Wage Differentials, Rate of Return toEducation, and Occupational WageShare in the Labour Market of Pakistan

Hyder, Asma

2007

PIDE WORKING PAPERS
2007 : 17

Wage Differentials, Rate of Return to Education, and Occupational Wage Share in the Labour Market of Pakistan

Asma Hyder

PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS

PIDE Working Papers
2007:17

Wage Differentials, Rate of Return to Education, and Occupational Wage Share in the Labour Market of Pakistan

Asma Hyder
Visiting Fellow
Pakistan Institute of Development Economics, Islamabad

PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS
ISLAMABAD

Pakistan Institute of Development Economics
Islamabad, Pakistan

E-mail: publications@pide.org.pk
Website: http://www.pide.org.pk
Fax: +92-51-9210886

Designed, composed, and finished at the Publications Division, PIDE.

C O N T E N T S

List of Tables

ABSTRACT

This paper examines the magnitude of public/private wage differentials in Pakistan using data drawn from the 2001-02 *Labour Force Survey*. Pakistan *Labour Force Survey* is a nationwide survey containing micro data from all over the country containing demographic and employment information. As in many other countries, public sector workers in Pakistan tend to have higher average pay and educational levels as compared to their private sector counterparts. First, this paper presents the inter-sectoral earning equations for the three main sectors of the economy, i.e., public, private, and state-owned enterprises. These results are further decomposed into "treatment" and "endowment effect". To examine the role of human capital in wage gap, the rate of return to different levels of schooling is calculated. These rates of return to education may be important for policy formulation. The relative earning share is also worked out to look into the distribution of wages across the occupational categories. The earning equations are estimated with and without correction for selectivity, which is also the main objective of the study, i.e., to find out if any non-random selection is taking place within these three sectors of employment.

JEL classification: J32, J45, J24

Keywords: Wage Differentials, Rate of Return to Education, Public Sector Labour Markets

1. INTRODUCTION

The inter-sectoral wage differentials have received a great deal of research attention in recent years because this is viewed as supporting efficiency wage theories. These theories predict that some firms find it profitable to pay their workers wages above the going rate. The causes of variation in wages and earnings among people are complex and controversial. The different levels of earnings reflect the decision of individuals to investment in human capital and the decision to acquire skill. Moreover, the research on wage differentials explains the usefulness of the human capital approach to explaining variation in earnings. The factors like education, occupation, gender, regional location, nature of employment and the sector of employment play important role in wage differential.

The concept of human capital pertains to skills, experience, and knowledge that have economic value to firms. Although the theory was originally developed to study the economic value of education [Schultz (1960)], more recently it has been applied to selection, training, compensation, and human resource management practices in general [Flamholtz and Lacey (1981); Perry (1991); Wallace and Fay (1988)]. Firms do not actually 'own' human capital, it is embodied in employees, who are free (within limits) to move from one firm to another [Becker (1962); Jacoby (1991)]. Even if employees stay with a firm, their contribution depends on their willingness to perform. Therefore, the logic underlying human capital considerations is straight forward: individuals who have made personal investments in education, job-relevant skills, and experience should earn a premium.

The wage differentials between the public and private sector have been analysed rigorously in the industrialised world [for example, Kruger and Summers (1988); Terrell (1993); Gindling (1991)]. More recently, Said (2004), using data for Egypt, found a wage gap in favour of the private sector for males which was reversed when wages were replaced by a broader compensation measure. Mengistae (1999) founds a sizeable pay gap in the urban labour markets of Ethiopia.

There exists a modest volume of empirical work undertaken on the public sector pay gap for developing countries, which shows that the source

Acknowledgements: The author acknowledges the invaluable guidance of Dr Barry Reilly (University of Sussex, UK), as well as the comments offered by the referees. However, the author remains responsible for any errors. She is also thankful to Dr Nadeem Ul Haque and Dr Ejaz Ghani for their encouragement.

of rents primarily lies with public sector. Boudarbat (2004) notes a preference for the public sector employment in Africa and a willingness among the educated to make queues for well paid and stable public sector jobs. The author notes a sizeable public sector pay differential in Morocco for the highly educated. Van der Gaag and Vijverberg (1988) for Cote D'Ivoire highlights the importance of selection bias in drawing any reasonable interpretation.

2. DATA

This study uses cross-section data drawn from the nationally representative *Labour Force Survey* (LFS) of Pakistan for 2001-02. The working sample used is based on those in wage employment and comprises a total of 7352 workers after discarding missing values and unusable observations. This total consists of 3694, 3310 and 348 workers in the private, public and state owned enterprise (SOE) sectors respectively. Table 1 of Appendix presents the summary statistics and definitions of the variables used in our analysis.

3. METHODOLOGY

3.1. The Basic Model

In approaching the problem, the labour market is divided into private sector, public sector and state owned enterprises.[1] In this human resource market analysis we are not controlling for labour market participation effects, rather we examine the setoral selection into one of the three categories. For each worker *i*, wage in the *j*th sector of the labour market is given by

$$W_{ij} = X'_{ji}\beta_j + Z'_{ji}\delta_j + \mu_{ji} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where W is a column vector of logarithmic values of hourly wage for individuals in sector j; X_{ji} is a $k \times 1$ vector of person specific explanatory variables; Z_{ji} is a $q \times 1$ vector of other demographic variables, while β and δ are vectors of the unknown parameters. The subscript $j = 1$ if worker belongs to the private sector, 2 if the worker is in the public sector and 3 if the worker is from state owned enterprises. The error term $\mu_j \sim N(0, \sigma_j^2)$ and subscript i is for each individual.

[1]The private sector is defined to include workers employed in, cooperative societies, individual ownership and partnerships. The government sector includes federal government, provincial government, public enterprises and local bodies. State owned enterprises (SOEs) are defined as private limited companies and public limited companies.

The hourly wage[2] is used as the dependent variable because hours worked varies over the life-cycle, with the level of education and may also vary across sectors. It is necessary to distinguish the effects on earnings of hours worked from those due to variation in wages. Seven occupational categories, defined according to the standard occupational classification, are included. To capture the age effect on earnings, we introduced age spline to examine the variation in earnings in different age groups. For this we introduced three age groups; with "knots" defining age groups at 14–25, 26–45 and 46–60 respectively. This allows for age effect on wages to vary over distinct segment of the life-cycle. To control for provincial variations in wages, we include three dummies for provinces while dummy variables for urban-rural residence, marital status, gender and the time spent in current district of living are also included.

3.2. Multinomial Logit Model

As we are dealing with three sectors of employment (i.e., public, private and SOEs) in the labour market.

Let $y_{ij} = 1$ if the ith individual chooses the jth alternative and
let $y_{ij} = 0$ otherwise, where j =1,2,3.
Prob[$y_{ij} = 1$] = P_{ij} and since the probabilities must sum to unity we have:
$P_{i1} + P_{i2} + P_{i3} = 1$.

In its more general form with j alternatives, the multinomial logit is expressed as:

$$P_{ij} = \frac{exp[\alpha_j + \beta_j X_j]}{\sum_{j}^{k} exp[\alpha_j + \beta_j X_j]} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

'k' is the number of outcomes being modeled. This, in general, expresses the probability that an individual with characteristics X_i chooses the jth sector of employment.

3.3. Correction for Selectivity Bias

The estimation of wage equations for three sectors of employment (described above) by OLS may be subject to selection bias if the sample of workers observed in a particular sector is non-random in some way in terms of the wage distribution. Given non-randomness the estimated coefficients may be potentially biased and the computation of sectoral wage differentials is thus affected.

---

[2]The hourly wages expressed in rupees, is calculated by dividing weekly earnings by number of hours worked per week.

In this context, the multinomial logit (MNL) model provides a potential solution to the problem. Lee (1983) proposed a more general approach to the issue than that originally offered by the Heckman (1979) procedure. The procedure outlined is also a two-step procedure but exploits estimates from the MNL to construct the selection correction terms. The following steps are followed:

(1) We estimate the reduced form MNL for the j=1, 2, 3 (i.e., for public, private and SOEs) categories and obtain the parameter estimates and the predicted probabilities for each individual i=1,....,N for each category j. The predicted probabilities are defined as P_{i1}, P_{i2}, P_{i3}.

(2) Next we obtain the 'normits' or standardised z values for each individual for each category j using the inverse standard normal operator. Thus:

$$z_{i1} = \Phi^{-1}(P_{i1}),\ z_{i2} = \Phi^{-1}(P_{i2}), \text{ and } z_{i3} = \Phi^{-1}(P_{i3}) \text{ for all } i=1,.....N.$$

(3) For the public sector, correction term used is:

$$\lambda_{i\text{pub}} = \frac{\phi(\Phi^{-1}(p_{i1})}{P_{i1}} \quad \text{for } i=1,2,.....M \qquad \ldots \qquad \ldots \qquad \ldots \qquad (3)$$

and similarly the correction terms for private and SOEs will be as follows;

$$\lambda_{i\text{pri}} = \frac{\phi(\Phi^{-1}(p_{i2})}{P_{i2}} \quad \text{for } i=M+1,.....N \qquad \ldots \qquad \ldots \qquad \ldots \qquad (4)$$

$$\lambda_{i\text{soe}} = \frac{\phi(\Phi^{-1}(p_{i3})}{P_{i3}} \quad \text{for } i=N+1,.....L \qquad \ldots \qquad \ldots \qquad \ldots \qquad (5)$$

This selection term is analogous to the one computed in the Heckman case though now based on MNL estimates.

(4) Then we estimate the following equation by OLS inserting the relevant correction term:

$$W_{ij} = \alpha_j + \beta_j X_{ij} - \mu_j \frac{\phi(z_{ij})}{P_{ij}} + u_{ij} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (6)$$

for j = 1, 2, 3 and where $E(u_{ij}) = 0$.

Lee (1983) demonstrates that the outcome W conditional on the *selection* is given by the above expression. In this application $\mu_j = \rho_j\sigma_j$. The ρj parameters capture the strength of the correlation between the unobservables determining W_j and those determining the jth sectoral attachment modeled by the MNL. The σ_j parameters represent the standard error in the jth equation for W. This is

analogous to the Heckman two-step case. Thus, using expression (1) the wage equation can be written as;

$$W_{ij} = X'_{ji}\beta_j + Z'_{ji}\delta_j - \rho_j\sigma_j\lambda_j + v_{ji} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

3.4. Decomposition of Wage Differentials

The most popular econometric framework to measure unequal treatment in wages was developed by Blinder (1973) and Oaxaca (1973) in the context of gender. According to this framework, discrimination is revealed by differences in the estimated coefficients. After correction and adjusting the λ term in wage decomposition the framework is given by:

$$\overline{W_{pub}} - \overline{W_{pri}} = \overline{\chi'_{pri}}(\hat{\beta}_{pub} - \hat{\beta}_{pri}) + \hat{\beta}_{pub}(\bar{\chi}_{pub} - \bar{\chi}_{pri}) + (\rho_{pub} * \sigma_{pub}\bar{\lambda}_{pub} - \rho_{pri} * \sigma_{pri}\overline{\lambda_{pri}}) \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

$$\overline{W_{soe}} - \overline{W_{pri}} = \overline{\chi_{pri}}(\hat{\beta}_{soe} - \hat{\beta}_{pri}) + \hat{\beta}_{soe}(\overline{\chi_{soe}} - \overline{\chi_{pri}}) + (\rho_{soe} * \sigma_{soe}\bar{\lambda}_{soe} - \rho_{pri} * \sigma_{pri}\overline{\lambda_{pri}} \quad \ldots \quad \ldots \quad (9)$$

and

$$\overline{W_{pub}} - \overline{W_{soe}} = \overline{\chi_{soe}}'(\hat{\beta}_{pub} - \hat{\beta}_{soe}) + \hat{\beta}_{pub}(\bar{\chi}_{pub} - \bar{\chi}_{soe}) + (\rho_{pub} * \sigma_{pub}\bar{\lambda}_{pub} - \rho_{pri} * \sigma_{pub}\bar{\lambda}_{pri}) \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

4. EMPIRICAL RESULTS

4.1. Results for Multinomial Logit Models (MNL)

The *selection* equation results based on estimation of the MNL model are presented in Table 2 of Appendix almost all the estimated effects for the variables are significant at conventional levels and have the expected signs as well. While comparing between public and private sector as compared to the category of no formal education all categories are pulled towards the public sector. It was quite expected, as the level of education increases the opportunity to get a public sector job also increases. This finding is also consistent with the literature estimating the probability of the public vs. private sector employment with logit or probit function [see for example: Terrell (1993) and Blank (1994)]. Similarly, in younger age there is a greater probability that one will get a public sector job.

4.2. The Wage Equation Results and Correction for Selectivity Bias

The estimates for the earnings equation for the three different sectors of employment (with and without correction for selectivity bias) are reported in

Table 3 of Appendix. The estimated coefficients are jointly significant, as indicated by the *F*-test. Some comments on the coefficients are in order. Most of the variables included in the earning equations are estimated with statistical precision (low standard error). The mean sums of square are 0.43723, 0.5527 and 0.50841 in the public, private and SOEs respectively. This shows compressed waged distribution in the public sector as compared to private sector, however in SOEs it may be attributable to a relatively small number of observations.

After the correction for selectivity the magnitude and significance of variables changes particularly in the private sector. The selectivity term is significant only in private sector. Head of the household is not included in the wage equation as it is used in the multinomial logit model for the identification purpose. Starting with human capital variables, educational categories are significant and well defined across the three sectors.

The estimated rate of return to educational qualification is calculated with the following well-known formula:

$$RORe = \frac{r_n - r_{n-1}}{s_t - s_{t-1}}$$

Where

$RORe$ = Rate of return for each educational level
r_n = earnings equation coefficient at current educational level
r_{n-1} = earnings equation coefficient at previous educational level
s_t[3] = time spend in current educational level
s_{t-1} = years spend in previous educational level.

The rate of returns to different educational qualifications (with and without correction for selectivity are presented in Table 1) for primary education (five years schooling) are .99 percent and 1.15 percent in public and private sector. However, the coefficients of primary and middle level of education are insignificant in state owned enterprises. While comparing between primary and matriculation certificate holder, after primary education if an individual spent five more years in schooling to get the matriculation certificate the rate of return to education increases to 0.94 percent, 0.18 percent and 6.4 percent in the public, private and SOEs, respectively. Similarly, while looking into the difference between intermediate and graduation, graduates are getting 6.4 percent, 17.43 percent and 1.11 percent more as compared to those having intermediate certificate in the three sectors of employment. The decrease in the rate of returns

[3]While calculating *RORe* (rate of return to education) it was assumed that it takes six years to complete the primary education, if one wants to get middle school education it will take three more years after primary school education, to get matriculation certificate one need to spend eleven years in school. Moreover for intermediate, graduation, professional degrees and post-graduate education the required time will be 13, 15, 18 and 19 years.

Table 1

Rate of Return for Educational Categories
(with and without Correction for Selection Bias)

Educational Categories	Full Sample	ROR for Educational Categories without Correction for Selectivity Bias			ROR for Educational Categories with Correction for Selectivity Bias		
		Public	Private	SOEs	Public	Private	SOEs
Primary	1.5%	2.34%	1.56%	0.21%	0.99%	1.15%	0.19%
Middle	2.24%	0.97%	2.85%	1.06%	0.94%	2.33%	0.67%
Matric	3.94%	6.29%	1.25%	6.50%	6.24%	0.18%	6.40%
Intermediate	5.81%	5.22%	7.36%	3.93%	5.17%	6.25%	4.33%
Graduate	9.02%	6.40%	17.4%	11.27%	6.41%	17.3%	1.11%
Professional	9.23%	7.27%	13.8%	5.80%	7.29%	14.12%	5.60%
Postgraduate	5.44%	4.89%	37.7%	2.97%	4.87%	12.02%	2.80%

in few of successive higher categories of education i.e., for matriculation category after middle school certificate in the public and private sector, graduate after intermediate in SOE, professionals in the public and SOE, and post-graduates in all the three sectors may reflect the law of diminishing returns to the formation of human capital at the margin. The same overall pattern are found by Psacharopoulos (1994),[4] in his study the highest rate of returns are for primary level of education, but for Pakistan he reported 20 percent, 11 percent and 21 percent for primary, secondary and higher level of education. However Psacharopoulos and Patrinos (2002)[5] presented the global update for return to investment in education that is in case of Pakistan the ROR to education are 8.4 percent, 13.7 percent and 31.2 percent for primary, secondary and higher categories while using the data for the year 1991. The ROR for these three categories in India are reported at 2.6 percent, 17.6 percent and 18.2 percent respectively, for the year 1995, in case of Nepal these are 16.6 percent, 8.5 percent and 12.0 percent respectively, in 1999.

In the private sector a huge gap exists between those that do not have any formal education and those with some education. This gap goes on widening as the levels of education increases. These results show the different reward system in private sector and changing trend of structure of different employment sectors in Pakistan. The wage gap among the employees of State Owned Enterprises is lowest for different educational levels. However, the training coefficient in all the three sectors is insignificant.

While comparing rates of return to education with and without correction for *selectivity* it is evident that estimates are changed significantly in the private sector. Without correction, the rate of return for matriculation category is 1.25 percent but with correction for *selectivity,* it becomes 0.18 percent. Another

[4]Psacharopoulos (1994).
[5]Psacharopoulos and Patrinos (2002).

large difference between corrected and uncorrected wage equation in private sector lies in post-graduate category. Without correction rate of return for post-graduates is 37.77 percent but after correction it becomes 12.02 percent. It is apparent from the result that a year of education yields a greater increase in wages in the private than in the public sector, despite the possibility, more educated have greater likelihood of being in the public sector. This perhaps reflect the scarcity of educated people in the private sector. This is in agreement with the finding by Psacharopoulos (1994) that the returns in the private/ competitive sector of the economy are higher than for those who work in the public/non-competitive sector of employment. Moreover, according to him these findings lend support in using labour market earnings as a proxy for productivity in estimating the return to education.

Now coming back to the wage equations, after discussing the rate of return for education next variable is *age* that enters in the wage equation as a continuous age spline variable. Particularly, throughout the range of values of age (with and with out correction for selectivity), income will be rising, but the slope may change at some distinct levels.[6] To examine the time profile of earnings of an individual we divide it in three sub samples. The results for age spline in three sector are quite interesting. In public sector, highest marginal premium is in young age i. e., 14 to 25 years. Then the marginal effect slows down for the remaining two age splines. Similarly, in case of the private sector, there is sharp increase at an early age then the marginal effect decreases. However, the SOE present a little bit of a different picture, the only significant age group is 26 to 40 years and in this age group there is a sharp marginal increase in earnings.

Gender is another important determinant of the wage. The estimates in all three sectors show that males are earning more as compared to females. This wage gap shows a male wage advantage in the overall employment sector. While looking into the *marital status* the estimated coefficient shows that married individuals are earning more as compared to those in other categories.

The estimated coefficients of occupational categories are an important part of the wage equation. In all the three sectors, managers, legislators and senior officials are getting more earning premium as compared to any other occupational categories. The omitted category is ‘clerks’. Starting from the public sector, all the estimated coefficients of the occupational dummies are statistically significant, managers and professionals earn more than clerks and all the other categories have negative signs. The relative earnings for each occupational category is reported in Table 2 and has been calculated with the following formula;

---

[6]Green (2003).

Table 2

Relative Earnings for Occupational Categories in the Public and Private Sector and SOEs (with and without Correction for Selectivity Bias)

Occupation	Relative Earning without Correction for Selectivity			Relative Earning with Correction for Selectivity		
	Public	Private	SOE	Public	Private	SOE
Average ln(Earning) per Hour	3.2031	2.518371	3.158366	3.2031	2.518371	3.158366
Managers	46.03%	40.21%	39.02%	46.24%	41.34%	37.88%
Professionals	31.46%	20.92%	16.02%	3146%	18.61%	17.26%
Tech	4.09%	–9.78%	16.48%	3.98%	–15.64%	17.23%
Clerks	–3.00%	15.09%	–2.82	–3.12%	8.27%	–1.99%
Service	–17.56%	–12.88%	–15.71%	–17.48%	–12.3%	–12.63%
Skill	–19.81%	–28.37%	21.21%	–16.70%	–35.83%	19.68%
Craft	–0.67%	7.40%	–12.58%	–20.02%	10.19%	–13.38%
Plant	–3.20%	12.51%	–8.29%	–0.19%	17.24%	–9.34%
Element	–19.91%	–15.95%	–16.31%	–19.98%	–19.01%	–16.26%

$$\text{Related share of occupation}_j = \hat{\partial}_j - \sum_{j=1}^{k} \hat{\partial}_j \times \overline{occu_j}$$

Where

∂j = is estimated coefficient of jth occupational category

$\overline{occu_j}$ = mean of earning in the jth occupational category

$\sum_{j=1}^{k} \hat{\partial}_j \times \overline{occu_j}$ = weighted average of all occupational categories

and j=1..k, is for nine occupational categories according to their standard classification.

On average, managers and professionals in the public sector earn 46.24 percent and 31.46 percent above the average, respectively. Service and elementary workers respectively earn 17.4 percent and 19.98 percent less then the average. The key point in Table 2 is that although professionals are doing above average in the public sector, the dispersion looks more pronounced in the private sector. The lowest relative earnings share is –35.8 percent (skill) and –20 percent (craft) in the public sector.

Regarding earning share of employees in the private sector, the managers earn 41.34 percent above the average earnings. Individuals in other occupational categories are earning less than the average earnings of the average private sector. In the corrected wage equation the relative effects decreases further (i.e., for technicians, service and elementary occupations). Besides from this, the sign of estimated coefficient for craft and plant workers is changed from negative to positive in corrected wage equation. However the evidence shows that there is smaller gap between below average categories. In the SOEs, like managers are

the highest earning category, as it is in the public and private sector. Technicians in SOEs are earning above average earnings of this sector.

Let us now turn to the interpretation of the coefficients on the selection terms. The results show that for public and SOEs sector, there is no correlation between unobserved factors across wages and selection. The estimate for λ_2 indicates the correlation between the unobserved factors and sector selection and wage in private sector. This coefficient shows that *unobserved characteristics* make it less likely that a person is found in private sector, and tends to improve a person's wage in private sector. For example the unobserved characteristics such as intelligence and motivation may decrease the probability that a person is found in the private sector, but those who posses these characteristics enjoy greater wage, *ceteris paribus*. In this case it can be concluded that individuals selected into the private sector earn lower earnings then those drawn at random from the working population. This sorting scheme may affect the productivity in these sectors, which is examined in detail in the following decomposition analysis.

4.3. Decomposition of Wage Differentials

The overall decomposition results after correction for selectivity shows that public and SOEs sector paying more as compared to private sector. SOEs and public sector may be creaming (paying more wages to attract best candidates among a given level of education and experience). Nevertheless the results in the second-last column of Table 3 indicate the extent to which the selection bias is lowering the public-private and SOEs-private wage differentials.

Table 3

Decomposition of Wage Equations with Correction for Selectivity Bias

	Unexplained or Treatment Differentials	*t*-values	Explained or Endowment Differentials	*t*-values	Due to Selection	Total
$Y_{public} - Y_{private}$	.506156	3.7243	0.279410	3.859	–0.1008	0.6847
	(0.135904)		(0.07239)			
$Y_{soe} - Y_{private}$	0.54344012	0.9048	0.327440	5.067	–0.230	0.639
	(0.600564)		(0.064616)			
$Y_{public} - Y_{soe}$	–0.10777	0.19533	0.022461	0.646	0.1300	0.0447
	(0.551741)		(0.034734)			

Y_{public} denotes the log of hourly wage in the public sector.

$Y_{private}$ denotes the log of hourly wage in private sector.

Y_{soe} denotes the log of hourly wage in State Owned Enterprises sector.

5. CONCLUSION

The probit estimates for human capital variables show that more educated individuals, are pulled towards the public sector. As elsewhere, public sector workers in Pakistan tend to have both higher average pay and education levels compared to their private sector counterparts. The results of the sectoral attachment equation (probit equation) show that females are more attached with the public sector as compared to their male counterparts. In addition, the public sector in Pakistan has a more compressed wage distribution and a smaller gender pay gap than that prevailing in the private sector.

The earning equations for the three sectors of employment have same trends for educational categories. Rate of returns to education founds in this study have the same overall pattern as found by Psacharopoulos (1994). The estimates for all the three sectors of labour market in Pakistan show that males are more advantaged in terms of earnings as compared to female counterpart. Thus wage gaps show a male wage advantage in the overall employment sector. The wage differentials between the public and the private sector are consistent with other developing countries. For instance, Terrell (1993) concluded that the wage differentials are in favour of the public sector and state owned enterprises while using the micro data from Haiti. The decomposition for earnings in these three sectors showed that sizable earning gap exist between public and private sector that may have adverse effects on the economy.

The existence of a sizeable public-private sector differential has obvious implications for the Pakistan labour market in terms of worker's job queues, wait unemployment, as well as adverse effects in recruitment, retention and incentive policies [Hyder and Reilly (2005)]. An obvious agenda for future research would be to investigate the extent of fringe benefits, which definitely contribute to wage differentials. Moreover, the existence of wage differentials between the public and the private sector may give rise to the phenomenon of 'wait' unemployment; this must be explored.

Appendix Table 1

Summary Statistics

Variable	Definition	Public Mean	Private Mean	SOE Mean
Lnhw	Log of the hourly wage	3.203	2.518	3.158
		(0.593)	(0.709)	(0.724)
Age	Age of individual in years	37.149	30.233	35.986
		9.294)	(11.015)	(10.54)
Nfe	= 1 No formal education and = 0, otherwise	.1419	.3351	.2298
Prim	=1 if individual has completed initial five years of education i.e., primary but below middle; =0, otherwise	.1033	.2049	.1264
Middle	=1 if individual has completed initial eight years of education i.e., middle but below matriculation;=0, otherwise	.08483	.1285	.1206
Matric	=1 if individual has completed initial ten years of education i.e., matriculation but below intermediate;=0, otherwise	.2251	.1686	.2097
Inter.	=1 if individual has completed two years for college education i.e., intermediate after matriculation but below university degree; =0, otherwise	.1619	.0619	.0890
Professional	= if individual has professional degree in engineering, medicine, computer and agriculture; = 0, otherwise	.0350	.0195	.0345
University	= 1 if individual has university degree but below post graduate; = 0, otherwise	.1419	.0573	.1005
P-grad	= 1 if individual is M.A/M.Sc, M.Phil/Ph.D;= 0, otherwise	.1057	.0238	.0890
Train	= 1 if individual has ever completed any technical/vocational training; = 0, otherwise	.0658	.0433	.0747
Urban	=1 if Living in urban area and = 0, otherwise	0.5924	0.6429	0.6609
Punjab	=1 if individual resides in Punjab; = 0, otherwise	.3691	.5319	.3275
Sindh	= 1 if individual resides in Sind; = 0, otherwise	.2698	0.2766	0.3563
NWFP	= 1 if individual resides in NEFP; = 0, otherwise	.1812	.11829	.1321
Balochistan	= 1 if individual resides in Balochistan;= 0, otherwise	.1798	.0731	.1839

Continued—

Appendix Table 1—(*Continued*)

Sincebirth	= 1 if individual has resided in the district since birth; = 0, otherwise	.8277	.7861	.7672
Oneyear	= 1 if individual has resided in the district for one year and = 0, otherwise	.0085	.0184	.0143
Fouryear	= 1 if individual has resided in the district for four years and = 0, otherwise	.0202	.0437	.0402
Nineyear	=1 if individual has resided in the district for nine years and = 0, otherwise	.03081	.0433	.0402
Aboveten	= 1 if individual has resided in the district for district more then ten years or = 0, otherwise	.1126	.10828	.1379
Gender	= 1 if individual is male;= 0, otherwise	.8809	.90633	.9741
Marr	=1 if individual is married; = 0, otherwise	.8558	.5544	.7701
Nmarr	= 1 if individual is unmarried;= 0, otherwise	.1323	.4274	.2241
Wnd	= 1 individual is widowed or divorced; = 0, otherwise	.01178	.01813	.00574
Head	= 1 If individual is head of the household; = 0, otherwise	.661027	.4187	.6695
Manager	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.05649	.04412	.10919
Professionals	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.0972	.0401	.0574
Technician	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.29244	.08743	.14367
Clerk	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.14410	.0389	.0891
Services	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.1259	.2005	.0603
Skilled	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.01117	.00487	.01436
Craft	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.04078	.2311	.1637
Plant	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.03897	.15078	.1637
Elementary	= 1 if individual is in this one-digit occupation group; = 0, otherwise	.19274	.2019	.19827
Sample Size		3310	3694	348

Notes: The average values for the continuous measures and the sample proportion for the discrete measures are reported. The standard deviations are also reported for the continuous variables.

Appendix Table 2

Multinomial Logit Results for Selection between Public vs. Private Sector and SOE vs. Private Sector

Variables	Public vs. Private		SOEs vs. Private	
	Co-efficients	Z-Values	Co-efficients	Z-Values
Primary	0.6875	6.55***	0.2264	1.13
	(0.1050)		(0.2012)	
Middle	1.1221	9.54***	0.7783	3.69***
	(0.1176)		(0.2111)	
Matric	1.5277	14.09***	1.0352	5.22***
	(0.1084)		(0.1983)	
Inter.	1.9593	14.47***	1.0943	4.08***
	(0.1353)		(0.26796)	
Prof.	1.6870	7.99***	1.2122	3.03***
	(0.2112)		(0.4001)	
Grad	1.8448	12.84***	1.1058	3.93***
	(0.1436)		(0.2812)	
P-grade	2.4692	13.89***	1.8466	5.85***
	(0.1777)		(0.3154)	
Train	0.28650	2.10**	0.3426	1.49*
	(0.1363)		(0.2304)	
Age1	0.17520	7.45***	–0.0215	–0.59
	(0.0235)		(0.0366)	
Age2	0.07407	9.29***	0.0832	5.14***
	(0.0079)		(0.0161)	
Age3	–0.01062	–1.33*	–0.0174	–1.15
	(0.0079)		(0.0151)	
Nmarr	–0.63191	–6.22***	–0.0316	–0.15
	(0.1015)		(0.2162)	
Wnd	–0.7288	–2.98***	–1.0109	–1.38*
	(0.2446)		(0.7327)	
Gender	–0.1735	–1.54*	1.3009	3.56***
	(0.1127)		(0.3650)	
Head	0.2343	2.78***	0.2518	1.44*
	(0.0842)		(0.1748)	
Urban	–0.4382	–6.37***	–0.0934	–0.69
	(0.0688)		(0.1349)	
Sindh	0.1473	1.98**	0.5666	4.00***
	(0.0743)		(0.1417)	

Coninued—

Appendix Table 2—(*Continued*)

NWFP	0.5357	5.93***	0.4885	2.58***
	(0.0903)		(0.1890)	
Baloch	1.3502	12.85***	1.4447	7.89***
	(0.1050)		(0.1831)	
Oneyear	–0.4134	–1.44*	0.0594	0.12
	(0.2877)		(0.4841)	
Fouryear	–0.7666	–4.13***	–0.0519	–0.17
	(0.1854)		(0.3022)	
Nineyear	–0.4246	–2.66***	–0.1514	–0.51
	(0.1595)		(0.2985)	
Aboveten	–0.1429	–1.47*	0.1113	0.61
	(0.0969)		(0.1810)	
Manage	–0.1335	–7.94***	–0.2205	–0.75
	(0.1681)		(0.2928)	
Profess	–0.6174	–3.73***	–0.5692	–1.68**
	(0.1653)		(0.3396)	
Tech	–0.0139	–0.10	0.0583	0.22
	(0.1332)		(0.2599)	
Service	–0.9798	–7.39***	–1.4843	–4.79***
	(0.1325)		(0.3096)	
Skill	0.4281	1.21	0.9362	1.63*
	(0.3544)		(0.5758)	
Craft	–2.0311	–13.33***	–0.4408	–1.68**
	(0.1523)		(0.2618)	
Plant	–2.2352	–14.05***	–0.4398	–1.62*
	(0.1591)		(0.2717)	
Element	–0.2733	–1.98**	–0.0506	–0.19
	(0.1383)		(0.2689)	
Constant	–5.0538	–8.60***	–4.4330	–4.57***
	(0.5875)		(0.2689)	

Multinomial logistic regression.
Comparison group is private sector.
Number of observation = 7352.
LR chi(62) = 3288.37.
Prob > chi2 = 0.0000.
Log likelihood = –4601.3006.

Note: All the estimates are white hetroscadastic consistent.
***Denotes significant at 1 percent level of significance. **Denote significant at 5 percent level of significance. *10 percent level of significant using 2-tailed test.

Appendix Table 3

Wage Equations for Public and Private Sector and SOEs
(with and without Correction for Selection Bias)

	Earning Equation Results with Correction						Earning Equation Results without correction					
	Public Sector		Private Sector		SOEs		Public Sector		Private Sector		SOE s	
Variables	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	t- values	Coef.	t- values	Coef.	t- values
Educational Categories												
Primary	0.0595	1.52*	0.0691	2.43***	0.0118	0.12	0.0614	2.09**	0.0939	3.77***	.01275	0.11
	(0.0390)		(0.0284)		(0.1025)		(0.0293)		(0.0248)		(.1125)	
Middle	0.0876	1.79**	0.1393	3.92***	0.03201	0.27	0.0907	3.28***	0.1794	6.07***	.04455	0.51
	(0.0490)		(0.0355)		(0.1188)		(0.0276)		(0.0295)		(.0865)	
Matric	0.2125	3.78***	0.1429	3.57***	0.1600	1.33*	0.2166	8.07***	0.2046	6.89***	.17466	1.92*
	(0.0563)		(0.0400)		(0.1207)		(0.0268)		(0.0297)		(.0908)	
Inter.	0.3160	4.61***	0.2679	4.69***	0.24679	1.87**	0.3210	9.88***	0.35184	8.52***	.25345	1.89*
	(0.0686)		(0.0571)		(0.1321)		(0.0325)		(0.0413)		(.1338)	
Prof.	0.6808	9.28***	0.9743	11.90***	0.5268	2.62***	0.6850	8.90***	1.0457	10.13***	.54352	2.58***
	(0.0733)		(0.0818)		(0.2011)		(0.0769)		(0.1032)		(.2102)	
Grad	0.4443	6.63***	0.6145	10.00***	0.4694	3.27***	0.4491	12.69***	0.7004	13.82***	.4788	2.79***
	(0.0670)		(0.0614)		(0.1437)		(0.0353		(0.0506)		(.1718)	
P-grad	0.6392	8.14***	0.9253	10.32***	0.5815	3.56***	0.6450	14.80***	1.0583	12.83***	.59768	4.07***
	(0.0785)		(0.0896)		(0.1633)		(0.0435)		(0.0824)		(.1468)	
Train	0.0474	1.47*	0.0083	0.18	0.0266	0.23	0.0479	1.29	.02155	.45	.03219	0.20
	(0.0323)		(0.0462)		(0.1147)		(0.0372)		(.0481)		(.1578)	
Age spline												
Age1	0.0153	1.29*	0.0353	8.06***	0.0115	0.63	0.0160	1.90*	.03745	8.70***	.01068	0.58
	(0.0118)		(0.0043)		(0.0184)		(0.0084)		(0.0043)		(.0182)	
Age2	0.0115	4.08***	0.0015	0.47	0.0269	2.74***	0.0116	6.07***	0.0063	2.65***	.0282	3.92***
	(0.0028)		(0.0032)		(0.0098)		(0.0019)		(0.0024)		(.0072)	
Age3	0.0088	4.43***	0.0067	2.36***	0.00065	0.09	0.0089	4.04***	0.0061	2.11**	.00031	0.03
	(0.0020)		(0.0028)		(0.0073)		(0.0022)		(0.0029)		(.0097)	

Continued—

Appendix Table 3—(*Continued*)

Marital Status												
Nmarr	–0.0519	–1.44*	-0.0366	–1.16	–0.1696	–1.62*	–0.0538	–1.81**	–0.0666	–2.20**	-.16285	-1.68*
	(0.0359)		(0.0316)		(0.1046)		(0.2973)		(0.0302)		(.0971)	
Wnd	0.0819	1.09	-0.0028	–0.04	0.0868	0.22	0.0799	1.30	–0.0427	–0.57	.06787	0.24
	(0.0749)		(0.0730)		(0.3972)		(0.0614)		(0.0750)		(.2825)	
Gender	0.1506	5.42***	0.4081	11.68***	0.2956	1.20	0.14981	5.11***	0.4201	9.75***	..33151	2.37**
	(0.0278)		(0.0349)		(0.2459)		(0.0293)		(0.0431)		(.1396)	
Residence												
Urban	0.0851	3.95***	0.1305	5.84***	0.15201**	2.22	0.0839	5.33***	0.11403	5.38***	.15536	2.22**
	(0.0215)		(0.0223)		(0.0684)		(0.1575)		(0.0211)		(.0698)	
Province												
Sindh	0.0521	2.57***	0.1532	6.84***	0.1713**	1.81	0.05231	2.60***	0.16092	7.44***	.18586	2.84***
	(0.0203)		(0.0223)		(0.0945)		(0.0213)		(0.0216)		(.0653)	
NWFP	–0.0826	–3.09***	-0.0740	–2.34***	0.0786	0.82	-0.0813	–3.55***	-0.0494	–1.60	.08374	0.97
	(0.02672)		(0.0316)		(0.0953)		(0.0228)		(0.0308)		(.0861)	
Baloch	0.1684	4.21***	0.1796	3.62***	-0.0088	–0.06	0.1712	8.05***	0.25539	7.51***	.01832	0.19
	(0.0400)		(0.0496)		(0.15141)		(0.0212)		(0.0340)		(.0973)	
Location Specific Human Capital Variables												
Oneyear	0.1084	1.28*	0.0591	0.86	0.44404	1.87**	0.1073	1.61*	0.0493	0.92	.44873	1.77*
	(0.0849)		(0.0685)		(0.2370)		(0.0666)		(0.0534)		(.2528)	
Fouryear	0.0956	1.58*	0.1996	4.27***	0.28271	1.82**	0.0934	1.53	0.17441	4.80***	.29308	1.50
	(0.0606)		(0.0466)		(0.1554)		(0.0611)		(0.0363)		(.1958)	
Nineyear	0.0788	1.69**	0.1126	2.44***	0.18526	1.27	0.0777	1.35	0.09555	2.00**	0.1860	0.88
	(0.0465)		(0.0460)		(0.1456)		(0.0575)		(0.0478)		(.2110)	
Aboveten	0.1045	3.96***	0.11756	3.79***	0.2178	2.24**	0.1041	3.30***	0.11181	3.65***	.22440	2.31**
	(0.0263)		(0.0310)		(0.0971)		(0.0315)		(0.0306)		(.0973)	
Occupational Categories												
Manage	0.4937	8.89***	0.3307	4.52***	0.3987	2.44***	0.49047	10.16***	0.25133	3.84***	0.4184	3.04***
	(0.0555)		(0.0731)		(0.1634)		(0.0482)		(0.0653)		(.1374)	

Continued—

Appendix Table 3—(*Continued*)

Profess	0.3459	9.12***	0.1034	1.45*	0.1926	1.22	0.3447	8.49***	0.05842	0.79	0.1885	1.05
	(0.0379)		(0.0714)		(0.1580)		(0.0406)		(0.0741)		(.1795)	
Tech	0.0711	2.75***	-0.2392	–4.18***	0.1922	1.58*	0.0710	2.97***	-0.2486	–4.79***	0.1931	1.87*
	(0.0259)		(0.0572)		(0.1215)		(0.0239)		(0.0519)		(.1033)	
Service	-0.1435	–3.64***	-0.2057	–3.37***	-0.1063	–0.64	-0.1456	–5.57***	-0.2795	–6.02***	–.1288	-.85
	(0.0394)		(0.0609)		(0.1815)		(0.0261)		(0.0464)		(.1509)	
Skill	-0.1689	–2.16**	-0.4411	–3.15***	0.2168	0.76	–	–3.51***	-0.4345	–3.08***	.24045	1.39
	(0.0784)		(0.1402)		(0.2855)				(0.1408)		(.1728)	
Craft	0.0294	0.35	0.0192	0.29	–0.1138	–0.80	0.02332	0.54	-0.0767	–1.62*	–.09752	-.96
	(0.0827)		(0.0666)		(0.1421)		(0.0433)		(0.0473)		(.1012)	
Plant	0.0049	0.05	0.0896	1.21	–0.0734	–0.47	–0.0019	–0.04	-0.0256	–0.53	–.05469	-.42
	(0.0924)		(0.0739)		(0.1548)		(0.0467)		(0.0481)		(.1313)	
Element	–0.1686	–5.06***	–0.27286	–4.86***	–0.1426	–1.12	–0.1690	–5.85***	-0.3102	–6.41***	–.13490	-1.43
	(0.0333)		(0.05614)		(0.1275)		(0.0288)		(0.0483)		(.0943)	
Selectivity terms												
Lambda1	–0.0086	–0.09	–	–	–	–	–	–	–	–	–	–
	(0.0997)											
Lambda2	–	–	0.17383	2.33***	–	–	–	–	–	–	–	–
			(0.0746)									
Lambda3	–	–	–	–	-0.0689	-0.23	–	–	–	–	–	–
					(0.3029)							
Constant	2.16805	5.86***	1.01127	8.49***	2.08674	2.12**	2.14137	10.37	1.068219	8.56***	1.89388	3.89***
	(0.03698)		(0.119120)		(0.9834)		(0.20643)		(0.12479)		(.48738)	
	Number of observation = 3310		Number of observation = 3694		Number of observation = 348		Number of observation = 3310		Number of obs = 3694		Number of obs= 348	
	F(31, 3278)=90.37		F(31, 3662)=77.90		F(31, 316)=12.51		F(30, 3279) = 81.17		F(30, 3663) = 65.93		F(30, 317) = 7.02	
	Prob>F=0.0000		Prob>F=0.0000		Prob>F=0.0000		Prob > F = 0.0000		Prob > F = 0.0000		Prob > F = 0.000	
	R-squared=0.4608		R-squared=0.3974		R-squared=0.5510		R-squared = 0.4608		R-squared = 0.3965		R-squared = .5509	
	Adjusted R-square=0.4557		Adjusted R-square=0.3923		Adjusted R-square=0.5069		Root MSE = .43716		Root MSE = .55304		Root MSE = .50765	
	Root MSE=0.43723		Root MSE=0.5527		Root MSE=0.50841							

Note: All the estimates are white hetroscadastic consistent.

***Denotes significant at 1 percent level of significance. **Denote significant at 5 percent level of significance. *10 percent level of significant using 2-tailed test.

REFERENCES

Becker, Gary S. (1962) Investment in Human Capital: A Theoratical Analysis. *Journal of Political Economy*, *Supplement.* 70, 9–49.

Blank, R. (1994) Public Sector Growth and Labour Market Flexibility: The US versus the UK. In R. Blank (ed.) *Social Protection versus Economic Flexibility: Is there a Trade-off?* NBER-CLM Series.

Blinder, A. S. (1973) Wage Discrimination: Reduced Form and Structural Variables. *Journal of Human Resources* 8, 436–455.

Boudarbat, B. (2004) Employment Sector Choice in a Developing Labour Market. Department of Economics, University of British Columbia. (Mimeographed.)

Flamholtz, E. G., and J. M. Lacey (1981) Personal Management, Human Capital Theory and Human Resource Accounting. Los Angeles: Institute of Industrial Relations, University of California.

Gindling, T. H. (1991) Labour Market Segment and Determination of Wages in the Public, Private-Formal and Informal Sector in San Jose, Costa Rica, *Economic Development and Cultural Change* 39, 585–605.

Green, William H. (2003) *Econometric Analysis*. (5th ed.) Englewood Cliffs, NJ: Prentice Hall.

Heckman, J. (1979) Sample Selection Bias as a Specification Error. *Econometrica* 47, 153–161.

Hyder, A., and B. Reilly (2005) The Public and Private Sector Pay Gap in Pakistan: A Quantile Regression Analysis. *The Pakistan Development Review* 44:3, 271–306.

Jacoby, D. (1991) Legal Foundations of Human Capital Markets. *Industrial Relation* 30, 229–250.

Krueger, Alan B., and L. H. Summers (1988) Efficiency Wages and Inter-Industry Wage Structure. *Econometrica* 56, 259–293.

Lee, L. (1983) Generalised Models with Selectivity. *Econometrica* 51, 507–512.

Mengistae, T. (1999) Wage Rate and Job Queues: Does the Public Sector Overpay in Ethiopia? The World Bank Development Research Group. Washington, D. C. (Policy Research Working Paper No. 2105)

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

Perry, N. J. (1991) *The Workers of the Future, Fortune*. Special-Issues, Spring-Summer, 68–72.

Psacharopoulos, G. (1994) Return to Investment in Education: A Global Update. *World Development* 22:9, 1325–1325.

Psacharopoulos, G., and H. Patrinos (2002) Return to Investment in Education. The World Bank. (Policy Research Working Paper No. 2881.)

Said, M. (2004) Compensating Differentials and the Queue for Public Sector Jobs: Evidence from Egyptian Household Survey Data. Department of Economics. SOAS, University of London. (Working Paper No. 136.)

Terrell, K. (1993) Public-Private Wage Differentials in Haiti: Do Public Servants Earn a Rent? *Journal of Development Economics* 42, 293–314.

Van der Gaag, J., and W. Vijverberg (1988) A Switchig Regression Model for Wage Determinants in the Public and the Private Sectors of the Developing Country. *Review of Economics and Statistics*. 70, 244–252.

Wallace and Fay (1988) *Compensation Theory and Practice*. (2 ed.) South-Western Publication, SWE-Management Series.