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# Gender based labor activity of farm households:

## A case of market imperfections in rural Pakistan.

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**Abstract— This paper evaluates the labor supply of male and female on own-farm, agri-wage and non-farm activities in Pakistan Our analysis reveals that education, caste, village infrastructure appeared to be important determinants for labor supply of both male and female. We also estimated the existence of perfect markets by applying three tests of separability. All tests strongly rejected the separability hypothesis, indicating the dependence of production and consumption decisions of rural households in Pakistan.**

**Keywords— labor supply, non-separability, shadow wages, Pakistan**

## I. Introduction

Gender based labor activities are the important determinants in defining the welfare of rural households in developing countries. Women constitute more than half of the rural labor force and are fundamental agent for development. Given the significance of the role of women, rural development cannot be achieved by ignoring the efforts of such a large segment of society (FAO, 2009). It is quite common to underestimate their contribution by statisticians and policy makers and their work might go under the label "housewives" (Mies, 1987). In Pakistan, there is male dominant. They are suffering from their social position and wage discrimination.

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In Pakistan labor and factor markets are (Heltberg, 1998; Fafchamps and Quisumbing, 1999) and hence rural households are the producers as well as consumers of farm produce simultaneously.

Several studies have investigated the role of rural women in crop activities (Qadri and Jahan, 1982), food requirement of family (ESCAP, 1997), decision making (Rasheed, 2004), inequality in resource access (Chaudhry et al., 2009. To the best of our knowledge no study has examined the labor supply responses of male and female of farm-households in Pakistan under the assumption of non-separability. The purpose of this study is to fill this gap and investige allocation of labor.

## II. Data Description

Data for this study was collected between September in 2011 through stratrfied random of rural households in the Punjab province of Pakistan. Table 1 includes the definitions and sample statistics of variables used in the analysis. Total value of output is computed as the sum of value of all crops grown, income from the sale of animal byproducts and twenty percent of the value of the household's herd.

## III. Empirical Approach

There are two step of estimation. In the first step marginal productivity of labor is measured by production funtion and the next step calculate labor supply functions by using shadow wages. Market imperfect was checked by applying separability tests.

TABLE 1: DEFINITION AND DESCRIPTIVE STATISTICS OF THE VARIABLES USED IN PRODUCTION

| Variable | Definition of variables | Mean | S.d |
|---|---|---|---|
| | ***Dependent variables*** | | |
| OutPutValue | Total output value in Rupees | **1654011** | **6598264** |
| | ***Explanatory variables*** | | |
| TCultiLand | Total cultivated land in acres | **19.93** | **41.35** |
| FertiCost | Expenditures on fertilizer(Rs) | **6584.33** | **8288.42** |
| SeedCost | Expenditures on seed(Rs) | **7202.84** | **9626.00** |
| PestCost | Expenditures on pesticide(Rs) | **3901.95** | **4325.17** |
| Equipments | Number of farm equipment | **4.34** | **4.56** |
| HrsFmale | Total hours of family male labor worked on farm | **97.25** | **135.94** |
| HrsFfemale | Total hours of family female labor worked on farm | **43.36** | **95.79** |
| HrsHmale | Total hours of hired male labor worked on farm | **139.20** | **184.20** |
| HrsHfemale | Total hours of hired female labor worked on farm | **82.06** | **104.77** |
| HrsChildlab | Total hours of farm child labor (family and hired) | **9.54** | **24.78** |
| Head | 1if Head of HH is male,0 otherwise | **0.74** | **0.44** |
| HeadEdu | Years of education of HH head | **2.12** | **1.18** |
| AgeHead | Age of education of HH head (years) | **48.47** | **11.54** |
| Livstk | 1 if HH has livestock, 0 otherwise | **0.83** | **0.38** |
| Location1 | 1 if HH resides in Lahore district, 0 otherwise | **0.15** | **0.36** |
| Location2 | 1 if HH resides in Sahiwal district, 0 otherwise | **0.20** | **0.40** |
| Location3 | 1 if HH resides in M.Garh district, 0 otherwise | **0.30** | **0.46** |
| Location4 | 1 if HH resides in Layyah district, 0 otherwise | **0.02** | **0.13** |
| Location5 | 1 if HH resides in Sialkot district, 0 otherwise | **0.25** | **0.43** |
| Location6 | 1 if HH resides in Khushab district,0 otherwise | **0.08** | **0.27** |
| | ***Instruments*** | | |
| M0CasWa | Average village daily wage rate of male | **272.23** | **74.21** |
| F0CasWa | Average village daily wage rate of female | **156.95** | **76.64** |
| Dis0vill | Distance of village from city in km | **18.05** | **12.69** |
| Road | 1 if village has road, 0 otherwise | **0.67** | **0.47** |
| Water0supp | 1 if village has water supply, 0 otherwise | **0.85** | **0.35** |
| Electricity | 1 if village has electricity, 0 otherwise | **0.99** | **0.09** |
| HHSizOvr14 | No. of adult household members | **4.99** | **2.76** |
| AdultFarm | No. of adults working on farm | **1.83** | **1.62** |
| Ch0L05 | No. of children under age of 5 years | **1.01** | **1.41** |
| Child14 | No. of children between age 6-14 years | **6.25** | **6.46** |

# IV. Results and Interpretations

We empolyed OLS and IV approach. The estimates showing that inputs increse the productivity. The results can be presented on reader's request.

Table 2 displays male and female labor supply functions. Starting with the estimates for males, the uncompensated own-wage effect is negative in the case of own-farm and agri-wage work, suggesting a backward sloping labor supply. In the case of non-farm work, own wage effect is positive, suggesting upward sloping labor supply.

The cross male wage effect on the non-farm and agri-wage labor supply of females is negative and significant in the case of non-farm, indicating that female labor supply is quite sensitive to any change in the male wage. The coefficient of shadow income is significant and negative for both males and females in all three sectors, indicating that both male and female leisure are normal goods

The labor supply of both male and female in own-farm and non-farm increse if there are adult family members in the household. These results are in contrast to the study of Barrett et al. (2008) and are in line with the study of Abdauli and Regime (2000) in the case of male labor supply. With regard to the age of household-head which also represents experience, we found that labor supply in the agriculture sector increases with experience and decreases in non-farm sector.

Turning to the variables of interest viz the education; family caste; village infrastructure, we found that investment in human capital significantly decreases the labor supply of household on own-farm and agri-wage activities. This indiacte the absence of realtionship between agri-wages and education in study area as noted by Kurosaki and Khan (2006); Ito and Kurosaki (2009) and disgrace of working as an agricultural laborer in rural areas (Ito and Kurosaki, 2009).

Looking at the role of family castes, we found that male labor supply from upper castes decreases in own-farm and agri-wage activities and increases in non-farm sector. Caste is traditionally hereditary social grouping which has great influence in Pakistan. We found that female labor supply decreases in non-farm and agri-wage work as we move up to the caste category. There are cultural and social barriers that prevent women from entering and remaining in the labor force. Presence of small scale industry (factory or mill) as indicator of village infrastructure is associated with higher amount of non-farm labor, indicating that male and female are less mobile

TABLE 2: INSTRUMENTAL VARIABLE ESTIMATES OF MALE AND LABOR SUPPLY FUNCTIONS USING SHADOW WAGESAND INCOME (DEPENDENT VARIABLE: LOG AVERAGE

| **Variables** | **Own-Farm** | | **Non-Farm** | | **Agri-Wage** | |
|---|---|---|---|---|---|---|
| | ***Male*** | ***Female*** | ***Male*** | ***Female*** | ***Male*** | ***Female*** |
| Log male swage | -1.184(3.24) | 0.097(0.27) | 0.583(0.59) | -1.568(1.93) | -1.404(1.93) | -0.345(1.02) |
| Log fem swage | 0.059(0.19) | -1.106(3.57) | 0.397(0.43) | -0.769(1.00) | 0.911(1.41) | 0.404(1.51) |
| Log s income | -0.916(3.77) | -2.072(5.62) | -1.244(1.63) | -0.979(1.52) | -1.788(2.81) | -0.708(2.50) |
| No. ofadults>14 | 0.106(1.67) | 0.014(1.70) | 0.500 (2.53) | 0.314(1.86) | -0.009(0.05) | -0.086(1.12) |
| No. of child<5 | 0.057(0.61) | -0.013(0.10) | 0.418(1.61) | -0.368(1.86) | 0.581(2.07) | 0.012(0.10) |
| No of Child 5-14 | -0.020(0.94) | 0.037(1.77) | -0.006(0.12) | 0.009(0.17) | -0.045(0.75) | 0.010(0.45) |
| Age of Head | 0.007(0.63) | 0.012(0.86) | -0.028(0.82) | -0.000(0.00) | 0.019(0.57) | 0.033(1.59) |
| Location1 | -0.657(1.35) | 0.589(0.59) | 5.009(2.72) | 6.071(3.44) | 3.572(2.47) | 0.094(0.15) |
| Location2 | -0.799(1.67) | -1.202(2.24) | 1.802(1.37) | 2.236(2.44) | 1.018(0.93) | -0.129(0.21) |
| Location3 | -1.251(2.99) | -1.114(2.25) | 1.114(1.04) | 2.286(3.27) | -1.632(1.87) | -0.437(0.80) |
| Location4 | 0.524(0.71) | 1.051(1.41) | -0.089(0.05) | 1.880 (1.32) | -3.131(2.16) | 0.049(0.07) |
| Location5 | -0.156(0.34) | 0.496(0.98) | 0.228(0.22) | 1.063(1.74) | 0.232(0.25) | 0.961(1.63) |
| Education | -0.127(1.69) | -0.058(1.86) | 1.098(3.18) | 0.099(0.69) | -0.229(1.82) | -0.041(2.62) |
| Upper caste | -0.640(2.52) | 0.648(1.79) | 1.255(1.69) | -1.85(1.95) | -0.709(1.89) | -0.209(1.87) |
| Lower caste | -0.718(1.94) | 0.337(0.91) | 0.425(0.44) | -1.569(1.50) | 2.939(2.35) | 1.809(2.32) |
| Factory/mil | -0.405(1.67) | -0.095(0.25) | 1.763(2.19) | 1.386(1.90) | -0.268(0.48) | -0.028(0.07) |
| cons | 13.268(4.80) | 25.038(5.97) | 13.647(1.58) | -10.190(1.43) | 22.175(3.14) | 11.034(3.09) |
| Adj R-squared | 0.2637 | 0.1161 | 0.1776 | 0.1005 | 0.1543 | 0.0770 |
| Wu-Hausman [a] | 13.13 | 5.62 | 1.86 | 4.01 | 1.42 | 0.45 |
| Breusch-Pagan [b] | 85.63 | 562.13 | 262.10 | 424.11 | 291.42 | 179.85 |
| Wald-Statistics[c] | 10.89 | 4.26 | 5.69 | 4.19 | 4.78 | 2.84 |

## v. Concluding Remarks

Shadow wages and shadow income are important variables for estimating the labor supply of rural household of developing countries, particularly where wage data is not available and markets are imperfect or weak. This article estimated own-farm, non-farm and agri-wage labor supply of rural households under the assumption of non-separability between the production and consumption decisions of households. Results indicate that education can be a powerful source for rural Pakistani households that lead labor out of agriculture and shift into high returning non-farm sector. Caste plays an important role in overthrowing the autonomy of female. The proximity of physical infrastructure, like factory or small scale industry in village can enables households to engage in high returning activities.

We applied three tests for separation hypothesis to the sample of Pakistani rural households. Our analysis provides strong evidence against the perfect labor market hypothesis in Pakistan. This stands in contrast to Benjamin (1992) but agree with other empirical work (Jacoby, 1993; Skoufias, 1994; Abdulai and Regmi, 2000; Le, 2010).

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We analyzed that how the household adjusts its decision on labor supply in response to change in economic conditions. A better understanding of how male and female members of household allocate their time between own-farm, non-farm, agri-wage sector in response to changes in economic conditions may be crucial for designing policy for the welfare of individuals.