The Proportion of Females in the Establishment: Discrimination, Preferences and Technology

KEVIN T. REILLY
Economics Division
LUBS, University of Leeds
Leeds, United Kingdom

TONY S. WIRJANTO
Department of Economics
University of Waterloo
Waterloo, Ontario

Cet article examine les facteurs déterminants la proportion de femmes dans l'entreprise, cette proportion pouvant affecter de manière significative la différence salariale entre hommes et femmes. Notre recherche se fonde sur deux perspectives du marché du travail: la discrimination et la coïncidence des besoins entre entreprises et travailleurs. Nos résultats suggèrent, d'une part, que l'on retrouve une plus grande proportion de femmes au sein des entreprises lorsque le taux d'emploi est élevé au cours d'une année scolaire et lorsque le taux de main d'oeuvre disponible est élevé. D'autre part, plus la demande pour un produit est stable, plus la proportion de cadres sera grande par rapport au petit marché du travail local. Cela suggère qu'une politique fondée sur un seule de ces perspectives du fonctionnement du marché du travail peut avoir des résultats qui ne vont pas nécessairement améliorer le bien-être des groupes cibles.

This paper examines determinants of the proportion of females in the establishment as this variable can affect the male-female wage gap in an important way. Our search for the determinants is guided by two views of the labour market, namely discrimination and coincidence of needs between firms and workers. Results suggest that establishments have a higher proportion of females when employment is higher during the school year and employment turnover is higher, the more stable the demand for the output, the higher the proportion of white-collar employees, and the smaller the local labour market. This suggests that public policy based on one view of how the labour market works may produce unintended results that will not necessarily improve the welfare of the very groups targeted.

Introduction

> *Every employer's workforce, in all occupational categories and at all levels of employments shall reflect the representation of Aboriginal people, people with disabilities, members of racial minorities and women in the community* (Province of Ontario 1993).

This rescinded piece of public policy made as its goal the elimination of differences in the composition, in various demographic dimensions, of the workforce of employers in the province of Ontario.[1] The legislation authorized a monitoring agency with administrative remedies, including fines, for failure to submit plans and achieve targets (Kaye 1993). The coverage was far-reaching since it applied to the public and all but the smallest private sector employers. Antecol and Kuhn (1999) estimate that it would have affected 75 percent of the province's labour force.

As public policy this legislation was invasive in its attempt to modify the outcomes of the labour market; however, while its scope was unprecedented, its spirit is not. The federal government under the 1995 *Employment Equity Act* operates two affirmative action programs. Both programs require firms to analyze existing sex, race, aboriginal, and disability composition of their workforces and set goals for changing this composition. The first program, introduced in 1978, is the Federal Contractors Program. It applies to firms with more than 100 employees seeking a contract with the federal government with a value of more than $200,000 (Canada. Employment and Immigration Canada 1993; Young 1988). A significant failure to institute changes in workforce composition can result in a firm being barred from biding on contracts. The second affirmative action program applies to all employers under federal jurisdiction with more than 100 employees (approximately 630,000 employees). A firm found guilty of repeated violations can be fined up to $50,000.

The United States federal government has a long-standing affirmative action program for firms with which they do business.[2] The US program was enacted in 1965 by Executive Order 11246 and amended to include sex as a designated group by Executive Order 11373 in 1967. Contractors are required to set goals for changing the demographic composition of their workforce, and the sanction for a significant failure is that the company is denied the right to bid on contracts. The US has no broad-based affirmative action program; however, it is a possible remedy that can be imposed on an employer found guilty of discriminatory practices under Title VII of the 1964 *Civil Rights Act* (Blau and Ferber 1992, p. 225).[3]

It is not inaccurate to say that the goal of an affirmative action policy is to eliminate gender and race differences from the workforce of employers in the economy. In this sense affirmative action can be viewed as a proactive form of intervention that explicitly forces employers to change the racial and gender composition of their workforce in a way that other policies do not.[4] Human Rights Codes at both the federal and provincial levels ban discrimination in hiring as well as firing and promotion; however, the mechanism depends on individual complaints which are difficult and expensive to litigate. With economy-wide public policy such as Human Rights Codes, combined with a substantial growth in female labour force participation over the last 30 years the fact remains that we are still observing gender segregation in occupations and establishments. The evidence at the occupation level is well known.[5] The evidence at the establishment level is starting to emerge for both the US and Canada. In particular, women tend to be overrepresented in certain establishments while in others men predominate more than would be expected. Reilly and Wirjanto (1999) have documented this for a sample of establishments in the Maritime provinces while for the US, Carrington and Troske (1995, 1998*b*) report a similar pattern in manufacturing.

The results on gender sorting at the occupational level and its effect on the male-female wage gap provided an impetus to governments to implement pay equity or comparable worth programs; however, gender sorting at the establishment level represents a significant constraint on this public policy.[6] Pay equity is based on comparing male-dominated occupations in an establishment with female-dominated occupations in the same establishment using a job-evaluation scheme. Employers are then required to adjust the wages of the gender-dominated occupations that provide a similar value to the employer but are found to have different pay structures. The lack of gender-dominated comparison occupations within a given establishment represents a barrier to the implementation of pay equity since a significant proportion of establishments will lack the minimum two opposite gender-dominated occupations that are necessary for the comparison. This suggests that gender sorting across establishments will reduce pay equity's effectiveness in closing the wage gap between males and females.

Besides the constraint on a pay equity policy a question arises as to whether sorting by gender at the establishment level has any effect on the male-female wage gap. Reilly and Wirjanto (1999) and Carrington and Troske (1995, 1998*b*) document that the effect of this sorting is to widen the male-female wage gap.[7] This suggests that in changing the observed outcomes that females have achieved in the labour market, policymakers might want to address this type of sorting first.

The next section briefly reviews the results in Reilly and Wirjanto (1999) on gender sorting at the establishment level and its effect on the male-female wage gap, and presents new evidence at the establishment level of the negative effect of this sorting on the average establishment wage. The effect of the gender distribution across establishments on the male-female wage gap can be viewed as an imperfect measure of the welfare implications of such a sorting and can be used as a justification for an affirmative action policy.[8] To provide an estimate of the possible improvement that can be obtained from such a policy we use a new method of wage-gap decomposition developed by Reilly (1999) and the analysis suggests that affirmative action could yield a 9-percent reduction in the male-female wage gap.

Given the stylized facts and the possible gains from a policy intervention, the next step in the analysis is to look at the determinants of the gender distribution across establishments. Simple economic models of discrimination (e.g., Arrow 1985*b*; Becker 1971; or Bergman 1974) predict that if discriminatory behaviour is present, then sorting by gender should be observable in the establishment data and it will widen the male-female wage gap. The use of these observed stylized facts to infer that discrimination is the driving factor is a valid exercise only when there is no alternative explanation. However, an alternative exists: firms with a high proportion of females offer employment contracts to workers that fit the employment pattern preferred by females. Workers and establishments have preferences, technological choices, and constraints that must be accommodated and in this context there exists a coincidence of needs between establishments with a high proportion of females and female workers. This view suggests that the gender sorting observed in the data is a result of an equilibrium process in which a mutually advantageous trade takes place between employers and workers.

The discrimination and market equilibrium views present to the policymaker very different options to pursue. However, one needs evidence on the importance of these two explanations of the determination of the gender distribution across establishments. In the third section, using the General Segmentation Survey, which is a matched establishment-worker data set from the Maritime provinces, we will identify variables that are consistent with the two views of the process in determining the proportion of females in the establishment. Our results

show that there exists evidence for both views of the labour market.

The results suggest that public policy in this area will be complex. Policies that focus just on labour market outcomes, such as affirmative action, will introduce further distortions into the labour market if it does not take account of the trades made by firms and workers. This public policy issue is taken up in the concluding section.

Data and Wage Equation Results

Data

The data set is the 1979 wave of the General Segmentation Survey (GSS) and we have information on 1,463 individuals and the 111 establishments they work for.[9] After imposing missing value restrictions we have a sample of 941 employees, who usually work 30 or more hours per week, in 86 establishments. There are 724 males and 217 females in this sample.

Our measure of gender composition in the establishment is the proportion of females (EFP) which is the number of full-time employees who are female divided by the total number of full-time employees and the average is 0.22 (22 percent). This is a reasonable estimate for the time period and underlying industrial structure of the GSS. However, this average hides a substantial amount of heterogeneity. Ten establishments have no full-time female employees while there are nine establishments with 70 percent or more employees who are female. For females the average EFP is 0.46 while for males this average is only 0.13. This variation at both the establishment and individual levels of the data suggests that we need to understand its determinants. The importance of this discussion will be reinforced if it can be established that this sorting in the data has an effect on wages.

Establishment Level Wage Equation Results

Table 1 reports that the average hourly wage (MEWAGE) in the establishment is $6.34. To explain the log of MEWAGE we have constructed a set of independent variables using both individual and establishment level data and the specification is similar to the traditional wage equation estimated using individual data.[10] The coefficient on the EFP variable in this equation is -0.393 and it is statistically significant. The implied elasticity at the means of the data is -0.09, which indicates that an 11-percent increase in the number of females in the establishment will result in a reduction in the average establishment wage of 1 percent. This negative effect on wages of EFP is a prediction of the economist's view of discrimination in the labour market.

Individual Wage Equation Results

The female to male wage ratio is 0.66, implying that at the mean for every dollar a male worker receives a female will receive only 66 cents.[11] This estimate of the male-female wage gap is consistent with the results obtained by Baker *et al.* (1995) using the 1980 Census of Canada. Estimating a standard log wage equation, making no differentiation for gender of the individual, we find a negative and significant effect for EFP on log wages of -0.490.[12] This indicates that there exists a positive wage premium to having more male colleagues, in spite of the fact that we have controlled for standard differences in productive characteristics, and that our establishment level results are not an artefact of aggregation.

Allowing males and females to have different wage determination processes we find that EFP retains its significant effect on wages: for females the coefficient is -0.291 and for males it is -0.230. Translating these coefficients into elasticity terms, the effect of EFP on wages is more than four times larger for females (-0.13) than for males (-0.03).[13] This differential effect of EFP implies that it increases the actual wage gap between males and females by 11 percent, which is not a trivial amount.

To the extent that the sorting by gender at the establishment level and its effect on the male-female wage gap are due to discrimination, it suggests the use of public policy to induce changes. A public

TABLE 1
Means of Variables for the 86 Establishments

Variable	*Mean*	*Variable*	*Mean*
FTEMP	222.48	P-OCC.MATH	0.045
EFP	0.216	WHITE	0.382
FTTURNO	0.171	CITY	0.337
SCHSURG	0.105	UNION	0.430
IND.PRIM	0.163	COMP	0.558
IND.MAN	0.209	SALPOR	0.342
IND.TRADE	0.209	STABLE1	0.093
IND.SRV	0.221	STABLE2	0.347
IND.OTHER	0.198	STABLE3	0.570
P-OCC.MAN	0.071	YEREQ	5.38
P-OCC.CLER	0.146	WOJEXP	17.98
P-OCC.SALES	0.101	EPMAR	0.714
P-OCC.SERV	0.135	EMYKIDS	0.367
P-OCC.PRIM	0.090	EMEDUC	10.23
P-OCC.PROC	0.235	EMCEXP	16.04
P-OCC.CONS	0.115	EMTEN	7.74
P-OCC.TRAN	0.063	MEWAGE	6.34

policy that directly addresses gender segregation in the establishment is an affirmative action program that attempts to modify the gender composition either through targets or in its extreme form quotas. Now the question is: how to model the effect on the wage gap of an affirmative action program? The Ontario legislation, as the quote in the introduction makes clear, sets as its goal that there should be one standard composition for all occupations in the establishment. This has the implication that we can ignore occupation and simply impose one standard on the establishment. The federal government's 1995 Employment Equity legislation uses similar language although it is not as unequivocal as the Ontario legislation. However, the logic of an affirmative action program is as equivocal as the logic of the Ontario legislation, in that all occupations should in the long run conform to a standard gender decomposition, so we can model its effect as one of choosing one standard for the establishment and ignore the occupational dimension. The selection of the gender composition goal is a free parameter for an affirmative action program and for expositional purposes we have selected the mean value of EFP, 0.22 as the standard. To calculate the effect of such a program we use a result in Reilly (1999), that shows that the effect of EFP on the log wage gap can be decomposed as: [14]

$$\bar{W}_m - \bar{W}_f = \bar{X}_m\hat{\beta}_m - \bar{X}_f\hat{\beta}_f =$$
$$\tilde{X}(\hat{\beta}_m - \beta^*) + \tilde{X}(\beta^* - \hat{\beta}_f) + (\bar{X}_m - \tilde{X})\hat{\beta}_m + (\tilde{X} - \bar{X})\hat{\beta}_f \quad (1)$$

where:

$\bar{W}_m - \bar{W}_f$: The gap in mean log wages between males and females after netting out the effect of all factors except EFP,

$\bar{X}_m$: The average EFP for males,

$\bar{X}_f$: The average EFP for females,

$\hat{\beta}_m$: The coefficient on EFP for males,

$\hat{\beta}_f$: The coefficient on EFP for females,

$\tilde{X}$: The average EFP over the Pooled sample,

β^*: The coefficient on EFP from the Pooled sample,

$\tilde{X}(\hat{\beta}_m - \beta^*)$: The Male Coefficient Advantage (MCA),

$\tilde{X}(\beta^* - \hat{\beta}_f)$: The Female Coefficient Disadvantage (FCDA),

$(\bar{X}_m - \tilde{X})\hat{\beta}_m$: The Male Characteristic Advantage (MCHA),

$(\tilde{X} - \bar{X}_f)\hat{\beta}_f$: The Female Characteristic Disadvantage (FCHDA).

Equation (1) is referred to as the Complete Decomposition and has four advantage terms that can be interpreted in the following way. The first term, MCA, represents the male advantage in the coefficient on EFP. This term can be viewed as the male coefficient gain they have in mean wages as a result of the existing structure in the labour market. The second term, FCDA, represents the female disadvantage in the coefficient on EFP, which is the disadvantage females face under the existing structure. Summing the two coefficient terms yields an estimate of the coefficient or discrimination effect on the log wage gap. The third term is the male characteristic advantage in the EFP (MCHA) and the final one is the female characteristic disadvantage in EFP (FCHDA). These two terms represent the (dis)advantage in mean log wages that a group has because of the existing sorting by gender at the

TABLE 2
The Complete Decomposition and the Effect of Establishment Female Proportion on the Wage Gap

	(1)	*(2)*	*(3)*
Partial log wage gap	0.102		0.245
Male coefficient advantage (MCA)	0.054 (0.019)	0.529	0.129
Female coefficient disadvantage (FCDA)	-0.042 (0.018)	-0.405	-0.099
Total coefficient effect	0.013* (0.030)	0.123	0.030
Male characteristic advantage (MCHA)	0.017 (0.006)	0.168	0.041
Female characteristic disadvantage (FCHDA)	0.073 (0.030)	0.708	0.173
Total characteristic effect	0.090 (0.031)	0.877	0.215

Notes: Column (1): The estimates of the decomposition terms and the numbers in brackets are their estimated standard errors. The * indicates that estimate is not significant at 95 percent level of confidence.

Column (2): The proportion of partial wage gap associated with EFP. The partial wage gap is defined as the implied mean log wage gap after taking out the effect on mean log wages for each sex of all factors which affect log wages except for the effect of EFP.

Column (3): The proportion of total log wage gap associated with EFP and the components of the Complete Decomposition.

Source of Calculations: For means, Table C1 of Appendix C and for coefficients, Table D2 of Appendix D.

establishment level. Summing the two characteristic effects yields an estimate of the traditional characteristic or productivity effect.

The results of the Complete Decomposition for EFP are reported in Table 2. The not-surprising implication of the phenomenon of gender sorting at the establishment level is that it is primarily a characteristic problem when looking at differences in mean log wages. The sum of the characteristic advantage terms accounts for 88 percent of the net-log wage gap while the coefficient effect accounts for only 12 percent of this gap. If we consider the effect on the wage gap of an affirmative action program as being one that changes mean EFP only, then the Complete Decomposition implies a reduction in the log wage gap of 25 percent from 0.418 to 0.316. For the actual wage gap, this change represents a 9.4 percent reduction. This suggests that an affirmative action program will have a large effect on the male-female wage gap.

However, embedded in the individual wage equation results is the important issue of whether or not the results provide a justification for an affirmative action program. If we view the cause of the gender sorting and its effect on the wage gap as a result of employer discrimination, then Reilly and Wirjanto (1999) show that a positive coefficient on EFP variable should be obtained in the female-only wage equation, and not a negative effect.[15] This suggests that before altering the gender distribution across establishments we should understand its determinants since a simple discrimination interpretation of the results is not available.

The Explanation for Establishment Female Proportion

Coincidence of Needs: Advantageous Trade Explanation

An aspect of interest is the variation in the timing of the labour being supplied and demanded. Establishments whose demand for labour coincides with the time period when children are in school allows them to offer an employment contract that minimizes child-care costs for the family. Contracts such as this reduce the coordination problem associated with a child's schooling and allow both parents to participate in the labour market. Females remain the primary child-care givers in the family and this suggests that the probability of females accepting such a contract is higher than males. According to this view the gender sorting observed in the data is a result of a child-care "friendly" employment contract. To test this hypothesis we create a dummy variable (SCHSURG), using the quarterly full-time employment data in the GSS, coded as one if the establishment employment in two or more of the three quarters when children are in school exceeds employment during the summer holiday quarter of July to September. Table 1 reports that 11 percent of the establishments have this employment pattern over the year, and we expect this to have a positive and significant effect on EFP.

Establishments with low turnover costs have a lower incentive to provide constant employment over the year since the cost of layoffs is lower. One standard example of turnover costs, which have the advantage of being shared by the establishment and the worker, is on-the-job training. Human Capital theory argues, if the training is specific, then the establishment and the worker have an incentive to share the costs. The larger the investment the higher the turnover costs for both the firm and workers. Females with their lower labour force attachment have a lower probability than males of accepting a contract that requires investment in specific human capital since this represents a cost to leaving the employer and/or the labour market. This specific human capital argument suggests that we should observe a positive relationship between establishment employment turnover and EFP. We model turnover as the ratio of full-time hires to full-time employment (FTTURNO) and Table 1 reports an average of 17 percent per annum in the sample.

A concern with the variables SCHSURG and FTTURNO are that they proxy industry patterns of

demand that are related to systematic differences in the industry. The problem is that there are also patterns in the demand for labour across these industries, so a failure to control for this opens up the possibility that SCHSURG and FTTURNO are capturing industry effects. We control for the industry effect by including one-digit level industry dummies in the equation. The variables, SCHSURG and FTTURNO, in modelling different dimensions of variation in the establishment's demand for labour suggest that it would be of interest to examine the demand for females in the context of the ability to plan its demand for labour. Are establishments with the ability to plan its demand for labour better able to deal with the issues associated with female labour supply and hence offer favourable employment contracts to women? This suggests that we want to identify a permanent pattern in the firms' demand for labour, unfortunately the GSS does not have such a variable. A good proxy can be obtained with the stability of the demand for the output of the establishment that is a precondition for the establishment's ability to plan its demand for labour. Establishments in the GSS were asked on a scale of one to nine to rank the stability of the demand for their output and we ranked the establishment's stability profile using three dummy variables. The highly unstable demand establishments captured by the variable STABLE1, average stability demand establishments have STABLE2 coded as one and the highly stable output demand dummy variable being in the category associated with STABLE3. In the estimation we drop the highly unstable output dummy STABLE1 so the estimated coefficients are effects relative to this reference group.

A question is whether employers with high EFP have a production process that has employment practices that permit females to accommodate the constraint imposed by below school-age children on labour force participation. What we have in mind is flexible hours, which allow coordination of working time between spouses, or an extreme flexibility in the production process that will accommodate a last minute no show of the employee. While an extreme idea, it is interesting to pursue; however, we do not have a measure of employment rules in the establishment that the idea suggests we use. Consequently we capture this effect using information from the worker side of the GSS by calculating the average number of children 5 years of age or under of the individuals in the establishment (EMYKIDS). If these employers offer an extremely flexible employment contract we expect this to have a positive sign in explaining the EFP.

Discrimination Explanation

An implication of the standard model of employee discrimination is that if employers have no taste for discrimination and have complete flexibility in hiring and firing, then the cost-minimizing choice for the establishment will result in the hiring of only males or females (Arrow 1985*a*, p. 119). The introduction of hiring and firing costs into this model will result in a distribution of EFP, some segregated by gender and other firms being integrated, at varying levels (ibid., p. 124). Further, Becker (1971, pp. 62-74) argues that a union can be viewed as a labour market institution that enforces employee preference for discrimination against a particular group. So to control for the possibility of employee discrimination we will use a dummy variable, UNION, which is coded as one if any of the employees in the establishment have their wages determined by a collective bargaining process. Given the employee discrimination argument we expect UNION to have a negative effect on EFP.

A concern in relation to UNION is that it proxies the occupational structure of the establishment and not the effect of employee discrimination. To deal with this problem we use two control variables. The first is the proportion of workers who are in the traditional female occupations in the establishment: clerical, sales, and services categories (WHITE). Table 1 reports that the average percentage of employees in these categories is 38.2.[16] The second is an establishment variable for the proportion of full-time employees who are salaried, SALPOR and Table 1 indicates that the average is 34 percent of the

employees are salaried. Both variables capture the white-blue collar distinction in occupation that is the most important aspect we wish to control for separately from UNION.

The occupation variable WHITE is not a pure "value" free control variable. Bergmann (1974) developed her theory of the wage gap based on the observation that discrimination in the labour market mainly operates by constraining female occupational choice which results in women being crowded into a few occupations. This argument suggests that WHITE will capture the effect of crowding at the establishment level. The coding of WHITE and the occupational crowding hypothesis suggest that a positive coefficient on EFP should be obtained.

A standard criticism of the economists' model of discrimination, by economists, is that competitive pressures should in the long-run eliminate the wage gap because establishments can make extra profits by hiring women only or, more realistically, as many women as possible. A way around this is the discriminatory monopsonist hypothesis (Benjamin, Gunderson and Riddell 1998, p. 143) in which a discriminating establishment exploits the different labour supply elasticities of males and females and still remains profitable. An implication of this model is that if females have a lower elasticity of labour supply (reflecting fewer employment opportunities) than males and if marginal products are equalized across the sexes then the discriminating monopsonist will hire a larger proportion of females. One characteristic generally associated with monopsony is the size of the local labour market; in particular the smaller the local labour market, the greater will be the likelihood that the establishment will have monopsony power. This simple argument suggests that in large urban labour markets we should observe lower EFP with its lower probability of the employer having monopsony power. We introduce a dummy variable, CITY, coded one if the establishment is located in an urban area. A large urban area is defined as one with more than 60,000 individuals, which is large for the Maritime provinces. Our expectation is that if the monopsony argument is correct then we will obtain a negative parameter on CITY in the EFP equation.

A concern that can be legitimately raised when using a variable such as CITY to model the size of the labour market is that we should consider it in the context of the size of the establishment itself. Large establishments in rural areas may have a monopsony power, but the general store in the same locality is unlikely to have such a power. For the monopsony interpretation of the CITY variable to be valid requires that we control for establishment size and will do so with the variable FTEMP, the number of full-time employees in the establishment. Finally, both Arrow (1985*b*) and Phelps (1972) argue that the observed unequal distribution of the sexes across establishments can be explained by differences in perceptions about productivity and requirements for skilled workers. This statistical discrimination model result is based on a number of assumptions. First, establishments have imperfect information on the potential productivity of workers. Second, they believe that there exist differences across definable groups in this potential productivity. The third assumption is that establishments differ in their demand for skilled workers; hence, the requirement to make investments in their workers. This results in differing needs to screen workers. Finally, group wages have not adjusted such that the firm's return on its investment in the workers is not equalized across groups. In this model it is hypothesized that establishments will use imperfectly correlated measures of workers' potential productivity as a screen in hiring. The idea is to obtain a measure of what the establishment uses to screen employees and the statistical discrimination story suggests that firms that use the screen should have "fewer" females. The measure should be independent of the employee's actual performance and observable to the establishment prior to hiring. The variable we use is the minimum number of years of education required for an individual to obtain permanent employment in the establishment (YEREQ). Table 1 reports that the average number of years is

5.38. This low number of years of education required is generated by 37 establishments that report they have no such requirement. The average for establishments which report a requirement, 49 in total, is a more reasonable nine years of education. The statistical discrimination theory predicts a negative sign on YEREQ in explaining EFP.

A potential problem with YEREQ is a possible bias if we fail to control for actual investments. Actual investments will be systematically related to both industry and occupational structure, which are already controlled for. We will also introduce other measures of average human capital at the establishment level, weeks of experience required by the average employee to adequately perform their job (WOJEXP) and the average tenure in the establishment (EMTEN). These variables should capture the actual investments being made and minimize the possibility that YEREQ is picking up an actual productivity effect.

Determinants of Establishment Female Proportion

Table 3 reports the determinants of EFP using two estimation procedures: ordinary least squares (OLS) and a two-limit Tobit (TOBIT). The latter recognizes that EFP is a bounded variable with a lower limit of zero and an upper limit of one (Maddala 1983, pp. 151-161), while the former is easier to interpret. The two sets of results are qualitatively the same in that differences in parameter estimates are marginal and yield the same conclusions as to what determines EFP. The final row of Table 3 reports measures of goodness of fit and concludes that the regressors are jointly significant at a level greater than 99 percent in both cases.

The two key coincidence-of-needs variables: SCHSURG and FTTURNO have the correct sign — positive — and are statistically significant. Both suggest, given our interpretation, that establishments with the ability to offer employment contracts that are compatible with constraints faced by females have significantly higher EFP. In the case of SCHSURG, peaks in employment coinciding with the school year have an effect on EFP in the range of 25 percent. For FTTURNO the implied elasticity, at the means of the data, is 0.18. This is consistent with the hypothesis that establishments and females have an incentive to make an employment contract in the context of lower than average specific human capital investment. These results are independent of industry since this factor is controlled for in the specification. SCHSURG and FTTURNO are strong evidence that part of the explanation of the gender sorting across establishments is the characteristic of the employment contract offered by an establishment and the demand for these characteristics by females.

The output stability coefficients (STABLE2 and STABLE3) results are positive and increasing in size, indicating that the more stable the demand for their output the higher the EFP is. Establishments with stable demand for output and — hence the demand for labour — are better able to accommodate females in employment than establishments with unstable demand for output. Like SCHSURG and FTTURNO the results on the output stability dummies suggest that systematic market-based factors are driving, in part, the observed gender distribution across establishments.

The only variable that failed to support the coincidence of needs hypothesis is EMYNKIDS. The point estimate is the wrong sign but at least it is statistically insignificant. Given the indirect way in which we are trying to measure flexibility in work practices in the establishment this result is perhaps not surprising.

The discrimination variables reported in Table 3 give mixed results but suggest that part of the explanation of the observed gender distribution is discrimination. The WHITE variable is significantly positive, the proportion of individuals in "traditional" female occupations helps explain the gender distribution across establishments. This suggests, not surprisingly, that the issues of occupational and

TABLE 3
Determinants of the Proportion of Females in the Establishment

Dependent Variable:	*EFP*				
Variable	*OLS*	*TOBIT*	*Variable*	*OLS*	*TOBIT*
SCHSURG	0.250***	0.264***	UNION	0.011	0.028
	(0.092)	(0.066)		(0.054)	(0.052)
FTTURNO	0.223*	0.233**	WHITE	0.350***	0.372***
	(0.125)	(0.096)		(0.077)	(0.076)
STABLE2	0.062	0.140*	SALPOR	-0.100	-0.119
	(0.053)	(0.082)		(0.075)	(0.076)
STABLE3	0.106**	0.175**	CITY	-0.178***	-0.189***
	(0.053)	(0.080)		(0.055)	(0.048)
EMYKIDS	-0.025	-0.033	FTEMP(*1/100)	0.003	0.003
	(0.041)	(0.053)		(0.005)	(0.005)
IND.PRIM	-0.019	-0.040	YEREQ	0.006	0.008*
	(0.046)	(0.069)		(0.004)	(0.004)
IND.TRADE	0.093	0.111	WOJEXP(*1/10)	-0.003	-0.011
	(0.076)	(0.082)		(0.010)	(0.010)
IND.SERV	0.096	0.096	EMTEN	-0.006	-0.007
	(0.069)	(0.076)		(0.004)	(0.005)
IND.OTHER	0.037	0.033	CONSTANT	0.003	-0.074
	(0.060)	(0.066)		(0.069)	(0.101)
SIGNIFICANCE	F(17,68) =7.85	χ^2(17) =86.46			

Notes: The numbers in the parentheses are standard error and in the OLS case they are robust standard errors.

* indicates that estimate is significant at 90 percent level of confidence.

** indicates that estimate is significant at 95 percent level of confidence.

*** indicates that estimate is significant at 99 percent level of confidence.

establishment segregation are not completely independent phenomena. Demand for labour by the establishment is guided by the occupations necessary for the production of output; however, as the other results in Table 3 suggest, this is not the whole story.

The CITY variable indicates establishments in urban areas have a lower EFP, in the range of 18 percent. The argument for the use of CITY is that the likelihood of observing discriminating monopsonist behaviour is negatively related to the size of the local labour market and this hypothesis is confirmed by the data. Further, it shows that the occupational mix is not the only dimension in which discrimination affects the gender distribution across establishments. The union dummy variable, UNION, is insignificant and provides no evidence that employees use this labour market institution to enforce

discriminatory preferences to reduce the proportion of females in the establishment. Further, our measure of the screening of potential employees (YEREQ) is marginally significant in the case of the TOBIT estimation. But it has the wrong sign in terms of the statistical discrimination argument; that is, we obtain a positive and not the predicted negative coefficient. This in spite of our controlling for the occupational structure and actual human capital investment in the establishment (WOJEXP and EMTEN). This suggests that imperfect information on potential workers productivity and heterogeneity in the requirement for skilled workers are unlikely to be the reason why we observe the type of gender distribution at the establishment level with this data set.

The conclusion from Table 3 is that there are significant determinants of EFP which are consistent with both the discrimination and labour market equilibrium explanations of it. It is important to stress that EFP should not be treated as a "pure" measure of how the labour market works under just one of the two hypotheses examined. Rather, the gender distribution across establishments is being driven by a multitude of factors and in the conclusion we will attempt to examine the implications of this new stylized fact.

Conclusions

In this paper we have reviewed the evidence on gender segregation across establishments and argued that the existing evidence of its effect on the male-female wage gap is only partially consistent with a discrimination explanation. As an alternative to the discrimination explanation of this distribution we proposed that firms and workers are making trades on the characteristics of employment which we labelled as the coincidence of needs hypothesis. Consistent with this idea we showed that female-dominated establishments tend to offer employment patterns that are consistent with females' family responsibilities, have high employment turnover, and a greater predictability of output demand. However, we also find that the occupation structure and size of the local labour market are significant determinants of the underlying establishment gender distribution and these results are consistent with the discrimination mechanism.

So, what are the implications of these results? First, the gender distribution across establishments is determined by multiple factors which are consistent with two views of the operation of the labour market. To attribute what we observe solely to discrimination would be limiting, since systematic factors that are related to the operation of properly functioning labour markets are, in part, the reason for the observed gender distribution across establishments.

Second, from a policy perspective the gender distribution represents a complex outcome which will not be amenable to the use of a blunt policy instrument that focuses only on labour market outcomes. In particular, a policy such as an affirmative action does not address all the factors that we have identified in this study as generating gender sorting across establishments and therefore runs the risk of introducing other distortions into the labour market. Single, focused policies like affirmative action would be fully justified if we could attribute the observed gender distribution across establishments solely to discrimination and that the problem is one of "artificially" shifted demand and supply curves. Our results suggest that part of the explanation is that there are real reasons for the placement of the demand and supply curves.

Explicitly our results suggest that policymakers also must address the constraints that establishments and workers are facing. On the supply side they need to consider the division of labour in the household, a constraint we used to justify the introduction of the equilibrium variables. Demand for the characteristics of the employment contract identified here is real and will not be addressed by policies that try to modify the outcomes only. Also, policymakers

need to consider constraints faced by firms; the pattern of employment identified here suggests real factors are driving the above average demand for females in certain establishments. If policymakers choose to try to alter the existing gender distribution at the establishment level then the issue of constraints faced on both the supply and demand sides of the market must be addressed. We would argue that our results are suggestive of policies such as subsidies to firms to smooth employment over the year and for child care of school-age children if governments are interested in altering the observed gender distribution across establishments. However, this paper does not tell the policymaker the extent to which these policies would be appropriate. For this more detailed analysis we require an estimate of the trade-off in wages for these employment characteristics, which is beyond the scope of the GSS for reasons discussed in the next paragraph.

Finally, we have shown that it is worthwhile to move beyond just the coefficient on a wage equation to examine an issue such as gender segregation across establishments. Wage equations are reduced forms and each parameter represents a combination of underlying supply and demand parameters. For the policymaker, as well as the labour econometrician, it is impossible to disentangle the driving forces behind them and this suggests that making or recommending policy on the basis of these parameters would not be a sound practice. This conclusion is not dissimilar to the one being reached in the more recent studies on the related issue of occupational segregation (Baker and Fortin 1998; Macpherson and Hirsch 1995).

In the context of the gender distribution across establishments we are able to move beyond wage equation results because of the special nature of the data set being used: matched worker-establishment data. With an extremely small data set, which is 20 years old, we were able to obtain results that other researchers using traditional individual or economy-wide data are unable to acquire. While many things have changed radically in the last 20 years since the data set was collected, we would argue that the labour market experience of females is unlikely to be one of them and therefore it is our expectation that the results are reasonably robust in this time dimension. However, this conclusion will await the analysis of the new matched worker-establishments data sets that are now being produced in Canada and many other countries.

Notes

The data set used in this paper was collected by R. Apostle, D. Clairmont and L. Osberg of Dalhousie University, using funds provided by the Social Science and Humanities Research Council (SSHRC), the Council of Maritime Premiers and Dalhousie University. Reilly acknowledges financial support from York University and the University of Leeds and Wirjanto thanks the SSHRC for financial support under the grant number 410-94-0532 and Departments of Economics at McMaster University and University of Guelph for their hospitality and computing facilities which allowed the final stage of this paper to be completed. A special thanks to Ron Oaxaca whose comments on previous work have resulted in some of the innovations reported in this paper. Comments by an anonymous referee, Charles Beach (the editor), Richard Chaykowski and Lisa Powell (the guest editors), our discussant, M. Abbott, at the 1998 Women and Work Conference at Queen's University and its participants, A. Brumwell and L. Zanchi are gratefully acknowledged. The usual disclaimers apply.

[1]It was rescinded in December 1995 following a change of government in Ontario.

[2]The requirement of these orders apply to contractors with more than 50 employees and a contract worth more than $50,000 (Koch and Chizmar 1976, pp. 9-19). For a complete description of all the main programs see Stephanopoulos and Edley (1995).

[3]See Antecol and Kuhn (1999) for a more detailed discussion of affirmative action legislation in North America.

[4]See Gunderson (1989) for a discussion of this traditional type of labour market policy.

[5]For the Canadian evidence see Baker *et al*. (1995), and for the US see Sorensen (1994). For the latest study,

which examines both countries on a comparative basis, see Baker and Fortin (1998).

[6]Benjamin, Gunderson and Riddell (1998, p. 439) report that all but Alberta and Saskatchewan have some form of comparable worth or pay equity legislation.

[7]See also Carrington and Troske (1998*a*) for a similar gap-increasing effect of the proportion of African Americans on the white-black wage gap in the United States.

[8]See Blau (1998) for a discussion of the use of wages.

[9]The sample of establishments excludes those from the finance and government sector. Quasi-government establishments such as universities and hospitals are included in the population and Appendix A provides a further description of the GSS. The variables used are obtained from both the individuals and management of the establishment. Appendix B provides variables definitions by level of aggregation.

[10]Variables calculated using individual level continuous variables are establishment averages; individual level dummy variables are proportions of individuals in the establishment with the characteristic and control variables at the establishment level (i.e., industry dummies) have the same value as would appear in the individual wage equation. A complete set of parameters is reported in Table D1 of Appendix D. Average data implies that the error terms are heteroskedastic, so standard error of estimates are corrected for this.

[11]Means for all variables used at the individual level of the data are reported in Table C1 of Appendix C.

[12]See the Pooled column for all parameter estimates, in Table D2 of Appendix D.

[13]In Table D2 of Appendix D the column labelled Male is for the male-only sample results and the column labelled Female is for the female-only results. This result on the sign and relative magnitude of the coefficients is similar to that observed in the occupational crowding literature which has motivated the introduction of comparable worth policies by governments. See Johnson and Solon (1986) for an introduction into the occupational segregation literature and Macpherson and Hirsch (1995) for the most comprehensive study. For a sympathetic view of the policy implications and a review of the numbers see Sorensen (1994). For a discussion of the Canadian experience with comparable worth see Gunderson and Riddell (1992).

[14]Equation (1) generalizes the Oaxaca Decomposition (Oaxaca 1973) which is the standard tool in discrimination studies (Cain 1986). This innovation builds on the work of Oaxaca and Ransom (1988) and Neumark (1988) who derived the Pooled Decomposition and Reilly and Wirjanto's (1999) development of the Characteristic Decomposition. The relationship between these decompositions is that they are all based on fixed-point comparisons.

[15]The logic of this result is straightforward: if firms do not profit from discrimination then the wage gap between males and females is a transfer between the two gender groups. The amount transferred is positively related to the level of discrimination. However, EFP is negatively related to the level of discrimination. This implies that the coefficient on EFP in a female-only wage regression should be positive.

[16]We experimented with the proportion of individuals at the one-digit occupation level, but found that they were highly co-linear with the industry dummies.

REFERENCES

Antecol, H. and P. Kuhn (1999), "Employment Equity Programs and the Job Search Outcomes of Unemployed Men and Women: Actual and Perceived Effects," *Canadian Public Policy/Analyse de Politiques* (this issue).

Apostle, R., D. Clairmount and L. Osberg (1983), "The Handbook of Bigbang 2: An SPSS Systems File of the General Segmentation Survey, 1979-1981," (Halifax, NS: Dalhousie University, unpublished paper).

Arrow, K.J. (1985*a*), "Mathematical Models of Race Discrimination," in *Collected Papers of Kenneth J. Arrow, Applied Economics*, Vol. 6, ed. K.J. Arrow (Cambridge, MA: The Belknap Press of Harvard University Press), pp. 112-29. Reprinted from *Racial Discrimination in Economic Life*, ed. A.H. Pascall (Lexington, MA: D.C. Heath, 1972), pp. 187-204.

____ (1985*b*) "The Theory of Discrimination," in *Collected Papers of Kenneth J. Arrow, Applied Economics*, Vol. 6, ed. K.J. Arrow (Cambridge, MA: The Belknap Press of Harvard University Press), pp. 143-64. Reprinted from *Discrimination in Labor Markets*, ed. O. Ashenfetter and A. Ress (Princeton, NJ: Princeton University Press), pp. 3-33.

Baker, M. and N. M. Fortin (1998), "Gender Composition and Wages: Why is Canada Different from the

United States?" (Toronto: Department of Economics, University of Toronto, unpublished paper).

Baker, M., D. Benjamin, A. Desauliners and M. Grant (1995), "The Distribution of the Male/Female Earnings Differential: 1970-90," *Canadian Journal of Economics* 38:479- 50.

Becker, Gary S. (1971) *The Economics of Discrimination*, 2d ed. (Chicago, III: University of Chicago Press).

Benjamin, D., M. Gunderson and W.C. Riddell (1998), *Labour Market Economics*, 4th ed. (Toronto: McGraw-Hill Ryerson).

Bergmann, B.R. (1974), "Occupational Segregation, Wages and Profits when Employers Discriminate by Race or Sex," *Eastern Economic Journal* 1:103-10.

Blau, F. D. (1998), "Trends in the Well-Being of American Women," *Journal of Economic Literature* 36:112-65.

Blau, F. and M.A. Ferber (1992), *The Economics of Women, Men and Work*, 2d ed. (Englewood Cliffs, NJ: Prentice-Hall).

Cain, G.C. (1986), "The Economic Analysis of Labor Market Discrimination: A Survey," in *Handbook of Labor Economics*, Vol. 1, ed. O.C. Ashenfelter and R. Layard (Amsterdam: North-Holland), pp. 693-785.

Canada (1995), *Employment Equity Act*, Consolidated Statutes (Ottawa: Supply and Services Canada).

Canada. Employment and Immigration Canada (1991), *Consultations in Preparation for the Review of the Employment Equity Act* (Ottawa: Supply and Services Canada).

Carrington, W.J. and K.R. Troske (1995), "Gender Segregation in Small Firms," *Journal of Human Resources* 30:503-33.

____ (1998*a*), "Interfirm Racial Segregation, and the Black/White Wage Gap," *Journal of Labor Economics* 16(2):231-60.

____ (1998*b*), "Sex Segregation in U.S. Manufacturing," *Industrial and Labor Relations Review* 51:445-64.

Groshen, E. (1991), "The Wage Structure of the Female/Male Wage Differential," *Journal of Human Resources* 24:457-72.

Gunderson, M. (1989), "Male-Female Differentials and Policy Responses," *Journal of Economic Literature* 26:46-72.

Gunderson, M. and W.C. Riddell (1992), "Comparable Worth: The Canadian Experience," *Contemporary Policy Issues* 10:85-94.

Johnson, G. and G. Solon (1986), "Estimates of the Direct Effects of Comparable Worth Policy," *American Economic Review* 75:1117-25.

Kaye, P. (1993), *An Overview of Bill 79. The Employment Equity Act, 1993*, Current Issue paper 143 (Toronto: Legislative Research Service, Legislative Library).

Koch, J.V. and J.F. Chizmar, Jr (1976), *The Economics of Affirmative Action* (Lexington: D.C. Heath and Co.).

Macpherson, D. A. and B.T. Hirsch (1995), "Wages and Gender Composition: Why Do Women's Jobs Pay Less," *Journal of Labour Economics* 13:426-71.

Maddala, G. S. (1983), *Limited-Dependent Variables and Qualitative Variables in Econometrics* (Cambridge: Cambridge University Press).

Neumark, D. (1988), "Employer Discriminatory Behavior and the Estimation of Wage Discrimination," *Journal of Human Resources* 23:279-95.

Oaxaca, R.L. (1973), "Male-Female Wage Differentials in Urban Labor Markets," *International Economic Review* 14:693-709.

Oaxaca, R.L. and M.R. Ransom (1988), "Searching for the Effect of Unionism on the Wages of Union and Nonunion Workers," *Journal of Labor Research* 9(1):139-48.

____ (1994), "On Discrimination and the Decomposition of Wage Differentials," *Journal of Econometrics* 61:5-21.

Phelps, E.S. (1972), "The Statistical Theory of Racism and Sexism," *American Economic Review* 62:659-61.

Province of Ontario (1993) *Employment Equity Act. 1993*, S. O. 1993 c.35, Part I, Section 2, Subsection 2.

Reilly, K.T. (1999), "A Generalisation of the Standard Wage Decomposition Techniques" (Leeds: Leeds University Business School unpublished paper).

Reilly, K.T. and T.S. Wirjanto (1999), "Does More Mean Less? The Male/Female Wage Gap and the Proportion of Females at the Establishment Level," *Canadian Journal of Economics* 32 (forthcoming).

Sorensen, E. (1994), *Comparable Worth: Is It a Worthy Policy?* (Princeton, NJ: Princeton University Press).

Stephanopolos, G. and C. Edley, Jr. (1995), *Affirmative Action Review: Report to the President* (Washington, DC: The White House), 19 July.

Young, M. (1988), *Affirmative Action/Employment Equity*, Current Issue Review 84-31E (Ottawa: Research Branch, Library of Parliament).

APPENDICES
The Data Set and Complete Set of Results

A. The Data Set

The data set that is used in this paper is the 1970 wave of the General Segmentation Survey (GSS) conducted by the Marginal Work World Program at Dalhousie University. The principal investigators were Richard Apostle, Donald Clairmont and Lars Osberg. The population base for the sample is non-governmental establishments in the Maritime provinces of Prince Edward Island, Nova Scotia, and New Brunswick. The non-governmental criteria exclude from the population establishments directly owned by the government. The broader public sector establishments, such as universities and hospitals, are included in the population that is sampled. An establishment itself is defined as a group of individuals at a single workplace under common management authority. The populations of establishments in the three provinces were identified using information for the years 1977 and 1978 from Statistics Canada, Monthly Employment, Payroll and Manhours survey and lists provided by the three-digit Standard Industrial Classification (SIC). A sample of 697 establishments, which is biased toward large establishments, was generated and 476 in-person interviews were conducted with a management representative at the establishment. From this group 118 establishments, maintaining the sampling structure, were asked to provide a list of their workers. A sample of 2,069 workers was drawn from these lists and telephone surveys were conducted in 1979. This produced 1,513 usable replies. The copy of the data used in this study has 1,463 respondents matched with information obtained from the 111 establishments for which they worked. The difference between 1,463 and 1,513 is accounted for by the exclusion of individuals who changed employers between the time their names were obtained from the establishment and the time the telephone survey was conducted. In 1981 the workers were re-surveyed and 1163 usable replies were obtained. Establishment responses to a mailed questionnaire done in 1981 are not part of the copy of the data set used. A complete description of the data set is available in Apostle, Clairmount and Osberg (1983).

The total number of possible individuals who were eligible for the sample for the study is 1,463, working for 111 different establishments. Imposing standard non-missing value restrictions on the individual level variables reduces the number of individuals who could be selected to 1,102. Imposing the restriction that the individual work, on average, more than 30 hours in the usual week reduces this number to 1,064. Finally, all individuals whose establishment level information is missing are eliminated, reducing the sample to 941 individuals who work at 86 establishments.

B. Variable Definitions

(i) Individual Level Variables

WAGE: An estimate of the gross hourly wage. It is calculated using the individual's response to gross labour earnings and, when necessary, their response to usual hours per week.

MALE: Dummy variable equal to one if the individual is a male and zero if the individual is a female.

AGE: Current age of the individual, which is year of interview minus year of birth.

EDUC: Years of education, which is derived from a variable coded between 0 and 17.

CEXP: Current experience, which is calculated as year of interview minus the year the individual started their first full-time job after completion of schooling.

TEN: Years of tenure with current employer calculated by subtracting from year of interview the year the individual started with current employer.

PEINS: Dummy variable coded as one if the individual lives in the provinces of Nova Scotia or Prince Edward Island.

MAR: Dummy variable coded as one if the individual is married.

NUMSUP: Number of persons the individual supervises. It is coded as one if the individual does not supervise anyone.

OCC.MAN: Dummy variable coded as one if the individual's occupation has a Canadian Classification Dictionary of Occupation (CCDO) coded between 0 and 4000.

OCC.CLER: Dummy variable coded as one if the individual's occupation has a CCDO coded between 4100 and 4199.

OCC.SALE: Dummy variable coded as one if the individual's occupation has a CCDO coded between 5100 and 5199.

OCC.SERV: Dummy variable coded as one if the individual's occupation has a CCDO coded between 6100 and 6199.

OCC.PRIM: Dummy variable coded as one if the individual's occupation has a CCDO coded between 7100 and 7199.

OCC.PROC: Dummy variable coded as one if the individual's occupation has a CCDO coded between 8100 and 8599.

OCC.CONS: Dummy variable coded as one if the individual's occupation has a CCDO coded between 8700 and 8799.

OCC.TRAN: Dummy variable coded as one if the individual's occupation has a CCDO coded between 9100 and 9199.

OCC.MATH: Dummy variable coded as one if the individual's occupation has a CCDO coded between 9300 and 9599.

(ii) Establishment Level Variables

FTEMP: Calculated using answers to quarterly employment in 1978 of salaried and wage-rated employees whose normal hours per week are more than 30 hours. This is a weighted average, since, if there was no employment in a given quarter, this quarter did not contribute to the average full-time employment.

EFP: The ratio of full-time employment of women and full-time employment (FTEMP).

FTTURNO: Ratio of the number of full-time hires in 1978 to the average full-time employment in the establishment, FTEMP.

SCHSURG: Dummy variable coded as one if full-time employment in the establishment in two or more of the three quarters between the months of October and June is greater than full-time employment during July to September quarter.

IND.PRIM: Dummy variable coded as one if the establishment in which the individual works is classified as being in the primary industry.

IND.MAN: Dummy variable coded as one if the establishment in which the individual works is classified as being in the manufacturing industry.

IND.TRADE: Dummy variable coded as one if the establishment in which the individual works is classified as being in the trade industry.

IND.SERV: Dummy variable coded as one if the establishment in which the individual works is classified as being in the service industry.

IND.OTHER: Dummy variable coded as one if the establishment in which the individual works is classified as not being in any of the other categories.

P-OCC.MAN: The proportion of the individuals in the establishment who are classified as OCC.MAN.

P-OCC.CLER: The proportion of the individuals in the establishment who are classified as OCC.CLER.

P-OCC.SALE: The proportion of the individuals in the establishment who are classified as OCC.SALE.

P-OCC.SERV: The proportion of the individuals in the establishment who are classified as OCC.SERV.

P-OCC.PRIM: The proportion of the individuals in the establishment who are classified as OCC.PRIM.

P-OCC.PROC: The proportion of the individuals in the establishment who are classified as OCC.PROC.

P-OCC.CONS: The proportion of the individuals in the establishment who are classified as OCC.CONS.

P-OCC.TRAN: The proportion of the individuals in the establishment who are classified as OCC.TRAN.

P-OCC.MATH: The proportion of the individuals in the establishment who are classified as OCC.MATH.

WHITE: The proportion of the individuals in the establishment who are classified as OCC.CLER, OCC.SALES and OCC.SERV.

CITY: Dummy variable coded as one if the establishment is located in an area with a population greater than 60,000 individuals.

UND1: Dummy variable coded as one if the individual works in an establishment that has no employees whose wages are determined by collective bargaining with union.

UND2: Dummy variable coded as one if the individual works in an establishment in which between 1 and 25 percent of the employees' wages are determined by collective bargaining with union.

UND3: Dummy variable coded as one if the individual works in an establishment in which between 26 and 50 percent of the employees' wages are determined by collective bargaining with union.

UND4: Dummy variable coded as one if the individual works in an establishment in which between 51 and 75 percent of the employees' wages are determined by collective bargaining with union.

UND5: Dummy variable coded as one if the individual works in an establishment in which more than 75 percent of the employees' wages are determined by collective bargaining with union.

UNION: Dummy variable coded as one if the establishment has any employees it is required to negotiate with a union over wages.

COMP: Dummy variable coded as one if the individual works in an establishment that responded in the affirmative that they owned or had access to an electronic computer.

SALPOR: The proportion of full-time employees classified by the establishment as salaried (as opposed to hourly rated).

STABLE1: A dummy variable coded as one if the establishment declared that the demand for its output was unstable. This variable is based on the following question: "On a scale of 1 to 9, would you say this establishment faces a demand that is 1=highly stable to 9=highly unstable." Establishments that responded in the seven to nine range had this dummy coded as one.

STABLE2: A dummy variable coded as one if the establishment declared the demand for its output was reasonably stable. For the question outlined in STABLE1 the establishments that responded in the four to six range had this dummy coded as one.

STABLE3: A dummy variable coded as one if the establishment declared the demand for its output was reasonably stable. For the question outlined in STABLE1 the establishments that responded in the one to three range had this dummy coded as one.

YEREQ: Number of the years of education required as a minimum to be hired permanently by the establishment. This is calculated as weighted average using years required for hourly and salaried positions. The weights used are based on the number of hourly and salaried employees in the establishment.

WOJEXP: The number of weeks on the job required before most employees adequately perform their job. The number of weeks' numbers were collected for office and other workers in the establishment. Then a weighted average was calculated using the salaried (office) and hourly (other) employment in the establishment.

EPMAR: The proportion of the individuals in the establishment who reported that they are married. This variable is calculated at the establishment level using the individuals observed in the establishment and their response to the marital status question.

EMYKIDS: The mean number of children aged five or under of the employees in the establishment. It is calculated at the establishment level using the individuals observed in the establishment and their response to the question about the number of children in this age category.

EMEDUC: The mean years of education of individuals working in the establishment. It is calculated at the establishment level using the individuals observed in the establishment and their response to the years-of-education question.

EMCEXP: The mean years of current experience of individuals working in the establishment. It is calculated at the establishment level using the individuals observed in the establishment and their calculated years of current experience.

EMTEN: The mean years of tenure with current employers of individuals working in the establishment. It is calculated at the establishment level using the individuals observed in the establishment and the calculated years of tenure with current employer.

MEWAGE: The mean hourly wage of individuals working in the establishment. It is calculated at the establishment level using the individuals observed in the establishment and their calculated hourly wage rate.

C. Means of Individual Level Variables

TABLE C1
Means for Individual Level Wage Equation Variables

Variable	*Pooled N=941*	*Males N=724*	*Females N=217*	*Variable*	*Pooled N=941*	*Males N=724*	*Females N=217*
WAGE	6.93	6.93	4.94	NUMSUP	4.01	4.43	2.64
MALE	0.77	1.00	0.00	IND.PRIM	0.21	0.27	0.02
AGE	38.04	38.63	36.06	IND.MAN	0.27	0.25	0.31
EDUC	10.42	10.21	11.10	IND.TRADE	0.15	0.10	0.28
CEXP	17.98	19.03	14.45	IND.SERV	0.20	0.18	0.28
TEN	9.41	10.14	6.99	IND.OTHER	0.17	0.19	0.11
EFP	0.21	0.13	0.46	OCC.MAN	0.10	0.10	0.10
UND1	0.40	0.36	0.52	OCC.CLER	0.15	0.07	0.39
UND2	0.02	0.03	0.01	OCC.SALE	0.08	0.06	0.14
UND3	0.06	0.05	0.10	OCC.SERV	0.09	0.08	0.10
UND4	0.13	0.14	0.12	OCC.PRIM	0.11	0.13	0.01
UND5	0.39	0.42	0.26	OCC.PROC	0.28	0.30	0.22
COMP	0.78	0.76	0.85	OCC.CONS	0.08	0.10	0.01
PEINS	0.57	0.53	0.67	OCC.TRAN	0.65	0.08	0.00
MAR	0.77	0.82	0.58				

D. Individual and Establishment Level Wage Equation Results

TABLE D1
Establishment Level Log Average Wage Determination

Dependent Variable: Log of MEWAGE

Variable		*Variable*	
EFP	-0.393* (0.118)	P-OCC.MATH	-0.061 (0.356)
IND.PRIM	0.056 (0.113)	UNION	0.132* (0.052)
IND.TRADE	0.115 (0.079)	COMP	0.111* (0.042)
IND.SERV	0.210 (0.129)	EPMAR	0.083 (0.095)
IND.OTHER	0.111 (0.071)	EMEDUC	0.051* (0.019)
P-OCC.CLER	-0.161 (0.200)	EMCEXP	0.023 (0.014)
P-OCC.SALES	0.068 (0.221)	SQ.EMCEXP (*1/100)	-0.047 (0.027)
P-OCC.SERV	-0.245 (0.177)	EMTEN	0.010 (0.016)
P-OCC.PRIM	0.341 (0.246)	SQ.EMTEN (*1/1000)	-0.025 (0.040)
P-OCC.PROC	0.100 (0.230)	PEINS	-0.110* (0.044)
P-OCC.CONS	0.278 (0.227)	CONSTANT	0.894* (0.377)
P-OCC.TRAN	0.036 (0.211)	R^2	0.804

Note: The numbers in the parentheses are robust standard errors and * indicates that estimate is significant at least at the 95 percent level of confidence.

TABLE D2
Individual Level Wage Equation Results

Dependent Variable: Log of Wage

Variable	*Pooled*	*Males*	*Females*	*Variable*	*Pooled*	*Males*	*Females*
EFP	-0.490*	-0.230*	-0.291*	COMP	0.077*	0.105*	0.072
	(0.071)	(0.083)	(0.120)		(0.033)	(0.032)	(0.076)
EDUC	0.020*	0.014*	0.049*	NUMSUP	0.021*	0.019*	0.013
	(0.004)	(0.004)	(0.009)	(*1/10)	(0.005)	(0.005)	(0.010)
CEXP	0.009*	0.007*	0.009	PEINS	-0.082*	-0.091*	-0.006
	(0.003)	(0.003)	(0.005)		(0.031)	(0.030)	(0.063)
SQ.CEXP	-0.020*	-0.018*	-0.013	MAR	0.083*	0.107*	-0.001
(*1/100)	(0.005)	(0.006)	(0.012)		(0.021)	(0.027)	(0.030)
TEN	0.009*	0.009*	0.025*	OCC.CLER	-0.316*	-0.258*	-0.208*
	(0.003)	(0.003)	(0.007)		(0.041)	(0.055)	(0.060)
SQ.TEN	-0.012	-0.014	-0.081*	OCC.SALE	-0.203*	-0.156*	-0.199*
(*1/100)	(0.007)	(0.008)	(0.025)		(0.049)	(0.062)	(0.071)
UND2	0.103	0.074	-0.211	OCC.SERV	-0.394*	-0.439*	-0.218*
	(0.098)	(0.089)	(0.208)		(0.049)	(0.057)	(0.081)
UND3	0.041	-0.019	0.103	OCC.PRIM	-0.099	-0.076*	-0.502*
	(0.070)	(0.068)	(0.115)		(0.053)	(0.057)	(0.176)
UND4	0.053	0.034	0.048	OCC.PROC	-0.197*	-0.184*	-0.163
	(0.051)	(0.047)	(0.099)		(0.045)	(0.051)	(0.092)
UND5	0.197*	0.182*	0.148*	OCC.CONS	-0.076	-0.085	-0.155
	(0.036)	(0.035)	(0.070)		(0.051)	(0.056)	(0.201)
IND.PRIM	0.050	0.031	0.146	OCC.MATH	-0.251*	-0.270*	-0.171
	(0.051)	(0.047)	(0.147)		(0.053)	(0.059)	(0.112)
IND.TRADE	0.079	0.082	-0.059	OCC.TRAN	-0.223*	-0.234*	N/A
	(0.051)	(0.052)	(0.092)		(0.052)	(0.056)	
IND.SERV	0.064	0.069	-0.105	CONSTANT	1.597*	1.650	1.079*
	(0.054)	(0.058)	(0.095)		(0.088)	(0.093)	(0.188)
IND.OTHER	0.086	0.071	-0.040	R^2	0.533	0.471	0.552
	(0.047)	(0.045)	(0.095)				

Note: The numbers in the parentheses are Generalized Least Squares standard errors, * indicates that estimate is significant at least at the 95 percent level of confidence and N/A indicates no observations in this occupation for this group.