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Gender Versus Ethnic Wage Differentials Among Professionals: Evidence from Israel

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ABSTRACT. – The purpose of this paper is to investigate wage structures of professional workers in the Israeli labor market using data from the 1983 Israeli census and correcting for selectivity at the state of entrance into the occupation. The sample of professionals is decomposed into several subsamples: Jewish men and Jewish women; within the Jewish sample a distinction is made between Westerners and Easterners. The core of this study is the investigation of wage differentials between the various groups, taking into account differences in entrance probabilities. The standard OAXACA decomposition does not take into account different probabilities of entering the professional occupations (*i.e.*, occupational segregation). In order to incorporate this type of segregation into the wage differential decompositions, two statistical methodologies are merged: the OAXACA methodology and the HECKMAN selectivity bias correction procedure. The decomposition procedure is then modified in order to take into account the contribution of segregation to the characteristics and the discrimination components. We propose four alternative decompositions of the selectivity corrected wage equations and present the results based on these decompositions.

Différentiels de salaires de genre et ethnique parmi les professions libérales. Le cas d'Israël

RÉSUMÉ. – Le but de ce papier est de s'intéresser aux structures de salaires des travailleurs professionnels sur le marché du travail israelien en utilisant les données du recensement de 1983 et en corrigeant pour le biais de selection à l'embauche. Utilisant la décomposition de OAXACA, nous trouvons que la discrimination joue un rôle plus important dans l'explication des différences de salaires entre hommes et femmes qu'entre groupes majoritaire et minoritaire.

1 Introduction

Wage differentials and occupational segregation have been intensively studied and well documented in the economic literature. Differences by gender and ethnicity have been examined and compared. Many studies presented an empirical analysis while others offered theories to explain the results. POLACHEK [1975; 1979; 1987] leads the group that emphasizes human capital differences in explaining wage differences and segregation, while BERGMANN [1974; 1986] is in the forefront of a second group of scholars who claim that discrimination is the major source of inequality of wages and occupations. In this study we examine both gender and ethnic wage differentials among professional workers in the Israeli labor market. Israel provides a tailor-made setting for ethnic studies since the Israeli Jewish population (4.119 million in 1983, 4.955 in 2000) consists of people with a large diversity in their countries of origin.

The major ethnic division in Israel is based on the country of origin. Although Jews from each of the countries of origin speak different languages and perceive themselves as having some distinctive ethnic characteristics, the dominant distinction is between Jews originating from Asia and Africa (excluding South Africa) (Easterners) and those from America, Europe, South Africa and Australia (Westerners). The former group is characterized by a more traditional orientation, limited education, large families, minimal economic resources and cultural and religious restrictions on women's activities outside the home (EISENSTADT [1954; 1967]). The shares of Westerners and Easterners in the Jewish population (in 2000) are about 65% and 35% (in 2000) compared to 56% and 44% (respectively) in 1983. The rise in the share of Westerners is due to the mass immigration from the former USSR in the first half of the 1990s.

We chose to analyze wages of professional workers only. Professional workers include the following: scientific and academic workers; other professional, technical and related workers; and administrators and managers. Reference to professional workers only results in more homogenous groups, however there is still a diversity of occupations (25 two-digit occupations) within the professional occupations.

The purpose of this study is to investigate gender and ethnic wage structures and wage differentials among professional workers in the Israeli labor market with special emphasis on correction for selection into the occupation. The economic literature identifies three major sources for wage differences: (1) differences in characteristics of the groups under comparison, mainly human capital traits, such as: education, experience and residence in the country; (2) wage discrimination represented by different rates of return of the workers' human capital; and (3) segregation, *i.e.*, the exclusion of minority groups (such as blacks, Easterners, Arabs, or women) from high-paid and high-status occupations, such as professional occupations. The first two factors have been studied intensively for more than three decades, but only recently has segregation been considered a third source of wage differences.

The common approach to measure wage discrimination and human capital differences is based on a statistical method originally developed by OAXACA [1973] and BLINDER [1973].

The simplest decomposition procedure is to adopt one of the estimated wage structures as the nondiscriminatory norm. In general the decomposition results depend on which group's estimated wage structure is adopted as the norm. This merely reflects the classic index number problem. Often researchers select the wage structure for the group of workers believed to be dominant in the labor market (at least relative to the comparison group). Differences in the mean characteristics of the two groups are weighted by the estimated coefficients for the nondiscriminatory wage standard and summed to obtain the human capital portion of the overall wage differential. The discrimination portion of the overall wage differential is the residual left over after netting out the human capital portion. Equivalently, the discrimination portion can be directly obtained as the summed difference in estimated coefficients between the two groups of workers weighted by the mean characteristics of the subordinate group. An implication of this procedure is that all of the discriminatory wage differential is ascribed to underpayment of the subordinate group rather than to overpayment of the dominant group.

A more general approach to wage decompositions is found in NEUMARK [1988], OAXACA and RANSOM [1988], and OAXACA and RANSOM [1994]. In the more general approach the nondiscriminatory wage structure is estimated from a pooled sample of the two demographic groups. This approach allows the discrimination component to be further disaggregated into overpayment (favoritism) and underpayment (pure discrimination).

Although the data used in our study are cross-sectional, panel data methods have been used to control for individual wage effects. POLACHEK and KIM [1994] uses fixed effects to estimate the gender earnings gap with intercept and slope specific effects. Since gender is a time invariant variable in the panel data models, a two-stage procedure is employed to obtain consistent estimators of the gender gap. ROSHOLM and SMITH [1996] estimates separate wage equations for male and female workers in Denmark using panel data techniques in order to identify the sources of changes in the wage gap.

Other refinements to measuring labor market discrimination incorporate the gender and ethnic compositions of each occupation as determinants of occupational wages: HIRSCH and MACPHERSON [1994], HIRSCH and SCHUMACHER [1992], and MACPHERSON and HIRSCH [1995]. Panel data techniques are used to control for occupational characteristics and unmeasured worker characteristics encompassing skill and tastes. In another set of studies the contribution of occupational segregation to the wage differential was estimated separately so that the difference between the wages of the groups under consideration was now decomposed into three components: the endowment component, wage discrimination, and segregation. Examples of such papers are BROWN *et al* [1980], MILLER [1987], REILLY [1991], and NEUMAN and SILBER [1996]. Most of these studies, however, were not based on theoretical models. Only recently was an attempt made by BALDWIN *et al.* [2001] to build a coherent theory which incorporates both wage differences and occupational segregation.

Another twist in wage decomposition methodology is occasioned by selectivity bias. Selectivity bias might be found at two stages of the employment process: at the stage of joining the employed labor force and when a specific occupation or an occupational status (*e.g.* union/nonunion) is chosen. Occupational selectivity bias affects wage differentials as occupations differ in average wage rates (even after controlling for workers' characteristics) and barriers to entrance of the subordinate group create another source of discrimination. In the presence of sample selection, of both types, *OLS* estimation of the wage equations can yield biased and inconsistent estimators, GRONAU [1974] and HECKMAN [1976, 1979]. While correction for the first type is standard, correction for the second type is not usually done, and if it is performed it is not taken to the stage of decomposing wage differentials including the decomposition of the Inverse Mills Ratio. DOLTON, MAKEPEACE, and VAN DER KLAAUW [1989] estimate a simultaneous model of occupational choice, wage determination, and occupational status in which selectivity corrections are included in the wage and occupational status equations. Selectivity corrections are made for labor force participation of women and occupational selectivity corrections are made for both men and women. Wage decompositions are not performed and gender discrimination is not estimated, though male and female occupational choices are predicted using own characteristics with the estimated model for the opposite sex. REIMERS [1983] and BOYMOND *et al.* [1994] correct for sample selection bias when estimating the effects of labor market discrimination.

As we show below, sample selection complicates the interpretation of wage decompositions. This compounds the usual difficulty of whether or not the unexplained wage gap should be labeled "discrimination". The unexplained gap; can always be interpreted as an estimate of discrimination, but then the question is whether or not it is an unbiased or consistent estimate. This in turn depends on how one characterizes the wage structure in a competitive labor market absent tastes for discrimination by economic agents. Econometrically, the same issue arises in other contexts. For example researchers estimate union-nonunion wage differentials or manufacturing-non manufacturing wage differentials. These can be regarded as unexplained differentials except that we have generally accepted labels to differentiate among a potentially infinite set of unexplained differentials. For the sake of expositional convenience we label the unexplained gap as discrimination but we acknowledge the usual caveats against making too literal an interpretation. Section 2 is a discussion of some methodological issues that arise when attempting to conduct wage decompositions with selectivity corrected wage equations. Section 3 uses Israeli census data to illustrate how estimates of labor market discrimination vary with different approaches to using selectivity corrected wage equations. Finally, section 4 is a summary and conclusion.

2 Methodology - Decomposition of Wage Differentials with Selectivity-Corrected Wage Equations[1]

For purposes of illustration we will consider a two equation model of wage determination within a given occupation and employment within the given occupation for the jth demographic group:

$$E^*_{ij} = Z'_{ij}\gamma_j + \varepsilon_{ij} \tag{1}$$

$$Y_{ij} = X'_{ij}\,\beta_j + u_{ij}, \tag{2}$$

where for individual "i" in the jth demographic group, E^*_{ij} is a latent variable associated with employment in the given occupation, Z'_{ij} is a vector of the determinants of occupational affiliation, Y_{ij} is the market wage (in logs), X'_{ij} is a vector of determinants of market wages, γ_j and β_j are the associated parameter vectors, and ε_{ji} and u_{ji} are $i.i.d$ error terms that follow a bivariate normal distribution $\left(0,0,\sigma_{\varepsilon j},\sigma_{uj},\rho_j\right)$. For identification purposes, the variance of ε_{ji} is normalized to 1.

While E^*_{ij} is unobserved as a continuous variable, market wages $\left(Y_{ij}\right)$ are observed when $E^*_{ij} > 0$. The probability of being in the given occupation (conditional on being employed) is given by

$$\begin{aligned} \Pr ob(E^*_{ij} > 0) &= \Pr ob\left(\varepsilon_{ij} > -Z'_{ij}\gamma_j\right) \\ &= \Phi(Z'_{ij}\,\gamma_j), \end{aligned} \tag{3}$$

where $\Phi(\cdot)$ is the standard normal C.D.F. (the variance of ε is normalized to 1). Equation (2) is estimated for $\left\{i \mid \varepsilon_{ij} > -Z'_{ij}\gamma_j\right\}$.

We have the familiar result that the expected wage of a worker observed to be in the given occupation is

$$\begin{aligned} E\left(Y_{ij} \mid E^*_{ij} > 0\right) &= X'_{ij}\,\beta_j + E\left(u_{ij} \mid \varepsilon_{ij} > -Z'_{ij}\gamma_j\right). \\ &= X'_{ij}\,\beta_j + \rho_j\sigma_{u_j}\lambda_{ij} \\ &= X'_{ij}\,\beta_j + \theta_j\,\lambda_{ij}, \end{aligned} \tag{4}$$

1. For a more detailed presentation, see NEUMAN and OAXACA [2002]. Here we briefly summarize the methodology.

where $\theta_j = \rho_j \sigma_{u_j}$, $\lambda_{ij} = \phi(Z'_{ij}\gamma_j)/\Phi(Z'_{ij}\gamma_j)$, and $\phi(\cdot)$ is the standard normal density function.

It is clear from (4) that correction for selectivity bias when comparing two demographic groups j and k requires a wage decomposition of the following sort:

$$
\begin{aligned}
\overline{Y}_j - \overline{Y}_k &= \left(\bar{X}'_j \widehat{\beta}_j + \widehat{\theta}_j \widehat{\lambda}_j\right) - \left(\bar{X}'_k \widehat{\beta}_k + \widehat{\theta}_k \widehat{\lambda}_k\right) \\
&= \bar{X}'_k \left(\widehat{\beta}_j - \widehat{\beta}_k\right) + \left(\bar{X}_j - \bar{X}_k\right)' \widehat{\beta}_j \\
&+ \left(\widehat{\theta}_j \widehat{\lambda}_j - \widehat{\theta}_k \widehat{\lambda}_k\right)
\end{aligned}
\tag{5}
$$

The first two terms in (5) are the familiar discrimination and human capital components, and the last term measures gender differences in the selection effects. A potentially critical issue is how to analyze and interpret this last term. One way to finesse the problem of what to do with the term $\left(\widehat{\theta}_j \widehat{\lambda}_j - \widehat{\theta}_k \widehat{\lambda}_k\right)$ is to simply net out the estimated differences in conditional means from the overall wage differential so that one is left with the familiar decomposition terms:

$$
\left(\overline{Y}_j - \overline{Y}_k\right) - \left(\widehat{\theta}_j \widehat{\lambda}_j - \widehat{\theta}_k \widehat{\lambda}_k\right) = \bar{X}'_k \left(\widehat{\beta}_j - \widehat{\beta}_k\right) + \left(\bar{X}_j - \bar{X}_k\right)' \widehat{\beta}_j. \tag{6}
$$

Examples of this approach may be found in REIMERS [1983] and BOYMOND *et al.* [1994]. A problem that arises with (6) is that this approach does not provide a decomposition of the *observed* wage differential $\overline{Y}_j - \overline{Y}_k$. In what follows group j (k) will represent males (females) in gender comparisons and Westerners (Easterners) in ethnic comparisons.

Our interest is in exploring the question of whether or not the term $\left(\widehat{\theta}_j \widehat{\lambda}_j - \widehat{\theta}_k \widehat{\lambda}_k\right)$ should be subject to further decomposition into discrimination and human capital components, and if so, how should this be done? Clearly if occupational affiliation were completely random there would be no selection correction needed. In the presence of non random selection in the sense of correlation between the errors in the wage and selection equations, it is important to understand what gives rise to group differences in the selection terms. We introduce the following decomposition of the gender difference in the conditional mean error terms for the wage equations for those employed in the given occupation (see NEUMAN and OAXACA [2002]):

$$
\begin{aligned}
&\bar{E}\left(u_j \mid \varepsilon_j > -Z'_j \hat{\gamma}_j\right) - \bar{E}\left(u_k \mid \varepsilon_k > -Z'_k \widehat{\gamma}_k\right) \\
&= \widehat{\theta}_j \widehat{\lambda}_j - \widehat{\theta}_k \widehat{\lambda}_k \\
&= \widehat{\theta}_j \left(\widehat{\lambda}^0_k - \widehat{\lambda}_k\right) + \widehat{\theta}_j \left(\widehat{\lambda}_j - \widehat{\lambda}^0_k\right) + \left(\widehat{\theta}_j - \widehat{\theta}_k\right) \widehat{\lambda}_k,
\end{aligned}
\tag{7}
$$

where $\widehat{\lambda}_j = \sum_{i=}^{N_j} \widehat{\lambda}_{ij}/N_j$ and $\widehat{\lambda}_{ij} = \phi(Z'_{ij}\widehat{\gamma}_j)/\Phi(Z'_{ij}\widehat{\gamma}_j)$ for $j = j,k$,

$\widehat{\lambda}_k^0 = \sum_{i=}^{N_k} \widehat{\lambda}_{ik}^0 / N_k$, and $\widehat{\lambda}_{ik}^0 = \phi(Z'_{ik}\, \widehat{\gamma}_j)/\Phi(Z'_{ik}\, \widehat{\gamma}_j)$. The term $\widehat{\lambda}_k^0$ is the mean value of the Inverse Mills Ratio (IMR) if females faced the same selection equation that the men face.

It will be convenient to introduce simplifying notation for the individual components of the total wage decomposition. We denote each decomposition term by Z_g, $g = 1,...,5$.

Let $Z_1 = \left(\bar{X}_j - \bar{X}_k\right)' \widehat{\beta}_j$. (conventional estimate of the effects of gender differences in human capital).

Let $Z_2 = \widehat{\theta}_j(\widehat{\lambda}_j - \widehat{\lambda}_k^0)$. (wage effects of gender differences in the variables that determine professional employment).

Let $Z_3 = (\widehat{\theta}_j - \widehat{\theta}_k)\widehat{\lambda}_k$. (effects of gender differences in the wage response to the probability of professional employment, *i.e.* the wage gap effects of gender differences in the correlation between the selectivity equation error term and the wage equation error term as well as gender differences in wage variability).

Let $Z_4 = \bar{X}'_k \left(\widehat{\beta}_j - \widehat{\beta}_k\right)$. (conventional estimate of wage discrimination)

Let $Z_5 = \widehat{\theta}_j\ (\widehat{\lambda}_k^0 - \widehat{\lambda}_k)$. (wage effects of gender differences in the parameters of the probit selectivity equation).

The total wage decomposition may now be expressed as

$$\begin{aligned} \overline{Y}_j - \overline{Y}_k &= D + H + S \\ &= \sum_{i=g}^{5} Z_i, \end{aligned} \tag{8}$$

where D, H, and S measure the discrimination, human capital (endowment), and pure selectivity contributions. How should the components of (8) be allocated to discrimination and endowments?

We consider four alternative decompositions that in effect define labor market inequity with respect to how sample selection varies across demographic groups.

Selectivity #1

$$\begin{aligned} &\bar{Y}_j - \overline{Y}_k = D_1 + H_1 \\ &D_1 = Z_4 + Z_5 = \bar{X}'_k \left(\widehat{\beta}_j - \widehat{\beta}_k\right) + \widehat{\theta}_j\ (\widehat{\lambda}_k^0 - \widehat{\lambda}_k) \\ &H_2 = Z_1 + Z_2 + Z_3 = \left(\bar{X}_j - \bar{X}_k\right)' \widehat{\beta}_j + \widehat{\theta}_j(\widehat{\lambda}_j - \widehat{\lambda}_k^0) \\ &+(\widehat{\theta}_j - \widehat{\theta}_k)\widehat{\lambda}_k \end{aligned}$$

This decomposition might be appropriate if one believes that group differences in the selection parameters reflect labor market inequity. Differential occupational barriers operating in the labor could generate differences in selection parameters.

Selectivity #2

$$
\begin{aligned}
\bar{Y}_j - \overline{Y}_k &= D_2 + H_2 \\
D_2 &= Z_4 + Z_3 + Z_5 = \bar{X}_k' \left(\widehat{\beta}_j - \widehat{\beta}_k\right) + \widehat{\theta}_j \widehat{\lambda}_k^0 - \widehat{\theta}_k \widehat{\lambda}_k \\
H_2 &= Z_1 + Z_2 = \left(\bar{X}_j - \bar{X}_k\right)' \widehat{\beta}_j + \widehat{\theta}_j (\widehat{\lambda}_j - \widehat{\lambda}_k^0)
\end{aligned}
$$

The second decomposition holds that group differences in the selection parameters and in the wage effects of selection reflect labor market discrimination. For example, if discrimination produced group differences in the unconditional wage dispersion parameters (σ_u) or within group wage inequality, group differences in θ could result. This still leaves open what assumptions one wants to make about group differences in ρ. The basic issue is how labor market inequity can affect group differences in the covariance between the selection error term and the wage equation error term.

Selectivity #3

$$
\begin{aligned}
\bar{Y}_j - \overline{Y}_k &= D_3 + H_3 + S_3 \\
D_3 &= D_1 = \bar{X}_k' \left(\widehat{\beta}_j - \widehat{\beta}_k\right) + \widehat{\theta}_j \left(\widehat{\lambda}_k^0 - \widehat{\lambda}_k\right) \\
H_3 &= H_2 = \left(\bar{X}_j - \bar{X}_k\right)' \widehat{\beta}_j + \widehat{\theta}_j (\widehat{\lambda}_j - \widehat{\lambda}_k^0) \\
S_3 &= Z_3 = (\widehat{\theta}_j - \widehat{\theta}_k) \widehat{\lambda}_k
\end{aligned}
$$

This decomposition measures inequity exactly the same as in the first decomposition except that the third decomposition is agnostic about the effects of group differences in the wage effects of selection. Term S_3 treats group differences in the wage effects of selection as neither discriminatory nor as human capital derived. The role of this term is as an adjustment of observed wage differentials for selection effects preparatory to estimation of discrimination and endowment effects.

Selectivity #4

$$
\begin{aligned}
\bar{Y}_j - \overline{Y}_k &= D_4 + H_4 + S_4 \\
D_4 &= Z_4 = \bar{X}_k' \left(\widehat{\beta}_j - \widehat{\beta}_k\right) \\
H_4 &= Z_1 = \left(\bar{X}_j - \bar{X}_k\right)' \widehat{\beta}_j \\
S_4 &= Z_2 + Z_3 + Z_5 = \widehat{\theta}_j \widehat{\lambda}_j - \widehat{\theta}_k \widehat{\lambda}_k
\end{aligned}
$$

This fourth decomposition is completely agnostic about the allocation of group differences in selection effects to discrimination and endowment effects. It corresponds to the methods of REIMERS [1983] and BOYMOND *et al.* [1994] except that the selection contribution appears as a separate component rather than being netted out of the observed wage differential.

3 Empirical Findings

For an illustration of the proposed decomposition methodologies we will use a sample of Israeli professionals – split by gender and by ethnicity. Some stylized facts regarding the ethnic division of the Israeli population and background data seem to be useful.

The major ethnic division in Israel is based on the country of origin. Although Jews from each of the countries of origin speak different languages and perceive themselves as having some distinctive ethnic characteristics, the dominant distinction is between Jews originating from Asia and Africa (excluding South Africa) (Easterners) and those from America, Europe, South Africa and Australia (Westerners). The former group is characterized by a more traditional orientation, limited education, large families, minimal economic resources and cultural and religious restrictions on women's activities outside the home (EISENSTADT [1954; 1967]). The shares of Westerners and Easterners in the Jewish population [in 2000] are about 65% and 35%. The respective shares in 1983 were 56% and 44%. The rise in the share of Westerners is a result of mass immigration from the former USSR in the 1990s.

The internally differentiated Jewish majority shares the country with a non-Jewish minority of Moslems, Christians and Druze. Most of the non-Jews are Arabs. In 1983 non-Jews represented 17.15% of the Israeli population. In 2000 the percent of non-Jew rose to 22.20% (Israel, Annual Statistical Abstract, [1984 and 2001]). There is almost complete residential segregation between Jews and Arabs, and this is reinforced by cultural differences and minimal social integration between the groups.[2] The Israeli population is thus organized in a dual ethnic stratification. The duality occurs on two levels: Jews versus non-Jews (mainly Arabs), and within the Jewish population, Jews of European or American origin (Westerners) versus Jews of Asian or African origin (Easterners).

We chose to analyze wages of Jewish professionals only, due to the small size of the Arab sample, mainly the female sample (866 Arab professional women).[3] Professional workers include the following: scientific and academic workers; other professional, technical and related workers; and administrators and managers. Reference to professional workers only results in more homogenous groups, however there is still a diversity of occupations (25 two-digit occupations) within the professional occupations.

The share of professionals employed in the Israeli Jewish labor force in 1983 was 32.4%. Quite surprisingly, the share is higher for women than for

2. While residential segregation between Jews and Arabs is extremely high, occupational segregation is much lower. The Duncan Dissimilarity Index based on a sample of 110,139 male Jews and 13,319 male Arabs from the 1983 census is 25 for a one-digit classification of occupations; 38 for a two-digit and 47 for a three-digit classification. The indices are similar for female samples and are much lower than respective gender occupational dissimilarity indices.

3. The small sample of the female Arab professionals is a result of the small share of Arabs in the Israeli population (about 15% in 1983) and mainly the very low labor force participation rate among Arab women - about 5.5% (see GROSSBARD-SHECHTMAN and NEUMAN, [1996]).

men: 35.5% of Jewish working women, compared to 29.8% of Jewish working men are professionals (Israel, Central Bureau of Statistics, [1984]). These statistics may be misleading, as we are looking at broad categories. Professional employment includes teachers, nurses and other relatively low-paid occupations. A closer look shows that most professional women, about 70%, are in the occupational category of "other professional, technical and related workers" that includes: teachers, nurses, social workers, technicians and artists. Only 9.2% of women are "scientific and academic workers" and a mere 2.5% are "managers". When only salaried workers are referred to, the share of professionals shows an increase. The census, used for our empirical study, contains earnings data for salaried workers only and this limits our empirical investigation to this part of the labor force (which constitutes over 80% of the employed labor force in Israel).

The Sample

For our illustration we investigate wage differentials between the various subgroups of Israeli Jewish professional workers, using the 20% sample of the 1983 Census of Population and Housing, conducted by the Israeli Central Bureau of Statistics (Israel, Central Bureau of Statistics, 1987). We will investigate the Jewish sample and a distinction will be made between the genders and between the two ethnicities: Westerners versus Easterners. We consider workers in the age group of 25-65 and exclude workers who have just entered the labor market (younger than 25) and workers older than 65 (retirement age).

The census contains individual data records on monthly earnings; human capital traits such as schooling, experience and residence in Israel; socioeconomic data such as ethnic origin; and labor market characteristics such as occupation, economic sector, hours of work per week, and weeks of work per year.

The samples used for the empirical analysis of wage differentials of professionals are large. The female sample is composed of 22,333 Jewish women – one-fourth of them are of an Eastern ethnic origin and three-fourths are Westerners. The share of Eastern women in the professional occupations is much smaller, as a result of two factors: (*i*) a lower rate of labor force participation among Eastern women, and (*ii*) within the female labor force they have a lower representation in the professions under consideration (24.48% as compared to 49.53% of Western working women, see Table 1), partly, as a result of lower educational attainments. The male sample is composed of 24,654 men – only 27% of them are Easterners. The reason is a much lower representation of Easterners in the professional occupations – 43.86% of all Western workers compared to only 16.6% of Eastern workers are professionals (see Table 1). Quite surprisingly, more women than men (as a proportion of the female and male labor forces, respectively) are professional workers. Whereas women seem to be sufficiently represented in prestigious occupations such as the professional category, this statistic is somewhat misleading, as mentioned above. Professional employment includes teachers, nurses and other relatively low-paying jobs within the professional category. Thus, looking at broad occupations is not always a satisfactory way of measuring

TABLE 1

Sample Characteristics by Ethnic Origin

Israeli Women and Men, 25-65 Year-Olds, Salaried Professionals – Israeli Census, 1983

	WESTERN WOMEN		EASTERN WOMEN		WESTERN MEN		EASTERN MEN	
CHARACTERISTICS	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Share in labor force (%)	49.53		24.48		43.86		16.60	
Gross hourly wage (shekel)	257.92	392.34	218.83	265.57	345.93	779.04	276.67	337.82
Marital status - married (%)	82.20	–	80.77	–	89.58	–	87.70	–
Number of years of schooling	15.35	2.63	13.88	2.66	15.53	3.28	13.64	3.55
0-8 Years of schooling (%)	0.86	–	3.29	–	1.92	–	7.08	–
9-12 Years of schooling (%)	14.09	–	27.26	–	19.38	–	34.07	–
13+ Years of schooling (%)	85.05	–	69.45	–	78.70	–	58.85	–
Experience (years)	17.18	10.16	14.29	8.61	19.52	11.62	19.37	11.14
Age (years)	38.53	9.53	34.17	7.74	41.05	10.77	39.01	10.05
Hours of work per week	30.58	12.00	30.45	11.17	46.24	11.59	44.97	11.37
Weeks of work per year	49.07	8.61	48.74	9.14	50.20	6.87	50.31	6.67
Israeli born (%)	50.72	–	43.84	–	54.30	–	28.37	–
Immigrated before 1947 (%)	5.25	–	2.58	–	9.21	–	4.15	–
Immigrated between 1948-64 (%)	22.16	–	45.69	–	25.54	–	57.23	-

	WESTERN WOMEN		EASTERN WOMEN		WESTERN MEN		EASTERN MEN	
CHARACTERISTICS	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Immigrated between 1965-71 (%)	6.03	-	4.99	-	5.53	-	6.80	-
Immigrated in 1972 and after (%)	15.84	–	2.90	–	14.02	–	3.45	–
Economic Sector (%)								
Agriculture	0.22	–	0.20	–	0.58	–	0.94	–
Industry	5.46	–	4.35	–	26.74	–	21.71	–
Electricity	0.38	–	0.11	–	2.14	–	1.12	–
Commerce	1.71	–	1.73	–	5.96	–	6.39	–
Finance	6.83	–	4.87	–	13.90	–	12.67	–
Transportation	0.75	–	0.48	–	3.81	–	4.85	–
Public services	81.98	–	86.44	–	40.86	–	46.36	–
Private services	2.07	–	1.61	–	3.04	–	3.63	–
Construction	0.58	–	0.21	–	2.97	–	2.33	–
Sample size	16,743	–	5,590	–	17,930	–	6,724	–

Notes: A worker is referred to as a Westerner if he was born in Europe, America, South Africa or Australia, or if he is Israeli-born and his father was born in one of these places. An Easterner is a worker who was born in Asia or Africa (excluding South Africa and Israel), or if he is Israeli born and his father was born in Asia/Africa. Second generation Israelis are part of the Western group.

female economic success. Even a one-digit classification of the professional occupations reveals a different and more accurate picture. While men are almost equally distributed between the three sub-categories of professionals (namely, scientific and academic workers; other professional and technical workers; and administrators and managers), more than two-thirds of women are in the second (least prestigious) group and a mere 7% of female professionals are managers. More than one-third of professional Jewish women are teachers (in elementary schools and kindergartens) and 17% are nurses. Earnings data will give us more information on the relative position of women.[4] Table 1 summarizes some socio-economic average characteristics of female and male workers in the two ethnic groups: Westerners and Easterners.

Eastern Jewish female professionals earn about 85% of the gross hourly average wage of Western female professionals. The differences are partly explained by differences in educational attainments: Average number of years of schooling for the two groups are about 15 and 14 respectively. Workers of the two groups have very similar hours of work (about 30 hours a week) and similar work stability (about 49 weeks of work a year). Eastern women are a bit younger and therefore also less experienced than Western women – a difference of about three years.

The great majority of all professional women are employed in the Public Services sector (about 82% of Westerners and 86% of Easterners), most of them in the education and health sectors, which in Israel, are public sectors. About half of female workers are Israeli born and the majority of those who are foreign born immigrated soon after statehood, between 1948-64.

A comparison of male-female wages shows that women, in both ethnic groups, earn significantly less than men. The ratios of female to male hourly earnings are: 75% for Westerners and 79% for Easterners. Wage differences between men and women are larger than wage differences between the ethnicities within the female and the male groups. Ethnic wage differentials among men are larger than among women. This finding is consistent with what BAYARD *et al.* [1999], HELLERSTEIN, NEUMARK and TROSKE [1999], and NEAL [2002] find. The larger gender wage differences are not in line with the observation that educational attainments are more similar between the sexes. The average number of years of schooling of men and women is almost identical, and the share of workers who have at least some academic education is even larger for women. Gender wage differentials are therefore not explained by differences in education.

Male workers are somewhat older than female workers (by 3-5 years) and therefore more experienced. Men work longer hours per week than women (about 15 hours more) and have about the same work stability in terms of weeks of work per year. The distribution by economic sector is different for men and women. The great majority of Jewish women (over 80%) are in the Public Services and only about 5% are employed in Industry and 6% in Finance; for Jewish men the share in Public Services is about half that of women (about 40%), while we find about 25% in Industry and about 13% in Finance. In all other economic sectors the percentage of both men and women

4. Comparable data on earnings and occupational achievements in the US and in other countries can be found in BLAU and FERBER [1992], JACOBSEN [1994], and POLACHEK and SIEBERT [1993].

is very low. About 50% of Jewish men (and women) are Israeli born. The great majority of the foreign born arrived between 1948-64.

Entrance Probabilities to the Professional Occupations

Now that we are acquainted with our samples, the next step would be to look at the respective probabilities of employment in the professional occupations. Different probabilities for the various groups (adjusted for variations in traits) could indicate barriers to entrance, depending on the extent of the role of tastes in occupational selection.

Entrance equations are insightful by themselves but here we use them to estimate another variant of discrimination that is reflected by different probabilities to get into the profession. The dependent variable takes on the value of 1 if the worker is employed in the professional occupations and 0 if he is employed in other occupations. Non-workers are excluded. A second version, where non-workers were also included in the reference group yielded similar results. The independent variables are: years of schooling, age, age squared, period of immigration and marital status. All variables affect the probability of employment in the professional occupations in the same direction for all groups. Schooling has a positive effect, age has a non-linear parabolic effect, length of residence in Israel has a positive effect and married workers are more likely to be professionals than single workers.[5] Within the Jewish sample – Westerners have better chances to enter the professional occupations. (The probit selectivity equations are in an appendix available from the authors on request.)

The estimates of the probit regressions will be used later to construct the IMR variable (λ) that will be used as a regressor in the wage equations and will thus correct for selectivity bias. It will then be used to estimate selectivity at the entrance stage.

Wage Equations by Gender and Ethnicity

Mincer-type wage equations are now estimated and then used to calculate the share of the human capital (explained) component versus the discrimination (unexplained) component and the selectivity component, in explaining wage differentials between the various groups. Two sets of wage equations are estimated: one set are the standard Mincer-type equations later used for the

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5. Both married men and married women are more likely to be professionals than their single co-workers. However, the coefficients are much smaller for men. These findings contrast with findings for other high-status occupations, like management. In the case of the management profession, we found that while married men have a significantly larger probability of being managers compared to single men, for women the effect is reversed – married women have a significantly lower tendency than single women to get into the managerial occupations, (NEUMAN and WEISBERG, [1995]). The reason for the different results is grounded in the fact that most professional women are either teachers or nurses. The two professions (mainly teaching) have flexible hours of work, low rates of human capital depreciation and can be combined with housework and household duties. These job characteristics are more important for married women and therefore married women have a higher tendency to enter these two professional occupations.

standard OAXACA [1973] decomposition, and the second set are those corrected for selectivity bias, using the two-stage Heckman procedure.

In all wage regressions, the logarithm of individual hourly wages was regressed against the following explanatory variables: years of schooling, years of potential work experience (age – years of schooling – 6), experience squared, the logarithm of weeks worked last year, the length of residence in Israel (a series of dummy variables corresponding to the period of immigration) and the economic sector in which the worker is employed (a series of dummy variables for one-digit economic sectors). Hourly wages were calculated using the formula (monthly earnings)/(4.33 * hours of work in a standard week). We also experimented with the dependent variable defined as the log of monthly earnings. In this case the number of hours of work was used as one of the explanatory variables. The regression results were similar.

The results of the regressions (obtainable upon request) conform to the results found in numerous other studies: earnings are positively related to years of schooling, the relationship between earnings and experience has an inverted U-shape, and length of residence in Israel is positively related to earnings.[6] The number of weeks worked per year, which is an indicator of stability and continuity of work, is also positively correlated with earnings. The magnitude of the effects of the various explanatory variables on earnings is less straightforward. There are gender differences in the returns to the human capital variables. Returns to experience are larger for men than for women, while returns to education and to residence in Israel are larger for women.

There are also differences between the ethnic groups. Schooling has a stronger effect on the wages of Easterners (in the cases of both men and women; the rate of return is 8.5% for women and 7.0% for men) than its effect on wages of Westerners (the rate of return is 5.8% for women and 5.4% for men).

When the Inverse Mill's Ratio is added as an additional explanatory variable, the coefficients of all human capital variables decrease and some lose their significance, (regressions not reported). This would indicate that the human capital variables affect the probability of employment in professional occupations; once the worker is in the professional occupations the effects on wages are smaller.

Table 2 presents the estimates of the averages of the IMR variable (λ) and the respective coefficients of this variable in the wage equations (θ). The coefficient of λ is negative and significant in all cases. This coefficient is the product of the standard deviation of the wage error term and the correlation between the error terms of the selection and the wage equations. Therefore, $\rho < 0$, or equivalently, $\mathrm{Cov}(u,\varepsilon) < 0$. Since λ is inversely related to the probability of employment in the professional occupation, a negative coefficient indicates that (cet. par.) workers with higher probabilities of being employed in the professional occupation will earn higher wages conditional upon employment in the professional occupation. In particular an increase in

6. It should be noted that the length of residence in the country is one of the elements of human capital, since it somehow measures the degree of understanding of the operation of the local labor market and also, which is most important, the command of the spoken language, *i.e.*, the ability to communicate verbally. (On language and earnings, see CHISWICK and MILLER [1995]).

TABLE 2
Estimates of Average Lambdas and Lambda's Coefficients

Wage differential	λ_j	$\hat{\lambda}_k$	$\hat{\lambda}_k^0$	$\hat{\theta}_j$	$\hat{\theta}_k$	Z_1	Z_2	Z_3	Z_4	Z_5
Westerners: Men-Women										
0.2626	0.6854	0.6244	0.6921	– 0.2947	– 0.2864	0.1072	0.0020	– 0.0052	0.1786	– 0.0199
Easterners: Men–Women										
0.2191	1.1330	0.9010	1.1043	– 0.4602	– 0.2423	0.1188	– 0.0132	– 0.1964	0.4034	– 0.0936
Men: Westerners–Easterners										
0.1936	0.6854	1.1330	0.9671	– 0.2947	– 0.4602	0.0263	0.0830	0.1875	– 0.1521	0.0489
Women: Westerners– Easterners										
0.1500	0.6244	0.9010	0.8702	– 0.2864	– 0.2423	0.0443	0.0704	– 0.0398	0.0662	0.0088

Notes: $\hat{\lambda}_j$, $\hat{\lambda}_k$ are averages of the inverse of Mill's ratios, for men and women (or Westerners and Easterners), respectively.
$\hat{\theta}_j$, $\hat{\theta}_k$ are estimates of the coefficients of λ_j, λ_k in the corrected wage equations.

Legend:

$Z_1 = (\overline{X}_j - \overline{X}_k)'\hat{\beta}_j$

$Z_2 = \hat{\theta}_j(\hat{\lambda}_j - \hat{\lambda}_k^0)$

$Z_3 = (\hat{\theta}_j - \hat{\theta}_k)\hat{\lambda}_k$

$Z_4 = \overline{X}_k'(\hat{\beta}_j - \hat{\beta}_k)$

$Z_5 = \hat{\theta}_j(\hat{\lambda}_k^0 - \hat{\lambda}_k)$

a variable Z_k with a positive coefficient γ_k will increase the probability of employment in the professional occupation (decrease λ) and hence have a positive partial effect on the conditional mean wage of a worker in the professional occupation (apart from any direct wage effect that Z_k may have).

Identification and Model Specification

A couple of issues merit discussion at this point. These have to do with identification and sensitivity of results to model specification. It is well known that the Heckit model can theoretically be identified by the nonlinearity of λ even if the selection equation and the main equation have identical regressors. However, it is also the case that relying solely on nonlinearity is viewed by most as taking the low road to identification. Fortunately in our specification there are a number of additional identifying restrictions. Age and its square appear in the selection equations while the closely related Mincer potential experience variable and its square appear in the wage equations. Of course if it were not for the parameter restrictions on age and experience and on their interaction and squares implied by the Mincer experience measure, there would be no differences between the selection equations and the wage equations with respect to age and experience. The selection equations exclude the log of weeks worked in the past year, years of residence, and dummy variables for branch (economic sector) while the wage equations exclude period of immigration and marital status. Evidence in favor of the view that the apparent wage effects of marital status stem from selection effects is presented in KRASHINSKY [2002]. The Krashinsky study uses data on a sample of twins and finds that unlike the standard human capital variables and union effects, marital status does not significantly affect wages after selection is accounted for. This finding is an example of the point made in HECKMAN [1979] that variables that may have no direct effect on wages may appear to do so if they are operating at the sample selection stage. Yet the choice of where to account for marital status remains somewhat arbitrary despite our best rationalizations. Finally, there is no question that selection model results can be enormously sensitive to specification. In particular one worries about obtaining consistent estimators of the θ's. Thus our results rely on the usual assumptions regarding consistency of the estimators of the selection model.

Decomposition of Wage Differentials

We now come to the core of our illustration – the breakdown of gender and ethnic wage differentials into the human capital (explained), the discrimination (unexplained), and the selectivity components. Table 3 presents the decomposition for the various comparisons. Each decomposition is done five times – first using the standard OAXACA [1973] decomposition technique and then integrating into it Heckman's selectivity bias correction procedure, in four alternative ways. We label the selectivity corrected decompositions Selectivity #1 – Selectivity #4 corresponding to expressions presented in the methodology section. By construction, the discrimination estimates for Selectivity #1 and Selectivity #3 are identical as are the estimated human

TABLE 3

Decompositions of Wage Differentials Israeli, Jewish, 25-65 year olds, salaried professionals Israeli Census, 1983

		Contribution of		
Decomposition method	Wage differential	H	D	Selectivity
		Westerners: Men - Women		
Standard Oaxaca	0.2626	0.1161 (44.19%)	0.1466 (55.81%)	0.0000 (0.00%)
Selectivity # 1		0.1040 (39.60%)	0.1586 (60.40%)	0.0000 (0.00%)
Selectivity # 2		0.1092 (41.57%)	0.1535 (58.43%)	0.0000 (0.00%)
Selectivity # 3		0.1092 (41.57%)	0.1586 (60.40%)	–0.0052 (–1.97%)
Selectivity # 4		0.1072 (40.81%)	0.1786 (67.99%)	– 0.0231 (–8.80%)
		Easterners: Men-Women		
Standard Oaxaca	0.2191	0.1154 (52.69%)	0.1037 (47.31%)	0.0000 (0.00%)
Selectivity # 1		– 0.0907 (– 41.41%)	0.3098 (141.41%)	0.0000 (0.00%)
Selectivity # 2		0.1056 (48.21%)	0.1135 (51.79%)	0.0000 (0.00%)
Selectivity # 3		0.1056 (48.21%)	0.3098 (141.41%)	– 0.1963 (–89.62%)
Selectivity # 4		0.1188 (54.23%)	0.4034 (184.11%)	– 0.3031 (-138.34%)
		Men: Westerners - Easterners		
Standard Oaxaca	0.1936	0.0970 (50.12%)	0.0966 (49.88%)	0.0000 (0.00%)
Selectivity # 1		0.2968 (153.34%)	– 0.1032 (– 53.34%)	0.0000 (0.00%)
Selectivity # 2		0.1093 (56.46%)	0.0843 (43.54%)	0.0000 (0.00%)
Selectivity # 3		0.1093 (56.46%)	– 0.1032 (– 53.34%)	0.1875 (96.88%)
Selectivity # 4		0.0263 (13.59%)	– 0.1521 (– 78.60%)	0.3194 (165.01%)

Decomposition method	Wage differential	Contribution of H	D	Selectivity
		Women: Westerners - Easterners		
Standard Oaxaca	0.1500	0.1017 (67.79%)	0.0483 (32.21%)	0.0000 (0.00%)
Selectivity # 1		0.0749 (49.96%)	0.0751 (50.04%)	0.0000 (0.00%)
Selectivity # 2		0.1147 (76.46%)	0.0353 (23.54%)	0.0000 (0.00%)
Selectivity # 3		0.1147 (76.46%)	0.0751 (50.04%)	–0.0398 (–26.50%)
Selectivity # 4		0.0443 (29.53%)	0.0662 (44.15%)	0.0395 (26.32%)

Legend:

Selectivity #1: $H = Z_1 + Z_2 + Z_3 \quad D = Z_4 + Z_5$
Selectivity #2: $H = Z_1 + Z_2 \quad D = Z_3 + Z_4 + Z_5$
Selectivity #3: $H = Z_1 + Z_2 \quad D = Z_4 + Z_5$ Selectivity $= Z_3$
Selectivity #4: $H = Z_1 \quad D = Z_4$ Selectivity $= Z_2 + Z_3 + Z_5$

where

$$Z_1 = (\overline{X}_j - \overline{X}_k)'\hat{\beta}_j \qquad Z_2 = \hat{\theta}_j(\hat{\lambda}_j - \hat{\lambda}_k^0) \qquad Z_3 = (\hat{\theta}_j - \hat{\theta}_k)\hat{\lambda}_k^0$$
$$Z_4 = \overline{X}_k'(\hat{\beta}_j - \hat{\beta}_k) \qquad Z_5 = \hat{\theta}_j(\hat{\lambda}_k^0 - \hat{\lambda}_k)$$

capital contributions for Selectivity #2 and Selectivity #3. The probit equation, used to correct for selectivity bias, was modeled using two different versions – first referring to workers only, and distinguishing between employed as professionals versus employment in other occupations, and second, referring to all respondents and distinguishing between professionals versus non professionals plus non-workers. The results of the two versions were similar and Table 3 presents the first version that deals with workers only. We also experimented with the Reimers' technique, yielding a second set of decompositions. The results are quite sensitive to the technique used (OAXACA or REIMERS) because among other things the Reimers method uses the average of the parameter estimates for two groups. Nevertheless the trends and relative results are similar, so in order to save space we present the first set only.

The overall results are the following. Gender wage differentials (at the mean points) are larger than ethnic wage differentials. Jewish men earn 28% more (per hour) than Jewish women. Gender wage differentials are larger among Westerners than among Easterners (30% and 25%, respectively) Ethnic differences are smaller: Western men have higher hourly earnings than Eastern men by about 20% and for women the ethnic difference drops to 16%. When entrance probabilities are not taken into account, differences in characteristics explain between 44% and 67% of the wage differentials. The explained share is smallest (44%) in a gender comparison among Westerners and largest (68%) in an ethnic comparison of women. In the two remaining cases (gender among Easterners and ethnicity among men) about half of the wage difference is explained by the differences in characteristics.

Among Westerners, the selectivity corrected male-female wage decompositions are very nearly identical. This is because gender differences in the selectivity components are negligible. For example, the estimates of θ are very nearly identical for males and females. The mean value of $\hat{\lambda}$ is slightly higher for males but slightly lower than the predicted mean value for females evaluated at the estimated coefficients from the male probit selectivity equation. The overall percent contribution of the average gender difference in the selectivity term is – 8.8%. Estimates of discrimination range from about 15.4 to 17.9 log points (58.4% to 68.0% of the logarithmic wage differential). The estimated contribution of human capital components ranges from 10.4 to 10.9 log points (39.6% to 41.6% of the logarithmic wage differential). By comparison, the standard Oaxaca decomposition yields the smallest estimate of discrimination at 14.7 log points (55.8% of the logarithmic wage differential) and the largest estimate of the human capital contribution at 11.6 log points (44.2% of the logarithmic wage differential).

When we turn to gender wage decompositions among Easterners, the results are quite different and varied. First it is important to note that the estimated value of θ for males is nearly twice as large (in absolute terms) as for females. This reflects some combination of a larger negative correlation between the selectivity equation error term and the wage equation error term for males and/or a larger standard deviation in the male wage equation error term. The latter would be indicative of more inherent wage inequality for males. The mean value of the IMR is considerably higher for males, 1.133 *versus* 0.901 for females. This means that the probability of being employed in the professional occupation is higher on average for Eastern women than for Eastern men, which is consistent with labor force shares reported in Table 1. We estimate the overall contribution of the average gender difference in the selectivity term at –30.3 log points or –138.3% of the unadjusted wage gap. Consequently, it makes a big difference as to how one apportions gender differences in the selectivity correction terms to discrimination and human capital components. When all of the gender gap in the selectivity terms are lumped together as a separate wage decomposition component (Selectivity #4), discrimination is estimated to be 40.3 log points (184.1%). In this decomposition human capital components account for 11.9 log points (54.2%). When the effects of the gender difference in $\hat{\lambda}$ evaluated at the estimated male probit coefficients are added to the human capital component and the effects of the gender difference in estimated probit coefficients are added to the discrimination component (Selectivity #3), estimated discrimination is reduced to 31.0 log points (141.4%). In this case the negative estimated selectivity contribution is reduced to 19.6 log points (– 89.6%). The effects of gender differences in the variables that determine professional employment turn out to be negligible for Easterners. Most of the differential selectivity effects turn out to be the result of gender differences in the coefficients of the probit selectivity equations. The Selectivity #2 decomposition differs from that of Selectivity #3 by the inclusion of the effects of gender differences in the θ parameter in the discrimination component. Because $|\hat{\theta}_j|$ is nearly twice the magnitude of $|\hat{\theta}_k|$, this difference reduces the estimate of discrimination to its smallest value of 11.4 log points (51.8%) among the set of selectivity corrected decompositions. Accordingly, transferring the effects of gender differences in θ to the human capital component in Selectivity #2 results in a human capital contribution of -9.1 log points (-41.4%). This decomposition implies that in the absence of labor market discrimination, Eastern women employed in the professional occupation would have earned about 8.7% higher wages than Eastern men in the professional occupation. As is the case among Westerners, the Standard Oaxaca decomposition yields the smallest estimate of discrimination (10.4 log points or 47.3% of the unadjusted log wage differential). We now consider the results from our ethnic wage decompositions, beginning with males in the professional occupation. These results are quite sensitive to the decomposition method as the estimate of θ is notably larger in absolute value for Eastern men compared with Western men. This is indicative of some combination of a higher negative correlation coefficient between the selectivity and wage equation errors for Eastern men and/or more inherent wage inequality for Eastern men. The average value of the IMR is much larger for Eastern men (1.133 *versus* 0.6854), thus indicating (as suggested by the labor force shares reported in Table 1) that Eastern men on average exhibit a lower probability of employment in the professional occupation. It is not surprising, therefore, that the total contribution of sample selection to the Westerner/Easterner wage differential for men is positive and sizeable at 31.9 log points (165.0%). Selectivity effects contribute heavily to the ethnic wage gap among professionals and obviously are offsetting factors that operate to narrow the gap. If all of the selectivity components are treated as a separate contribution to the wage gap, discrimination is estimated to be –15.2 log points (78.6%). In other words, the labor market exhibits some favoritism toward Eastern males vis-à-vis Western males. At the same time the human capital component is a fairly modest 2.6 log points (13.6%) which means that in the absence of favoritism Western men would enjoy a productivity wage advantage over Eastern men of about 2.6%. When the wage effects of ethnic differences in the selectivity equation parameters are included in the discrimination component, the estimated extent of favoritism toward Eastern males falls to 10.3 log points. If in addition gender differences in the wage effects of the probability of professional employment are included in the discrimination component, our estimate of favoritism reverses sign and indicates a Western male advantage of 8.4 log points. When the effects of ethnic differences in the probit selectivity equation explanatory variables are included in the human capital component, the estimated productivity advantage of Western men increases to 10.9 log points (56.5%). Also including the effects of ethnic differences in the parameters of the probit selectivity equation to the human capital component further increases the estimated Western male productivity advantage vis-à-vis Eastern males to 29.7 log points (153.3%). This means that in the absence of favoritism for Eastern male professionals, Westerners would earn approximately 35% higher wages than the Eastern males as opposed to the roughly 20% more that they actually earned. The standard Oaxaca decomposition yields a middle of the road decomposition with human capital accounting for 9.7 log points (50%) and discrimination (against Easterners) accounting for the remaining 9.7 log points (50%).

As previously noted, the unadjusted wage gap between Western and Eastern women professionals is 16%. This is the smallest unadjusted wage differential of those that we have considered. Our estimates of θ for Western and Eastern women are fairly similar. On the other hand, there is a marked difference in the mean values of $\hat{\lambda}$. The smaller value for Western women is indicative of a tendency for them to have higher probabilities of selection in professional employment, an observation borne out by the raw labor force shares reported in Table 1. Selectivity effects have negligible to modest effects on our estimates of discrimination and productivity differences between Western and Eastern female professionals. The combined effects of ethnic differences in the conditional mean error terms due to selectivity bias is 4.0 log points (26.3%). This is a fairly modest wage advantage for Western women. According to Selectivity #4, discrimination is estimated at 6.6 log points (44.2%). In this case the Western female productivity advantage is estimated at 4.4 log points (29.5%). Counting ethnic differences in the probit selectivity equation parameters as discrimination increases the contribution of discrimination only very slightly to 7.5 log points (50.0%). If in addition one also regards the effects of ethnic differences in θ as a source of wage discrimination (Selectivity #2), our estimate of discrimination actually declines a bit to 3.5 log points (23.5%). This is because Eastern women have a slight advantage in that their $\hat{\theta}$ is smaller in absolute value. Counting the effects of ethnic differences in the selectivity equation explanatory variables as a human capital component raises the contribution of productivity differences to 11.5 log points (76.5%). Further adding the negative effect of ethnic differences in θ to the human capital component (Selectivity #1) lowers the estimate of the Western female productivity advantage to 7.5 log points (49.6%). The Standard Oaxaca decomposition yields estimates of discrimination and human capital effects somewhere in the middle of selectivity corrected estimates.

4 Summary and Conclusions

Our results show that selectivity corrected decompositions are quite capable of yielding very different conclusions than those based on the standard Oaxaca decompositions without selectivity correction. These results mirror common experience with the Heckman procedure – sometimes selectivity matters and sometimes it does not. In such cases it has to be recognized that the prominence of selection effects may reflect nothing more than the identifying restrictions adopted by the researcher. As in the case of all such studies, our findings are conditioned on the particular identifying restrictions we have adopted. Given these restrictions we do find considerable variations in the decompositions. Our results show that Selectivity #2 always comes the closest to yielding the same decomposition as would be obtained from the standard Oaxaca method. This of course does not imply that either of these is the appropriate method to use. Selectivity #2 apportions all of the effects of group differences in conditional mean errors to the human capital and discrimination components. Group differences in the variables that determine the selection probabilities are counted as human capital or endowment effects. Group differences in correlation and wage dispersion parameters as well as group differences in the coefficients in the selection equation are counted as discriminatory.

Assuming that selectivity bias is indeed present, the choice of which selectivity corrected decomposition to use may appear to be largely judgmental because it inevitably reflects value judgments about what constitutes labor market inequity. However, one might look to institutional factors for guidance. An example would be legal or social barriers that hinder participation of women in certain occupational categories. Selectivity #4 is certainly the most non committal relative to the standard approach in the absence of selectivity bias. This is because all of the group differences in selectivity effects are set apart and not interpreted as either discriminatory or justified on human capital grounds.

If one decides that some aspects of group differences in the selectivity terms ought to be apportioned to either discrimination or human capital, it would seem that group differences in the values of the explanatory variables in the selectivity equation, $\widehat{\theta}_j\,(\widehat{\lambda}_j - \widehat{\lambda}_k^0)$, ought to be counted as an endowment effect. Unless one can make a convincing argument that group differences in the correlation between selectivity equation and wage equation error terms or group differences in the standard deviation in the wage equation error term are the results of labor market discrimination, it would seem appropriate to include the term $(\widehat{\theta}_j - \widehat{\theta}_k)\,\widehat{\lambda}_k$ in the endowment effect. These restrictions leave us with the Selectivity #1 decomposition. This decomposition regards group differences in the parameters of the probit selectivity equation, $\widehat{\theta}_j\,(\widehat{\lambda}_k^0 - \widehat{\lambda}_k)$, as sources of discrimination. There is of course always the counter argument that occupational choice is purely supply side driven which would be manifested by different values of the selectivity equation parameters (see POLACHEK [1975]). There is also the issue of the identification of the standard deviation of the selection equation error term (σ_u). Group differences in this parameter are incorporated into the estimated coefficients of the probit selectivity equation because of the normalization of the error variance to 1. If one were to regard $\widehat{\theta}_j\,(\widehat{\lambda}_k^0 - \widehat{\lambda}_k)$ as a purely supply side effect, then yet another decomposition emerges in which this term is added to the human capital component of Selectivity #1 and removed from the discrimination component. This is equivalent to treating all group differences in selectivity effects as human capital components.

One interesting result from our decompositions is that for ethnic differences among males in the professional occupation, 3 of the 5 decompositions presented indicate some sort of bias or favoritism toward Easterners. This is an area that might merit further research.

Our paper is mainly technical, dealing with measurement techniques. However, it might also be policy oriented and lead to suggested policies to fight wage inequality. In order to do so it is important to establish empirically the major source of wage dissimilarity. If simple wage discrimination is the main factor behind wage inequality, then vigorous enforcement of equal pay laws would be the remedy. If wage inequality is largely the result of involuntary occupational segregation, then affirmative action could be an efficient policy (as suggested by BERGMANN [1974, 1986, 1996]). On the other hand, if differences in qualifications are a major factor, policy should be targeted at minimizing them, mainly by providing the subordinate groups with better access to quality education. And if selectivity exists, barriers to the more prestigious high-pay occupations should be loosened. Exactly how these factors manifest themselves in the labor market for Israeli professional workers could be the subject of a separate paper.

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