.015)
Labor Market Variable							
Low local unemp rate				.036	.025	.024	.027
(High is reference)				(..019)	(.019)	(.019)	(.018)
Medium local unemp r				.062***	.055**	.052**	.054**
				(.018)	(.018)	(.018)	(.017)
In SMSA, Central City				.076***	.066**	.067**	.071***
Known (Ref=not in SM				(..023)	(.023)	(..022)	(.022)
In SMSA, in Central Ci				.154***	.140***	.143***	.152***
				(..027)	(.027)	(.026)	(.026)
In SMSA, not in Ctr Ci				.172***	.157***	.152***	.157***
				(.021)	(.021)	(.020)	(.020)
Urban (0=rural)				.056**	.045*	.042*	.040*
				(.020)	(.020)	(.019)	(.019)
Region NC				-.089***	-.090***	-.089***	-.091***
(West is reference)				(.021)	(.021)	(.020)	(.020)

Table 2 (cont

Variable	Model 1	2	3	4	5	6	7
Region NE				.073***	.066**	.059**	.060**
				(.022)	(.022)	(.021)	(.021)
Region SO				-.128***	-.131***	-.135***	-.135***
				(.020)	(.019))	(.019)	(.019)
Mobility & Occupational Va							
Training Oppty (1=yes)					.147***	.151***	.150***
					(..014)	(.014)	(.013)
New Occupation W/Fi					.034**	.034**	.035**
(1= yes)					(.013)	(.012)	(.012)
Professional Work					.211***	.270***	.265***
(Ref is unskilled lab					(.019)	(.020)	(.020)
Sales/Clerical					.106***	.175***	.173***
					(.017)	(.018)	(.018)
Craft/Blue Collar					.121***	.035***	.040
					(.021)	(.022)	(.022)
Gender Demographic c							
Percent Male in Occup						.360***	.488
(Centered)						(.031)	(.060)
Percent Male ^{2}						.228**	.637
(Centered)						(.088)	(.152)
Interaction Terms							
Gender X Age							.015**
							(.005)
Gender X Married							.141***
							(.025)
Gender X Educ							-.013**
							(.005)
Gender X Percent M							-.132
							(.069)
Gender X Percent M^2							-.691***
							(.204)
Constant	1.727	.891	.697	.643	.780	.818	1.05
Adj R Squared	.070	.260	.273	.328	.370	.390	.399

S – sample is restricted to individuals working at least 35 hours per week and 50 weeks in the last year.
Standard Errors are in parenthesis.
*P<.05
**P<.01
***P<.001