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Factors Determining Work Participation and Labour Supply Decisions in Pakistan's Urban Areas

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Labour force participation in Pakistan, even amongst prime-aged males, is lower than observed in many similar countries. The analysis of labour force participation in urban Pakistan in this paper indicates that systematic factors explain a fair amount of this participation. The extended family structure as well as the availability of remittances allow younger, educated males to extend their job search. Using tobit and probit estimation techniques, the study found that labour supply is explained primarily by participation as opposed to hours worked conditional upon participation. The study also found that the rise in wages attributed to education is fairly high and similar to what was found in Pakistan in the late 1970s.

INTRODUCTION

There is a broad body of empirical work that attempts to explain individual labour supply decisions – whether to work, how intensively, at what wage, and in which sector of the economy. Governments are concerned with such determinates of labour supply for a number of reasons. An understanding of supply response allows planners to anticipate impacts of changes in economic conditions or in government policies. In addition, analysis of earnings and labour supply provides important information concerning the relative economic returns to physical assets and human capital in different sectors of the economy, and is useful for analyzing income distribution and poverty issues.

Studies of labour supply typically focus on groups with low participation rates – for example, women, young people, and the elderly – where changes in economic incentives may elicit a significant supply response. In most regions, the vast majority of "prime-aged" men (an estimated 95 percent of those between 15 and 55 years of age) not enrolled in school are in the labour force [Lipton (1983)]. The remainder are ill, handicapped, or perhaps unwilling to work. In contrast, Pakistan has a comparatively large share of inactive prime-aged men, particularly among younger age groups: according to the 1981 Population Census [Government of Pakistan (1984)], some 17.7 percent of urban males between the ages of 15 and 24 years were neither enrolled in school nor in the labour force, and 12.6 percent between the ages of 25 and 54 were likewise inactive. These numbers

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are substantiated by other surveys – for example, the 1978-79 Household Income and Expenditure Survey [Government of Pakistan (1983)]. Women in Pakistan are seldom reported to be economically inactive in the sense that men are; rather, some 95.4 percent of urban females aged 15 to 54 years, not enrolled in school, were classified as "housekeeping" in the 1981 Population Census, and nearly all of the remaining 4.6 percent were classified as working.

These figures suggest some interesting questions regarding not only women's but also men's labour supply decisions. In an attempt to illuminate these questions, this paper presents labour force participation equations for urban men and women. Earning functions and labour supply models are presented for men only; there are not sufficient women working in the wage sector in our sample to perform similar estimates for female workers. The data used to estimate the models were collected in 1986 under the auspices of the International Food Policy Research Institute (IFPRI) and the Pakistan Institute of Development Economics (PIDE). The survey covers 1,000 urban households residing in low-income neighbourhoods throughout Pakistan. The survey was based on a random draw of households listed in a subsample of census tracts classified as low socio-economic neighbourhoods by the Federal Bureau of Statistics. The stratification is then by neighbourhood; within these neighbourhoods, there is a fair amount of variation in earnings and remittances.[1]

The paper has four sections. It opens with a brief overview of the relevant labour supply literature, followed by a description of methodology. Empirical results are described in the third section. The fourth and final section of the paper draws out policy implications and presents our conclusions and recommendations for future work.

OVERVIEW OF THE LITERATURE

The empirical literature on individual labour supply for the developing countries has primarily focused on three types of questions: (1) how does landholding and tenancy status influence agricultural labour supply [Rosenzweig (1980); Bardhan (1984)]; (2) how does education influence earnings [Behrman and Wolfe (1984); Chiswick (1977)]; and (3) what determines female labour supply [Khandker (1987); Smith (1980)]. While these questions are often addressed simultaneously [Sahn and Alderman (1988)], the first of these questions is, of course, relevant only to rural populations.

The second question has been addressed for Pakistan by Khan and Irfan (1985) using the household sample from the Population, Labour Force, and

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Migration Survey of 1979, and by Haque (1984) using a 2,000 household survey administered in Rawalpindi in 1977. Their estimates of earning functions indicate increasing returns to higher education, especially in urban areas. There have been a number of efforts to address the third question in Pakistan.[2] These studies have, however, been somewhat handicapped by limited and conflicting data. The current study does address this question as well as the issue of the impact of education. In addition, it seeks an explanation for the comparatively low labour force participation of urban men, which may have significant policy implications in the near future.

METHODOLOGY AND MODEL SPECIFICATION

Our analysis uses a model of wage determination initially developed by Becker (1964) and Mincer (1974), which assumes that differences in wages depend on differences in human capital – education, training, and work experience. The likelihood of being employed and the number of hours an individual works are a function of the market wage and the individual's demand for leisure; if the wage offer (W) exceeds the individual's shadow wage rate (W_r) or implicit value of time, he or she will participate in the labour market. Further, an individual will adjust the number of hours worked (H) so as to equate the market wage with the shadow wage rate.

Formally, the model can be written:

$$\left.\begin{aligned} W &= \alpha_0 + \alpha_n X_n + \mu_1 \\ H &= \beta_0 + \beta_1 W + \beta_m X_m + \mu_2 \end{aligned}\right] \text{ if } W > W_r,\ H > 0 \qquad (1),\ (2)$$

$$H = 0 \text{ otherwise}$$

Wages are observed only for individuals whose reservation wage is less than or equal to the market wage ($W_r <= W$) and who have chosen to work in the wage sector. This excludes individuals who are not employed. It also excludes self-employed individuals who typically report profits in lieu of wages, which include returns to labour (e.g., wages) and returns to capital, although these self-employed individuals are included in estimates of labour supply. Observations on wage earners are used to estimate predicted wages for other individuals. However, potential selectivity bias is introduced by the fact that $E(\mu_1 \mid H > 0)$ is not necessarily equal to zero in the sample of wage earners. To correct this, we first estimate a probit function to predict the probability that an individual is in the wage sector. The results of this equation are used to derive the inverse Mills ratio (denoted λ), which is then included in the wage equation to obtain consistent estimates of the α's [Heckman (1976)].

[2]See Afzal and Nasir (1987) and the references cited in that article: see also Chaudhry and Khan (1987).

The wage equation corrected for sample selection provides the necessary information to impute a predicted wage for all individuals in the sample. The predicted wage is included in the labour supply function for the second stage of the estimation process. Note that by using predicted wages even for those individuals whose wages are reported, we avoid correlation of errors stemming from the fact that wages are derived from dividing earnings by hours worked. A selectivity-correlated OLS regression as well as a tobit or censored regression model is used to estimate the labour supply function to correct possible biases introduced by selectivity and censoring. In addition, the predicted wage is included in a simple probit model of labour force participation (1 if economically active, 0 otherwise). Note that the participation model is implicitly imbedded in the tobit labour supply equation.

The natural log of the wage rate per hour is used as the dependent variable in the wage equation. Included on the right-hand side are dummy variables for the highest level of education achieved (primary, middle school, secondary, university), and age and age-squared, which represent job experience. The use of age and age-squared rather than job experience greatly simplifies estimates of returns to education [Heckman and Hotz (1986)]. In addition to age and education, a dummy variable for formal sector employment[3] and for residence in Punjab are included in the wage model. On *a priori* grounds, we expect that education and age/work experience will be positively correlated with the wage rate, and that formal sector workers will be paid a premium in comparison to employees in the informal sector.

The *labour supply model* uses hours worked per week as the dependent variable, and the imputed wage (derived from the selectivity-correlated wage equation), household demographics (number of individuals in various age/gender groupings), non-labour income, and a dummy variable for individuals aged 55 years and greater and for households receiving transfers from abroad as independent variables. We expect the predicted wage rate to be positively correlated with labour supply (individuals who command higher market wages will work more hours), and non-labour income (derived from transfers, *zakat*, rents, pensions, and the like) to be negatively correlated due to the decreasing marginal utility of income. All other things being equal, older individuals are likely to work fewer hours than younger individuals, and individuals living in households receiving transfers from abroad are also likely to work less intensively since leisure is a normal good.[4] Demographic

[3] All employees who contribute to the Employees Provident Fund (EPF) are assumed to work in the formal sector.

[4] Pakistan has a history of labour migration to the Middle East, where migrant workers earn substantially more than what they would earn in Pakistan. The higher labour productivity of migrants may act to decrease family labour supply. This is measured through total non-labour income and more directly via simple availability of remittances from abroad.

variables are included to test the hypothesis that individuals living in households with high dependency ratios (e.g., many children or, possibly in Pakistan, many women) either choose or are required to work more intensively than individuals living in household with few dependents. Similarly, individuals living in households with many potential workers (for example, several prime-aged males) may work less intensively than those living in households without these.

Binary probit labour force participation equations are estimated for both men and women. Two models are presented: the first, a reduced form equation includes variables in both the wage and labour supply models, while the second includes a measure of imputed wage in lieu of wage determinates. Only the former model is presented for women due to the data insufficiency noted earlier.

EMPIRICAL RESULTS

Descriptive Overview

The estimation sample includes 2,179 women and 2,254 men who are over 10 years of age and not currently enrolled in school. An estimated 78 percent of the men and 8 percent of the women are economically active. While the women's participation rates in the sample are roughly consistent with estimates from recent Labour Force Surveys (LFS), there is evidence to suggest serious underreporting of women's labour force activities in Pakistan, particularly informal sector activities occurring at the periphery of the domestic sphere [Afzal and Nasir (1987)]. The questionnaire used here, and the technique of obtaining labour information using female interviewers speaking directly to the women, has also been used in rural areas. There it obtained appreciably higher female labour force participation than recent government surveys [Alderman and Chishti (1989)]. The methodology, then, has proven capable of recording female labour activities even when they are informal and seasonal. This increases confidence that the urban data studied here is not an underestimate. Labour force activities, as defined for this study, include work in household enterprises and production of crafts for sale as well as wages. It does not include activities such as household chores and production of goods for home consumption even though it is recognized that these activities are a form of production and generally occupy a major part of any day [see Alderman and Chishti (1989)].

Table 1 shows employment rates, hours worked for those in the labour market, and average wage rates per hour by employment sector (self-employed, employees), age, and gender. According to these statistics, reported employment rates for women are low and do not vary greatly by age. Interestingly, younger working women tend to be employees (and earn as much on average as their male counterparts, although this reflects the different average education levels of the women actually in the labour force), while older women who work are more likely to be self-employed.

Table 1

Employment Activities, Weekly Hours Worked, and Wages of Individuals not Enrolled in School, by Age and Gender (IFPRI–PIDE Urban Survey, 1986)

	No. of Cases	Percent Inactive	Self-employed		Wage Employees		
			Percent Self-employed	Average Hours Worked/Week	Percent Earning Wages	Average Hours Worked/Week	Average Wage (Rs/Hour)
Females							
10–14 Years	285	94.9	4.3	28.0	0.9	48.0	0.42
15–19 Years	358	92.7	5.3	26.6	1.9	33.6	2.59
20–24 Years	324	92.0	4.0	18.3	4.0	39.5	7.53
25–34 Years	422	91.9	5.5	24.2	2.6	40.3	6.06
35–44 Years	338	90.8	5.3	29.4	3.8	51.0	2.95
45–54 Years	234	90.1	7.7	25.7	2.1	47.8	4.01
55–64 Years	139	90.6	7.2	41.4	2.2	32.0	4.83
⩾ 65 Years	129	96.9	3.1	26.5	0.0	–	–
Total	2,179	92.2	5.3	26.9	2.5	42.3	4.74
Males							
10–14 Years	163	55.2	18.4	46.2	26.4	56.9	1.13
15–19 Years	276	32.9	35.1	44.1	31.9	52.5	2.68
20–24 Years	349	15.8	40.1	46.3	44.1	53.8	4.50
25–34 Years	493	9.7	44.6	51.2	45.6	54.6	4.73
35–44 Years	313	11.5	42.2	48.4	46.3	53.1	5.76
45–54 Years	289	9.0	47.4	51.8	43.6	52.5	6.10
55–64 Years	182	22.5	44.0	46.2	33.5	53.2	5.15
⩾ 65 Years	189	58.2	32.3	46.5	9.5	50.3	2.95
Total	2,254	22.0	39.8	48.4	38.2	53.6	4.67

This pattern is not observed for men, except in the oldest age groups (greater than 55 years), which are above the mandatory retirement age for most formal sector jobs. What is observed is a considerable proportion of economically inactive men, particularly in younger age groups (10–14 years, 15–19 years), but in the so-called "prime-aged" groups as well. According to our estimates, 11.4 percent of men between the ages of 20 and 54 are not in the labour force. As noted earlier, this is a high proportion in comparison to other developing countries.

Women in the labour force spend an average of 26.9 hours per week working outside the household if they are self-employed, and 42.3 hours per week if they are employees. In contrast, self-employed men work 48.4 hours per week and male employees work an average of 53.6 hours per week. In most countries, the self-employed work longer hours than wage employees. Unlike many of these countries, Pakistan has a substantial informal wage sector typified by very flexible labour arrangements. If we separate the formal and informal wage sectors for men (Table 2), informal sector employees (some 73 percent of the total) work an average

Table 2

Average Hours Worked and Wages for Men in the Formal and Informal[a] Wage Sectors, by Age (IFPRI–PIDE Urban Survey, 1986)

	Informal Sector			Formal Sector		
	Percent	Hours/ Week	Rs/Hour	Percent	Hours/ Week	Rs/Hour
10–14 Years	100.0	56.9	1.13	0.0	–	–
15–19 Years	92.0	53.1	2.67	8.0	45.1	2.83
20–24 Years	74.0	55.9	3.82	26.0	47.7	6.45
25–34 Years	69.3	56.5	4.08	30.7	50.3	6.20
35–44 Years	62.8	54.8	5.22	37.2	50.4	6.69
45–54 Years	64.3	55.4	4.96	35.7	47.1	8.16
55–64 Years	73.8	53.9	4.83	26.2	51.1	6.05
Total	72.9	55.2	3.95	27.1	49.2	6.60

[a]Individuals who report contributing to the Employees' Provident Fund are considered to be in the formal sector. Their wages are typically reported *net* of Provident Fund contributions.

of 55.2 hours per week in contrast to 49.2 hours per week for the formal sector.[5]

According to Table 2, employees in the formal sector earn higher wages on average than those in the informal sector (overall, the former earn 6.60 Rs/hour in contrast to 3.95 Rs/hour for the latter). Wage differences are most extreme for the very young and very old; however, differences persist throughout the age distribution. As predicted by the standard human capital model, earnings increase with age (e.g., work experience) – formal sector employees reach maximum earnings between the ages of 44 and 55, while informal sector employees reach maximum earnings between 35 and 54 years of age.

Wage Determination Equation

The selectivity-corrected wage Equation (1) for the 854 male employees in the sample is presented in Table 3.[6] The results confirm that wages increase with age and peak at 46 years in this population. Education strongly influences the wage received – the higher the level of education, the higher the wages; employees with a primary or middle school education receive some 12 to 14 percent wages higher than those with no education, all other things held constant. Effects are more pronounced at higher levels of education – with secondary schooling earning some 63 percent higher wages, and workers with a university education receiving 139 percent higher wages, or roughly 11.6 percent for every year of schooling completed. These private returns are very close to those estimated by Khan and Irfan (1985) despite the different data-set and technique.

As indicated by the coefficient of the provident fund dummy variable, workers in the formal sector earn more per hour than workers of equivalent education and age in the informal sector. Note that the wage is net of such deductions. If such mandatory savings are also considered as worker remuneration, the difference in earnings between the two sectors would be even larger.

It is somewhat puzzling why wages are lower in the Punjab, although this is also consistent with Khan and Irfan (1985). It may be that a distinction that separates Karachi from other non-Punjabi areas or one that separates large metropolitan areas from other urban areas would illuminate this issue. However, the current sample is too small to be partitioned into many subdivisions.

Determination of Labour Force Participation

Female labour force participation is strongly influenced by higher education,

[5] Some 51 percent of formal sector employees report working 48 hours per week. An additional 20 percent report working either 36 or 42 hours per week.

[6] Means and standard deviation of the variables used in these equations are presented in the Appendix.

Table 3

Selectivity-correlated Wage Equation[a] for Men (IFPRI–PIDE Urban Survey, 1986)

Variables	Total Wage Sector[b]	
Age	0.1016	(8.8)
$(Age)^2$	–0.0011	(7.2)
Education		
None	–	–
Primary School	0.1214	(2.0)
Middle School	0.1427	(1.9)
Secondary School	0.4886	(6.5)
University	0.8723	(7.0)
Deduct Employees' Provident Fund?	0.1606	(2.9)
Live in Punjab?	–0.2297	(4.7)
λ (Mills Ratio)	0.2475	(1.3)
Intercept	1.0234	(3.0)
Model Statistics		
Number of Observations	854	
Average Wage (Rs/Hours)	4.58	
R^2	.369	

[a] Dependent variable is the natural log of the wage rate measured in Rs/hours.
[b] *T*-statistics are in parentheses.

although such education is still a relatively uncommon occurrence in Pakistan. It is also influenced by household composition. Women's participation rates increase with the number of females of any age, likely due to substitution and sharing of domestic tasks (such as child care), and decrease with the number of males in the household. Other males affect female labour force participation both through an income effect and by their influence on the amount of household tasks that are deemed necessary, which affects the reservation wage.

Men's participation rates are not strongly affected by education, but are affected by age (which acts as a proxy for work experience). Household composition is likewise important; the negative impact of the number of adult males in the household on male labour force participation is also likely explained by the effect

of more potential earnings. The coefficient on the number of females 7–14 is less intuitive. Labour force participation also declines with remittances, either domestic or from abroad, and is in keeping with leisure being a normal good. As expected, participation increases with the (expected) wage offer, which is primarily a function of age and education (Table 4).

Male Labour Supply Equations

Mathematically the tobit or truncated regression model incorporates both the labour participation equation and the estimation of hours worked conditional on participation. While the expected wage effect is positive and significant in the tobit model (Table 5) and in the probit model (Table 4), it is not significant in the selected corrected OLS equation (Table 5). This suggests that the wage offer primarily influences the choice of whether to work (e.g., labour participation), and not how many hours to work once the decision to participate has been made. When we disaggregate the wage effect by sector (wage versus non-wage, not shown here), the labour supply of the self-employed responds more strongly to wage incentives (predicted wages) than employees. This is likely because they have greater control over the conditions of their employment (e.g., hours worked) than employees.

Each additional adult male in the household decreased the average hours worked by 1.3 (OLS) to 1.8 (tobit) hours per week. This is likely an income effect. Consistent with the theory of labour supply, non-wage income has a negative impact on hours worked, and individuals receiving remittances from abroad work fewer hours. In addition, older men work less intensively than younger men.

Note that comparing the coefficients between the tobit and OLS equations indicates some interesting aspects about the structure of labour supply behaviour. For example, men living in households receiving transfers from abroad work on average 15.4 hours less than other men; however, conditioned on being in the labour force, transfers decrease hours worked only by some 5.6 hours per week. Thus the impact of transfers is primarily one of labour participation rather than supply, conditioned on participation. Similarly, older men are generally less likely to be in the labour force, while the impact of age, conditioned on participation, is not significant. These results suggest that it is important to interpret tobit estimates with care, particularly when predicting future labour supply responses.

POLICY IMPLICATIONS AND CONCLUSIONS

Our results suggest that there are strong and systematic factors that explain both men's and women's labour supply decisions in urban Pakistan. Labour force participation rises with increases in expected earnings, and wages do, indeed, vary with differences in human capital – represented by education and work experience.

Table 4

Probit Estimates of Labour Force Participation Rates, Males and Females not Enrolled in School (IFPRI–PIDE Urban Survey, 1986)

Variables	Reduced Form[a]				With Predicted Wages[a]			
	Women		Men		Men			
Age	0.0429	(3.5)	0.190	(12.2)	–	–		
(Age)^2	–0.0005	(3.2)	–0.0021	(10.1)	–	–		
Older than 55 Years	–	–	–0.980	(3.0)	–	–		
Education								
None	–	–	–	–	–	–		
Primary School	0.185	(1.4)	0.233	(1.5)	–	–		
Middle School	0.102	(0.6)	0.192	(1.0)	–	–		
Secondary School	0.845	(5.3)	0.110	(0.6)	–	–		
University	1.163	(3.9)	0.414	(1.2)	–	–		
Household Composition								
Number of Children, 0–6 Years	–0.027	(0.9)	0.022	(0.6)	0.017	(0.8)		
Females, 7–14 Years	0.082	(2.2)	–0.127	(2.4)	–0.073	(2.4)		
Males, 7–14 Years	–0.077	(1.9)	–0.094	(1.9)	–0.039	(1.3)		
Females, 15+ Years	0.061	(1.8)	–0.042	(1.0)	–0.036	(1.5)		
Males, 15+ Years	–0.128	(3.9)	–0.082	(2.3)	–0.051	(2.5)		

Continued –

Table 4 – (*Continued*)

Variables	Reduced Form[a]				With Predicted Wages[a]	
	Women		Men		Men	
Non-labour Income (Rs/Month)	–	–	$-0.4E^{-4}$	(0.8)	$-0.3E^{-5}$	(0.8)
Receive Remittances from Pakistan?	–	–	–0317	(1.7)	–0.245	(2.1)
Receive Remittances from Abroad?	–	–	–0.773	(3.2)	–0.564	(3.9)
Live in Punjab?	0.337	(3.6)	–0.136	(1.2)	–	–
Log_e Expected Wage (Rs/Hour)	–	–	–	–	1.166	(16.7)[b]
Household Head log_e (Rs/Hour)	–0.026	(0.9)	–	–	–	–
Intercept	–2.158	(8.2)	–1.159	(4.1)	0.371	(3.8)
Model Statistics						
Number of Observations	2,179		2,254		2,254	
Percent Economically Active	7.8		78.0		78.0	
Chi-squared Statistic	94.8/13 df.		369.3/16 df.		492.9/10 df.	

[a] *T*-statistics in parentheses.
[b] Standard errors have not been corrected.

Table 5

Men's Selectivity-correlated OLS and Tobit Labour Supply Models (IFPRI–PIDE Urban Survey, 1986)

Variables	Selectivity-correlated OLS[a,b]		Tobit[a]	
Expected (Log_e Wage) (Rs/Hour)	1.432	(1.2)	22.269	(17.3)
Household Composition Effects				
Number of Children, 0–6 Years	0.137	(0.5)	0.110	(0.2)
Number of Females, 7–14 Years	0.408	(0.9)	–0.795	(1.2)
Number of Males, 7–14 Years	0.410	(1.0)	–0.611	(0.9)
Number of Females, 15+ Years	0.475	(1.4)	0.001	(0.0)
Number of Males, 15+Years	–1.306	(4.6)	–1.817	(4.0)
Non-labour Income (Rs/Month)	–0.00014	(3.2)	–0.00031	(4.2)
Receive Transfers from Abroad?	–5.621	(2.5)	–14.337	(4.3)
Older than 55 Years?	–1.084	(0.6)	–15.367	(7.0)
Intercept	51.237	(27.7)	27.129	(13.2)
λ (Mills Ratio)	–0.376	(0.1)	–	–
Model Statistics				
Log-likelihood at Convergence	–		8720.3	
R^2	0.038		–	
Number of Observations	1.687		2.231	
Mean of Dependent Variable (Hours Worked/Week)	49.81		39.79[c]	

[a] *T*-statistics are in parentheses.
[b] Individuals reporting unusually high values (e.g., greater than 84 hours/week) have been excluded.
[c] Includes zero values.

Despite data limitations, it is interesting to note that women's labour supply responds dramatically to increases in levels of education. For example, university education increases the likelihood of a woman being in the labour force by nearly three times as much as it increases the likelihood of a man being in the labour force. Household demographics are likewise revealing: the presence of males tends to decrease the likelihood that a woman will work, while the presence of other females (aged 7 years and above) tends to increase the likelihood of female employment.

are substantiated by other surveys – for example, the 1978-79 Household Income and Expenditure Survey [Government of Pakistan (1983)]. Women in Pakistan are seldom reported to be economically inactive in the sense that men are; rather, some 95.4 percent of urban females aged 15 to 54 years, not enrolled in school, were classified as "housekeeping" in the 1981 Population Census, and nearly all of the remaining 4.6 percent were classified as working.

These figures suggest some interesting questions regarding not only women's but also men's labour supply decisions. In an attempt to illuminate these questions, this paper presents labour force participation equations for urban men and women. Earning functions and labour supply models are presented for men only; there are not sufficient women working in the wage sector in our sample to perform similar estimates for female workers. The data used to estimate the models were collected in 1986 under the auspices of the International Food Policy Research Institute (IFPRI) and the Pakistan Institute of Development Economics (PIDE). The survey covers 1,000 urban households residing in low-income neighbourhoods throughout Pakistan. The survey was based on a random draw of households listed in a sub-sample of census tracts classified as low socio-economic neighbourhoods by the Federal Bureau of Statistics. The stratification is then by neighbourhood; within these neighbourhoods, there is a fair amount of variation in earnings and remittances.[1]

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The second question has been addressed for Pakistan by Khan and Irfan (1985) using the household sample from the Population, Labour Force, and

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Our analysis uses a model of wage determination initially developed by Becker (1964) and Mincer (1974), which assumes that differences in wages depend on differences in human capital – education, training, and work experience. The likelihood of being employed and the number of hours an individual works are a function of the market wage and the individual's demand for leisure; if the wage offer (W) exceeds the individual's shadow wage rate (W_r) or implicit value of time, he or she will participate in the labour market. Further, an individual will adjust the number of hours worked (H) so as to equate the market wage with the shadow wage rate.

Formally, the model can be written:

$$\left.\begin{aligned} W &= \alpha_0 + \alpha_n X_n + \mu_1 \\ H &= \beta_0 + \beta_1 W + \beta_m X_m + \mu_2 \end{aligned}\right\} \text{ if } W > W_r,\ H > 0 \qquad \begin{matrix}(1)\\(2)\end{matrix}$$

$$H = 0 \text{ otherwise}$$

Wages are observed only for individuals whose reservation wage is less than or equal to the market wage ($W_r <= W$) and who have chosen to work in the wage sector. This excludes individuals who are not employed. It also excludes self-employed individuals who typically report profits in lieu of wages, which include returns to labour (e.g., wages) and returns to capital, although these self-employed individuals are included in estimates of labour supply. Observations on wage earners are used to estimate predicted wages for other individuals. However, potential selectivity bias is introduced by the fact that $E(\mu_1 \mid H > 0)$ is not necessarily equal to zero in the sample of wage earners. To correct this, we first estimate a probit function to predict the probability that an individual is in the wage sector. The results of this equation are used to derive the inverse Mills ratio (denoted λ), which is then included in the wage equation to obtain consistent estimates of the α's [Heckman (1976)].

[2] See Afzal and Nasir (1987) and the references cited in that article: see also Chaudhry and Khan (1987).

The wage equation corrected for sample selection provides the necessary information to impute a predicted wage for all individuals in the sample. The predicted wage is included in the labour supply function for the second stage of the estimation process. Note that by using predicted wages even for those individuals whose wages are reported, we avoid correlation of errors stemming from the fact that wages are derived from dividing earnings by hours worked. A selectivity-correlated OLS regression as well as a tobit or censored regression model is used to estimate the labour supply function to correct possible biases introduced by selectivity and censoring. In addition, the predicted wage is included in a simple probit model of labour force participation (1 if economically active, 0 otherwise). Note that the participation model is implicitly imbedded in the tobit labour supply equation.

The natural log of the wage rate per hour is used as the dependent variable in the wage equation. Included on the right-hand side are dummy variables for the highest level of education achieved (primary, middle school, secondary, university), and age and age-squared, which represent job experience. The use of age and age-squared rather than job experience greatly simplifies estimates of returns to education [Heckman and Hotz (1986)]. In addition to age and education, a dummy variable for formal sector employment[3] and for residence in Punjab are included in the wage model. On *a priori* grounds, we expect that education and age/work experience will be positively correlated with the wage rate, and that formal sector workers will be paid a premium in comparison to employees in the informal sector.

The *labour supply model* uses hours worked per week as the dependent variable, and the imputed wage (derived from the selectivity-correlated wage equation), household demographics (number of individuals in various age/gender groupings), non-labour income, and a dummy variable for individuals aged 55 years and greater and for households receiving transfers from abroad as independent variables. We expect the predicted wage rate to be positively correlated with labour supply (individuals who command higher market wages will work more hours), and non-labour income (derived from transfers, *zakat*, rents, pensions, and the like) to be negatively correlated due to the decreasing marginal utility of income. All other things being equal, older individuals are likely to work fewer hours than younger individuals, and individuals living in households receiving transfers from abroad are also likely to work less intensively since leisure is a normal good.[4] Demographic

[3] All employees who contribute to the Employees Provident Fund (EPF) are assumed to work in the formal sector.

[4] Pakistan has a history of labour migration to the Middle East, where migrant workers earn substantially more than what they would earn in Pakistan. The higher labour productivity of migrants may act to decrease family labour supply. This is measured through total non-labour income and more directly via simple availability of remittances from abroad.

variables are included to test the hypothesis that individuals living in households with high dependency ratios (e.g., many children or, possibly in Pakistan, many women) either choose or are required to work more intensively than individuals living in household with few dependents. Similarly, individuals living in households with many potential workers (for example, several prime-aged males) may work less intensively than those living in households without these.

Binary probit labour force participation equations are estimated for both men and women. Two models are presented: the first, a reduced form equation includes variables in both the wage and labour supply models, while the second includes a measure of imputed wage in lieu of wage determinates. Only the former model is presented for women due to the data insufficiency noted earlier.

EMPIRICAL RESULTS

Descriptive Overview

The estimation sample includes 2,179 women and 2,254 men who are over 10 years of age and not currently enrolled in school. An estimated 78 percent of the men and 8 percent of the women are economically active. While the women's participation rates in the sample are roughly consistent with estimates from recent Labour Force Surveys (LFS), there is evidence to suggest serious underreporting of women's labour force activities in Pakistan, particularly informal sector activities occurring at the periphery of the domestic sphere [Afzal and Nasir (1987)]. The questionnaire used here, and the technique of obtaining labour information using female interviewers speaking directly to the women, has also been used in rural areas. There it obtained appreciably higher female labour force participation than recent government surveys [Alderman and Chishti (1989)]. The methodology, then, has proven capable of recording female labour activities even when they are informal and seasonal. This increases confidence that the urban data studied here is not an underestimate. Labour force activities, as defined for this study, include work in household enterprises and production of crafts for sale as well as wages. It does not include activities such as household chores and production of goods for home consumption even though it is recognized that these activities are a form of production and generally occupy a major part of any day [see Alderman and Chishti (1989)].

Table 1 shows employment rates, hours worked for those in the labour market, and average wage rates per hour by employment sector (self-employed, employees), age, and gender. According to these statistics, reported employment rates for women are low and do not vary greatly by age. Interestingly, younger working women tend to be employees (and earn as much on average as their male counterparts, although this reflects the different average education levels of the women actually in the labour force), while older women who work are more likely to be self-employed.

Table 1

Employment Activities, Weekly Hours Worked, and Wages of Individuals not Enrolled in School, by Age and Gender (IFPRI–PIDE Urban Survey, 1986)

			Self-employed		Wage Employees		
	No. of Cases	Percent Inactive	Percent Self-employed	Average Hours Worked/Week	Percent Earning Wages	Average Hours Worked/Week	Average Wage (Rs/Hour)
Females							
10–14 Years	285	94.9	4.3	28.0	0.9	48.0	0.42
15–19 Years	358	92.7	5.3	26.6	1.9	33.6	2.59
20–24 Years	324	92.0	4.0	18.3	4.0	39.5	7.53
25–34 Years	422	91.9	5.5	24.2	2.6	40.3	6.06
35–44 Years	338	90.8	5.3	29.4	3.8	51.0	2.95
45–54 Years	234	90.1	7.7	25.7	2.1	47.8	4.01
55–64 Years	139	90.6	7.2	41.4	2.2	32.0	4.83
⩾65 Years	129	96.9	3.1	26.5	0.0	–	–
Total	2,179	92.2	5.3	26.9	2.5	42.3	4.74
Males							
10–14 Years	163	55.2	18.4	46.2	26.4	56.9	1.13
15–19 Years	276	32.9	35.1	44.1	31.9	52.5	2.68
20–24 Years	349	15.8	40.1	46.3	44.1	53.8	4.50
25–34 Years	493	9.7	44.6	51.2	45.6	54.6	4.73
35–44 Years	313	11.5	42.2	48.4	46.3	53.1	5.76
45–54 Years	289	9.0	47.4	51.8	43.6	52.5	6.10
55–64 Years	182	22.5	44.0	46.2	33.5	53.2	5.15
⩾65 Years	189	58.2	32.3	46.5	9.5	50.3	2.95
Total	2,254	22.0	39.8	48.4	38.2	53.6	4.67

This pattern is not observed for men, except in the oldest age groups (greater than 55 years), which are above the mandatory retirement age for most formal sector jobs. What is observed is a considerable proportion of economically inactive men, particularly in younger age groups (10–14 years, 15–19 years), but in the so-called "prime-aged" groups as well. According to our estimates, 11.4 percent of men between the ages of 20 and 54 are not in the labour force. As noted earlier, this is a high proportion in comparison to other developing countries.

Women in the labour force spend an average of 26.9 hours per week working outside the household if they are self-employed, and 42.3 hours per week if they are employees. In contrast, self-employed men work 48.4 hours per week and male employees work an average of 53.6 hours per week. In most countries, the self-employed work longer hours than wage employees. Unlike many of these countries, Pakistan has a substantial informal wage sector typified by very flexible labour arrangements. If we separate the formal and informal wage sectors for men (Table 2), informal sector employees (some 73 percent of the total) work an average

Table 2

Average Hours Worked and Wages for Men in the Formal and Informal[a] *Wage Sectors, by Age (IFPRI–PIDE Urban Survey, 1986)*

	Informal Sector			Formal Sector		
	Percent	Hours/ Week	Rs/Hour	Percent	Hours/ Week	Rs/Hour
10–14 Years	100.0	56.9	1.13	0.0	–	–
15–19 Years	92.0	53.1	2.67	8.0	45.1	2.83
20–24 Years	74.0	55.9	3.82	26.0	47.7	6.45
25–34 Years	69.3	56.5	4.08	30.7	50.3	6.20
35–44 Years	62.8	54.8	5.22	37.2	50.4	6.69
45–54 Years	64.3	55.4	4.96	35.7	47.1	8.16
55–64 Years	73.8	53.9	4.83	26.2	51.1	6.05
Total	72.9	55.2	3.95	27.1	49.2	6.60

[a]Individuals who report contributing to the Employees' Provident Fund are considered to be in the formal sector. Their wages are typically reported *net* of Provident Fund contributions.

of 55.2 hours per week in contrast to 49.2 hours per week for the formal sector.[5]

According to Table 2, employees in the formal sector earn higher wages on average than those in the informal sector (overall, the former earn 6.60 Rs/hour in contrast to 3.95 Rs/hour for the latter). Wage differences are most extreme for the very young and very old; however, differences persist throughout the age distribution. As predicted by the standard human capital model, earnings increase with age (e.g., work experience) – formal sector employees reach maximum earnings between the ages of 44 and 55, while informal sector employees reach maximum earnings between 35 and 54 years of age.

Wage Determination Equation

The selectivity-corrected wage Equation (1) for the 854 male employees in the sample is presented in Table 3.[6] The results confirm that wages increase with age and peak at 46 years in this population. Education strongly influences the wage received – the higher the level of education, the higher the wages; employees with a primary or middle school education receive some 12 to 14 percent wages higher than those with no education, all other things held constant. Effects are more pronounced at higher levels of education – with secondary schooling earning some 63 percent higher wages, and workers with a university education receiving 139 percent higher wages, or roughly 11.6 percent for every year of schooling completed. These private returns are very close to those estimated by Khan and Irfan (1985) despite the different data-set and technique.

As indicated by the coefficient of the provident fund dummy variable, workers in the formal sector earn more per hour than workers of equivalent education and age in the informal sector. Note that the wage is net of such deductions. If such mandatory savings are also considered as worker remuneration, the difference in earnings between the two sectors would be even larger.

It is somewhat puzzling why wages are lower in the Punjab, although this is also consistent with Khan and Irfan (1985). It may be that a distinction that separates Karachi from other non-Punjabi areas or one that separates large metropolitan areas from other urban areas would illuminate this issue. However, the current sample is too small to be partitioned into many subdivisions.

Determination of Labour Force Participation

Female labour force participation is strongly influenced by higher education,

[5] Some 51 percent of formal sector employees report working 48 hours per week. An additional 20 percent report working either 36 or 42 hours per week.

[6] Means and standard deviation of the variables used in these equations are presented in the Appendix.

Table 3

Selectivity-correlated Wage Equation[a] *for Men (IFPRI–PIDE Urban Survey, 1986)*

Variables	Total Wage Sector[b]	
Age	0.1016	(8.8)
$(Age)^2$	–0.0011	(7.2)
Education		
None	–	–
Primary School	0.1214	(2.0)
Middle School	0.1427	(1.9)
Secondary School	0.4886	(6.5)
University	0.8723	(7.0)
Deduct Employees' Provident Fund?	0.1606	(2.9)
Live in Punjab?	–0.2297	(4.7)
λ (Mills Ratio)	0.2475	(1.3)
Intercept	1.0234	(3.0)
Model Statistics		
Number of Observations	854	
Average Wage (Rs/Hours)	4.58	
R^2	.369	

[a]Dependent variable is the natural log of the wage rate measured in Rs/hours.
[b]*T*-statistics are in parentheses.

although such education is still a relatively uncommon occurrence in Pakistan. It is also influenced by household composition. Women's participation rates increase with the number of females of any age, likely due to substitution and sharing of domestic tasks (such as child care), and decrease with the number of males in the household. Other males affect female labour force participation both through an income effect and by their influence on the amount of household tasks that are deemed necessary, which affects the reservation wage.

Men's participation rates are not strongly affected by education, but are affected by age (which acts as a proxy for work experience). Household composition is likewise important: the negative impact of the number of adult males in the household on male labour force participation is also likely explained by the effect

of more potential earnings. The coefficient on the number of females 7–14 is less intuitive. Labour force participation also declines with remittances, either domestic or from abroad, and is in keeping with leisure being a normal good. As expected, participation increases with the (expected) wage offer, which is primarily a function of age and education (Table 4).

Male Labour Supply Equations

Mathematically the tobit or truncated regression model incorporates both the labour participation equation and the estimation of hours worked conditional on participation. While the expected wage effect is positive and significant in the tobit model (Table 5) and in the probit model (Table 4), it is not significant in the selected corrected OLS equation (Table 5). This suggests that the wage offer primarily influences the choice of whether to work (e.g., labour participation), and not how many hours to work once the decision to participate has been made. When we disaggregate the wage effect by sector (wage versus non-wage, not shown here), the labour supply of the self-employed responds more strongly to wage incentives (predicted wages) than employees. This is likely because they have greater control over the conditions of their employment (e.g., hours worked) than employees.

Eeach additional adult male in the household decreased the average hours worked by 1.3 (OLS) to 1.8 (tobit) hours per week. This is likely an income effect. Consistent with the theory of labour supply, non-wage income has a negative impact on hours worked, and individuals receiving remittances from abroad work fewer hours. In addition, older men work less intensively than younger men.

Note that comparing the coefficients between the tobit and OLS equations indicates some interesting aspects about the structure of labour supply behaviour. For example, men living in households receiving transfers from abroad work on average 15.4 hours less than other men; however, conditioned on being in the labour force, transfers decrease hours worked only by some 5.6 hours per week. Thus the impact of transfers is primarily one of labour participation rather than supply, conditioned on participation. Similarly, older men are generally less likely to be in the labour force, while the impact of age, conditioned on participation, is not significant. These results suggest that it is important to interpret tobit estimates with care, particularly when predicting future labour supply responses.

POLICY IMPLICATIONS AND CONCLUSIONS

Our results suggest that there are strong and systematic factors that explain both men's and women's labour supply decisions in urban Pakistan. Labour force participation rises with increases in expected earnings, and wages do, indeed, vary with differences in human capital – represented by education and work experience.

Table 4

Probit Estimates of Labour Force Participation Rates, Males and Females not Enrolled in School (IFPRI–PIDE Urban Survey, 1986)

Variables	Reduced Form[a]				With Predicted Wages[a]	
	Women		Men		Men	
Age	0.0429	(3.5)	0.190	(12.2)	–	–
$(Age)^2$	–0.0005	(3.2)	–0.0021	(10.1)	–	–
Older than 55 Years	–	–	–0.980	(3.0)	–	–
Education						
None	–	–	–	–	–	–
Primary School	0.185	(1.4)	0.233	(1.5)	–	–
Middle School	0.102	(0.6)	0.192	(1.0)	–	–
Secondary School	0.845	(5.3)	0.110	(0.6)	–	–
University	1.163	(3.9)	0.414	(1.2)	–	–
Household Composition						
Number of Children, 0–6 Years	–0.027	(0.9)	0.022	(0.6)	0.017	(0.8)
Females, 7–14 Years	0.082	(2.2)	–0.127	(2.4)	–0.073	(2.4)
Males, 7–14 Years	–0.077	(1.9)	–0.094	(1.9)	–0.039	(1.3)
Females, 15+ Years	0.061	(1.8)	–0.042	(1.0)	–0.036	(1.5)
Males, 15+ Years	–0.128	(3.9)	–0.082	(2.3)	–0.051	(2.5)

Continued –

Table 4 – (*Continued*)

Variables	Reduced Form[a]				With Predicted Wages[a]	
	Women		Men		Men	
Non-labour Income (Rs/Month)	–	–	$-0.4E^{-4}$	(0.8)	$-0.3E^{-5}$	(0.8)
Receive Remittances from Pakistan?	–	–	–0317	(1.7)	–0.245	(2.1)
Receive Remittances from Abroad?	–	–	–0.773	(3.2)	–0.564	(3.9)
Live in Punjab?	0.337	(3.6)	–0.136	(1.2)	–	–
Log_e Expected Wage (Rs/Hour)	–	–	–	–	1.166	(16.7)[b]
Household Head log_e (Rs/Hour)	–0.026	(0.9)	–	–	–	–
Intercept	–2.158	(8.2)	–1.159	(4.1)	0.371	(3.8)
Model Statistics						
Number of Observations	2,179		2,254		2,254	
Percent Economically Active	7.8		78.0		78.0	
Chi-squared Statistic	94.8/13 df.		369.3/16 df.		492.9/10 df.	

[a] *T*-statistics in parentheses.

[b] Standard errors have not been corrected.

Table 5

Men's Selectivity-correlated OLS and Tobit Labour Supply Models (IFPRI–PIDE Urban Survey, 1986)

Variables	Selectivity-correlated OLS[a,b]		Tobit[a]	
Expected (Log_e Wage) (Rs/Hour)	1.432	(1.2)	22.269	(17.3)
Household Composition Effects				
Number of Children, 0–6 Years	0.137	(0.5)	0.110	(0.2)
Number of Females, 7–14 Years	0.408	(0.9)	–0.795	(1.2)
Number of Males, 7–14 Years	0.410	(1.0)	–0.611	(0.9)
Number of Females, 15+ Years	0.475	(1.4)	0.001	(0.0)
Number of Males, 15+Years	–1.306	(4.6)	–1.817	(4.0)
Non-labour Income (Rs/Month)	–0.00014	(3.2)	–0.00031	(4.2)
Receive Transfers from Abroad?	–5.621	(2.5)	–14.337	(4.3)
Older than 55 Years?	–1.084	(0.6)	–15.367	(7.0)
Intercept	51.237	(27.7)	27.129	(13.2)
λ (Mills Ratio)	–0.376	(0.1)	–	–
Model Statistics				
Log-likelihood at Convergence	–		8720.3	
R^2	0.038		–	
Number of Observations	1.687		2.231	
Mean of Dependent Variable (Hours Worked/Week)	49.81		39.79[c]	

[a] *T*-statistics are in parentheses.
[b] Individuals reporting unusually high values (e.g., greater than 84 hours/week) have been excluded.
[c] Includes zero values.

Despite data limitations, it is interesting to note that women's labour supply responds dramatically to increases in levels of education. For example, university education increases the likelihood of a woman being in the labour force by nearly three times as much as it increases the likelihood of a man being in the labour force. Household demographics are likewise revealing: the presence of males tends to decrease the likelihood that a woman will work, while the presence of other females (aged 7 years and above) tends to increase the likelihood of female employment.

Thus, there are clear substitution effects between household work and outside work: the more women there are in the household to perform household chores and childcare, the likelier it is that one or more will work outside the household.

Results for men are different, but equally interesting. Low participation rates appear primarily attributable to high levels of non-labour income, particularly remittances from within Pakistan and from abroad. While the sign of the income effect is predicted by theory, the relative impact on participation, as opposed to hours worked, is somewhat surprising. A number of the men who are not participating in the labour force appear to be younger and relatively more educated than other men, and are likely engaging in an extensive job search supported by other household members. The impact of exogenous income is not, however, confined to younger men. Thus, the recent decrease in labour migration to the Middle East and the concomitant (and continuing) drop in remittances may have a much stronger impact on wages and unemployment than anticipated; not only will returning migrants attempt to enter the domestic work force, but some tens of thousands of previously inactive men may find it necessary to enter the labour force as well.

Appendix

Appendix Table 1

Variable Means for Work Participation (Wage and Labour Supply) Equations (IFPRI–PIDE Urban Survey, 1986)

	Variable Means	
	Men	Women
Age (Years)		
Older than 55 Years?	34.9	31.8
Education	0.135	–
None	0.519	0.780
Primary School	0.183	0.106
Middle School	0.122	0.058
Secondary School	0.131	0.045
University	0.045	0.011
Household Composition		
Number of Children, 0–6 Years	1.89	1.92
Number of Females, 7–14 Years	0.96	1.09
Number of Females, 15+ Years	2.47	2.79
Number of Males, 7–14 Years	1.08	1.05
Number of Males, 15+ Years	3.23	2.81
Household and Individual Income Measures		
Non-labour Income (Rs/Month)	2835.2	–
Receive Remittances from Pakistan?	0.101	–
Receive Remittances from Abroad?	0.069	–
Wage Rate (Rs/Hour)	4.58	0.118
Hours Worked per Week	39.8	2.6
Contribute to Employees' Provident Fund	0.103	0.012
Wage Rate of Household Head (Rs/Hour)	–	4.05

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