Worker Sorting and the Risk of Death on the Job

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Abstract

This paper examines worker sorting across occupations in response to the risk of death on the job. We use family structure as a proxy for willingness to trade safety for wages in order to test the proposition that workers with strong aversion to this risk sort into safer jobs. We estimate conditional logit models of occupation choice as a function of injury risk and other job attributes. Our results confirm the sorting hypothesis; within gender, single moms and dads are the most averse to risk. The effect of parenthood for those who are married is much larger for women than for men, which is consistent with the idea that mothers' contributions to raising children are less insurable than fathers' contributions. Our results also show a consistent difference in the riskiness of men's and women's occupations that is independent of family structure. Although we cannot say whether gender differences in occupational outcomes are driven by supply or demand factors, we estimate that differences in the risk of death across occupations explain about one-quarter of occupational gender segregation.

1. Introduction

There has been very little empirical research on the extent to which workers sort into jobs based on their willingness to trade off wages for disagreeable job characteristics. This behavior is assumed to occur in the model of compensating differentials with worker heterogeneity. Elaborating on Adam Smith's seminal observation that "[t]he wages of labor vary with the ease or hardship, the cleanliness or dirtiness, the honorableness or dishonourableness of the employment"[1], Sherwin Rosen observed that workers will sort on the basis of their preferences: "workers choosing clean jobs have larger than average distastes for dirt".[2] Testing this proposition is difficult since measuring preferences directly is not generally possible.

In this paper, we use family structure as a proxy for aversion to the risk of death to test the proposition that individuals with strong aversion to this risk choose safer jobs. The basic idea is that workers who are raising children are less willing to trade on-the-job safety for wages since their children depend on them, and this should be especially true for single parents. We also allow the effect of family structure on occupation choice to differ for men and women. Because married men with children are typically not in the role of primary caregiver, they should be more willing to trade safety for wages. Married women with children, in contrast, may be less willing to make this tradeoff since there are fewer substitutes for their contributions to childrearing.[3]

Differences in the risk of death across occupations may also help explain the well-known fact that women and men tend to work in different jobs (Weeden [1998]; Wells [1998]; King [1992]; Beller

[1] Adam Smith (1776), *The Wealth of Nations*, Book I, Chapter X, Part 1.

[2] Sherwin Rosen (1986), "The Theory of Equalizing Differences," *Handbook of Labor Economics*, vol. I, p. 654.

[3] Case and Paxson (2001) find that investments in children's health are significantly lower for children living without their birth mothers, regardless of whether or not a stepmother is present. The same is not true for children living without birth fathers.

[1982]). Another contribution of this paper is to quantify the extent to which differences in the risk of death across jobs explain occupational gender segregation.

Our empirical approach is to estimate conditional logit models of occupation choice as a function of injury risk and other job attributes. Our hypothesis is that single moms and dads should have the highest aversion to risk of death on the job, followed by married women with children, married men with children, then people without children (men or women, single or married). We find results that generally support the sorting hypothesis; within gender, single moms and dads are the most averse to risk. The effect of parenthood for those who are married is much larger for women than for men, which is consistent with the idea that mothers' contributions to raising children are less insurable than fathers' contributions.

Our results also show a consistent difference in the riskiness of men's and women's occupations that is independent of family structure. The most safety-oriented group of men (single dads) have the same level of aversion to risk as the *least* safety-oriented group of women (married women without children). This means that gender is correlated with occupational risk in a way that is only partially explained by differences in family structure. The remaining gender difference could be due to inherent differences in men's and women's abilities, differences in their preferences, or discrimination by employers. Without determining the relative importance of these supply and demand-side factors, we estimate that differences in the risk of death across occupations explain about one-quarter of occupational gender segregation.

We proceed as follows. In Section 2, we present an overview of the literature on compensating differentials for risk and differences in occupation choice by gender. In Section 3, we describe the data used for our empirical analysis and present summary statistics. In Section 4, we present a model of occupation choice that allows the risk of injury to differ across occupations and allows the effect of risk to differ depending on gender and family structure. We also discuss the implications of our model for occupational segregation. In Section 5, we show the results of our empirical model of occupation choice and show how much of occupational segregation can be explained by differences in the risk of death across occupations. Section 6 concludes.

2. Background

The theory of compensating differentials implies that there will be a positive relationship between wages and job risk in the market, holding all other factors equal. This situation is illustrated in figure one. Figure one shows the indifference curves of two different individuals, Worker A and Worker B (who we can think of in this context as a single dad and a married dad, respectively) where worker utility is determined by injury risk and the wage rate. It also shows the market offer curve: that is, the wage/risk bundles offered by firms from which workers choose. The compensating differential is the positive slope of the market offer curve. Numerous studies have confirmed empirically that there is indeed a positive compensating differential for physical risk; see, for example, Viscusi (1993) and Hersch (1998).

Figure one also illustrates workers with different willingness to trade off risk for wages sorting into different jobs. Worker A is less willing to trade off wages for risk than is worker B; worker A chooses the safer job while worker B chooses the riskier one. It is this sorting behavior that we examine in this paper.

Another implication of this sorting on the basis of aversion to risk is that if men and women have different willingness to trade off risk for wages, they will work in different occupations. Many studies have documented the fact that men and women do indeed work in different occupations. Of course, a male/female differential in risk aversion is only one of many reasons why this segregation might occur. There are two other sets of reasons why men and women might be in different occupations. The first is differences in willingness to trade wages for job characteristics other than risk. For example, training costs have been shown to affect occupation choice (Boskin 1972; Siow 1984; Robertson and Symons 1990). Polachek (1981) finds evidence that women, anticipating time spent out of the labor force to have children, rationally choose occupations with lower wage penalties for intermittent labor force participation.

Alternatively, one might think that differences in men's and women's occupations are driven by demand rather than supply factors. Labor demand factors could cause occupational gender segregation either because men and women have different skills (for example, men are stronger on average than women, and some jobs require physical strength) or because employers discriminate. The discrimination argument has been proposed by England (England 1982, England 1985) who posits a counter-argument to Polachek focusing on the role of social and cultural factors, rather than individual choice, in determining the distribution of women across occupations. The Polachek-England debate has led to several other studies analyzing the question of whether women systematically choose jobs that will more easily accommodate childbearing. Glass and Camarigg (1992) test the hypothesis that women are in jobs that provide more "flexibility" and find that, in fact, self-reported Aflexibility@ is higher for men. Desai and Waite (1991) estimate hazard models of women=s decision to leave work during a first pregnancy and to return to work following first birth. They find that some job attributes do affect these hazards; for example, pregnant women=s job-leaving hazard is higher if they are in physically demanding jobs. They find no effect of the fraction of workers in the woman=s occupation who are female on the hazard of her return to work following birth. This result is, as they acknowledge, difficult to interpret. It is not entirely clear, based on England=s work, whether fraction female serves as a good proxy for occupations that flexibly accommodate maternity leaves; so that the

Desai and Waite result may reflect the lack of correlation between percent female and flexibility or it may reflect the absence of an underlying relationship between job flexibility and women's return-to-work decisions.

Reed and Dahlquist (1994) also estimate hazard models of job leaving for men and women to determine how self-reported job attributes affect these hazards. Perhaps surprisingly, among the nonpecuniary job characteristics studied, only two significantly affected job quitting hazards, and did so differently for men and women. More positive responses to a question that asked whether the respondent's job allowed him/her to "do the things you do best" reduced quit hazards for women while a variable that reflected the quality of friendships the respondent had at work reduced quit hazards for men. Taken at face value, Reed and Dahlquist's results suggest that men greatly value having close friendships on the job, while women greatly value jobs in their area of comparative advantage. Since this result is not consistent with their stated prior beliefs about men's and women's preference for nonpecuniary job characteristics - that women would prefer safe, people-oriented jobs with pleasant surroundings - Reed and Dahlquist interpret this result as evidence against voluntary sorting as an explanation for occupational gender segregation.

Summarizing even this small literature on the determinants of men's and women's occupations is difficult because there is very little consensus on methods, results, or interpretation. While there seems to be general agreement that men and women have different preferences for different job attributes, there is general disagreement about whether these preferences are expressed in their choices of occupations. And there is no evidence on the extent to which differences in choices, which may or may not reflect preferences, translate into the observed pattern of occupational segregation by gender.

There is also disagreement in the literature on how such segregation should be measured.[4] A common measure of occupational segregation is the Duncan index of dissimilarity (also sometimes called the index of segregation), defined as:

$$D = .5 \cdot \sum_j \left| \frac{f_j}{F} - \frac{m_j}{M} \right|$$

where j indexes occupations and

f_j = number of women in occupation j

m_j = number of men in occupation j

F = total number of women in all occupations

M = total number of men in all occupations

The Duncan index, D, can be interpreted as the fraction of men (or women) who would have to change jobs in order for each occupation to have the same percentage of women. If D is equal to zero, then men and women have the same occupational distribution. If D is equal to 1, the men and women are completely segregated into different occupations. Several studies have documented a decline in this index over time, including Weeden (1998), Wells (1999), King (1992), and Beller (1982). In our data (which we describe in more detail in Section 3), the Duncan index of dissimilarity between the occupational distributions of men and women is 0.425.[5]

In this paper, we hypothesize that individuals with different willingness to trade off wages for risk of

[4]For a debate over different measures of segregation, see Watts 1998; Grusky and Charles 1998; Boisso et al. 1994; and Deutsch et al. 1994.

[5]This estimate differs from those in the literature in two ways: first, we have calculated the Duncan index using two-digit occupation codes while most studies use three-digit. Second, our sample is restricted to young workers. The Duncan index calculated using three-digit codes without the age

death at work will choose different occupations based on their preferences. Although we cannot measure these preferences directly, we believe that marriage and the presence of children are good proxies for preferences. We also think that it is unlikely that there is discrimination on the basis of family structure. For example, if we observe single dads choosing safer jobs than married dads, there is little reason to think this is the result of discrimination. If we observe women choosing safer jobs than men, it is less straightforward to conclude that this difference is solely the result of preferences and is not at least partially due to discrimination. That is, we cannot say whether the fact that men have more dangerous jobs than women is the result of supply or of demand. We will therefore remain agnostic on the question of whether observed differences by gender are the result of choice or discrimination. Instead, we will rely on differences by family structure within gender as a test of the sorting hypothesis, and we will also document how much less overall gender segregation there would be if all jobs had the same level of physical risk without testing whether this reduction is the result of free choices or of a reduction in the scope for discrimination.

3. The Data

We use data from three different sources for our analysis. First, we use data on employment in different occupations by gender and family structure from the March Current Population Surveys (CPS). Second, we use data on the fatal and non-fatal risks associated with each occupation that we construct by merging Bureau of Labor Statistics data on injuries and deaths with CPS data in a way that we describe in more detail below. Third, we use data on the occupational characteristics of each occupation other than injury risks from the Dictionary of Occupational Titles (DOT).

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restriction is 0.471.

We calculate employment by occupation using the March CPS surveys from 1995 through 1998. We use responses to March supplement questions about the longest job held in the previous calendar year prior to the survey. We restrict the sample to individuals who worked full-time full-year in the calendar year prior to the survey year and use the 2-digit Adetailed occupation recode@ (46 codes in all) of the longest job held in the previous calendar year. To avoid counting people twice, for the 1995 through 1997 surveys, we restrict our sample to rotation groups 5 through 8 while for the 1998 survey we use all rotation groups. In addition, we restrict our sample to young workers (ages greater than or equal to 25 and less than or equal to 34). Looking at young workers only minimizes the possibility that the injury and deaths risks we observe in the data from the 1990s are different from those observed by the workers in choosing their occupations.[6] This gives us approximately 24,000 workers (approximately 5,000 in each year from 1995 - 1997 and 9,000 in 1998).

We assign fatal and non-fatal injury risks to each occupation using data from the BLS Survey of Occupational Injuries and Illnesses and Census of Fatal Occupational Injuries. These data provide counts of injuries and fatalities at the 3-digit occupation level from 1992 to 1999; there is also information on the severity of non-fatal injuries, including the median number of days missed from work per injury within an occupation. In some cases the data are aggregated across 3-digit occupations; we aggregate all data to correspond to the 2-digit detailed occupation recodes in the CPS[7]. We use monthly CPS data to calculate

[6]Older workers made their initial occupation choices in an earlier period; if occupations were (differentially) safer then and if workers accumulate occupation-specific human capital over time that prevents costless mobility across occupations, current risks are not necessarily a good measure of what affects older workers= current occupation choices.

[7]The categories do not correspond perfectly to the Census detailed occupation recodes; we collapse codes 40, 41, and 42 into a single category since the fatality data are not available for these categories in a way that can be disaggregated.

hours worked over this period in each category to transform the counts into risks (the number of injuries per 100 full-time workers[8]). We also calculated Aanticipated@ days of work lost due to nonfatal injury by multiplying the risk of nonfatal injury by the median days lost per injury within an occupation.

Table 1 presents published data from the Bureau of Labor Statistics on employment, non-fatal occupational injuries, and work-related deaths for men and women from 1993 through 1998. Overall during this period, men made up 54 percent of all workers, but 92 percent of workers killed on the job. In Table 2, we report the occupations with the highest and the lowest risk of fatal injury based on the BLS data from 1992 to 1999. In addition, the table reports the fraction of hours worked in the occupation that are worked by women (Afraction female@). The occupation with highest risk of deathis forestry and fishing, with 0.0869 deaths per 100 full-time workers, or a risk of death that is approximately 1 in 1,100 workers. The fraction female is 4.4 percent. With the exception of ATechnicians, except health, engineering and science,@ which is 36.6 percent female, all of these occupations are almost completely male. The ten safest occupations, by contrast, which are also listed in table 2, are heavily female.

Another way to represent the association between risk and gender is to plot the fraction female in each occupation against the natural log of fatal risk, as we have done in figure 2. This figure shows the strong negative correlation between fraction female and log risk; the regression coefficient is -0.174 ($p<0.001$).

Of course, our models must include controls for a job's other attributes. For example, dangerous jobs might also be jobs that require physical strength. Since men are on average stronger than women, failing to control for strength requirements would bias the estimated effect of risk on occupational choice.

[8]A full-time worker is assumed to work 2000 hours/year, so that the risks we calculate are per 200,000 hours worked.

Other occupational characteristics are available from the DOT. The DOT is a reference manual compiled by the U.S. Department of Labor that provides information about occupations. The DOT attempts both to define occupations in a uniform way across industries and to assess the characteristics of occupations. The occupational characteristics in the DOT were not collected from a nationally representative survey of firms; little detail on sampling or response rates is available. However, they are the best data available on the characteristics of occupations. The analysis of occupational characteristics was conducted through on-site observation and interviews with employees. The DOT data were constructed by analysts assigning numerical codes to 43 job traits. We create five aggregate variables from the underlying DOT variables to describe occupational characteristics: substantive complexity, motor skills, physical demands, working conditions, and creative skills. Details on how these five variables were constructed are provided in the Appendix (Section 7). Table 3 reports the correlations between our job characteristics and our measures of fatal and non-fatal injury risks, the percent of hours worked in an occupation by unionized workers, and the fraction female at the occupation level.

In Table 4, we report the job attributes of our CPS sample by gender, marital status, and whether or not the individual has children at home. Fifty-eight percent of our sample of young workers are men. The largest single group of these men -- 43 percent -- are married with children. Another 16 percent of men are married without children; 36 percent are single and have no kids, while 5 percent are single dads. Most women workers in our sample (34 percent) are married and have children; almost as many (31 percent) are single women without kids. Nineteen percent are married women without children and 16 percent are single moms.

Average annual risk of death on the job is 0.004 for all men (or one for every 25,000 men) and

0.002 (or one for every 50,000 women). Fatal risk does not differ by family structure within gender. Non-fatal risk is higher on average for men; within gender, non-fatal risk is highest for single parents. Men are in much more physically demanding jobs than are women and are more likely to experience hot, wet or cold conditions on the job. On other dimensions measured by the other DOT variables men's and women's jobs do not differ systematically.

4. A Model of Occupation Choice

We assume a random utility model of occupation choice in which individuals choose from a variety of occupations. The utility an individual derives from a particular occupation depends upon that individual's characteristics, the wage he or she can receive on the job, and the characteristics of the job:

$$U_{ij}^{*} = U(X_i, W_{ij}, Z_j) \tag{2}$$

where *i* indexes individuals and *j* indexes occupations. The wage an individual receives in occupation *j* is a function of the same (or a subset of) individual (X_i) and job (Z_j) characteristics as in equation (2):

$$W_{ij} = f(X_i, Z_j) \tag{3}$$

Substituting the wage equation into equation (2), assuming a linear functional form, and adding an independently and identically distributed with type I extreme value distribution disturbance term yields:

$$U_{ij}^{*} = bX_i + aZ_j + e_{ij} \tag{4}$$

An individual will choose among J occupations the one that yields the highest utility. An individual will choose occupation j if

$$U_{ij}^{*} > U_{ik}^{*} \;\forall\; k \neq j\,. \tag{5}$$

Define $U_{ij} = 1$ if individual i chooses occupation j and $U_{ij} = 0$ otherwise. Given our assumption on the distribution of the error term, we can estimate the parameters of the random utility model by McFadden=s conditional logit (for a description, see Maddala 1983):

$$Prob(\,U_{ij} = 1\,) = \frac{\exp\left\{ b\ X_i + a\ Z_j \right\}}{\sum_{j=1}^{J} \exp\left\{ b\ X_i + a\ Z_j \right\}} \tag{6}$$

Note that *ß* cannot be estimated because $ßX_i$ will drop out of equation (6).

The vector of parameters *a* reflects the weights on different job characteristics *Z* in determining occupation choices. We are interested in how the influence of fatal risk and other job characteristics on occupational choice differs for women and men, with and without spouses and/or children. Therefore we estimate this model separately for these groups (eight categories in all) to obtain different a vectors for each of the eight groups.

5. Results

Table 5 presents the evidence on the sorting hypothesis. The table contains parameter estimates from conditional logit models estimated separately for eight disaggregated categories defined by gender, marital status, and presence of children. All specifications include a full set of DOT occupational characteristics plus the fraction unionized as controls. We find that men and women who are single parents choose jobs with lower risk of death than their married or childless counterparts. Among men, those who are single parents choose jobs with lower fatal risk than married men, but married men with children do not appear to react differently to risk than do married men without children. Married women without children work in jobs with a greater risk of death than married women with children, but single mothers are in even safer jobs. These results confirm that workers sort into occupations based on their aversion to risk of death.

The coefficient on nonfatal injury risk is positive for all groups of men and women. While we might have expected this coefficient to be negative, the sign is less surprising in light of the fact that we are controlling for fatal risk and a host of other job characteristics. Moreover, this result may be due to the fact that workers are more likely to miss work when they have generous disability insurance, a feature of "good" jobs. All of the DOT control variables are statistically significant in almost all models. Interpreting these coefficients is difficult since they are, as discussed above, composite variables that capture aspects of jobs which would appeal to some individuals and not to others (e.g., does a job require motor skills).[9]

Although the patterns that we observe within gender are consistent with the hypothesis of worker sorting on the basis of preferences, it is also true that all women, regardless of whether they are married or have children, are in safer jobs than any group of men. The most risk-avoiding men (single dads) have the same coefficient on fatal risk as do the least risk-avoiding women (married women without children). This suggests that differences in family structure alone do not explain why women are in safer jobs than men.

Recall that differences in the distribution of men and women across occupations may be the result

[9] There are other factors that we do not measure that also plausibly affect occupation choice. In particular, there are other ways in which a job can be risky besides risk of injury or death. Risk of layoff or risk of income fluctuations, for example, are important kinds of uncertainty about employment that would be expected to affect individuals differently depending on their levels of risk aversion. The omission of these variables biases the estimates only if they are correlated with the risk of injury or death.

either of different willingness to trade off risk for wages or of discrimination.[10] Without distinguishing between these two possibilities, we would like to document how much less overall gender segregation there would be if all jobs had the same level of physical risk. In order to do this we re-estimate the conditional logit models for men and women separately, pooling all family structures (table 6). We use the results from the pooled conditional logit models to estimate out-of-sample predictions about the fraction female in each occupation under the assumption that all jobs have the same level of risk, and compare them to the actual distribution by recalculating the Duncan index using the predicted distribution. We estimate that if all jobs had the same level of risk, the Duncan index would be 0.324; that is, only 33 percent of women would have to change jobs in order to achieve a uniform distribution of women and men across occupations. Recall that in the actual data, this fraction is 42.5 percent. This leads us to conclude that differences in the risk of death or injury across jobs explain roughly one-quarter of occupational gender segregation, although as we have discussed we cannot identify whether risk affects segregation through choice or through discrimination.

6. Conclusion

Our results support the hypothesis that workers who are most willing to trade risk for wages choose jobs with higher levels of risk: within gender, single moms and dads are the most averse to risk. The effect of children for those who are married is much larger for women than for men, which is consistent with the sorting hypothesis under the assumption that that mothers= contributions to raising children are more difficult to replace than fathers' contributions. We believe that family structure is a good proxy for worker preferences. It seems unlikely to us that employers discriminate within gender on the basis of marital status

[10] We believe that the inclusion of the controls for other job attributes effectively rules out a "job requirements" story where demand for women in risky occupations is low because risky occupations are also ones requiring (for example)

or parenthood. Therefore, we conclude that these results offer strong empirical support for the hypothesis that workers sort into jobs on the basis of their preferences.

Our results also show that risk of death on the job is an important reason why men and women are in different occupations. We cannot say whether the reason risk affects men and women differently is due to supply or demand factors. We can, however, estimate the size of the effect: we find that differences in physical risk across occupations explain about one-quarter of occupational gender segregation.

physical strength.

7. Appendix

We create five occupational characteristics (substantive complexity, motor skills, physical demands, working conditions, and creative skills) from the Dictionary of Occupational Titles (DOT) in the following manner. We use the data set created by England and Kilbourne (1988) which aggregated 503 1980 Census detailed occupations and the variables from the 4th edition DOT (Inter-university Consortium for Political and Social Research Study 8942). We match the 1980 Census detailed occupations with their 1990 analogues and create a variable that contains the 1990 occupation codes.

To determine how to group the disaggregated occupation traits, we conducted a factor analysis of the disaggregated worker traits and worker functions by using the above data for 503 census occupational categories. Five factors emerged which we label substantive complexity, motor skills, physical demands, working conditions, and creative skills. The first four factors correspond to the factors found the by authors of *Work, Jobs and Occupations: A Critical Review of the Dictionary of Occupational Titles* (Miller et al. 1980). The results of this analysis are presented in tables A1 and A2.

Next we chose for each factor that set of items that loaded strongly on the factor and only weakly or not at all on all other factors. The rule used was that items should be loaded at least 0.4 on the primary factor and less than 0.3 on the remaining factors. Items chosen in this way were then standardized and summed to form each scale.

We then calculate the factor scores for each aggregated occupation used in our analysis by calculating the weighted mean of that factor for detailed occupations in that aggregated occupation, weighting by the yearly hours worked in each detailed occupation. We standardize each of these variables (so that the mean of the attribute in the sample of workers is 0 and the variance is 1) to yield a set of occupational attributes that can be merged to the data on occupation-level risks and then to individual-level data on occupation choice from the March CPSs.

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Figure 1
Worker sorting and compensating differentials

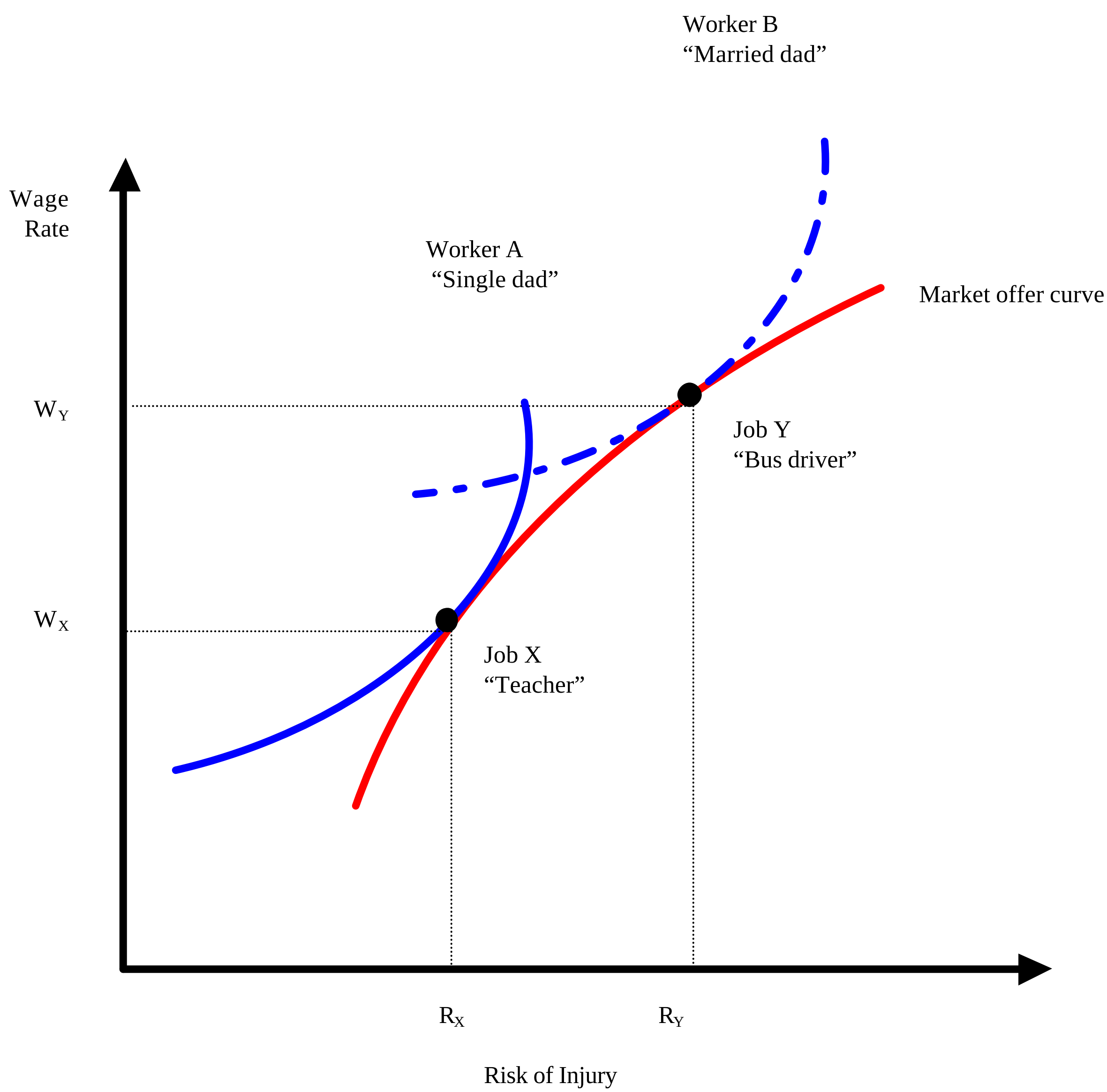

Figure 2: Fraction female by fatal risk

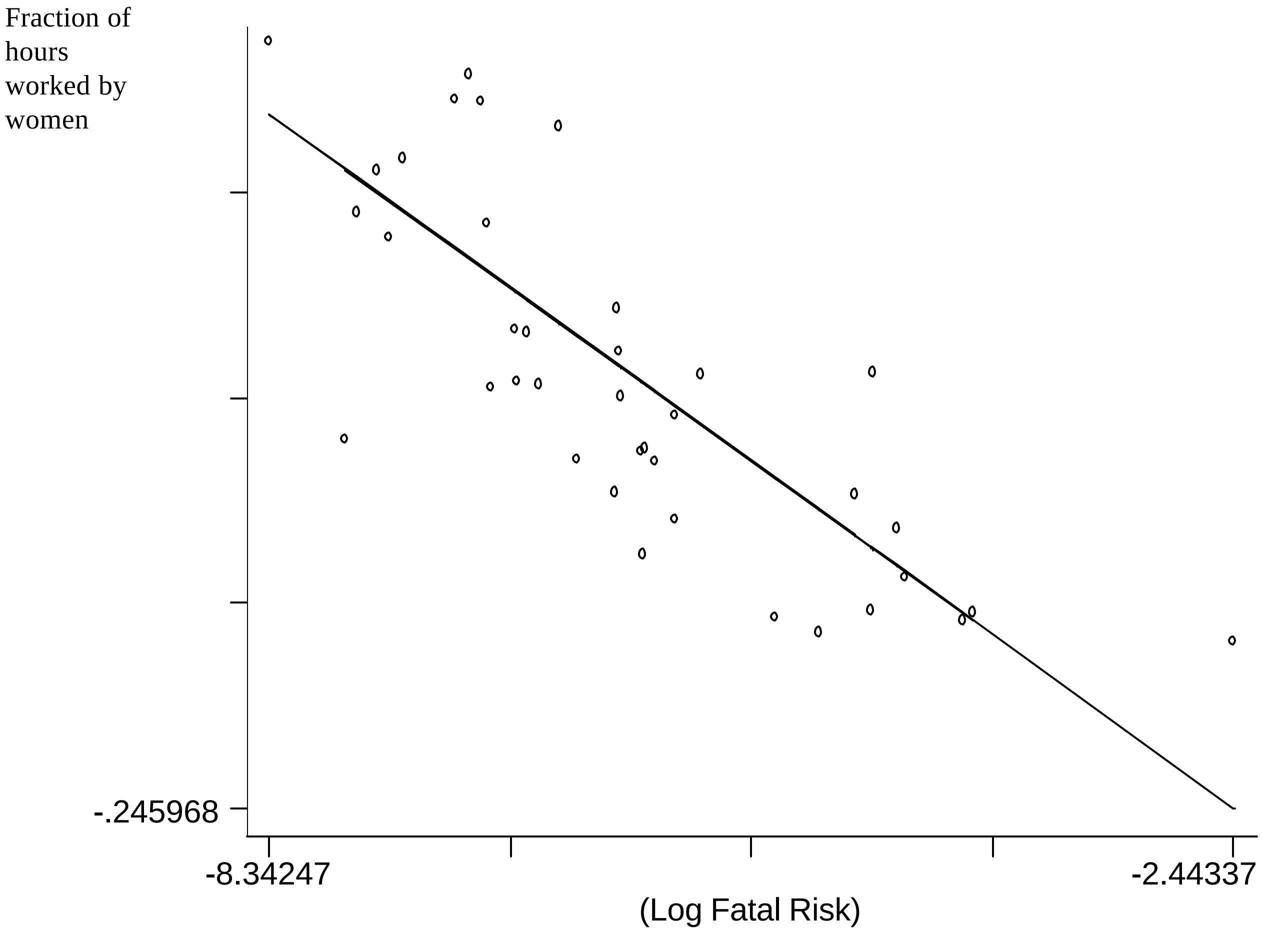

Table 1
Civilian Employment, Non-Fatal Occupational Injuries
and Fatal Occupational Injuries
By Gender, 1993 - 98

	93	94	95	96	97	98	Mean
Civilian employment							
Men (thousands)	65,349	66,450	67,377	68,207	69,685	70,693	67,960
Women (thousands)	54,910	56,610	57,523	58,501	59,873	60,771	58,031
% men	0.543	0.540	0.539	0.538	0.538	0.538	0.539
Non-fatal injuries							
Men	1,490,418	1,483,202	1,355,098	1,240,018	1,209,097	1,147,388	1,320,870
Women	735,570	730,802	667,166	620,508	605,589	571,341	655,163
% men	0.670	0.670	0.670	0.666	0.666	0.668	0.668
Fatal injuries							
Men	5,790	6,067	5,676	5,605	5,743	5,544	5,738
Women	481	521	534	507	475	482	500
% men	0.923	0.921	0.914	0.917	0.924	0.920	0.920

Mean prob. of non-fatal injury = 1,976,033/125,991,000 = 0.0157, or about 1 in 64.
Mean prob. of death = 6,238/125,991,000 = 0.0000495, or about 1 in 20,000.

Sources: Employment counts are from Bureau of Labor Statistics' series LFU11000001 (men) and LFU11000002 (women), based on the Current Population Survey. Non-fatal injury counts are from the BLS Survey of Occupational Illnesses and Injuries. Fatal injury counts are from the BLS Census of Fatal Occupational Injuries.

Table 2
Occupations with highest and lowest risk of death, 1992 - 1999, and the fraction of employment that is female

Deaths per 100 FT workers	Occupation	Fraction female
Highest risk:		
0.0869	494-499: Forestry & fishing occupations	0.044
0.0176	803-814: Motor vehicle operators	0.097
0.0166	823-859: Other transportation occupations and material moving	0.044
0.0117	477-489: Farm workers	0.165
0.0110	864-889: Construction laborers; freight, stock and material handlers; equipment cleaners	0.180
0.0096	226-235: Technicians except health, engineering and science	0.366
0.0094	473-476: Farm operators and managers	0.168
0.0086	413-427: Protective services occupations	0.140
0.0068	553-599: Construction trades	0.020
0.0053	503-549: Mechanics & repairers	0.038
Lowest risk:		
0.0007	403-407: Private household service occupations	.928
0.0005	316-336,345-353,359-389: Other administrative support occupations, including clerical	.720
0.0005	113-154: Teachers, college and university	.386
0.0005	155-159: Teachers, except college and university	.678
0.0004	303-307: Supervisors -- administrative support	.563
0.0004	64-68: Mathematical and computer scientists	.267
0.0003	313-315: Secretaries, stenographers and typists	.971
0.0002	337-344: Financial records processing occupations	.887
0.0000	283-285: Sales-related occupations	.616
0.0000	308-309: Computer equipment operators	.560

Table 3
Pairwise correlations of job characteristics, injury risks and fraction female

Characteristic:	Percent female	Fatal risk	Non-Fatal risk	Subs. complex	Motor skills	Phys. demands	Hot/cold/wet	Creative skills
Fatal risk	-0.3885 (0.0100)	1.0000						
Non-fatal risk	-0.3609 (0.0174)	0.5679 (0.0001)	1.0000					
Substantive complexity	-0.0186 (0.9059)	-0.3153 (0.0394)	-0.7076 (0.0000)	1.0000				
Motor skills	-0.0515 (0.7431)	0.0388 (0.8048)	-0.1465 (0.3484)	0.0086 (0.9566)	1.0000			
Physical demands	-0.4839 (0.0010)	0.5984 (0.0000)	0.6181 (0.0000)	-0.5070 (0.0005)	-0.0615 (0.6954)	1.0000		
Hot, cold, or wet	-0.3612 (0.0173)	0.5270 (0.0003)	0.6032 (0.0000)	-0.4611 (0.0019)	0.0280 (0.8583)	0.4215 (0.0049)	1.0000	
Creative skills	0.0197 (0.9004)	-0.1223 (0.4346)	-0.2463 (0.1113)	0.4407 (0.0031)	0.1952 (0.2097)	-0.2500 (0.1060)	-0.1421 (0.3634)	1.0000
Percent unionized	-0.1870 (0.2299)	0.0398 (0.8001)	0.3337 (0.0287)	-0.2491 (0.1071)	-0.0199 (0.8991)	0.1301 (0.4057)	0.1689 (0.2789)	-0.0696 (0.6576)

Entry in each cell is: correlation
(p-value of H_0: correlation is 0)

Table 4: Descriptive Statistics of Job Characteristics by Family Structure and Gender

	All men Mean (s.d.)	Single men w/o kids Mean (s.d.)	Married men w/o kids Mean (s.d.)	Single men w/ kids Mean (s.d.)	Married men w/ kids Mean (s.d.)
Fatal Risk	0.004 (.005)	0.004 (.005)	0.004 (.005)	0.005 (.005)	0.005 (.006)
Non Fatal Risk	12.44 (11.1)	11.798 (11.0)	10.324 (10.8)	15.545 (10.5)	13.467 (11.2)
Subst. Complexity	-0.187 (.910)	-0.173 (.915)	0.034 (.930)	-0.536 (.753)	-0.248 (.894)
Motor Skills	-0.007 (.902)	0.051 (.876)	0.062 (.962)	-0.139 (.805)	-0.069 (.904)
Physical Demands	0.150 (.953)	0.079 (.933)	0.002 (.897)	0.342 (.950)	0.248 (.977)
Working Conditions	0.274 (1.13)	0.289 (1.19)	0.109 (1.02)	0.594 (1.27)	0.290 (1.10)
Creative Skills	-0.106 (.864)	-0.044 (.978)	-0.038 (.936)	-0.297 (.354)	-0.164 (.756)
Percent Unionized	0.154 (.096)	0.148 (.096)	0.142 (.097)	0.173 (.091)	0.162 (.095)
Percent Female	0.299 (.207)	0.327 (.216)	0.305 (.202)	0.294 (.218)	0.274 (.196)
N	13,955	5,086	2,281	621	5,967
Row percent	1.000	0.364	0.163	0.045	0.428
	All women	Single women w/o kids	Married women w/o kids	Single women w/ kids	Married women w/ kids
Fatal Risk	0.002 (.002)	0.002 (.002)	0.002 (.002)	0.002 (.002)	0.002 (.002)
Non Fatal Risk	6.746 (7.37)	6.120 (7.03)	5.169 (6.01)	8.711 (8.21)	7.281 (7.69)
Subst. Complexity	0.030 (.777)	0.125 (.791)	0.237 (.726)	-0.246 (.727)	-0.043 (.766)
Motor Skills	0.121 (.945)	0.178 (.940)	0.229 (.976)	0.049 (.858)	0.043 (.960)
Physical Demands	-0.434 (.501)	-0.452 (.483)	-0.510 (.402)	-0.343 (.573)	-0.418 (.521)
Working Conditions	-0.165 (.814)	-0.188 (.775)	-0.279 (.659)	-0.020 (.961)	-0.147 (.842)
Creative Skills	-0.043 (.950)	0.096 (1.168)	0.024 (1.054)	-0.186 (.636)	-0.139 (.746)
Percent Unionized	0.119 (.080)	0.120 (.088)	0.108 (.070)	0.124 (.077)	0.123 (.080)
Percent Female	0.561 (.236)	0.546 (.232)	0.541 (.232)	0.584 (.234)	0.575 (.240)
N	9,714	3,030	1,823	1,518	3,343
Row percent	1.000	0.312	0.188	0.156	0.344

Table 5. Coefficients from Conditional Logit Model: Family Structure and Gender

	Single men w/o kids Coef. (s.e.)	Single men w/ kids Coef. (s.e.)	Married men w/o kids Coef. (s.e.)	Married men w/ kids Coef. (s.e.)
Fatal Risk	-47.60 (2.9)	-64.45 (10.0)	-42.83 (4.1)	-46.25 (2.3)
Non-Fatal Risk	0.056 (0.003)	0 .048 (0.007)	0 .068 (0.004)	0.067 (0.002)
Subst. Complexity	0.205 (0.024)	-0.060 (0.073)	0.510 (0.037)	0.328 (0.023)
Motor Skills	0.144 (0.016)	-0.088 (0.054)	0.180 (0.022)	0.084 (0.015)
Physical Demands	0.056 (0.022)	0.190 (0.058)	0.041 (0.032)	0.175 (0.018)
Working Conditions	0.156 (0.014)	0.222 (0.037)	0.093 (0.023)	0.088 (0.013)
Creative Skills	-0.046 (0.017)	-0.497 (0.125)	-0.171 (0.026)	-0.189 (0.020)
Percent Unionized	-1.840 (0.160)	-0.811 (0.429)	-2.05 (0.243)	-1.24 (0.140)
N	218,698	26,703	98,083	256,581
Log Likelihood	-18494.275	-2123.311	-8338.740	-21422.716
	Single women w/o kids Coef. (s.e.)	Single women w/ kids Coef. (s.e.)	Married women w/o kids Coef. (s.e.)	Married women w/ kids Coef. (s.e.)
Fatal Risk	-96.69 (10.0)	-165.21 (13.8)	-64.55 (12.6)	-126.15 (9.1)
Non-Fatal Risk	0.038 (0.005)	0.074 (0.006)	0.038 (0.007)	0.064 (0.004)
Subst. Complexity	-0.148 (0.032)	-0.414 (0.047)	-0.012 (0.042)	-0.179 (0.031)
Motor Skills	0.178 (0.020)	0.159 (0.032)	0.205 (0.025)	0.108 (0.019)
Physical Demands	-0.796 (0.053)	-0.896 (0.071)	-0.946 (0.073)	-0.945 (0.051)
Working Conditions	-0.029 (0.028)	-0.021 (0.033)	-0.108 (0.040)	-0.066 (0.025)
Creative Skills	-0.001 (0.019)	-0.313 (0.050)	-0.142 (0.027)	-0.275 (0.028)
Percent Unionized	-1.86 (0.188)	-3.05 (0.300)	-2.71 (0.277)	-2.25 (0.187)
N	130,290	65,274	78,389	143,749
Log Likelihood	-10749.244	-5165.839	-6366.365	-11681.079

Note: N represents number of person-choices; there are 13955 men, 9714 women, and 43 occupation choices.

Table 6: Coefficients from Conditional Logit Model: Men vs. Women

	Men	Women
	Coef. (s.e.)	Coef. (s.e.)
Fatal Risk	-47.019 (1.630)	-113.983 (5.436)
Non-Fatal Risk	0.063 (0.002)	0.055 (0.003)
Subst. Complexity	0.304 (0.015)	-0.159 (0.018)
Motor Skills	0.119 (0.010)	0.163 (0.011)
Physical Demands	0.115 (0.012)	-0.878 (0.030)
Working Conditions	0.118 (0.008)	-0.051 (0.015)
Creative Skills	-0.127 (0.012)	-0.131 (0.013)
Percent Unionized	-1.569 (0.093)	-2.294 (0.110)
N	600,065	417,702
Log Likelihood	-50,595.121	-34,205.791

Note: N represents number of person-choices; there are 13,955 men, 9,714 women, and 43 occupation choices.

Table A1
Factor Loadings

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5
CLIMB	0.01771	-0.03591	**0.82639**	0.08414	0.02784
CLRDISC	-0.00617	**0.58784**	-0.00118	-0.25946	-0.21238
COLD	0.08643	-0.03091	0.06168	**0.46669**	-0.02921
ABSCREAT	-0.19656	-0.11392	-0.06444	-0.02566	**0.8413**
DATAL	**0.84702**	0.11411	0.18327	0.11733	-0.2025
EYHNFTC	-0.14225	0.16927	**-0.76271**	-0.01573	-0.11788
FIF	-0.10294	-0.01196	-0.02104	-0.02747	**0.89113**
FNGRDXT	-0.00918	**0.87123**	0.09742	0.14902	-0.03135
GED	**-0.94283**	-0.02373	-0.18367	-0.07407	0.06728
HAZARDS	0.06954	-0.10016	**0.69383**	0.28572	-0.07471
HEAT	0.10863	0.06464	0.05963	**0.79161**	0.01304
INTELL	**0.91629**	-0.02654	0.19936	0.10318	-0.09375
MNLDXTY	-0.28218	**0.79132**	-0.28537	-0.11136	0.06003
MTRCRD	-0.15301	**0.82253**	-0.11486	0.08309	-0.09819
NUMERCL	**0.85488**	0.05273	0.25349	0.14359	0.02963
OUT	0.20281	0.19867	**0.65708**	-0.16031	-0.02046
REPCON	**0.73114**	0.16406	0.01287	0.17038	-0.07969
SJC	**-0.66222**	0.05325	-0.05835	0.09547	0.27869
STOOP	0.27390	-0.09483	**0.76089**	0.09830	-0.05808
THINGS	-0.05587	**0.77742**	-0.1249	-0.03403	0.04259
SVP	**-0.90675**	-0.20312	0.01556	-0.05701	0.10359
VERBAL	**0.88441**	-0.07302	0.27181	0.11333	-0.08618
WET	0.16012	0.06657	0.22401	**0.68155**	0.02283

Table A2
Composition of each factor

Factor 1	SUBSTANTIVECOMPLEXITY
	DATAL (complexity of function in relation to data)
	GED (general educational development)
	INTELL (intelligence)
	NUMERCL (numerical aptitude)
	REPCON (Adaptability to performing repetitive work)
	SJC (sensor or judgmental criteria)
	SVP (specific vocational preparation)
	VERBAL (verbal aptitude)
Factor 2	MOTOR SKILLS
	CLRDISC (color discrimination)
	FNGRDXT (finger dexterity)
	MNLDXTY (manual dexterity)
	MTRCRD (motor coordination)
	THINGS (complexity in relation to things)
Factor 3	PHYSICAL DEMANDS
	CLIMB (climbing, balancing)
	EYHNFTC (eye-hand-foot coordination)
	HAZARDS (hazardous conditions)
	OUT (outside working conditions)
	STOOP (stooping, kneeling, crouching, crawling)
Factor 4	WORKING CONDITION
	COLD (extreme cold)
	HEAT (extreme heat)
	WET (wet, humid)
Factor 5	CREATIVE SKILLS
	ABSCREAT (abstract & creative activities)
	FIF (feelings, ideas or facts)