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Measuring the Extent and Components of the Gender Wage Differential in the Philippines

by

*Michael M. Alba**

*Assistant Professor, School of Economics,
University of the Philippines

Preliminary. Do not quote.

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Abstract

This paper investigates the existence, extent, and sources of the gender wage differential in the Philippines, using data from the Labor Force Survey of the third quarter of 1988. Coefficient estimates of separate wage regressions for male and female workers (using Heckman's two-step procedure to control for possible sample selectivity) are used to calculate the magnitude of the gross gender wage differential and to decompose it into four components, namely: (a) the benefits that male wage earners receive because of nepotism, (b) the losses that female wage earners suffer because of discrimination, (c) differences in the productivity-determining characteristics of male and female wage earners, and (d) sample selectivity. The paper finds that the wage structures of male and female workers are apparently quite different: Women tend to derive higher rates of return from education and lower rates of return from tenure, employment in the private sector, and residence in regions other than the National Capital Region; men tend obtain high rates of return fròm industry affiliation and low rates of return from occupational status. The paper also finds that, if self-selection in the wage earning samples is controlled for, the wage of the average male worker in 1988 turns out to be about 25 percent higher than that of the average female worker. Moreover, the logarithmic decomposition of this wage differential reveals that gender discrimination in the labor market may distort the male-female wage ratio by as much as 52 percent of what it would be in the absence of discrimination—when, ironically, men are measured to be less productive than women by as much as 18 percent and male wage earners are found to be less able at wage earning than men who are engaged in other economic pursuits.

I. Introduction

The existence of a gender wage gap as well as the extent and sources of such a differential, if indeed it is found, are important empirical issues that demand to be explored in a country like the Philippines, which claims to uphold the equal status of men and women. For differences in the earning capacities of men and women imply differences in their relative valuations in the labor market; the size of the gap in their wage rates reflects, in part, the degree of inequality of (economic) status between them; and the relative magnitudes of the constituent factors that make up the total wage differential are indicative of the comparative importance of various policy initiatives that may be formulated to redress the differential status of men and women in the labor market. To amplify on this last point: a policy that mandates equal pay for equal work, for instance, may nonetheless come to naught if it turns out that the larger portion of the gender wage gap is accounted for by systematic differences in human capital investments between men and women or in (unobserved) abilities and motivation that affect selection into and out of the sample of wage earners.

A problem with the customary strategies for investigating gender (or race) wage differentials (see, for example, Oaxaca (1973a and 1973b), Cotton (1988), Neumark (1988), and Oaxaca and Ransom (1994)), however, is that they (implicitly) assume that the sample of wage earners is randomly drawn from the working-age population.* Consequently, neither the sample means of observed wage rates, which are used to calculate the gross differential, nor the wage regressions whose coefficient estimates are used to decompose the gender wage gap into its various sources are adjusted for possible endogenous selection in the sample of wage earners. While this oversight may not be statistically important in cases where most

Assistant Professor, School of Economics, University of the Philippines, Diliman, Quezon City 1101, Philippines. I wish to thank Vanessa Ann Mina for processing the Labor Force Survey data, running the regressions, and preparing the tables reported in this paper, and the Philippine Center for Economic Development for financial support.

* The exception is Reimers (1983).

of the working-age population are wage earners, in instances all too common in developing countries, where considerable numbers of working-age individuals, particularly those from minority groups or the ill-treated gender, are usually not wage earners (possibly because of racial or cultural barriers to the practice of the wage earning occupations), the bias from self-selection may be large enough to mask the extent of the (true) gross wage differential and to distort the relative magnitudes of the sources of the wage differential.

This paper investigates the existence, extent, and sources of the gender wage differential in the Philippines, using data from the Labor Force Survey of the third quarter of 1988. It does so by estimating separate wage regressions for male and female workers, using Heckman's two-step procedure to control for sample selectivity, and then comparing the coefficient estimates of these to identify differences in the wage structures. Given these coefficient estimates, the paper calculates the magnitude of the gross gender wage differential and decomposes it into four (rather than the more customary three) components, namely: (a) the benefits that male wage earners receive because their wage offers tend to be higher than the nondiscriminatory wage structure, (b) the losses that female wage earners suffer because their wage offers tend to be lower than the nondiscriminatory wage structure, (c) the wage gap due to differences in the productivity-determining characteristics of male and female wage earners, and (d) the difference is wages due to sample selectivity, which may arise because, particularly in developing countries where significant portions of the working-age population choose not to be wage earners, different types of (or differently motivated) men and women may be endogenously selecting themselves to practice the wage earning professions. Since a number of nondiscriminatory wage structures are proposed in the literature (e.g., Oaxaca (1973a and 1973b), Reimers (1983), Cotton (1988), Neumark (1988), and Oaxaca and Ransom (1994)), six decompositions, each of which assumes a particular nondiscriminatory wage structure, are undertaken and reported in this paper to provide a range of estimates on the sources of gender wage differentials.

The paper finds that the wage structures of male and female workers are apparently quite different. The regression results indicate that (a) married women (married men) have relatively lower (higher) rates of return for potential labor market experience than single men and women, (b) for men, the rates of increase in wage rates due to an additional year of schooling in the elementary and high school years are more similar (and lower) than the rate of increase in their wages for staying an additional year in college, whereas, for women, the rates of increase in wage rates are more similar (and higher) for high school and college than for grade school, (c) women are generally better than men in turning their advanced educational degrees into a wage advantage, (d) but the public-private sectoral wage gap is larger and the tenure wage gap is smaller for female than for male workers, (e) the wages of men exhibit greater variation due to industry affiliation and occupational status, although the effect of the former set of variables is to increase men's wages while the effect of the latter set of variables is to reduce them (relative to the left-out categories), (f) relative to the wages of workers in the National Capital Region, the remuneration rates of workers residing in other regions of the country are much lower, but the wage gap tends to be more pronounced among female employees than among their male counterparts, and (g) endogenous selection into the sample of wage earners apparently occurs among male workers but not among female workers.

In addition, the paper discovers evidence of a gender wage differential in 1988: In that year, the wage of the average male worker is measured to be about 25 percent higher than that of the average female worker. Moreover, the logarithmic decomposition of this wage differential reveals that gender discrimination in the labor market may distort the male-female wage ratio by as much as 52 percent of what it would be in the absence of discrimination—when, ironically, men are measured to be less productive than women by as much as 18 percent, and male wage earners are found to be less able at wage earning activities than men engaged in other economic pursuits.

The rest of this paper is organized as follows: The next section sets out the empirical framework of this study and discusses how certain empirical issues (e.g., the possible existence of selectivity in the sample of wage earners and the various specifications found in the literature of what is inherently an unobservable nondiscriminatory wage structure) are handled. The data sets and variables employed in the analysis are then described in Section III, and the empirical results are reported and interpreted in Section IV. This is followed by a critique of the data and a discussion of the larger significance of the findings in Section V. Section VI concludes by reviewing the objectives of the paper and summarizing the results.

II. Empirical Framework

Suppose there are two types of wage earners.* Let m stand for males who are assumed to be the favored workers, and let f stand for females who are assumed to be the disadvantaged workers. If the wage of the disadvantaged group is used as the benchmark, then the gross wage differential between the average male and the average female worker may be written as

$$G_{mf} = \frac{w_m - w_f}{w_f} = \frac{w_m}{w_f} - 1, \tag{1}$$

where w_i is the wage rate of the average worker of gender i, $i = m, f$.

Suppose there are no discriminatory practices in the labor market. Then neoclassical theory predicts that the male-female wage differential, if indeed any were to exist, would be due solely to differences in the marginal products of male and female workers. The gender wage differential in such a regime may be written as

$$Q_{mf} = \frac{w_m^0 - w_f^0}{w_f^0} = \frac{w_m^0}{w_f^0} - 1, \tag{2}$$

where w_i^0 is the value of the marginal product of the average worker of gender i, $i = m, f$.**

In his model on labor market discrimination, Becker (1971) formulates a market discrimination coefficient, which he defines as the difference between the ratio of observed wages and the wage ratio that would prevail without discrimination:

$$MDC = \frac{w_m}{w_f} - \frac{w_m^0}{w_f^0}. \tag{3}$$

* The exposition here, with the exception of the discussion on sample selectivity, generally follows the scheme of Oaxaca and Ransom (1994).

** It may be pointed out, though, that discrimination prior to entry in the labor force, e.g., in terms of differences in human capital investment opportunities, may still be the ultimate cause of the productivity differential.

To facilitate the decomposition of the gross wage differential, Oaxaca (1973a and 1973b) recasts this variable by dividing (3) through by (2) to get

$$\begin{aligned} D_{mf} &= \left(\frac{w_m}{w_f} - \frac{w_m^0}{w_f^0}\right) \Big/ \frac{w_m^0}{w_f^0} \\ &= \frac{G_{mf} + 1 - (Q_{mf} + 1)}{Q_{mf} + 1}. \end{aligned} \tag{4}$$

In other words, Oaxaca's version of the market discrimination coefficient D_{mf} is simply the difference between the gross wage ratio, $G_{mf}+1$, and the productivity ratio, $Q_{mf}+1$, expressed in units of the latter. Note that by algebraically manipulating (3), it is possible to express the gross wage ratio in logarithmic form as follows:

$$\begin{aligned} D_{mf} &= \frac{w_m/w_f}{w_m^0/w_f^0} - 1 \\ D_{mf} + 1 &= \frac{G_{mf} + 1}{Q_{mf} + 1} \\ \ln(G_{mf} + 1) &= \ln(D_{wb} + 1) + \ln(Q_{wb} + 1), \end{aligned} \tag{5}$$

which yields a rather convenient break down of the natural logarithm of the ratio of observed wages as the sum of logarithmic functions of the market discrimination coefficient and of the ratio of marginal products.

A problem with (5), however, is that its specification of the residual of the productivity differential, $\ln(D + 1)$, measures only the total wage effect of discrimination in the labor market. What it fails to take into account is how much of the discriminatory wage gap is due to a wage structure that presumably favors men and that is biased against women.

As first pointed out by Cotton (1988) and Neumark (1988), though, it is possible to decompose the discrimination component further as follows:

$$\begin{aligned} \ln(D_{mf} + 1) &= \ln\left(\frac{w_m}{w_f}\right) - \ln\left(\frac{w_m^0}{w_f^0}\right) \\ &= \ln\left(\frac{w_m}{w_m^0}\right) + \ln\left(\frac{w_f^0}{w_f}\right) \\ &= \ln(\delta_{m0} + 1) + \ln(\delta_{0f} + 1), \end{aligned} \tag{6}$$

where $\delta_{m0} = w_m/w_m^0 - 1$ is the wage differential between what males currently receive and what they would get in the absence of discrimination, and $\delta_{0f} = w_f^0/w_f - 1$ is the differential between the wage rates that females would have received in the absence of discrimination and their current wages. Thus, by substituting (6) into (5), one derives a more informative decomposition of the gross gender wage differential. In logarithmic form, this turns out to be

$$\ln(G_{mf} + 1) = \ln(\delta_{m0} + 1) + \ln(\delta_{0f} + 1) + \ln(Q_{mf} + 1). \tag{7}$$

Now consider the operationalization of (7) in the context of the wage generating equations which are usually estimated using cross-section data. For developing countries where significant numbers of the working-age population may not be working for wages (as well as for minorities in developed countries who may not find the formal labor market readily accessible, as Reimers (1983) notes), the specifications of the (separate) regression equations for male and female wage earners may be written as

$$\ln w_{mt} = \beta_m' \mathbf{x}_{mt} + \varepsilon_{mt} \qquad \text{if } I_{mt} = 1 \tag{8a}$$

$$I_{mt} = \begin{cases} 1 & \text{if } \theta_m' \mathbf{z}_{mt} + \nu_{mt} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{8b}$$

and

$$\ln w_{ft} = \beta_f' \mathbf{x}_{ft} + \varepsilon_{ft} \qquad \text{if } I_{ft} = 1 \tag{9a}$$

$$I_{ft} = \begin{cases} 1 & \text{if } \theta_f' \mathbf{z}_{ft} + \nu_{ft} > 0 \\ 0 & \text{otherwise,} \end{cases} \tag{9b}$$

where for gender i, $i = m, f$, $\mathbf{x}_{it}$ is the vector of explanatory variables for tth observation in the sub-sample of wage earners, $\mathbf{z}_{it}$ is the vector of explanatory variables for the tth observation in the sample of working-age individuals, β_i and θ_i are the vectors of coefficient parameters of the wage and selection equations, and ε_{it} and ν_{it} are the disturbance terms of of the wage and selection equations.

Since the dependent variables of the wage equations $\ln w_{it}$, $i = m, f$, have a censored distribution, by implication $\mathrm{E}(\varepsilon_{it}) \neq 0$, which violates an assumption of the classical regression model. Moreover, as Heckman (1976 and 1979) has shown, if ε_{it} and ν_{it} are independently distributed across observations but jointly normally distributed for each t with means zero and variance matrix,

$$\Sigma_i = \begin{bmatrix} \sigma_{\varepsilon_i}^2 & \\ \sigma_{\varepsilon\nu_i} & 1 \end{bmatrix},$$

then the effect of the censoring on estimation by ordinary least squares is similar to that of an omitted relevant regressor, in which the omitted variable is the inverse Mills' ratio, $\phi(-\theta_i'\mathbf{z}_{it})/[1 - \Phi(-\theta_i'\mathbf{z}_{it})]$, where $\phi(\cdot)$ and $\Phi(\cdot)$ are, respectively, the density and distribution functions of the standard normal random variable.

For unbiased and consistent estimation of the semi-logarithmic wage equations, the following regression equations therefore need to be specified and estimated by OLS for the sample of wage earners (according to Heckman's proposed procedure):

$$\ln \mathbf{w}_m = \mathbf{X}_m \beta_m + \sigma_{\varepsilon\nu_m} \widehat{\lambda}_m + \mathbf{u}_m$$

and

$$\ln \mathbf{w}_f = \mathbf{X}_f \beta_f + \sigma_{\varepsilon\nu_f} \widehat{\lambda}_f + \mathbf{u}_f,$$

where, for gender i, $i = m, f$, $\widehat{\lambda}_i$ are vectors of inverse Mills' ratios whose parameters are derived from the estimation of a probit model based on (8b) for males and (9b) for females, and $\mathbf{u}_i$ are vectors of new disturbance terms.

Hence, the operational definition of the gross wage differential in logarithmic form (at least for samples with self-selectivity) is given by

$$\begin{aligned} \overline{\ln(G_{mf} + 1)} &= \ln\left(\frac{\bar{w}_m}{\bar{w}_f}\right) \\ &= \hat{\beta}_m' \bar{\mathbf{x}}_m - \hat{\beta}_f' \bar{\mathbf{x}}_f + \hat{\sigma}_{\varepsilon\nu_m} \bar{\lambda}_m - \hat{\sigma}_{\varepsilon\nu_f} \bar{\lambda}_f, \end{aligned}$$

where the bar over the variables is intended to indicate that they are the values at the sample means, the hat over the parameters signifies that they are estimates, and $\overline{\ln(G_{mf} + 1)}$ denotes that the observed logarithmic wage differential is affected by the selectivity parameters. Applying the further partitioning implied by (7) yields

$$\overline{\ln(G_{mf} + 1)} = (\hat{\beta}_m - \beta^*)' \bar{\mathbf{x}}_m + (\beta^* - \hat{\beta}_f)' \bar{\mathbf{x}}_f + \beta^{*\prime}(\bar{\mathbf{x}}_m - \bar{\mathbf{x}}_f) + \hat{\sigma}_{\varepsilon\nu_m} \bar{\lambda}_m - \hat{\sigma}_{\varepsilon\nu_f} \bar{\lambda}_f, \tag{10}$$

where β^* is the estimated nondiscriminatory wage structure and

$$\ln(G_{mf}+1) = (\hat{\beta}_m - \beta^*)'\bar{\mathbf{x}}_m + (\beta^* - \hat{\beta}_f)'\bar{\mathbf{x}}_f + \beta^{*\prime}(\bar{\mathbf{x}}_m - \bar{\mathbf{x}}_f). \tag{11}$$

In other words, $\ln(G_{mf}+1)$ is the (possibly unobserved) logarithmic wage differential when there is no endogenous selection in the samples of male and female wage earners.

Comparing (7), (10), and (11), one readily sees that when endogenous sample selectivity is controlled for so that it is as if wage earning is being randomly assigned among members of the working-age population, $(\hat{\beta}_m - \beta^*)'\bar{\mathbf{x}}_m$ is an estimate of the wage advantage enjoyed by males $\ln(\delta_{m0}+1)$, because they are favored by the market, $(\beta^* - \hat{\beta}_f)'\bar{\mathbf{x}}_f$ is an estimate of the wage disadvantage suffered by females $\ln(\delta_{0f}+1)$, because the labor market discriminates against them, $\beta^{*\prime}(\bar{\mathbf{x}}_m - \bar{\mathbf{x}}_f)$ is an estimate of the productivity differential $\ln(Q_{mf}+1)$, because of differences in productivity-determining characteristics between male and female wage earners, and $\hat{\sigma}_{\varepsilon\nu_m}\bar{\lambda}_m - \hat{\sigma}_{\varepsilon\nu_f}\bar{\lambda}_f$ is an estimate of the wage gap due to sample selectivity.

Unfortunately, the decomposition given in (10) cannot be performed without any prior assumption on the wage structure that would obtain in the absence of discrimination. Consequently, this paper uses several forms that are found in the literature. These include: Oaxaca (1973a and 1973b) who proposes $\beta^* = \beta_m$ and $\beta^* = \beta_f$, since the nondiscriminatory wage structure is likely to lie in the interval $[\beta_f, \beta_m]$; Reimers (1983) and Cotton (1988) who suggest rather arbitrarily that $\beta^* = 0.5\beta_m + 0.5\beta_f$ and $\beta^* = \gamma\beta_m + (1-\gamma)\beta_f$, respectively, where γ is the proportion of males in the sample of wage earners; and Neumark (1988) and Oaxaca and Ransom (1994) who show that if employer utility functions over profits and the numbers of employees of each sex are homogeneous of degree zero with respect to the latter (implying that employers discriminate only on the basis of proportions rather than absolute numbers of male and female workers), then the nondiscriminatory wage structure is equivalent to the coefficient estimates of a pooled wage regression.

III. Data Set and Variables

The data used in this study are drawn from the Labor Force Survey (LFS) of the third quarter of 1988. A quarterly undertaking of the National Statistics Office (NSO), the LFS is a nationally (and regionally) representative survey that collects information on demographic, socioeconomic, and employment-related characteristics of the population in order to monitor developments in the domestic labor market. Its sample consists of some twenty thousand households from 73 provinces and 14 chartered cities of the Philippines.

Administered during the first week of October, the third quarter LFS, at least for 1988, has two distinctive features: First, for some variables pertaining to the labor force, the entire third quarter (instead of the week prior to the survey) is used as the reference period. Second, information on labor supply and earnings is available. Thus, with 1988 data, it is possible to construct wage data for the third quarter, as is done in this paper.

To generate the cross-section sample of men and women of working ages, this paper adopts the following criteria: Included are members of the sample households who were between 15 and 64 years of age at the time of the survey* and who were reported not to be boarders or domestic helpers, since data on these persons tend to be less reliable,** or

* This is the age span of the population of working-ages in the Philippines, which constitutes the universe from which the labor force is drawn.

** In the LFS, the usual respondent is the spouse of the household head. While he or she may be able to give more or less accurate information on the demographic and socioeconomic characteristics of family members, it is less reasonable to expect him or her to provide reliable information on household members who are not part of the family.

members of the armed forces, who, by definition, are not considered part of the civilian labor force. Eligible individuals are excluded, however, if they had missing values in any of the variables used in the probit model of wage earning. Given these selection rules, the sample of males comes to 22,257 observations, while that of females includes 11,116 observations.

For a member of the cross-section sample to be included as well in the sub-sample of wage earners, he or she additionally has to have been reported as being employed for wages in all jobs held during the reference quarter (rather than as self-employed individuals, paid or unpaid workers in family enterprises, unemployed, or as drop outs from the labor force) and to have no missing values in all variables used in the semi-logarithmic wage equation. As a result of these extra data demands, the sub-samples of male and of female wage earners are considerably smaller than the male and female samples of working-ages from which they were drawn. The size of the sub-sample of male wage earners has 11,880 observations and that of female wage earners has 5,443 observations.

Tables 1a and 1b present, for the male and female samples, respectively, all the variables used in the probit and wage regressions along with the means and standard deviations of these variables—for the cross-section sample as a whole and for the corresponding sub-sample of wage earners. As indicated in the table, the wage variable used in this study is the *hourly wage rate*, defined operationally as a worker's total earnings in both cash and kind for the third quarter of 1988 (expressed in nominal Philippine pesos) divided by his or her labor hours for the same period. The independent variables include age and marital status (which may be regarded as proxies for work experience,* years of schooling in each of the three levels of education, a set of dummy variables on the highest undergraduate or graduate degree attained classified by major field of study, a dummy variable indicating the sector of employment and another denoting job tenure (to capture the wage effects of job security or lack thereof), two sets of mutually exclusive dummy variables reflecting the industry affiliation and the usual occupation of the wage earner, sets of dummy variables indicating the region and urbanity of the wage earner's place of residence, and four variables disaggregating household size by the age group of members (to reflect household composition), which are used as identifying instruments in the probit model.

* The anecdotal evidence seems to be that being married confers a *stabilizing* influence among males in that, once married, men are less likely to leave the labor market, but that it has a *destabilizing* effect among females in that married women are more likely to drop out of the labor force altogether or to participate only intermittently, particularly during the childbearing years.

IV. Results

This section presents and interprets the results of the wage regressions and of calculations based on the coefficient estimates of these regressions which are used to measure the magnitudes of the overall gender wage differential as well as of its various sources. It has three sub-sections: The first compares the coefficient estimates of the wage equations of men and women to identify differences in their wage structures; the second evaluates the evidence on the existence and extent of a gender wage differential in the Philippines; and the third relates the results of the various decompositions of the overall wage differential.

A. Are there differences in the wage structures of men and women?

Table 2 presents the parameter estimates of the semi-logarithmic wage equations which were regressed separately for male and female wage earners, using Heckman's two-step procedure to control for possible endogenous sample selection. It indicates that the wage trajectories of single and married workers of both sexes have the expected concave shape and imply rates of return with respect to age (or potential work experience) of about 1.3 and 1.4 percent per year for single men and women, respectively, and 1.4 and 1.0 percent per year for married men and women, respectively, when the evaluations are taken at age 35. Since these rates of return are non-linear, however, they vary (with age) over the entire working life. To impart a sense of how the age-wage profiles of the four configurations of marital status and gender compare with each other, Figure 1 provides a graphical depiction. As shown in the figure, the paths of the wage curves over the working lives of single men and women are almost identical, with the women's just being slightly below the men's until they reach age 53, when the average wage rate of single women finally overtakes that of single men. In contrast, the wage trajectories of married men and women start out (i.e., at age 15) with almost identical intercepts (which are higher than those of the single workers), but, unfortunately for married women, their average wage quickly declines with age and, by age 51, even falls below the wages of single men and women. Hence, the results of the wage regressions may be taken as evidence of the relatively lower rates of return for potential labor market experience of married women.*

In the case of the continuous education variables, their coefficient estimates imply that, holding the worker's age constant, the rate of increase in the wages of men due to an additional year of schooling is about 3.6 percent for both the elementary and secondary levels and 7.0 percent for the tertiary level, while for women the corresponding rates of increase are 2.3 percent for the grade school years, 7.1 percent for the high school years, and 6.7 percent for the undergraduate years.** Thus, the way in which years of schooling in each educational level affects the rate of increase in the wages of men seems to be quite different from their effect on the wages of women: For men, the elementary and secondary years are apparently more similar in their of rates of return, while, for women, the secondary and undergraduate years are apparently the ones that are more alike.

As for the dummy variables classifying undergraduate and graduate degreees by major field of study, the results of the wage regressions suggest that, in general, women are much

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* Alonzo et al. (1996) point out that, unlike the evidence in other countries, this low rate of return is apparently not due to the shorter duration of participation in the labor market of married women, since, as a group, married women in the Philippines do not supply less labor hours relative to other demographic segments.

** Note that since the specification of the wage equations in this study is not identical to Mincer's in that age rather potential labor force experience, defined as *age* − *schooling* − 6, is used, these rates of increases are not to be confused with the Mincerian *rates of return to education*. To obtain estimates of this latter variable, one needs to substitute *schooling* + *experience* + 6 for *age* on the right hand side of the wage equation used and apply the chain rule, $(\partial \ln w / \partial\, age)(\partial age / \partial\, schooling)$. For the specification of the wage equation used in this paper, this turns out to be $\beta_{age} + 2\beta_{age^2} age + \beta_{schooling}$.

better than men in turning advanced educational degrees into a wage advantage. Not only are there more coefficient estimates of the education dummies which are found to be statistically significant in the wage equation of women, the coefficient estimates of these variables also turn out to be generally higher than their corresponding estimates in the wage equation of men. In particular, female wage earners with bachelor's degrees in education, engineering, the humanities, and the medical sciences or with graduate degrees in agriculture, education, and medicine are indicated to have higher wage rates than their male peers, while male wage earners with bachelor's degrees in the natural sciences and in the social sciences or with graduate degrees in other medical sciences and in the social sciences are the only ones with better wages than their female peers.

Turning to the characteristics of employment, notice that the coefficient estimate of employment in the private sector is negative and statistically significant in the two wage equations. Specifically, the regression results indicate that male (female) wage earners who are employed by private firms earn wages that are 10.6 percent (19.7 percent) below those of government employees with identical characteristics.* In contrast (to private sector employment), tenure is shown to have a positive and statistically significant effect on the wage rates of men and women. Specifically, permanent employment results in 14.0 percent (7.0 percent) higher wages for men (women). What these results seem to say is that, in general, private sector and temporary workers earn lower wages than their government and tenured counterparts, but the (public-private) sectoral wage gap is larger and the tenure wage gap is smaller among female workers than that among their male peers. Or to put it more provocatively, female wage earners are apparently doubly cursed: They are not only paid lower wages in the private sector than their sisters in government, tenure does not confer on them as much of a wage advantage than it does their male siblings.

With respect to the industry affiliation of the wage earners, the regression results suggest that it matters for men but not as much for women. Of the eight categories of the first digit Philippine Standard Industrial Classification (PSIC) specified, six are found to have statistically significant coefficient estimates in the wage regression for men, while in the case of the wage regression for women, only one turns out to have a statistically different effect relative to that exerted by Agriculture, Forestry, and Fishery, the left out industry. More specifically, men who work in Mining and Quarrying, Manufacturing, Electricity, Gas, and Water, Construction, and Financing, Insurance, Real Estate, and Business Services are found to have higher wages than those involved Agriculture, and only those engaged in Wholesale and Retail Trade have lower wages. In contrast, only women in Financing, Insurance, Real Estate, and Business Services are found to do better than those in Agriculture. In the case of the usual occupation of the wage earners, the results indicate that, again, it matters more for men than for women. Relative to Agricultural, Animal Husbandry, and Forestry Workers, and Fishermen and Hunters, the omitted occupation, five of the six occupational categories turn out to have statistically significant coefficient estimates in the case of male wage earners, while only three are similarly found in the case of female wage earners. However, unlike the results of the industry affiliation dummies, which generally meant higher wages for men, three of the five statistically significant occupation coefficients for men are negative, implying that these occupations tend to have lower wages than Agricultural Workers. (The exceptions are Administrative, Executive, and Managerial Workers and Sales Workers.) In contrast, only one of the three statistically significant occupation coefficients for women is negative. Thus, while the two sets of mutually exclusive dummy variables are both found to cause greater variation in the wages of men than women, their effects go in opposite directions: Affiliation

* This is an unexpected outcome, although, in retrospect, at least two reasons may account for it. First, private sector employees may enjoy more non-wage benefits such as health insurance coverage. Second, the use of flexible labor arrangements as a way of cutting the wage bill is more rampant in the private sector.

in industries other than agriculture tends to increase male wage rates; being engaged in occupations other than farming tends to depress them.

Relative to the National Capital Region, the left out geographic area which is a hundred percent urbanized, residence in rural areas (of other regions) tends to depress male and female wage rates, with the effect being more pronounced for females rather than males. Moreover, only in the urban areas of Central Luzon (Region 3) do men receive wages that are higher than and statistically significant from those obtained by male workers in the National Capital Region.*

Finally, the coefficient estimate of the inverse Mills' ratio turns out to negative in both wage equations, although only that of male wage earners is found to be statistically different from zero. What these results imply is that there is endogenous sample selection into the wage earning activities among men but not among women. In other words, men who are found (by the probit equation) to be more likely to become wage earners are also those who tend to exhibit lower rates of increases in wages. Or, to put it another way, male wage earners apparently do not have a comparative advantage in the practice of wage earning occupations than men who are engaged in other pursuits.

B. Is there a gender wage gap?

As may be gleaned from Tables 1a and 1b, the values of the sample means of the hourly wage rates of men and women are quite close: P8.30 for males and P8.21 for females. Indeed, the null hypothesis that the two sample means are equal cannot be rejected at level of significance 0.01: $\hat{t}_{T_m+T_f-2} = 0.457 < |t_{17323,\alpha/2=0.005}| = 2.5761$.** But as was noted in Section II, these (observed) sample means may be contaminated by self-selectivity in the sub-sample of wage earners, since they are presumably generated as $E(w_i \mid I_i = 1)$, for $i = m, f$, rather than with the more customary specification that $E(w_i)$. Indeed, as the regression results discussed in the previous sub-section confirm, there is sample selectivity in the sub-sample of male (but not female) wage earners. Specifically, it is found that $E(w_m \mid I_m = 1) < E(w_m)$, implying that the sub-sample of men who choose to undertake wage earning activities is less able as a group (in the sense of showing less rapid increases in wage rates) than if the sub-sample of wage earners were randomly drawn from the male population of working ages.

Thus, to explore the existence of a gender wage differential, this paper uses the predicted natural logarithms of male and female wage rates at the sample means of the wage regressors (but without the selectivity parameters). By definition, the exponential functions of these forecasts are what average male and female wage rates would be in the absence of self-selectivity in the sub-sample of wage earners. From the predictions, the estimate of the logarithmic gross wage differential, $\overline{\ln(G_{mf}+1)} - (\hat{\sigma}_{\varepsilon\nu_m}\bar{\lambda}_m - \hat{\sigma}_{\varepsilon\nu_f}\bar{\lambda}_f)$, turns out to be about 22 percent and the corresponding wage differential, $\hat{G}$, is calculated to be about 25 percent.

* Although the coefficient estimates of the interaction terms between urbanity and region are also statistically significant in Regions 4, 6, and 7 for male wage earners and Regions 3, 4, 6, 7, and 11 for female wage earners, their magnitudes are smaller than those of the coefficient estimates of the region dummies. As such, the net effect on wage rates of being in urban areas of these regions is still negative or lower than what would be obtained in the National Capital Region.

** The t-test statistic for this hypothesis relies on the assumption that the variances of the hourly wage rates of men and women are equal. But an F-test on the null hypothesis that $\sigma^2_{w_m} = \sigma^2_{w_f}$ cannot be rejected at two-tail test of significance with $\alpha = 0.01$, since $F_{T_m-1,T_f-1,0.005} < \hat{F} < F_{T_m-1,T_f-1,0.0.995}$, where $\hat{F} = 1.024$, $F_{11879,5442,0.005} = 0.9424$, and $F_{11879,5442,0.995} = 1.0612$. It may be noted that a two-tail test is employed here because, as pointed out in Amemiya (1994, 306), in this case "either a large or a small value of the [F-]statistic ... is a reason for rejecting the null hypothesis."

Moreover, the null hypothesis that the two estimates are equal can be rejected at level of significance 0.01,† implying that a gender wage gap does exist.

C. What accounts for the gender wage differential?

Table 3a presents the results of various decompositions of the gender wage differential for 1988. Its first column contains the schedule of nondiscriminatory wage structures that have been proposed in the literature, its second and fifth columns show the logarithmic functions of the overall discrimination differential $\ln(D_{mf}+1)$ and of the productivity differential $\ln(Q_{mf}+1)$, and its third and fourth columns report the further decomposition of the discrimination component into $\ln(\delta_{m0}+1)$, which is a measure of discrimination due to the overpayment of male workers, and $\ln(\delta_{0f}+1)$, the measure of discrimination resulting from the underpayment of female workers.

Comparing the first two rows of Table 3a, notice that when the nondiscriminatory wage structure is assumed to be that of male wage earners, the estimated logarithmic discrimination coefficient is smaller and the logarithmic productivity differential is larger (in the sense of being less negative) than when the standard is posited to be the wage structure of women. What this means is that although, in general, female wage earners have better characteristics than male wage earners (which explains the negative values of the logarithmic productivity differential in both rows) and indeed are much better in those characteristics which are paid highly by the female wage structure (which explains the more negative value of the logarithmic productivity differential under the female wage structure), men are better in those characteristics in which the difference in the estimated wage coefficients is quite large (which explains the higher value of the logarithmic discrimination coefficient in the second row than in the first). Looking at the next three rows, note that their decompositions yield values that are between the extremes posed by the first two cases. This is because the nondiscriminatory wage structures assumed in this second set of rows are merely linear combinations of the wage structures of men and women. In contrast, the weighting structure which uses the coefficient estimates of the pooled regression run is not similarly restricted. Consequently, it yields an estimate of the logarithmic discrimination differential that is lower and a value of the logarithmic productivity differential that is higher than those obtained when the male wage structure is assumed to be the norm.

The estimated magnitudes of the discrimination, productivity, and selectivity differentials under the six possible nondiscriminatory wage structures are not easily obtained from Table 3a. Thus, they are separately reported in Table 3b, where it is shown that estimates of Oaxaca's market discrimination coefficient $\hat{D}_{mf}$ range from 32 percent (the pooled wage structure) to 52 percent (the female wage structure) and that the wage advantage enjoyed by men may be as much as 52 percent, while the wage disadvantage suffered by women may be as high as 38 percent. As for the other components of the gender wage differentials, the table indicates that estimates of the productivity differential range from −18 percent to −8 percent, while that due to selectivity accounts for −19 percent.

The implications of these numbers are the following: First, the measured difference between the logarithms of the (selectivity-corrected) gross wage ratio $G_{mf}+1$ and of the productivity ratio $Q_{mf}+1$ is quite large, with its distortive effects on the male-female wage ratio accounting for as much as 32 percent to 52 percent of what the ratio would be in the absence of discrimination. Second, the magnitudes of the overvaluation of the men's earning capacities and of the undervaluation of women's receipts depends on the nondiscriminatory

† $\hat{t}_{T_m+T_f-K_m-K_f} > |t_{17194,\alpha/2=0.005}| = 2.5761$. (The derivation of this test statistic is provided in the Appendix.)

wage structure that is used. When the women's wage structure is assumed to be the nondiscriminatory regime, the wage rate of the average male worker is calculated to be 52 percent higher than what is due him; when the men's wage structure is so assumed, the wage rate of the average female worker is estimated to be 38 percent lower than what she ought to receive; and when the pooled wage structure is postulated as the nondiscriminatory standard, the wage rate of the average male worker is calculated to be overvalued by 8 percent, while that of the average female worker is estimated to be undervalued by 24 percent. Third, if the same wage structure were applied to male and female workers (so that the payment scheme is gender insensitive), men are predicted to receive wages that are between 8 percent and 18 percent lower than those of women. Fourth, the negative effect of endogenous selectivity in the wage earning sample of men (because the less able men tend to be wage earners) masks or deflates the gender wage differential by about 19 percent, which makes the observed differential statistically no different from zero.

V. Critique and Discussion

In the previous section, evidence on the existence of the gender wage differential in the Philippines in 1988 was uncovered, even though the gap in the observed wage rates of men and women was found to be attenuated by endogenous selectivity in the sample of male wage earners and by the higher productivity of female wage earners. Before too much is made of these findings, however, a caveat must be mentioned regarding the quality and reliability of the data on wages from the Labor Force Surveys. After all, the regression results, the calculations that are made based on the parameter estimates, and the inferences that are drawn therefrom are only as good as the data that brought them forth.

As may have been noticed from Tables 1a and 1b, the sample means of the hourly wage rates for male and female workers seem inordinately low; indeed, they are much lower than the legally mandated regional minimum wage rates. There are at least five possible explanations for this: First, it may be that minimum wage laws are widely disregarded. Anecdotes certainly abound about how firms keep different books of account (e.g., for tax and administrative audits, for obtaining bank loans, and for negotiations with labor unions) and how, for purposes of nominal compliance with labor laws, employees are forced to sign pay slips whose amounts are well in excess of what they receive.

Second, notwithstanding the confidentiality clause of the surveys of the National Statistics Office, respondents, particularly those from better-off households, may be unwilling to provide accurate information on earnings for fear that the data, whether grouped or ungrouped, may be used by government agencies as benchmarks for assessing income and tax returns.

Third, respondents of the Labor Force Surveys may be ill-informed about the earnings and labor supply of particular household members. Being a household-based survey, the LFS generally relies on the spouse of the household head as its key informant. In the case of most demographic, locational, and socioeconomic variables, this is just as well, since all household members tend to be relatively well-informed on these matters. On the relatively variable variables such as earnings and hours of work, however, this presumption may be less reasonable. Indeed, the spouse, who also tends to be the care giver of the household, may even be systematically misinformed about the incomes of household members, since, as has been documented elsewhere, men tend not to turn over their entire earnings to the care giver, but withhold some for vices such as cigarette and alcohol consumption and gambling. If this is in fact the case in the Philippines, then the reported wage rates of men may be biased downwards and may account for the absence of a gap in observed wage rates as well as for the negatively impact of selectivity in the wage earning sample of male workers.

Fourth, the operative definition for earnings in the Labor Force Surveys may be too restrictive. This may account for the lower wage rates found in the regressions for private sector and tenured employees, who, compared to government and temporary workers, may have more health benefits as well as vacation and sick leaves, access to an intra-firm pension fund for employees, and higher incentive bonuses—all of which are not specifically asked for by the LFS questionnaire.

Fifth, wealthy households may be under-represented in the household surveys, given that interviewers are generally unable to penetrate exclusive subdivisions and to the extent that wealthy communities are difficult to replace in the sample.

Be that as it may, certain findings in this study deserve to be further explored. In particular, more focused investigations need to be undertaken to verify and find detailed explanations for the regression results that married men and women have very different wage trajectories than their unmarried counterparts, that men's wages exhibit greater variation in connection with industry affiliation and occupational status, while women's wages vary more because of tenure, employment in private firms, and residence in regions other than the National Capital Region, and that men, though not women, are negatively affected by endogenous sample selection in wage earning activities. In the case of the lack of variation in women's wages due to industry affiliation, for instance, it needs to be investigated whether this is due to discrimination (in the sense that women are barred from the high wage or high growth industries or from occupying the high wage positions in these industries) or female preferences (in the sense that women tend to work in the low wage sectors because they allow more flexible working arrangements). In the case of the greater regional variation in women's wages, what ought to be pursued further is whether there is greater discrimination against women in the regions or whether the more able women tend to migrate to Metro Manila.

As the results stand, however, it may be concluded that there is discrimination against women in the labor market, as shown by the various measures of decompositions of the gender wage differential. Moreover, depending on the nondiscriminatory wage structure that is assumed, the extent of this discrimination ranges from 38 percent to 52 percent of what the male-female wage ratio should be in the absence of discrimination. But what is worse for, perhaps even insulting to, women is that the discrimination in wages is more or less offset by the better productivity-determining characteristics of female wage earners and by their having to compete with less able or less motivated men in the labor market.

What policy prescriptions, then, can be drawn from the findings? What is clear is that the gender gap in wages cannot be redressed by equalizing opportunities in human investments since, if anything, women have better productivity-determining characteristics than men. But pre-labor market discrimination notwithstanding, the answer to the question depends on the true structure of nondiscriminatory wages. If discrimination from co-workers and from consumers are assumed away, the most reasonable wage structure (of the five or so that are on offer in the literature) seems to be the one that obtains under the pooled wage regression. If so, then the finding of the paper that applies is that the nature of discrimination in wages is not so much due to the nepotism that favors men but to the prejudice against women, and the policy implication then is not so much to deflate the wage rates of men as to bring the wage rates of women closer to the weighting scheme implied by the coefficient estimates of the pooled regression. In terms of legislative reform, legal applicability, and relative to the feminist agenda, however, nothing less than the wage structure of men may be acceptable as the nondiscriminatory wage structure.

VI. Summary and Conclusion

This paper investigated the existence, extent, and sources of the gender wage differential in the Philippines, using data from the Labor Force Survey of the third quarter of 1988. Separate wage regressions for male and female workers were estimated (using Heckman's two-step procedure to control for sample selectivity) and their results were used to (a) identify differences in the wage structures, (b) calculate the magnitude of the gross gender wage differential and (c) decompose the wage gap into four components.

The paper finds the wage structures of male and female workers to be quite different: Women are inferred to derive higher rates of increases in wages from education and lower rates of return from tenure, employment in the private sector, and residence in regions other than the National Capital region; men are seen as obtaining high rates of return from industry affiliation and low rates of return from occupational status. In addition, the paper finds that, if self-selection in the wage earning samples is controlled for, the wage of the average male worker in 1988 turns out to be about 25 percent higher than that of the average female worker. Moreover, the logarithmic decomposition of this wage differential reveals that gender discrimination in the labor market may distort the male-female wage ratio by as much as 52 percent of what it would be in the absence of discrimination—when, ironically, men are measured to be less productive than women by as much as 18 percent and male wage earners are found to be less able at wage earning than men who are engaged in other economic pursuits.

Table 1a
Descriptive Statistics of Variables, Male Sample, 1988

Variables	Whole Sample		Wage Earners	
	Mean	Standard Deviation	Mean	Standard Deviation
Hourly wage rate			8.29988	12.68253
Wage earner	0.53376	0.49887		
Age	35.27124	12.50877	33.85976	11.55759
Married	0.68841	0.46315	0.66995	0.47025
Years of elementary education completed	5.31285	1.44213	5.52205	1.19397
Years of high school education completed	1.83331	1.88036	2.16170	1.88258
Years of college education completed	0.59087	1.32570	0.78998	1.49869
Bachelor's degree in agriculture	0.00611	0.07793	0.00875	0.09316
Bachelor's degree in education	0.01240	0.11067	0.02079	0.14269
Bachelor's degree in engineering	0.02067	0.14227	0.02862	0.16674
Bachelor's degree in fine arts	0.00139	0.03730	0.00177	0.04201
Bachelor's degree in the humanities	0.00427	0.06519	0.00589	0.07654
Bachelor's degree in law	0.00427	0.06519	0.00589	0.07654
Bachelor's degree in the medical sciences	0.00207	0.04542	0.00236	0.04849
Bachelor's degree in the natural sciences	0.00094	0.03070	0.00152	0.03890
Bachelor's degree in the social sciences	0.03311	0.17894	0.04436	0.20590
Graduate degree in agriculture	0.00036	0.01896	0.00042	0.02051
Graduate degree in education	0.00090	0.02996	0.00160	0.03996
Graduate degree in engineering	0.00018	0.01341	0.00025	0.01589
Graduate degree in the humanities	0.00018	0.01341	0.00034	0.01835
Graduate degree in law	0.00243	0.04920	0.00303	0.05497
Graduate degree in medicine	0.00180	0.04236	0.00219	0.04673
Graduate degree in other medical sciences	0.00004	0.00670	0.00008	0.00917
Graduate degree in the social sciences	0.00049	0.02223	0.00059	0.02427
Employed in the private sector			0.85884	0.34820
Permanent employee			0.65135	0.47656
Industry affiliation of wage earner				
1 Agriculture, Fishery, and Forestry			0.27483	0.44645
2 Mining and Quarrying			0.01557	0.12382
3 Manufacturing			0.15093	0.35799
4 Electricity, Gas, and Water			0.01355	0.11563
5 Construction			0.12727	0.33329
6 Wholesale and Retail Trade			0.04899	0.21586
7 Transportation, Storage, and Communication			0.11911	0.32393
8 Financing, Insurance, Real Estate, and Business Services			0.03695	0.18865
9 Community, Social, and Personal Services			0.21246	0.40906
Usual occupation of wage earner				
1 Professional, Technical and Related Workers	0.03981	0.19551	0.06625	0.24872
2 Administrative, Executive and Managerial Workers	0.01393	0.11720	0.01465	0.12014
3 Clerical and Related Workers	0.03612	0.18660	0.06490	0.24636
4 Sales Workers	0.07755	0.26747	0.03771	0.19050
5 Service Workers	0.05428	0.22656	0.08620	0.28066
6 Agricultural, Animal Husbandry and Forestry Workers, Fishermen and Hunters	0.46767	0.49897	0.27635	0.44721
7 Production and Related Workers Transport, Equipment Operators and Laborers	0.31064	0.46277	0.45396	0.49790

Table 1a

Descriptive Statistics of Variables, Male Sample, 1988

Variables	Whole Sample		Wage Earners	
	Mean	Standard Deviation	Mean	Standard Deviation
Region of residence				
National Capital Region (NCR)	0.13394	0.34059	0.18965	0.39204
Region 1 (Ilocos)	0.06775	0.25133	0.05303	0.22410
Region 2 (Cagayan Valley)	0.04902	0.21591	0.03914	0.19394
Region 3 (Central Luzon)	0.10482	0.30633	0.11153	0.31480
Region 4 (Southern Tagalog)	0.14041	0.34741	0.15547	0.36237
Region 5 (Bicol)	0.06367	0.24416	0.05783	0.23343
Region 6 (Western Visayas)	0.08519	0.27917	0.09487	0.29304
Region 7 (Central Visayas)	0.07324	0.26053	0.06726	0.25048
Region 8 (Eastern Visayas)	0.05185	0.22173	0.03805	0.19132
Region 9 (Western Mindanao)	0.04713	0.21192	0.03274	0.17797
Region 10 (Northern Mindanao)	0.06164	0.24051	0.06061	0.23862
Region 11 (Southern Mindanao)	0.07364	0.26119	0.06852	0.25264
Region 12 (Central Mindanao)	0.04772	0.21317	0.03131	0.17417
Region 1 x Urban	0.02256	0.14848	0.02306	0.15011
Region 2 x Urban	0.01213	0.10947	0.01128	0.10561
Region 3 x Urban	0.04848	0.21478	0.05817	0.23407
Region 4 x Urban	0.06919	0.25379	0.08914	0.28496
Region 5 x Urban	0.01748	0.13105	0.01970	0.13896
Region 6 x Urban	0.02965	0.16963	0.03460	0.18276
Region 7 x Urban	0.02826	0.16572	0.03106	0.17349
Region 8 x Urban	0.01519	0.12230	0.01616	0.12610
Region 9 x Urban	0.01119	0.10518	0.01153	0.10677
Region 10 x Urban	0.01981	0.13936	0.02214	0.14714
Region 11 x Urban	0.03010	0.17087	0.03535	0.18468
Region 12 x Urban	0.01200	0.10887	0.00985	0.09875
Number of household members 6 years old or younger	1.00593	1.14435	1.03729	1.13987
Number of household members between 7 and 14 years old	1.25857	1.31095	1.20657	1.28343
Number of household members between 15 and 64 years old	3.77868	1.90413	3.77433	1.92301
Number of household members 65 years old or older	0.13605	0.41212	0.14066	0.41663
Number of Observations	22257		11880	

Table 1b
Descriptive Statistics of Variables, Female Sample, 1988

Variables	Whole Sample		Wage Earners	
	Mean	Standard Deviation	Mean	Standard Deviation
Hourly wage rate			8.20577	12.39094
Wage earner	0.48965	0.49992		
Age	36.50567	12.38467	33.35017	11.47569
Married	0.60759	0.48831	0.50542	0.50002
Years of elementary education completed	5.38035	1.41389	5.65387	1.06530
Years of high school education completed	2.09185	1.91133	2.74940	1.78555
Years of college education completed	1.10570	1.70213	1.78578	1.89441
Bachelor's degree in agriculture	0.00630	0.07911	0.00937	0.09635
Bachelor's degree in education	0.08708	0.28197	0.16131	0.36785
Bachelor's degree in engineering	0.00702	0.08348	0.01084	0.10356
Bachelor's degree in fine arts	0.00135	0.03671	0.00165	0.04063
Bachelor's degree in the humanities	0.00963	0.09764	0.01525	0.12255
Bachelor's degree in law	0.00063	0.02509	0.00129	0.03584
Bachelor's degree in the medical sciences	0.01412	0.11801	0.02113	0.14382
Bachelor's degree in the natural sciences	0.00288	0.05358	0.00533	0.07281
Bachelor's degree in the social sciences	0.08672	0.28144	0.14128	0.34834
Graduate degree in agriculture	0.00036	0.01897	0.00073	0.02710
Graduate degree in education	0.00261	0.05101	0.00533	0.07281
Graduate degree in engineering	0.00018	0.01341		
Graduate degree in the humanities	0.00054	0.02323	0.00037	0.01917
Graduate degree in law	0.00225	0.04737	0.00092	0.03030
Graduate degree in medicine	0.00027	0.01643	0.00312	0.05580
Graduate degree in other medical sciences	0.00054	0.02323	0.00037	0.01917
Graduate degree in the social sciences			0.00110	0.03319
Employed in the private sector			0.72717	0.44545
Permanent employee			0.74775	0.43434
Industry affiliation of wage earner				
1 Agriculture, Fishery, and Forestry			0.13008	0.33642
2 Mining and Quarrying			0.00129	0.03584
3 Manufacturing			0.20154	0.40119
4 Electricity, Gas, and Water			0.00514	0.07155
5 Construction			0.00459	0.06762
6 Wholesale and Retail Trade			0.10546	0.30717
7 Transportation, Storage, and Communication			0.01635	0.12683
8 Financing, Insurance, Real Estate, and Business Services			0.04795	0.21368
9 Community, Social, and Personal Services			0.48760	0.49989
Usual occupation of wage earner				
1 Professional, Technical and Related Workers	0.12972	0.33601	0.24949	0.43276
2 Administrative, Executive and Managerial Workers	0.00882	0.09348	0.01047	0.10181
3 Clerical and Related Workers	0.08951	0.28549	0.17619	0.38102
4 Sales Workers	0.27879	0.44842	0.09498	0.29322
5 Service Workers	0.11155	0.31483	0.15965	0.36632
6 Agricultural, Animal Husbandry and Forestry Workers, Fishermen and Hunters	0.23633	0.42484	0.12511	0.33088
7 Production and Related Workers Transport, Equipment Operators and Laborers	0.14529	0.35240	0.18409	0.38759

Table 1b

Descriptive Statistics of Variables, Female Sample, 1988

Variables	Whole Sample		Wage Earners	
	Mean	Standard Deviation	Mean	Standard Deviation
Region of residence				
National Capital Region (NCR)	0.16094	0.36749	0.22561	0.41802
Region 1 (Ilocos)	0.06081	0.23900	0.05310	0.22424
Region 2 (Cagayan Valley)	0.04597	0.20943	0.04079	0.19781
Region 3 (Central Luzon)	0.10777	0.31011	0.12714	0.33316
Region 4 (Southern Tagalog)	0.15113	0.35820	0.16700	0.37301
Region 5 (Bicol)	0.05794	0.23363	0.04556	0.20855
Region 6 (Western Visayas)	0.08186	0.27417	0.08727	0.28225
Region 7 (Central Visayas)	0.08789	0.28315	0.06724	0.25046
Region 8 (Eastern Visayas)	0.05614	0.23019	0.03674	0.18815
Region 9 (Western Mindanao)	0.03437	0.18217	0.02407	0.15327
Region 10 (Northern Mindanao)	0.05587	0.22967	0.04575	0.20895
Region 11 (Southern Mindanao)	0.06189	0.24097	0.05218	0.22240
Region 12 (Central Mindanao)	0.03742	0.18981	0.02756	0.16372
Region 1 x Urban	0.02195	0.14653	0.02168	0.14565
Region 2 x Urban	0.01385	0.11689	0.01470	0.12035
Region 3 x Urban	0.05874	0.23516	0.06614	0.24855
Region 4 x Urban	0.08114	0.27307	0.09995	0.29995
Region 5 x Urban	0.01835	0.13423	0.01892	0.13627
Region 6 x Urban	0.03652	0.18760	0.04079	0.19781
Region 7 x Urban	0.03769	0.19046	0.03730	0.18950
Region 8 x Urban	0.01727	0.13029	0.01433	0.11886
Region 9 x Urban	0.01098	0.10419	0.01066	0.10269
Region 10 x Urban	0.02177	0.14594	0.02186	0.14625
Region 11 x Urban	0.03095	0.17318	0.03050	0.17197
Region 12 x Urban	0.01206	0.10914	0.01121	0.10528
Number of household members 6 years old or younger	0.80578	1.05800	0.76300	1.03204
Number of household members between 7 and 14 years old	1.20781	1.28998	1.08819	1.23287
Number of household members between 15 and 64 years old	3.77591	1.92605	3.92467	1.98168
Number of household members 65 years old or older	0.18928	0.47348	0.20779	0.49806
Number of Observations	11116		5443	

Table 2
Wage Regressions

Variable	Male Coefficient Estimate	Male t-statistic		Female Coefficient Estimate	Female t-statistic	
Constant	1.16926	9.489	**	0.97830	7.842	**
Single x Age	0.02950	7.139	**	0.02689	4.840	**
Single x Age Squared	-0.00024	-3.501	**	-0.00019	-2.388	*
Married x Age	0.03742	11.805	**	0.03750	7.640	**
Married x Age Squared	-0.00033	-7.734	**	-0.00040	-6.572	**
Years of elementary education completed	0.03677	7.555	**	0.02297	2.320	*
Years of high school education completed	0.03575	9.139	**	0.07166	8.626	**
Years of college education completed	0.07047	9.133	**	0.06666	4.459	**
Bachelor's degree in agriculture	-0.01015	-0.147		0.09569	1.062	
Bachelor's degree in education	0.01078	0.232		0.17599	3.320	**
Bachelor's degree in engineering	0.10045	2.092	*	0.18213	2.119	*
Bachelor's degree in fine arts	0.17513	1.323		0.20453	1.353	
Bachelor's degree in the humanities	0.08339	1.055		0.22942	2.810	**
Bachelor's degree in law	-0.01001	-0.132		0.32590	0.620	
Bachelor's degree in the medical sciences	-0.01848	-0.158		0.17372	2.438	*
Bachelor's degree in the natural sciences	0.54334	4.209	**	0.21214	1.840	
Bachelor's degree in the social sciences	0.16291	4.314	**	0.14754	3.088	**
Graduate degree in agriculture	0.19779	1.562		0.62934	8.987	**
Graduate degree in education	0.10341	1.004		0.27793	2.473	*
Graduate degree in engineering	0.81781	1.825				
Graduate degree in the humanities	0.36761	0.786		-0.11676	-1.033	
Graduate degree in law	0.38227	2.870	**	0.58965	1.032	
Graduate degree in medicine	0.83882	6.101	**	0.98243	3.398	**
Graduate degree in other medical sciences	0.65746	12.150	**	0.60932	3.907	**
Graduate degree in the social sciences	1.01232	4.685	**	0.28765	2.691	**
Employed in the private sector	-0.10557	-5.179	**	-0.19654	-6.916	**
Permanent employee	0.13965	11.137	**	0.06991	2.702	**
Industry Affiliation						
2 Mining and Quarrying	0.29991	6.766	**	0.13265	0.618	
3 Manufacturing	0.13911	4.923	**	0.09771	1.478	
4 Electricity, Gas, and Water	0.16706	3.202	**	0.12289	0.848	
5 Construction	0.18207	7.016	**	0.12490	1.248	
6 Wholesale and Retail Trade	-0.08718	-2.296	*	-0.12045	-1.689	
7 Transportation, Storage, and Communication	0.02454	0.850		0.16716	1.841	
8 Financing, Insurance, Real Estate, and Business Services	0.09325	2.354	*	0.17651	2.374	*
9 Community, Social, and Personal Services	-0.00359	-0.122		-0.10454	-1.590	
Usual Occupation						
1 Professional, Technical and Related Workers	-0.11622	-1.173		0.22935	2.113	*
2 Administrative, Executive and Managerial Workers	0.56430	6.437	**	0.37846	3.208	**
3 Clerical and Related Workers	-0.37494	-3.457	**	0.00892	0.085	
4 Sales Workers	0.22936	4.880	**	0.00837	0.106	
5 Service Workers	-0.37104	-4.011	**	-0.24915	-2.824	**
7 Production and Related Workers Transport, Equipment Operators and Laborers	-0.22139	-2.757	**	-0.06251	-0.780	

Table 2
Wage Regressions

Variable	Male Coefficient Estimate	Male t-statistic		Female Coefficient Estimate	Female t-statistic	
Region of residence						
Region 1 (Ilocos)	-0.06816	-1.709		-0.31152	-6.570	**
Region 2 (Cagayan Valley)	-0.19522	-5.661	**	-0.38523	-8.678	**
Region 3 (Central Luzon)	-0.17793	-7.416	**	-0.29389	-7.911	**
Region 4 (Southern Tagalog)	-0.13836	-6.161	**	-0.35833	-9.349	**
Region 5 (Bicol)	-0.26409	-8.650	**	-0.52612	-8.261	**
Region 6 (Western Visayas)	-0.47329	-13.886	**	-0.55989	-13.164	**
Region 7 (Central Visayas)	-0.41864	-14.231	**	-0.64482	-11.951	**
Region 8 (Eastern Visayas)	-0.26576	-5.999	**	-0.48960	-8.000	**
Region 9 (Western Mindanao)	-0.14848	-3.103	**	-0.48428	-4.633	**
Region 10 (Northern Mindanao)	-0.05340	-1.724		-0.36543	-5.928	**
Region 11 (Southern Mindanao)	-0.03265	-1.082		-0.37758	-5.547	**
Region 12 (Central Mindanao)	0.01652	0.369		-0.29298	-4.407	**
Region 1 x Urban	-0.02705	-0.620		0.06459	0.951	
Region 2 x Urban	0.04125	0.836		0,00030	0.004	
Region 3 x Urban	0.22744	7.897	**	0.19485	4.390	**
Region 4 x Urban	0.10393	4.293	**	0.23896	5.653	**
Region 5 x Urban	-0.00346	-0.077		0.17184	1.835	
Region 6 x Urban	0.23720	5.735	**	0.16852	3.001	**
Region 7 x Urban	0.13126	3.237	**	0.30383	4.819	**
Region 8 x Urban	-0.07126	-1.257		0.01045	0.121	
Region 9 x Urban	-0.03090	-0.470		-0.03963	-0.285	
Region 10 x Urban	-0.06872	-1.539		0.07408	0.967	
Region 11 x Urban	-0.00817	-0.212		0.24585	3.030	**
Region 12 x Urban	-0.01535	-0.261		-0.01243	-0.130	
Inverse Mills' Ratio	-0.48686	-4.676	**	-0.15978	-1.696	
R-squared	0.4303			0.5470		
Adjusted R-squared	0.4272			0.5416		
Log of Likelihood Function	-9410.18			-4748.25		
Number of Observations	11880			5443		

* -- significant at 0.05 level

** - significant at 0.01 level

Notes:

The t-statistics are computed from robust-White standard errors.

The left-out industry affiliation category is Agriculture, Fishery, and Forestry.

The left-out occupation is Agricultural, Animal Husbandry and Forestry Workers, and Fishermen and Hunters.

The left-out region is the National Capital Region.

Figure 1
Wage Trajectories

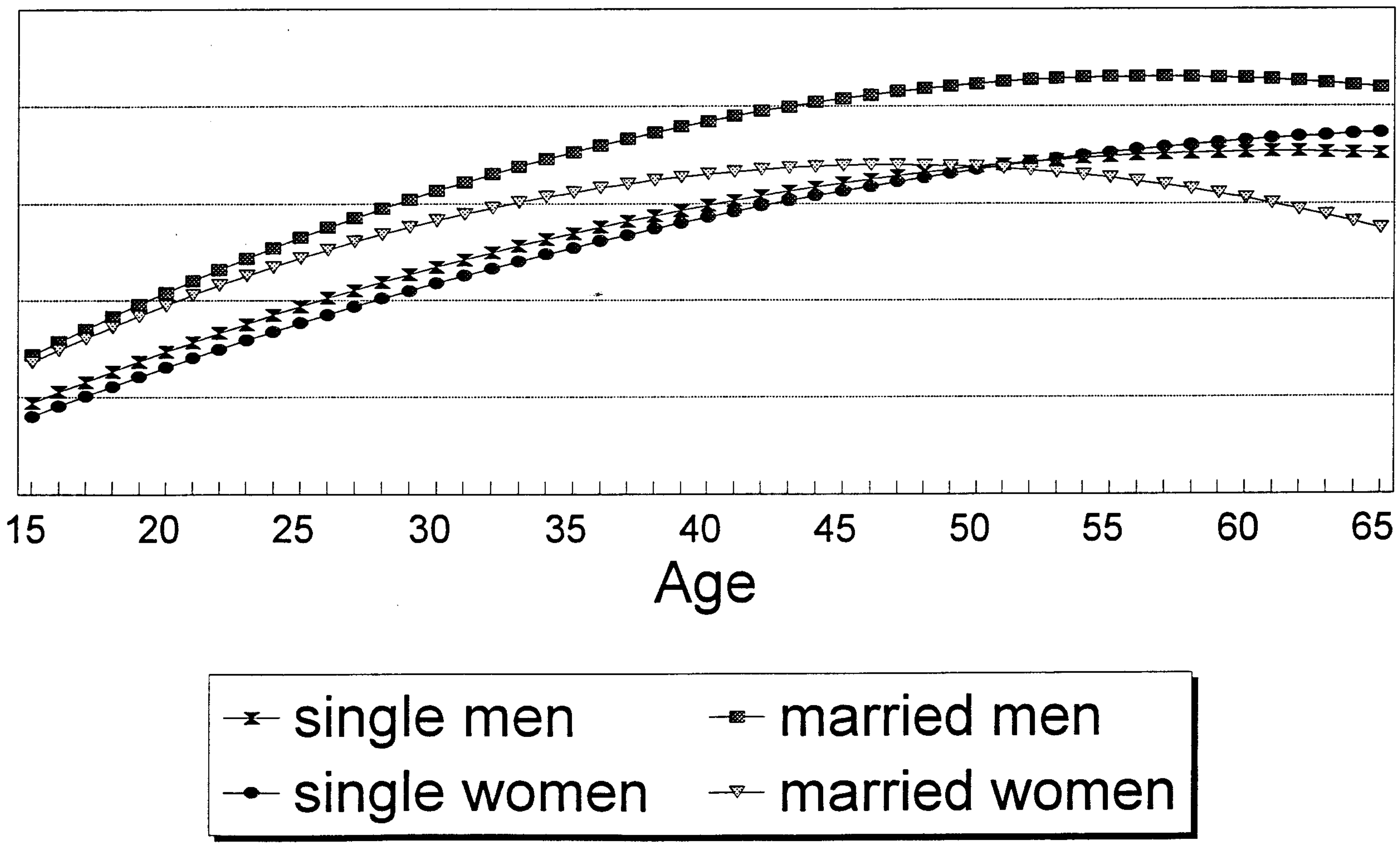

Table 3a

Logarithmic Decompositions of the Gender Wage Differential, 1988

Nondiscriminatory wage structure	ln(D(mf)+1)	ln[d(m0)+1]	ln[d(0f)+1]	ln(Q+1)
B(m)	0.32358	0.00000	0.32358	-0.10327
B(f)	0.41793	0.41793	0.00000	-0.19762
0.69B(m) + 0.31B(f)	0.35323	0.13132	0.22191	-0.13292
0.67B(m) + 0.33B(f)	0.35501	0.13920	0.21580	-0.13470
0.50B(m) + 0.50B(f)	0.37076	0.20897	0.16179	-0.15045
Pooled	0.29206	0.07667	0.21539	-0.07176

Table 3b

Component Factors of the Gender Wage Differential, 1988

Nondiscriminatory wage structure	Gross wage differential with selectivity G	Gross wage differential without selectivity	Discrimination coefficient D(mf)	Wage advantage enjoyed by men d(m0)	Wage disadvantage suffered by women d(0f)	Productivity differential Q	Sample selectivity
B(m)	0.01147	0.24646	0.38207	0.00000	0.38207	-0.09812	-0.18853
B(f)	0.01147	0.24646	0.51882	0.51882	0.00000	-0.17932	-0.18853
0.69B(m) + 0.31B(f)	0.01147	0.24646	0.38879	0.14033	0.24846	-0.12446	-0.18853
0.67B(m) + 0.33B(f)	0.01147	0.24646	0.39022	0.14936	0.24086	-0.12602	-0.18853
0.50B(m) + 0.50B(f)	0.01147	0.24646	0.40802	0.23240	0.17561	-0.13968	-0.18853
Pooled	0.01147	0.24646	0.32003	0.07968	0.24035	-0.06924	-0.18853

Appendix Table 1
Probit Model of Wage Earnings

Variable	Male Coefficient Estimate	Male t-statistic	Female Coefficient Estimate	Female t-statistic
Constant	-0.11439	-0.967	0.52179	3.064 **
Single x Age	0.01035	1.454	-0.00401	-0.437
Single x Age Squared	-0.00034	-3.194 **	-0.00027	-2.132 *
Married x Age	0.00370	0.687	-0.03047	-3.954 **
Married x Age Squared	-0.00022	-3.185 **	0.00016	1.604
Years of elementary education completed	0.00617	0.820	-0.02475	-2.093 *
Years of high school education completed	-0.03112	-4.601 **	0.02961	2.662 **
Years of college education completed	0.04756	4.682 **	0.04940	3.293 **
Usual Occupation				
1 Professional, Technical and Related Workers	1.64389	24.733 **	1.99129	25.355 **
2 Administrative, Executive and Managerial Workers	0.61794	7.722 **	0.55539	3.916 **
3 Clerical and Related Workers	2.16532	25.859 **	1.98142	21.264 **
4 Sales Workers	-0.20176	-5.151 **	-0.53622	-11.627 **
5 Service Workers	1.49916	30.640 **	0.97020	18.723 **
7 Production and Related Workers Transport, Equipment Operators and Laborers	1.23466	49.303 **	0.76840	16.049 **
Region of residence				
Region 1 (Ilocos)	-0.48193	-8.831 **	-0.32226	-3.799 **
Region 2 (Cagayan Valley)	-0.25910	-4.484 **	-0.17981	-1.987 *
Region 3 (Central Luzon)	-0.08019	-1.603	0.25246	3.306 **
Region 4 (Southern Tagalog)	-0.08741	-1.850	-0.11479	-1.675
Region 5 (Bicol)	-0.16253	-3.021 **	-0.43482	-5.144 **
Region 6 (Western Visayas)	0.32170	6.329 **	0.16693	2.144 *
Region 7 (Central Visayas)	-0.22865	-4.170 **	-0.59228	-7.487 **
Region 8 (Eastern Visayas)	-0.46805	-7.803 **	-0.48850	-5.547 **
Region 9 (Western Mindanao)	-0.48836	-8.095 **	-0.51148	-4.824 **
Region 10 (Northern Mindanao)	-0.06948	-1.255	-0.39837	-4.378 **
Region 11 (Southern Mindanao)	-0.17286	-3.149 **	-0.28814	-3.148 **
Region 12 (Central Mindanao)	-0.50535	-8.330 **	-0.74230	-7.140 **
Region 1 x Urban	0.19534	2.562 *	0.05731	0.460
Region 2 x Urban	0.03048	0.314	-0.05720	-0.382
Region 3 x Urban	-0.07032	-1.196	-0.44534	-5.002 **
Region 4 x Urban	0.09011	1.746	0.06958	0.923
Region 5 x Urban	0.01285	0.156	-0.02072	-0.155
Region 6 x Urban	-0.39737	-5.925 **	-0.40444	-3.989 **
Region 7 x Urban	-0.05870	-0.818	0.29114	2.856 **
Region 8 x Urban	0.28714	3.123 **	-0.03108	-0.230
Region 9 x Urban	0.28688	2.783 **	-0.02604	-0.146
Region 10 x Urban	-0.09068	-1.128	0.03431	0.261
Region 11 x Urban	0.05921	0.837	-0.06876	-0.590
Region 12 x Urban	-0.00415	-0.041	0.35551	2.108 *

Appendix Table 1
Probit Model of Wage Earnings

Variable	Male		Female	
	Coefficient Estimate	t-statistic	Coefficient Estimate	t-statistic
Number of household members 6 years old or younger	0.03713	4.035 **	-0.00981	-0.654
Number of household members between 7 and 14 years old	-0.00653	-0.876	-0.00063	-0.053
Number of household members between 15 and 64 years old	-0.02303	-4.095 **	-0.00173	-0.205
Number of household members 65 years old or older	-0.02132	-0.899	-0.02851	-0.871
R-squared	0.2905		0.4500	
Log of Likelihood Function	-11852.70		-4797.78	
Number of Observations	22257		11116	

* -- significant at 0.05 level

** - significant at 0.01 level

Appendix

The purpose of this section is to show how the t-test statistic for testing the difference of forecasts used in Section IV C is developed and the conditions under which the statistic is applicable.

Let there be two regression regimes:

$$\mathbf{y}_1 = \mathbf{X}_1\boldsymbol{\beta}_1 + \mathbf{u}_1$$

and

$$\mathbf{y}_2 = \mathbf{X}_2\boldsymbol{\beta}_2 + \mathbf{u}_2,$$

where $\mathbf{y}_1$ and $\mathbf{y}_2$ are, respectively, T_1- and T_2-dimensional column vectors, $\mathbf{X}_1$ and $\mathbf{X}_2$ are $T_1 \times K$ and $T_2 \times K$ matrices of constants, $\boldsymbol{\beta}_1$ and $\boldsymbol{\beta}_2$ are K-dimensional parameter vectors, and $\mathbf{u}_1$ and $\mathbf{u}_2$ are vectors of disturbance terms which are assumed to be normally distributed with means zero and variance matrix

$$\mathrm{E}\begin{bmatrix}\mathbf{u}_1\\ \mathbf{u}_2\end{bmatrix}[\mathbf{u}_1' \quad \mathbf{u}_2'] = \begin{bmatrix}\sigma_1^2\mathbf{I}_{T_1} & 0\\ 0 & \sigma_2^2\mathbf{I}_{T_2}\end{bmatrix}.$$

We wish to test the null hypothesis that $\mathrm{E}(y_1^p) = \mathrm{E}(y_2^p)$, where

$$y_i^p = \bar{\mathbf{x}}_i\boldsymbol{\beta}_i + u_i^p \qquad \text{for } i = 1, 2.$$

In other words, y_i^p is the predicted value of y_i at the sample means of the matrix $\mathbf{X}_i$, for $i = 1, 2$. It is assumed that the disturbance terms of the forecasts u_1^p and u_2^p are jointly normally distributed with means zero and variance matrix

$$\mathrm{E}\begin{bmatrix}u_1^p\\ u_2^p\end{bmatrix}[u_1^p \quad u_2^p] = \begin{bmatrix}\sigma_1^2 & 0\\ 0 & \sigma_2^2\end{bmatrix},$$

and are independent of $\mathbf{u}_1$ and $\mathbf{u}_2$.

We need to devise a test statistic. Define $\hat{y}_i^p$, the least squares predictor of $\mathrm{E}(y_i^p)$, $i = 1, 2$, by

$$\begin{aligned}\hat{y}_i^p &= \bar{\mathbf{x}}_i\hat{\boldsymbol{\beta}}_i\\ &= \bar{\mathbf{x}}_i(\mathbf{X}_i'\mathbf{X}_i)^{-1}\mathbf{X}_i'\mathbf{y}_i.\end{aligned}$$

From the Gauss-Markov theorem, it follows that $\hat{y}_i^p$ is the best linear unbiased estimator of $\mathrm{E}(y_i^p)$. Its forecast error is

$$\hat{u}_i^p = y_i^p - \hat{y}_i^p \qquad \text{for } i = 1, 2,$$

and (since bias is zero so that the mean squared prediction error and the variance are equal) the variance associated with the forecast error is

$$\begin{aligned}\mathrm{Var}(\hat{y}_i^p) &= \mathrm{Var}(u_i^p) + \bar{\mathbf{x}}_i\mathrm{Var}(\hat{\boldsymbol{\beta}}_i)\bar{\mathbf{x}}_i'\\ &= \sigma_i^2[1 + \bar{\mathbf{x}}_i(\mathbf{X}_i'\mathbf{X}_i)^{-1}\bar{\mathbf{x}}_i'].\end{aligned}$$

Moreover, since $\hat{y}_i^p$ is a linear function of $\hat{\boldsymbol{\beta}}_i$, it follows that $\hat{y}_i$ is itself normally distributed and that

$$\frac{\hat{y}_1 - \hat{y}_2 - (\bar{\mathbf{x}}_1\boldsymbol{\beta}_1 - \bar{\mathbf{x}}_2\boldsymbol{\beta}_2)}{\sigma_1\sqrt{1 + \bar{\mathbf{x}}_1(\mathbf{X}_1'\mathbf{X}_1)^{-1}\bar{\mathbf{x}}_1'} + \sigma_2\sqrt{1 + \bar{\mathbf{x}}_2(\mathbf{X}_2'\mathbf{X}_2)^{-1}\bar{\mathbf{x}}_2'}} \sim \mathrm{N}(0, 1). \qquad (A1)$$

If σ_1^2 and σ_2^2 are known, then $(A1)$ may be used as the test statistic. Unfortunately, this is not the case in general. Under the distributional assumptions, however, we do have

$$\frac{\hat{\mathbf{u}}_i'\hat{\mathbf{u}}_i}{\sigma_i} \sim \chi^2_{T_i-K} \qquad \text{for } i = 1,2, \tag{A2}$$

where $\hat{\mathbf{u}}_i$ is the vector of least squares residuals defined by

$$\hat{\mathbf{u}}_i = \mathbf{y}_i - \hat{\mathbf{y}}_i.$$

Moreover, it can be easily shown that $(A1)$ and $(A2)$ are independent. Consequently, the following random variable can be formed:

$$\frac{\hat{y}_1^p - \hat{y}_2^p - (\bar{\mathbf{x}}_1\boldsymbol{\beta}_1 - \bar{\mathbf{x}}_2\boldsymbol{\beta}_2)}{\sigma_1\sqrt{1+\bar{\mathbf{x}}_1(\mathbf{X}_1'\mathbf{X}_1)^{-1}\bar{\mathbf{x}}_1'} + \sigma_2\sqrt{1+\bar{\mathbf{x}}_2(\mathbf{X}_2'\mathbf{X}_2)^{-1}\bar{\mathbf{x}}_2'}} \cdot \left(\frac{T_1+T_2-2K}{\frac{\hat{\mathbf{u}}_1'\hat{\mathbf{u}}_1}{\sigma_1} + \frac{\hat{\mathbf{u}}_2'\hat{\mathbf{u}}_2}{\sigma_2}}\right)^{1/2} \sim t_{T_1+T_2-2K}.$$

Finally, if $\sigma_1 = \sigma_2$, then under the null hypothesis that $\mathrm{E}(y_1^p) = \mathrm{E}(y_2^p)$ we have our test statistic

$$\hat{t} = \frac{\hat{y}_1^p - \hat{y}_2^p}{\sqrt{1+\bar{\mathbf{x}}_1(\mathbf{X}_1'\mathbf{X}_1)^{-1}\bar{\mathbf{x}}_1'} + \sqrt{1+\bar{\mathbf{x}}_2(\mathbf{X}_2'\mathbf{X}_2)^{-1}\bar{\mathbf{x}}_2'}} \cdot \left(\frac{T_1+T_2-2K}{\hat{\mathbf{u}}_1'\hat{\mathbf{u}}_1 + \hat{\mathbf{u}}_2'\hat{\mathbf{u}}_2}\right)^{1/2} \sim t_{T_1+T_2-2K}.$$

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