Efficiency Wages in Pakistan's Small Scale Manufacturing

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Abstract

This paper investigates wage differentials between workers in subcontracting and non-subcontracting firms, using data from a recent survey of small manufacturing firms in Gujranwala, Pakistan. The paper finds that subcontracting workers receive a high wage premium and invokes efficiency wage arguments to explain this differential. The paper argues that due to a client/vendor monitoring problem it is optimal for subcontracting firms to pay higher than the market clearing wages. The use of Heckman's two stage procedure to test for sample selection bias fails to give such evidence. A decomposition of the wage differentials indicates that endowment differentials partly explain higher wages for subcontracting workers while the bulk of this wage gap is explained by differential returns to workers' attributes.

Introduction

Lack of appropriate incentives and effective competition in the factor markets of LDCs produce resource use inefficiencies resulting in under-or-over utilisation of inputs [White (1978)]. Lovell and Sickles (1983) have demonstrated that such inefficiencies are costly because they reduce the profitability of firms below their potential. In a recent article we have shown that manufacturing firms in India and Pakistan suffer from allocative inefficiencies which produce over-utilisation of capital and raw materials relative to labour and energy [Burki et al. (1997)]. Such inefficiencies in allocation of resources warrant adjustment policies for optimal resource allocation in these countries. However, this desire for competitive factor markets is hard to come by at least for labour resource where, due to government action or collective bargaining of workers, there are substantial inter-industry wage variations.

Even in the absence of such controls, wage differentials may arise from the decisions made by economic agents to maximise profits, especially when it is optimal to pay higher than the market clearing wages as effort

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inducing implicit contracts. This approach is lumped together as efficiency wage theories, which suggest that certain job attributes systematically effect wages.[1] The rationales provided by four distinct efficiency wage theories, for paying noncompetitive wages, are that higher wages reduce shirking incentives to workers, lower turnover costs, provide a pool of best qualified workers, and produce favourable morale effects [Yellen (1984)].[2] Krueger and Summers (1987) argue that in such cases eliminating wage differentials from the labour market would be inefficient and undesirable.

An alternative explanation for the wage differentials comes from the neoclassical competitive equilibrium model, which posits a single market where workers with equivalent human capital attributes received similar wages. The competitive model predicts equalising wage differentials across industries and sectors and regards observed wage differentials only reflecting compensation for non-pecuniary aspects of job matching. These alternative explanations for wage differentials, however, lead to entirely different policy implications.

In this paper, we investigate wage differentials for equally skilled workers in Pakistan's small scale manufacturing and explore whether the wage gap can be attributed to noncompetitive labour market models. More specifically, this paper examines the magnitude of wage differentials for workers employed in subcontracting and non-subcontracting firms in Pakistan's small manufacturing sector and finds important variations in relative wages of the two kinds of workers. The small firms we consider, operate in the private sector with no influence of labour unions or the government in employment and wage setting decisions. In other words, they are guided only by market forces and profit maximisation in wage setting decisions. We test for differences in relative wages by using recent data based on a survey of small manufacturing firms in Gujranwala, Pakistan. We invoke the efficiency wage argument to relate the observed wage premiums for subcontracting workers to the firms' profit maximisation decisions. We argue that in labour-intensive activities of small subcontracting firms the quality and in-time delivery considerations involve a client-vendor monitoring problem, which require subcontracting firms to pay higher than the market clearing wages. Along the way, we find apparent differences in personal characteristics of the two kinds of workers, which raise the possibility of nonrandom sorting, but

[1] Reviews of these studies are done by Yellen (1984), Shapiro and Stiglitz (1984), Dickens et al. (1989), and Lang and Khan (1990). For negative reviews, see Carmichael (1985, 1990). For empirical evidence, see Krueger and Summers (1987, 1988), Dickens and Katz (1987), Moll (1993), Arai (1994). The implications of efficiency wage models for developing countries are discussed in Burki (1996).

[2] The hallmark of this approach is that workers' effort crucially depends upon the wages paid by the firms.

Heckman's two stage procedure fails to detect any such problem. A decomposition of wage differentials indicates that differences in average endowments partly explain higher wages in subcontracting firms, but the bulk of this differential is explained by unequal returns. Our analysis leads us to conclude that observed variations in wages cannot be explained by the competitive model. The idea of efficiency wages helps to explain the large difference in the wage premium to workers in subcontracting firms.

The paper is organised as follows. Section 2 lays out the statistical model used to estimate the wage equations. Section 3 describes the data and discusses variable definitions. Section 4 presents the empirical results and interpretation of our primary findings. The results for Heckman's two stage procedure, to test for sample selection bias, are also discussed in the same section. Section 5 analyses wage differentials by decomposing them into differences in worker characteristics and differential returns. And section 6 summarises the basic results of the paper.

The Statistical Model

To examine the importance of non-competitive explanations of wage differentials, we assume distinct markets for subcontracting and non-subcontracting workers. Potentially, wages in respective markets are determined by

$$\text{Ln}y_k = X\beta_k + u_k \qquad \textbf{(1)}$$

Where $\text{In}y_k$ denotes the natural log of wages, X is a vector of observable characteristics, β is the corresponding coefficient vector, u_k is the error term such that $u_k \sim N(0, \sigma^2)$, and $k = 1, 2$ is for subcontracting and non-subcontracting workers, respectively.

To test the hypothesis that the coefficients for wage equations in the two sectors are statistically equivalent we conduct a Chow test, that is a test of hypothesis that a single equation characterises the entire labour market .

Estimation of (1) by ordinary least squares (OLS) may produce inconsistent estimates if the employers in their respective sectors select particular kinds of workers. Although we standardise for human capital and other controls, the wage differentials between the two sectors may be false if this standardisation is incomplete. More specifically, if sorting across the two sectors is driven by some unmeasured or unobservable characteristics affecting productivity (such as manual dexterity, initiative, innate mental ability, and honesty) then this hiring process would be nonrandom, which will produce omitted variable bias in OLS estimates. The extent of this bias

may be proportional to the degree of failing to account for unmeasured factors. Therefore, we employ Heckman's two stage procedure to purge the data of this statistical problem [Heckman (1979)]. Formally, this procedure is illustrated as follows:

Let d_i be a dummy variable that equals 1 if the ith worker is found in a subcontracting firm and zero otherwise. Also let Z_i be a vector of observed characteristics or explanatory variables in the model and Γ a vector of parameters. Now consider an unobservable binary index I, determining a worker's sector allocation expressed as

$$I_i = Z_i \Gamma > 0. \qquad (2)$$

We assume a random component in I_i represented by a standard normal random variable (u_{Ii}) subtracted from I_i, $I_i - u_{Ii} > 0$, or $u_{Ii} < I_i$. These random components are $u_{Ii} \sim N(0, \sigma^2)$. It implies that a worker will be observed in subcontracting firms or

$$di = \begin{cases} 1 \ iff \ I_i > 0 \\ 0 \ otherwise \end{cases}$$

This is a probit specification and the probability that the ith worker is found in subcontracting firm is

$$\Pr(\text{SUBCONTR}) \int_{-oo}^{I_i} f(u)\, du, \qquad (3)$$

where $f(u)$ is a standard normal density function. In other words, u_{Ii} represents the effects of unobserved worker characteristics that may sort workers in the two sectors. The disturbance term u_{Ii} is very likely correlated with the disturbance term u_{WI} from the wage equation. In other words, $\sigma\Gamma_{WI}$ or the covariance between u_{Ii} and u_{WI} will be non zero.

In the first step, we estimate the probit selection equation in (3) and obtain the inverse Mills ratio λ. In the second step, we use λ as an additional regressor in wage determination equations for respective sectors. This two-stage procedure produces unbiased estimates of wage equations. The insignificant coefficients for λ, however, are interpreted as demonstrating that unmeasured worker characteristics influencing wages and sector assignment are captured quite well by our model.

The Sample Survey

Data on subcontracting firms are often difficult to obtain, particularly in developing countries. Therefore, studies on subcontracting relationships usually rely on specially designed sample surveys. The wage and sample selection equations are estimated with data on male production workers employed in small manufacturing firms in Gujranwala and obtained from a self-administered survey conducted in July-August, 1991. To conform with the official definition in Pakistan, small firms are defined as those that are un-registered under the Factories Act 1934 and employ fewer than 10 workers.[3]

Because sampled firms are un-registered, they represent an uncharted territory with unknown total population. Hence, the sampling frame is purposive in nature and does not always reflect a random drawing from the total population. The selection of manufacturing industries was randomly made from Standard Industrial Classification (SIC) at the four-digit level (See, CSO (1970)]. Out of a total of 182 manufacturing groups at the four digit level one group was randomly picked from each of the nine standard manufacturing divisions at the two-digit level. In random drawing, the industries which were found to be nonexistent in Gujranwala were, however, dropped from the survey. For cost effectiveness, seventeen firms were contacted for data collection from each industry group and all of them were included in the survey. The included firms were the first seventeen that we ran into during our field trips to the pre-identified clusters of firms for sampled industries.

The survey data were collected from 153 entrepreneurs/managers of enumerated firms and their 665 workers employed at the time of the survey, on two separate questionnaires: one each for workers and owners. The questionnaires were administered in personal interviews with owners and workers. Separate interviews for entrepreneurs/managers and workers were conducted in which detailed questions were asked in the local Punjabi language. Ambiguous answers to questions by respondents were subjected to further scrutiny in the second or third visits to the firms. The survey covers both subcontracting and non-subcontracting firms. The two sub-samples of subcontracting and non-subcontracting workers were obtained by a matching of workers' and owners' surveys, since information on subcontracting status was recorded in owners' questionnaire only. From the total sample of 665

[3] This definition is consistent with the Federal Bureau of Statistics, Government of Pakistan's *Survey of Small Scale and Household Manufacturing Industries (SSHMI)* conducted periodically. However, up till 1976-77, the Federal Bureau defined small firms as those having a capital stock of less than Rs. 2 million.

workers, 31 unpaid family members were excluded, leaving a final sample of 634 workers: 208 subcontracting 426 non-subcontracting.

Definition of Variables

We estimate separate wage equations for workers in subcontracting and non-subcontracting firms by employing an extended version of the human capital model (1), which includes human capital variables (schooling, experience and a skill-specific experience variable substituting for tenure), and control variable for working conditions, payment system, personal characteristics and industry affiliations.

Some interesting issues arise in including tenure as a variable in our model. The years of tenure with a firm indicate accumulation of firm-specific human capital that increases workers' productivity in respective firms making such human capital investments. Therefore, in conventional earnings functions the variable for total experience and tenure are used to estimate returns to general and specific training. Sometimes, however, labour market conditions do not allow accumulation of firm-specific training due, for example, to the threat of raiding by their competitor firms.[4] As Guiding (1991) has found, tenure (experience in the current job) is not important in determining wages in the informal sector in less developed countries. Hence, we assume that returns to specific training are associated with skill-specific training instead of firm-specific training. For instance, the labour market in Pakistan's small manufacturing sector does not allow firm-specific human capital accumulation because accumulated skills are highly portable. Small firms are known for their operations with minimum of space and machines where, more often, they use similar locally manufactured adapted technologies and tools. Workers in these firms acquire skill-specific training by working as apprentices in one or more firms. As an example, skills acquired by electricians are useful in all firms in the electrical appliance industry. Similarly, welding is a skill commonly acquired to work in the informal manufacturing sector, which is equally useful in several industries. Because of skill-specific training, no rational employer pays for their training costs due to the threat of raiding by other firms.[5] Hence we introduce the *SKLEXP* variable, for skill-specific experience, to capture the effects on wages of specific training investments or experience in current skill. The starting date of acquiring the current skill is an important threshold and its precise identification is essential so that the *SKLEXP* variable is not a very noisy

[4] For example, Becker (1964) noted that for monopsonists all investments on their employees' on-the-job training may be regarded as specific training, since they face no competition from others. However, in perfectly competitive labour markets employers are under 'constant threat of raiding' and thus would have little firm-specific investment.

[5] For further details on the training system in Pakistan, especially in the informal sector, see Burki and Ubaidullah (1992) and Burki and Afaqi (1996).

empirical construct. This threshold was identified by respondents in their responses while accounting for the experience in current skill.

Descriptive statistics for the working sample and definition of variables are reported in Table-1. It is interesting to note that mean monthly wages, years of formal schooling, and skill-specific experience are higher for workers in subcontracting than in non-subcontracting firms. More specifically, mean monthly wages are about 3 percent higher in subcontracting firms. Other notable differences are in years of work experience *(EXPER)*, years of training completed *(TRAIN)*, and the proportion of married workers. These statistics indicate that there are differences in personal characteristics of the two kinds of workers, which also raise the possibility of sample selection bias.

In Pakistan's social system ***bradris*** are associated with particular professions.[6] Traditional craftsmanship of certain ***bradris*** are sometimes recognised as an important determinant of wages [Nabi (1998)].[7] Therefore, we include the ***bradri*** background of workers, which has diminishing importance in Pakistan's labour market. We can see that workers with various ***bradri*** origins are evenly spread across subcontracting and non-subcontracting firms. To investigate the industry effects we include the industry origin of the workers. The highest concentration of subcontracting workers is in bakery products, saw and planning mills, while non-subcontractig workers are mainly found in knitting mills, soap and detergents and the china and ceramics industries.

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[6] *Bradri* is an important element of the social system in Pakistan, which has its origins in the Hindu caste system. For centuries the social system in India and Pakistan centered around villages which were will-knit entities self-sufficient for all their economic and social needs on account of a social division of labour by which *bradris* were identified with particular professions, e.g. *lohar* (blacksmith), *mochi* (cobbler), *ansari* (weaver), *rajput* (landlowner and ruler), and *arain* (cultivator), etc. Although the power of the village has eroded during the past century, the traditional craftsmanship of particular *bradris* is sometimes recongnised (Nabi (1988); Nadvi (1990).

[7] For example, Nabi (1988) has shown that in the farm machinery industry in Punjab, Pakistan, *lohar* workers earn a premium due to their *bradri* origin. Moreover, he found that *lohar* entrepreneurs prefer workers from the *lohar bradri*.

Table-1: Summary Statistics and Definition of Variables

Variable	Definition	*Subcontracting*		*Non-subcontracting*	
		Mean	Std.Dev.	Mean	Std.Dev.
SUBCONTR	= 1 if employer a subcontracting firm	---	---	---	---
LWAGE	Natural logarithm of monthly wage	7.16	0.54	7.05	0.73
SCH	Years of completed schooling	3.84	3.56	3.73	3.76
EXPER	Years in labour market	11.17	8.56	9.56	7.87
SKLEXP	Years of experience in current skill	7.94	6.98	6.13	6.05
EXP	Years in labour market before current skill	3.24	5.55	3.42	5.80
FAMSIZE	Number of other household members	7.39	3.14	7.53	2.77
WORKHRS	Number of hours worked per week	53.75	11.19	51.59	9.86
PIECE	= 1 if paid on piece-rate basis	0.19	0.40	0.39	0.49
MONTHLY	= 1 if paid on fixed weekly/ monthly basis	0.72	0.45	0.52	0.50
DAILY	= 1 if paid on daily basis	0.09	0.29	0.09	0.29
TRAIN	Years of completed training in current skills	2.47	1.79	2.19	1.80
HINCOME	Monthly household income other than the worker	2255	3983	2501	2943
URBAN	= 1 if lives in Gujranwala city	0.59	0.49	0.71	0.45
MARRIED	= 1 if married	0.53	0.50	0.44	0.50
SKILL1	= 1 if trained worker	0.72	0.45	0.63	0.48
SKILL2	= 1 if semi-trained worker	0.17	0.38	0.18	0.39
SKILL3	= 1 if untrained worker	0.11	0.31	0.19	0.39
BRADRI1	= 1 if rajput	0.20	0.40	0.16	0.37
BRADRI2	= 1 if lohar	0.14	0.35	0.09	0.29
BRADRI3	= 1 if arain	0.17	0.38	0.14	0.35
BRADRI4	= 1 if ansari	0.04	0.19	0.08	0.27
BRADRI5	= 1 if kashmiri	0.05	0.22	0.06	0.24
BRADRI6	= 1 if others	0.40	0.49	0.47	0.50
IND1	= 1 if in saw and planing mills	0.16	0.37	0.01	0.10
IND2	= 1 if in bakery products	0.28	0.45	0.03	0.17

IND3	= 1 if in printed cards and stationery	0.13	0.33	0.05	0.23
IND4	= 1 if in iron and steel foundries	0.09	0.29	0.12	0.32
IND5	= 1 if in jewellery and precious metals	0.05	0.21	0.06	0.24
IND6	= 1 if in electrical appliances and housewares	0.13	0.34	0.14	0.35
IND7	= 1 if in knitting mills	0.06	0.23	0.25	0.43
IND8	= 1 if in soap and detergents	0.01	0.10	0.18	0.38
IND9	= 1 if in china and ceramics	0.09	0.29	0.16	0.37
N	Sample size	208	---	426	---

Empirical Results

We expect positive signs for *SCH, EXPER, SKLEXP,* and negative signs for nonlinear terms $EXPER^2$ and $SKLEXP^2$. Due to the joint family system in Pakistan where other family members also work, workers from large families are expected to be less compelled to work hard. Therefore, family size *(FAMSIZE)* is expected to be negatively related to wages. The coefficient for *MARRIED* is expected to be positive. Other things being equal, those who work more hours per week are expected to receive higher wages. However, the sign pattern for *WORKHRS* is not easy to determine from our sample because the work norms vary across firms, largely depending upon the demand patterns for respective firms, while the payments are mostly made on fixed weekly/monthly or daily basis.[8]

In a first run of the model, due to high collinearity between *EXPER* and *SKLEXP* both the experience variables were found to be statistically insignificant.[9] Therefore, to avoid this problem we replaced *EXPER* with *EXP*, which is a control variable for EXPER and explicitly measured by subtracting *SKLEXP* from *EXPER*.

Table-2 presents results of the OLS regression estimates for wage equations for full sample that includes the *SUBCONTR* dummy variable, and the two sub-samples for workers in subcontracting and non-subcontracting firms. A Chow test was used to test if a single wage equation characterises

[8] The tests of specification for including *HINCOME* and *URBAN* variables in the wage equations were rejected by the *F*-test. The computed *F* values for the full, subcontracting, and non-subcontracting samples were 0.00035, 0.274, and 0.087, respectively which were less than the critical *F* value of 3.32 at the 0.05 level.

[9] The correlation between *EXPER* and *SKLEXP* was positive and high at 0.76 and 0.68 for subcontracting and non-subcontracting samples, respectively.

the entire labour market. The finding that the wage structure in subcontracting and non-subcontracting sectors is statistically equivalent would be treated as evidence in favour of the competitive model. By contrast, our results indicate that the coefficients for subcontracting and non-subcontracting wage regressions are statistically not equal, since our computed test statistic was greater than the critical value at the 1 per cent level. Hence, the two wage equations are structurally different, which implies that the workers in the two sectors are paid differently for similar characteristics. In other words, competitive explanations of the wage differentials for equally skilled workers may not be important in this particular data from Pakistan's labour market. This view is further corroborated by the evidence discussed below.

In all three regressions, the coefficients for *SCH*, *EXP*, and *SKLEXP* are positive and statistically significant at any reasonable significance level while the coefficients for EXP^2 and $SKLEXP^2$ generate the usual quadratic concave earnings profiles [Mincer (1974)]. By comparison, whereas an additional year of schooling raises wages by 2 per cent in subcontracting firms, it raises wages by 1.6 per cent in non-subcontracting firms. The returns to *EXP* in the non-subcontracting sector are lower in the beginning years, which overtake subcontracting sector returns at about 16 years of experience. However, the reliability of the non-subcontracting sector's profile is doubtful since its coefficient is statistically insignificant.

A more meaningful comparison is provided by the cumulative wage growth for the two kinds of workers. These are estimates of skill-specific wage premiums that a typical worker earns as he accumulates experience in current skills. Our results indicate that the accumulation of skill-specific experience leads to a steeper experience-wage profile for subcontracting than for non-subcontracting workers since wage growth in the beginning and peak years is greater for subcontracting workers. More specifically, an average subcontracting worker gets about 23 per cent wage growth by the fifth year as against only 15 per cent for non-subcontracting workers. Moreover, peak earnings of 86.8 per cent occur at 35 years of experience in current skills in subcontracting firms, as against the peak growth of 43.1 per cent at 25 years in non-subcontracting firms. Whereas the average starting monthly wages at zero skill-specific experience are roughly the same in both the sectors,[10] a year of skill-specific experience yields a greater increase in subcontracting workers' wages. In other words, each additional year of skill-specific experience is valued more highly in subcontracting firms. The

[10] The starting monthly wages are Rs. 1010 and Rs. 908 in subcontracting and non-subcontracting sectors, respectively. They are obtained at the mean values of right hand variables.

existence of this differential invokes the efficiency wage arguments discussed in more detail below.

The negative coefficient for *FAMSIZE* shows that other things being equal, workers who have larger families tend to earn less, but these coefficients are not significantly different from zero. Similarly, the coefficient for *WORKHRS* is statistically insignificant in all the models implying that wages are not determined by the length of the days worked. However, the negative coefficients for *WORKHRS* may be due to possible endogeneity between *WORKHRS* and *LWAGE*: workers with high wages may be working more hours per week. We deal with this problem by using a two-stage least squares approach where wages and hours worked are treated endogeneous. But the Wu-Hausman specification test fails to detect any such problem.[11] The two control variables for pay system, *PIECE* and *MONTHLY*, are also not significantly different from zero, except that the dummy variable *PIECE* is significant at the 5 per cent level for non-subcontracting workers. In other words, there is no premium for piece rate workers in subcontracting firms. Most *bradri* dummy variables are statistically insignificant except *BRADRI 2*, which shows that workers in non-subcontracting firms belonging to the arain caste earn a premium relative to the excluded category.

The positive coefficient for *SUBCONTR* in column 1 suggests that taking into account human capital and other controls, wages in subcontracting firms are on average about 16 per cent higher than in non-subcontracting firms. Although, subcontracting workers are relatively more educated and experienced, the magnitude of wage differential is substantially higher than the gross differential observed in Table-1. The existence of substantial wage premium for equally skilled workers across industries implies that the employers have motives other than opportunity costs of workers, such as effort elicitation. Similarly, the evidence on inter-industry wage differentials substantiates this point.

The industry wage effects are indicated by the industry dummy variables, which are generally statistically significant in Table-2. For instance, the coefficient for *IND1* for subcontracting workers implies that after controlling for human capital and other characteristics, an average worker in saw and planning mills earns 29.8 per cent lower wages than an average worker in china and ceramics. The large and significant magnitudes

[11] Implementing this test procedure, the coefficients for *WORKHRS* remain negative but statistically insignificant. The Wu-Hausman specification test fails to reject the null hypothesis that *WORKHRS* is exogeneous in either of the two equations. The test statistics were 0.689 and 0.726 for subcontracting and non-subcontracting regressions, respectively against the χ^2 critical value of 3.84 at the 0.05 level.

of industry dummies in all the regressions in Table-2 clearly show that factors other than opportunity costs are also relevant in explaining relative wage differentials.

A primary question for a non-competitive explanation of wage differential is to ask why high wage subcontracting firms do not cut wages. The answer could be that subcontracting relationships involve a client-vendor monitoring problem not found in the non-subcontracting sector. As a consequence, firstly, subcontracting relationships involve hard to observe quality and in-time delivery considerations. These monitoring considerations are adequately addressed by the high pay strategies of subcontracting firms. One piece of evidence for this is that firms that subcontract are less likely to rely on piece rates (evidence that the monitoring of output may be difficult) than those that do not subcontract. Secondly, the large industry wage differentials across subcontracting and non-subcontracting sectors may reflect monitoring costs, as is often argued in the efficiency wage literature. Lastly, the observed subcontracting pay premium could be interpreted as serving the twin functions of solving the monitoring problems and signalling clients that production will be on time and of the contracted quality.

Table-2: OLS Estimates of the Wage Equations
(Dependent variable is LWAGE)[a]

Explanatory Variable	Full Sample	Subcontracting	Non-subcontracting
Constant	6.42	6.54	6.42
	(40.66)	(35.28)	(28.45)
SCH	0.019	0.020	0.017
	(3.50)	(2.53)	(2.44)
EXP	0.031	0.035	0.023
	(3.47)	(3.72)	(1.77)
$EXP^2 \ X \ 10^2$	-0.075	-0.110	-0.038
	(-3.68)	(-3.52)	(-0.71)
SKLEXP	0.0398	0.050	0.034
	(5.43)	(5.28)	(2.99)
$SKLEXP^2 \ X \ 10^2$	-0.063	-0.072	-0.066
	(-3.68)	(-3.86)	(-2.00)
FAMSIZE	-0.011	-0.009	-0.004
	(-1.79)	(-1.23)	(-0.49)
$WORKHRS \ X \ 10^2$	-0.024	-0.057	-0.036
	(-1.22)	(-0.21)	(-1.16)
PIECE	0.205	0.114	0.233

	(2.24)	(0.81)	(1.92)
MONTHLY	-0.027	-0.003	-0.058
	(-0.33)	(-0.03)	(-0.52)
MARRIED	0.080	0.016	0.150
	(1.82)	(0.27)	(2.52)
SUBCONTR	0.147	---	---
	(3.76)	---	---
BRADRI 1	-0.011	-0.011	0.066
	(-0.21)	(-1.72)	(0.94)
BRADRI 2	-0.06	-0.128	-0.036
	(1.12)	(1.64)	(-0.51)
BRADRI 3	0.050	-0.088	0.138
	(1.03)	(-1.31)	(2.19)
BRADRI 4	0.016	-0.208	0.095
	(0.17)	(-0.87)	(0.92)
BRADRI 5	0.007	-0.11	0.044
	(0.012)	(-1.02)	(0.54)
IND 1	-0.374	-0.261	-0.267
	(-4.22)	(-2.31)	(-1.20)
IND 2	-0.381	-0.332	-0.469
	(-4.98)	(-3.04)	(-3.83)
IND 3	-0.355	-0.355	-0.292
	(-4.62)	(-3.24)	(-2.85)
IND 4	0.034	0.172	-0.015
	(0.46)	(1.30)	(-0.17)
IND 5	-0.529	-0.033	-0.720
	(-4.14)	(-0.19)	(-4.92)
IND 6	-0.249	-0.140	-0.269
	(-3.99)	(-1.44)	(-3.46)
IND 7	-0.097	0.117	-0.145
	(-1.31)	(0.93)	(-1.68)
IND 8	-0.291	-0.278	-0.293
	(-3.85)	(-1.24)	(-3.46)
Adj. R^2	0.57	0.57	0.59
F-statistic	32.66	11.40	24.58
N	634	208	426

Notes: Variables are defined in Table-1. *t*-statistics in parentheses are computed from White heteroskedastic-consistent standard errors.

The Selectivity Bias

Apparently, there are no constraints on workers' freedom to choose either subcontracting or non-subcontracting firms. However, the employers may be selecting particular kinds of workers. Therefore, we employ Heckman's two-stage procedure to purge the data of this statistical problem. The estimates for the maximised probit likelihood function for the full sample of 634 workers are presented in Table-3. The dependent variable is SUBCONTR that equals unity for subcontracting workers and zero otherwise. In the selectivity equation we include all human capital variables and personal characteristics important in capturing the quality of labour. We find little systematic relationship between workers' human capital characteristics and their being in subcontracting or non-subcontracting firms. Our results indicate that differences in education, experience, time spent in training and household income do not significantly affect the probability of being in the subcontracting versus non-subcontracting firms. Similarly, the probability for married workers and workers who belong to a particular ***bradri*** is not significantly different from the base category. However, the probability of a worker found in subcontracting firms increases with the level of training. For instance, being a trained worker (SKILL1) raises the probability of employment in subcontracting firms by 18.2 per cent. Similarly, workers residing in Gujranwala city are 10 per cent less likely to get employment in a subcontracting firm. Moreover, for workers in saw and planning mills, bakery products and printed cards and stationary, the probability of being in subcontracting firms increases by 77.3 per cent, 61.9 per cent and 29.4 per cent, respectively. In contrast, being in knitting mills and soap and detergents lowers the same probability by 28.5 and 53.8 percentage points, respectively. In sum, most human capital variables do not play a role in selecting workers, but industry affiliations do affect this selection process.

Table-3: Maximum Likelihood Estimates of the Probit Selection Equation

Explanatory Variable	Coefficient	Asymptotic t-statistics	Change in Probability[a]
Constant	-0.746	(-2.31)	---
SCH	-0.029	(-0.65)	-0.0114
EXPER	-0.043	(-1.20)	-0.0169
$EXPER^2$	0.001	(1.27)	0.0004
SKLEXP	0.025	(0.69)	0.0098
$SKLEXP^2$	-0.0004	(-0.35)	0.0002
TRAIN	0.009	(0.11)	0.0035
$TRAIN^2$	0.004	(0.50)	0.0016
HINCOME	-0.000	(-0.59)	-0.0000
URBAN	-0.248	(-1.76)	-0.0975
MARRIED	0.006	(0.03)	0.0024
SKILL1	0.463	(1.49)	0.1820
SKILL2	-0.131	(-0.42)	-0.0515
SCH SKILL1*	0.038	(0.73)	0.0149
SCH SKILL2*	0.102	(1.69)	0.0401
BRADRI1	0.131	(0.73)	0.0515
BRADRI2	-0.077	(-0.37)	-0.0303
BRADRI3	0.227	(1.24)	0.0892
BRADRI4	-0.040	(-0.14)	-0.0157
BRADRI5	0.127	(0.45)	0.0499
IND1	1.967	(5.75)	0.7730
IND2	1.574	(6.30)	0.6186
IND3	0.748	(2.90)	0.2940
IND4	-0.149	(-0.60)	-0.0586
IND5	0.223	(0.75)	0.0876
IND6	0.152	(0.68)	0.0597
IND7	-0.726	(-2.99)	-0.2853
IND8	-1.370	(-3.86)	-0.5384
R^2	0.353	---	---
Log-likelihood	-278.420	---	---
N	634	---	---

Notes: Variables are defined in Table-1. Asymptotic t-statistics are computed from White heteroskedastic-consistent standard errors.

a) Partial derivatives evaluated at the mean of the dependent variable.

We take inverse Mills ratio from the probit selection equation and use it as an additional regressor in wage determination equations. This procedure produces unbiased estimates of wage equations. Results from the OLS regressions conditioned on selection are displayed in Table-4. The

estimated coefficient for inverse Mills ratio (the correction factor) is negative but statistically insignificant in both sub-sectors, thus suggesting that we cannot reject the null that the covariance between errors in selection and wage equations is zero, $\sigma_{IW} = 0$. The insignificant coefficients for inverse Mills ratio demonstrate that unmeasured worker characteristics that influence wages and sector assignment are captured quite well by human capital and control variables and hence there is no evidence of selectivity bias. The selectivity bias corrected estimates in Table-4 differ trivially from the estimates in Table-2 that were not corrected for selectivity bias.

Table-4: Selectivity Bias Corrected Estimates
(Dependent variable is LWAGE)[a]

Explanatory Variable	Subcontracting	Non-subcontracting
Constant	6.65	6.36
	(15.74)	(28.60)
SCH	0.020	0.016
	(2.50)	(2.37)
EXP	0.035	0.025
	(3.63)	(1.94)
$EXP^2 X 10^2$	-0.112	-0.048
	(-3.42)	(-0.88)
SKLEXP	0.050	0.034
	(5.25)	(2.96)
$SKLEXP^2 X 10^2$	-0.072	-0.067
	(-3.88)	(-2.00)
FAMSIZE	-0.009	-0.004
	(-1.18)	(-0.52)
$WORKHRS X 10^2$	-0.052	-0.034
	(-0.19)	(-1.18)
PIECE	0.112	0.223
	(0.79)	(1.84)
MONTHLY	0.001	-0.062
	(0.01)	(-0.56)
MARRIED	0.016	0.148
	(0.27)	(2.49)
IND1	-0.338	-0.597
	(-1.13)	(-1.48)
IND2	-0.403	-0.730
	(-1.47)	(-2.47)

IND3	-0.396	-0.404
	(-2.09)	(-2.74)
IND4	0.166	-0.017
	(1.22)	(-0.20)
IND5	-0.045	-0.736
	(-0.26)	(-5.13)
IND6	-0.155	-0.290
	(-1.38)	(-3.59)
IND7	0.146	-0.076
	(0.85)	(-0.62)
IND8	-0.205	-0.201
	(-0.599)	(-1.54)
Inverse Mills Ratio (λ)	-0.069	-0.263
	(-0.28)	(-0.99)
Adj. R^2	0.56	0.59
F-statistic	10.93	23.69
N	208	426

Notes: Variables are defined in Table-1. *t*-statistics in parentheses are computed from White heteroskedastic-consistent standard errors.

a) To save space, the estimated coefficients for ***bradri*** control are not shown.

Decomposition of Wage Differentials

The wage gap between workers in subcontracting and non-subcontracting firms is decomposed into differences in endowments (due to human capital endowments and personal characteristics of workers) and differences in estimated coefficients or effects of discrimination (due to differences in the structure of wage payments). We use Oaxaca's (1973) decomposition technique with the modification of unweighted average, also used by Holtman and Idson (1993). This decomposition is written as

$$\overline{LWAGE^{sc}} - \overline{LWAGE^{nsc}} = 0.5\Sigma(\beta^{sc} + \beta^{nsc})(\bar{X}^{sc} - \bar{X}^{nsc}) + 0.5\Sigma\,(\bar{X}^{sc} + \bar{X}^{nsc})\,(\beta^{sc} - \beta^{nsc}) \quad \textbf{(4)}$$

where superscripts *sc* and *nsc* are for workers in subcontracting and non-subcontracting firms, respectively, *LWAGE* refers to the mean *ln* wage, overbars on *X*'s indicate the sample means of the explanatory variables, and β's are the estimated coefficients.

The results from this decomposition are presented in Table-5 where we find that differences in average endowments on *SCH*, *EXP* and *SKLEXP* partly help to account for higher wages in subcontracting firms,

but the bulk of this effect is explained by differential returns to these human capital attributes. In particular, higher value placed on *SKLEXP* or skill-specific experience in subcontracting firms explains a major portion of the higher observed wages. Similarly, higher returns to workers paid on monthly basis in subcontracting firms also explain the wage gap. On net, differences in human capital endowments explain part of the observed wage differentials, but these differentials are much less important than the differences in returns in explaining the wage gap. These results are in contrast with the predictions of equalising wage differentials in competitive equilibrium models. These general results are also corroborated by the second last row in Table-5, which shows that the differential in returns to attributes rather than differences in endowments are much more important in explaining the wage differential. The constant term depicts the differences in base wages that are interpreted as premium or rent to subcontracting workers. However, even after ignoring the constant term, as in the last row, the net total returns to coefficients act to more than explain the wage differential.

The wage differential to subcontracting workers cannot be explained as a premium offered by subcontracting employers to attract the best available workers, because our selectivity equation indicates no evidence of sorting by subcontracting firms. The idea of efficiency wages helps explain the large difference in the wage premiums to workers in subcontracting firms. Being in the private sector, small firms in Pakistan have full control on their wage setting decisions. They seem to maximise their profits by setting higher than the market wages to solve their monitoring problem. The returns to formal schooling and skill-specific experience are higher in subcontracting firms, which tend to increase the wage gap. Subcontracting firms not only offer higher wages, but also offer steeper experience-wage profile.

Table-5: Decomposition of Wage Differentials

Variable	Due to endowments	Due to coefficients	Total effect
Constant	--	0.120	0.120
SCH	0.0020	0.0114	0.0134
EXP	-0.0051	0.0376	0.0325
SKLEXP	0.0748	0.1121	0.1869
FAMSIZE	0.0009	-0.0373	-0.0364
WORKHRS	-0.001	-0.01	-0.011
PIECE	-0.0347	-0.0345	-0.0692
MONTHLY	-0.0061	0.0341	0.0280
MARRIED	0.0075	-0.0650	-0.0575
BRADRI	-0.0015	-0.1040	-0.1055
IND	-0.2224	0.1332	-0.0892
Total	-0.1856	0.1976	0.012
Total (net of constant)	--	0.0776	-0.108

Conclusions

This paper investigates the wage differentials for equally skilled workers in Pakistan's small manufacturing sector, focusing on subcontracting and non-subcontracting firms. Using survey data of small firms in Gujranwala, Pakistan we find important variations in relative wages of the two kinds of workers, which cannot be explained by the competitive model. More specifically, our results show that subcontracting workers earn 16 per cent higher wages than their non-subcontracting counterparts. We explain this high wage premium to subcontracting workers by invoking efficiency wage arguments and argue that the quality and in-time delivery considerations for labour-intensive activities of small manufacturing firms involve a client-vendor monitoring problem, which influences the optimal wage for the subcontracting firms. The client/vendor monitoring problem necessitates high pay strategies for subcontracting firms. The paper also takes account of the possibility of selectivity bias by employing Heckman's two stage procedure, but fails to detect any such problem. A decomposition of our results indicates that endowment differentials between workers partly explain higher wages in subcontracting firms, but unequal returns to human capital and other attributes of workers explain the major portion of the wage gap. This evidence is quite contrary to the predictions of equalising wage differentials of the competitive models.

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