The Pakistan Development Review
32:4 Part II (Winter 1993) pp. 895–904

An Analysis of the Male-Female Earnings Differential in Pakistan

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I. INTRODUCTION

Several articles have examined the status of women in developing countries. But while numerous studies have attempted to estimate the extent of wage discrimination against women in the west, few such studies have been conducted for Third World countries. The only such published study for Pakistan appears to be Ashraf and Ashraf's (1993) examination of the gender earnings differential for Rawalpindi City. Given the very restricted sample (based on just one city in Pakistan) and the relatively dated data (from 1975) used in that study, a need clearly exists for a more comprehensive examination of earnings by gender. This article represents the first intensive look into male-female earnings differentials, not only for Pakistan as a whole, but for each of its four provinces individually as well. Gender earnings differentials have also been calculated for a number of industrial subgroups. Computations have been made for the years 1979 and 1985-86.[1] This allows the trend in the gender earnings gap to be tracked over that period. Data from the *Household Income and Expenditure Surveys* are used in the estimations for both the Oaxaca (1973) model as well as the more recently developed Cotton (1988) and Neumark (1988) models. A new twist is the incorporation of correction for selectivity bias in the sample data which strengthens the methodological underpinnings of the model.

II. THE DATA AND MODEL

The samples included in each year of the *Household Income and Expenditure Surveys* consisted of well in excess of 100,000 individuals. However, the useable sample of working individuals (with observations on all variables used in this study) was much smaller. There were 25,167 men and 1,763 women in 1979, and 21,944 men and 1,493 women in 1985-86.

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[1]Data was available for 1984-85 also, but was not used in this study due to what appears to be a coding error. Specifically, 369 out of the 1,858 working women in that year reported an income of Rs 50,000. This represents a very high level of income (only three women reported higher earnings levels in that year, with the highest being Rs 61,513).

The variables used in the model were age, the square of age, a variable identifying residence in an urban area, the four provinces, seven levels of educational attainment and nine industrial groups with which the respondents were associated.

Among the education variables, EDUC1 was the omitted reference category and represented respondents who reported themselves to be uneducated or had less than a primary level of education. Those who had completed primary school were denoted by a dummy variable, EDUC2. Dummy variables for other levels of education were EDUC3 (those with "middle" level of schooling), EDUC4 for matriculates, EDUC5 for those with intermediate diplomas, EDUC6 for college graduates, and EDUC7 for workers with a masters or higher level degree.

Although the *Household Income and Expenditure Surveys* identifies several occupational groups, these categorisations were very broad. The mix of workers within each group was so varied that little purpose would have been achieved by including the occupational classifications in the earnings equations. However, the model did make use of the industrial groups with which respondents were associated. Theses were (i) Agriculture, Forestry and Fishing (AGRIC); (ii) Mining and Quarrying (MINING); (iii) Manufacturing (MANUFACTURING); (iv) Electricity, Gas and Water (ELECTRICITY); (v) Construction (CONSTRUCTION); (vi) Wholesale and Retail Trade and Restaurants and Hotels (WHOLESALE); (vii) Transport, Storage and Communications (TRANSPORT); (viii) Financing, Insurance, Real Estate and Business Services (FINANCE); and (ix) Community, Social and Personal Services (COMMUNITY).

It can be argued that working women are not a randomly selected sample of all females in the population especially in developing countries. This is the familiar selectivity-bias problem expressed by Heckman (1979), following whom variables to correct for sample-selectivity bias were developed, and used as an additional explanatory variable in the wage equations. These variables (popularly refered to as "Inverse Mills Ratios") have seldom been employed in computations of the gender earnings gap, but have been widely used in the literature on union nonunion wage differentials. A detailed exposition of the methodology used in this study can be found in Ashraf and Ashraf (1993) in which the present authors calculated the gender wage gap for Rawalpindi City.

III. EMPIRICAL RESULTS

Table 1 lists the regression coefficients of the wage equations for males and females separately for 1979 and 1985-86. Unfortunately, the data did not allow determination of the experience level of the individuals in the sample. Following Mincer (1974), it has been common practice in the west to estimate experience as [Age-Schooling-6]. However, such a formulation would be inappropriate for Pakistan. Since it is well-known that there is no uniform age at which children

Table 1

Regression Coefficients of Wage Equations for Pakistan

	1979		1985-86	
	Males	Females	Males	Females
Constant	4.49	5.77	5.08	5.99
	(164.26)	(38.38)	(169.90)	(37.03)
Age	8.11	2.05	8.46	5.57
	(67.72)	(2.83)	(64.11)	(7.51)
Age Sq.	−7.90	−2.32	−8.56	−7.44
	(−57.61)	(−2.85)	(−57.13)	(−8.85)
Punjab	−0.10	−0.35	−0.06	−0.16
	(−8.13)	(−5.19)	(−4.65)	(−2.60)
Sindh	−0.00	−1.10	1.10	0.04
	(−0.06)	(−1.07)	(1.26)	(0.49)
Balochistan	−0.00	0.03	0.09	0.59
	(−0.12)	(0.18)	(4.38)	(4.84)
Urban	0.08	0.32	0.07	0.20
	(8.25)	(5.43)	(7.17)	(4.11)
Educ 2	0.20	0.52	0.21	0.57
	(17.08)	(5.02)	(13.28)	(5.29)
Educ 3	0.26	0.52	0.38	0.61
	(17.57)	(4.15)	(24.90)	(7.17)
Educ 4	0.41	0.76	0.54	0.78
	(25.98)	(6.59)	(22.01)	(6.43)
Educ 5	0.63	0.93	0.79	0.96
	(23.05)	(5.85)	(29.14)	(8.58)
Educ 6	0.88	0.96	1.01	1.42
	(29.40)	(5.63)	(25.43)	(8.26)
Educ 7	1.09	1.42	0.84	1.07
	(24.05)	(7.39)	(5.09)	(1.30)
Mining	0.01	−0.45	0.08	−0.41
	(0.13)	(−0.97)	(0.42)	(−0.50)
Manuf.	−0.04	−0.84	−0.06	−0.93
	(−3.29)	(−11.31)	(−3.81)	(−12.59)
Elec.	−0.08	−0.53	–	–
	(−2.21)	(−0.72)	–	–
Constr.	−0.16	−0.72	−0.15	−1.17
	(−9.39)	(−2.38)	(−8.89)	(−5.09)
Whlsl.	0.09	−0.55	0.09	−0.56
	(6.88)	(03.85)	(6.49)	(−4.41)
Transp.	−0.02	−0.28	0.02	−0.59
	(−0.89)	(−1.17)	(0.80)	(−2.21)
Finance	0.16	−0.94	0.25	−0.34
	(4.22)	(−2.32)	(5.19)	(−0.97)
Commun.	−0.18	−0.79	−0.19	−0.92
	(−12.69)	(−10.64)	(−12.76)	(−15.08)
Selec. Var.	0.02	−0.21	3.34	−0.46
	(0.42)	(−0.45)	(0.96)	(−0.06)
R^2	0.27	0.19	0.28	0.31
N	25,167	1,763	21,944	1,493

Note: AGE was divided by 100, since the coefficient estimates for this variable, and for AGESQ were otherwise so small that they rounded off to zero. Figures in parentheses represent *t*-statistics.

begin schooling in Pakistan, and that the variance of age among beginning school-goers is quite large (specially among rural females), age is a more appropriate proxy for experience than is the Mincer formulation. Clearly however, the use of age instead of experience leads to misleading inferences in the case of individuals with interrupted labour force participation. AGE was statistically significant for both males and females in both years. Interestingly, the difference between males and females in the absolute values of the coefficient estimates for AGE was wider in 1979 than in 1985-86. AGE-SQUARED was negative and highly significant in both years confirming the concavity of the age-earnings profile.

The inclusion of dummy variables for the province of residence of each respondent was intended to capture the effects of geographical location on earnings. Such an exercise would have been valuable in its own right, but was much more so in the context of calculating gender earnings differentials, since some parts of the country are known to be less accepting of female participation in the work force. The omitted reference group in the earnings equations was NWFP. The largest earnings divergence between provinces was between workers in NWFP relative to those in the Punjab. In both years, and for both sexes, workers in the Punjab had considerably lower earnings than those in the NWFP. The NWFP-Punjab earnings gap was even larger for women than it was for men. In 1979, for example, women in the Punjab earned 42 percent less than those in the NWFP.[2] The inter-province earnings differential was smallest in the case of NWFP-Sindh as evidenced by the statistically insignificant coefficient estimates for Sindh. An interesting trend was observed in the Balochistan-NWFP earnings gap. The coefficient estimate for Balochistan was statistically insignificant in 1979 but was highly significant in 1985-86. Balochi women did particularly well, relative to their NWFP counterparts earning 80 percent more than them in 1985-86. Balochi men in contrast earned only 9 percent more than NWFP men in 1985-86.

Not surprisingly, residence in urban areas was associated with large earnings premiums. The coefficients for URBAN were positive and highly significant in all four of the gender/year cells. A ready and standard explanation for this is the higher cost of living associated with urban locations relative to rural areas.

Dummy variables were used to identify association with nine broad industrial categories defined in the *Household Income and Expenditure Surveys*. The omitted base industry was agriculture. The absolute values of the coefficient estimates as well as the *t*-statistics were highest for workers in the COMMUNITY (community, social and personal services) industry. Employees in this group, both male and female, earned considerably less than agricultural workers. But lower monetary rewards (relative to agriculture) was not restricted to COMMUNITY. Workers in manufacturing, electricity, and construction also had lower earnings than their

[2]The percentages reported in this section were obtained by taking the antilog of the relevant dummy variables.

agricultural counterparts, though not as much as COMMUNITY workers. An interesting relationship was observed for workers in finance. The coefficients (which were statistically significant in three of the four industry/gender cells), suggested that while men in this sector earned more than their agricultural counterparts, the reverse was true of women.

The coefficient estimates for the variables representing different levels of educational attainment were consistent with *a priori* expectations. Earnings levels rose monotonically with the level of educational attainment for both years, and for both sexes in most cases. In 1985-86 however, the returns to EDUC7 were *below* those for EDUC6 for both men and women. An interesting finding was that the returns to education were higher for women than they were for men in both years, and for all levels of educational attainment. This may have represented a return to the relative scarcity of women with schooling at all levels. No particular trend was evident from the coefficient estimates of the education variables. The returns appeared to have risen for some of the educational-attainment/gender cells, and dropped for some others.

The coefficient estimates for the selectivity variable were statistically insignificant in both years, and for both males and females. This contrasts with Ashraf and Ashraf (1993) who found the variable to be positive and significant in their male sample for Rawalpindi in 1975 (the female coefficient was however, insignificant). The results of this article, based on a much larger and broader sample, and over two different years suggests that the average individual in the samples (either male or female) was no different than a randomly drawn worker from the broader population of working and nonworking individuals. Of course, this result may not necessarily hold if smaller and narrower segments of the labour force are examined.

Male-Female Earnings Differentials: Table 2 presents the gender earnings gap for Pakistan for each of the two years used in this study. The table also calculated the earnings differential for several subgroups of the sample. The male-female earnings differential which stood at 63.27 percent in 1979, had dropped to 33.09 percent in 1985-86. The decline in the gender earnings differential was uniform across every group listed in Table 2. The gap appeared to be much larger in rural areas than in urban areas in 1979 (75 percent and 50 percent respectively), but had narrowed considerably by 1985-86 (38 percent and 33 percent respectively).

Balochistan was unique in that it was the only province in which the gender earnings gap was *negative*. This implies that women, after adjusting for characteristics, actually earned more than men in that province. This was true in both rural and urban Balochistan. A plausible hypothesis to explain this result can be advanced: Balochistan is a feudal, socially less-developed backwater of the country where participation of women in the workforce is frowned upon. As a result, only the most motivated and talented women are likely to work in that province. If then, women are observed earning more than their male counterparts, it is likely a reflection of their selectivity. In other words, the comparison in

Balochistan is between "average" male and "above average" female workers. The small number of female observations (there were only 59 working women in Balochistan in the 1985-86 sample) calls for caution in interpreting these results.

Table 2

Male-Female Earnings Differentials in Pakistan

	1979	1985-86
Pakistan	63.27%	33.09%
	(25,065; 1,744)	(21,945; 1,494)
Pakistan (urban)	49.55%	32.69%
	(10,747; 757)	(10,772; 854)
Pakistan (rural)	74.92%	38.29%
	(14,318; 987)	(11,173; 640)
	By Province	
Punjab	75.50%	39.12%
	(14,940; 1,149)	(12,062; 957)
Punjab (urban)	53.06%	27.24%
	(5,492; 436)	(5,376; 483)
Punjab (rural)	90.25%	43.54%
	(9.520; 531)	(6,686; 474)
Sindh	53.23%	34.92%
	(5,643; 260)	(5,370; 242)
Sindh (urban)	41.91%	29.71%
	(3,509; 212)	(3,379; 220)
Sindh (rural)	157.54%	66.63%
	(2,134; 48)	(1,991; 59)
Balochistan	9.14%	−34.07%
	(1,364; 33)	(1,222; 22)
Balochistan (urban)	28.66%	−15.31%
	(658; 23)	(605; 39)
Balochistan (rural)	−9.45%	−55.49%
	(717; 10)	(617; 20)
NWFP	28.97%	9.04%
	(3,138; 303)	(3,291; 236)
NWFP (urban)	28.57%	9.04%
	(1,134; 95)	(1,412; 112)
NWFP (rural)	28.11%	20.96%
	(2,014; 209)	(1,879; 124)
	By Industry	
Manufacturing	162.43%	124.81%
	(4,189; 283)	(3,622; 175)
Construction	62.82%	148.56%
	(1,855; 12)	1,991; 13)
Wholesale	167.56%	94.38%
	(3,802; 56)	(3,624; 46)
Transport	29.69%	16.20%
	(1,768; 20)	1,537; 10)
Finance	82.33%	33.23%
	(335; 7)	(188; 6)
Communications	70.26%	57.71%
	(3,506; 421)	(3,502,437)
Agriculture	198.56%	202.37%
	(8.005; 163)	(5,753; 58)

Estimates are not presented for Mining and Electricity as a result of the very low number of females in those industries. There were five and 1 working female in the 1979 and 1985-86 samples respectively in the Mining industry. Similarly, there were two working females in ELECTRIC in 1979 and none in 1985-86. The figures in parentheses represent the number of men and women in each subsample.

The highest male-female earnings differentials were in rural Sindh where an enormous difference of 158 percent in 1979 had declined to a less imposing, but still high level of 67 percent by 1985-86. The differences in urban Sindh were much smaller than in the rural parts of the province (53 percent in 1979, and 35 percent in 1985-86). To any observer of the Pakistan economy, this is not surprising. Like Balochistan, low levels of literacy and a feudal structure in rural Sindh combine to present great obstacles to the upward economic mobility of women. A relatively modern and literate population in urban Sindh helped to keep earnings differentials at more modest levels (42 percent in 1979 compared to 30 percent in 1985-86). The gender earnings gap also appeared to have dropped sharply in the Punjab and NWFP between 1979 and 1985-86. This was true in both rural and urban areas.

Of the nine industries identified in the data, gender earnings differentials could be calculated for only seven of them due to the very low number of females in some industries. In fact, only four industries (AGRIC, COMMUNITY, WHOLESALE and MANUFACTURING) had enough women for the estimates to be credible. The earnings gap fell in three of these industries between 1979 and 1985-86. AGRIC bucked this trend, with the gap rising somewhat from a high 199 percent in 1979 to a still loftier 202 percent in 1985-86

IV. CONCLUDING REMARKS AND SUMMARY

Viewing the results as a whole, the evidence is overwhelming that the male-female earnings differential have dropped sharply in Pakistan between 1979 and 1985-86. This may be a result of changing social attitudes toward the participation of women in the workforce, or may be the effect of years of governmental attempts to reduce discriminatory sentiment against female workers. But no matter what the reasons, it represents a positive and welcome development.

This article represents the first comprehensive study of the gender earnings gap in Pakistan. Separate estimates were provided for each of the four provinces of the country, and for nine major industrial groups. A modified version of the Oaxaca model recently suggested by Cotton and Neumark was used to derive the estimates of male-female earnings differentials. Corrections for selectivity bias in the data constituted a methodological improvement in the model not normally found in such studies. The results indicated a significant decline in the gender earnings gap between 1979 and 1985-86. The decline was broad-based and appeared to have occured in every province, and across every industrial group.

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Comments on "An Analysis of the Male-Female Earnings Differential in Pakistan"

The authors have made an important and interesting contribution while analysing male-female earnings differentials in Pakistan. This exercise, which utilises data from three nation-wide Household Income and Expenditure Surveys (HIES), provides a unique opportunity for inter-temporal comparison. Although the work is fairly concise and employs an appropriate methodology, nonetheless I have a few comments which I believe could improve the presentation of the paper.

First, the authors have made an incorrect observation while stating that the *only* published study regarding gender earnings differential is their own 1993 paper. I would like to point out the recent report by Afzal and Shabbir (1992) which undertakes such comparison using the most recent 1987-88 HIES data. However, to be fair to Ashraf and Ashraf, Afzal and Shabbir do not control for selectivity bias. Similarly an inter-provincial comparison of earnings has also been undertaken previously by Khan and Irfan (1985); Shabbir and Khan (1991); and Ahmed (1991).

My second observation relate to the size of the sample used in the present paper. I must confess that I was surprised to see more than 20,000 observations for men and similarly more than 1400 observations for women in the three surveys. All previous work on such earnings function report final sample sizes which are of a much lower order of magnitude. e.g. Khan and Irfan (1985) is based on 2811 observations of male wage earners and Afzal and Shabbir (1992) on 7949 observations for males. It appears that in the present paper appropriate filtering in sample selection has not been used which warrants even more caution while interpreting the results.

Third, while the authors have rightly used the Oaxaca model for the decomposition of the gender gap in earnings, I wonder how one can ignore the important contribution by Blinder (1973) which also decomposes earnings into two parts, i.e., difference in earnings due to endowments (characteristics) and difference in earnings due to discrimination. Since the two contributions (Oaxaca and Blinder) have been published in the same year, I would prefer due recognition of Blinder's work.

Fourth, while specifying expressions (7) and (8), the authors have avoided the possible index number problem, however, there is only a passing remark in the paper that "the two sets of estimates were very close to each other" even though "closeness" does not mean that the interpretation is also very close.

Fifth, the paper employs Heckman's two-step procedure which requires the estimation of a decision function to generate the Inverse Mill's Ratio that in turn

determines the extent of the selectivity problem. In this regard, it would be nice to present the results of the reduced form equation determining the employment status. Continuing my comment within the same context, I presume that the authors have properly tackled the identification problem that is extensively discussed in Willis and Rosen (1979).

Sixth, the discussion in the paper reveals that the selectivity variable is insignificant in all cases even though female workers are found to be "above-average" in Balochistan and rural Sindh. This suggest that for more meaningful conclusions, the results obtained from Heckman's procedure should have been compared with the OLS results.

Finally, it is rather unfortunate that we have had to use the word "discrimination".

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