

Determinants of Female Time Allocation in Selected Districts of Rural Pakistan

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I. INTRODUCTION

This paper attempts to explain female time allocation for rural women in selected districts of Pakistan. This topic is of considerable importance for several reasons. At an academic level, the fact that the female labour force participation decision and the hours worked are jointly determined raises interesting problems of modelling and econometric estimation in taking account of the selectivity bias thus introduced into OLS estimation. At the policy level, an insight into the factors influencing female labour force participation is extremely important in a developing country such as Pakistan where the majority of females do not participate in mainstream economic activities.

The objective of this study is to determine the factors affecting the optimum time allocation between market and housework of females in rural Pakistan. In a male dominated society like Pakistan with strong cultural taboos, a woman's labour force participation can be expected to depend significantly on non-market factors. In this study we examine, in particular, whether women's decisions not to work outside the home are influenced more by social norms, for example *purdah* and *patriarchy*, or by economic constraints such as lack of relevant education and training, non-availability of job opportunities and low wages etc.

In many developing countries, women are usually subordinated by men and are considered useful only for child care and other household activities. They rarely have access to the productive resources and very little control over important

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household decisions. In a developing country like Pakistan, social and cultural norms are generally considered to hinder the participation of women in activities outside the home. Thus a large part of the population does not participate in the development process.

The study of time allocation has begun to receive attention relatively recently in developing as well as in developed countries. The literature on time allocation by females is of even more recent vintage.

Becker (1965) presented the pioneering study of time allocation in which time was introduced as an additional commodity in the utility maximisation process. The total available time less market work is a good approximation of the husband's leisure time it seriously overestimates the wife's leisure since she devotes a substantial amount of her time to productive housework [Gronau (1973); Wales and Woodland (1977)]. An increase in the market wage rate reduces work at home while its effect on time spent at leisure and on market production is indeterminate. However, an increase in household income reduces work in the market and leaves work at home unchanged [Gronau (1977); Evanson (1978); Alderman and Chishti (1989)].

In male dominated societies where social and cultural norms are very strong, female labour force participation decision is not only determined by the market forces but also expected to depend on non-market factors. In such societies women respond to the market if opportunities to work are available. It is not only the patriarchy that keeps women away from the labour market but other economic factors such as low wages and low education are also responsible [Khandker (1987, 1988)]. An increase in female education reduces her work time at home and an increase in the number of adult females in the household reduces the work burden at home and an additional male or child increases the work load [Alderman and Chishti (1989); Kozel and Alderman (1990)].

The extent of female labour force participation in Pakistan is abysmally low; 8.23 percent overall; 9.35 percent of rural areas and 5.75 percent for urban areas [Pakistan Economic Survey 1992-93]. In three of the four districts selected for this study the rural population accounts for more than 87 percent of the total. A majority of the population has no access to safe water, electricity and health facilities. The literacy rate and labour force participation rate especially among females in these districts is even lower than that in other regions of the country.

The study is organised as follows: The methodology and data are outlined in the second section. The results are presented in the third section while the major conclusions are summarised in the fourth section.

II. METHODOLOGY AND DATA

The classical theory of labour supply and time allocation overlooked the production activities of women at home, regarding their time outside the market as leisure. According to the Beckerian approach, however, each person derives utility by allocating his or her time to different activities in the market as well as at home.

This study is based on the utility maximisation criterion.¹ The final equations on the endogenous variables of particular interest, i.e. the time allocation in market as well as at home for two groups of women; who participate and who do not participate are presented here. For participating women, the optimal values of time allocated to home production (T_{WN}), and time allocated to market work (T_{WM}) can be written as:

$$T_{WN} = T_{WN} (W_H, W_w, \gamma, \delta, V, P_X, P_M, T_H, T_w)$$

$$T_{WM} = T_{WM} (W_H, W_w, \gamma, \delta, V, P_X, P_M, T_H, T_w) \quad \dots \quad \dots \quad \dots \quad (1)$$

For non-participating women on the other hand, the equations can be written as:

$$T_{WN} = T_{WN} (W_H, W_w^*, \gamma, \delta, V, P_X, P_M, T_H, T_w) \quad \dots \quad \dots \quad \dots \quad (2)$$

$$T_{WM} = 0$$

where γ and δ are shadow prices of market purchased inputs and the female's time in home production respectively. W_w^* is the threshold wage rate (or reservation wage). T_H and T_w are the total time available to males and females respectively. T_{HM} and T_{WM} are time allocated by males and females respectively to market work. T_{WN} is female time allocation to home production. W_H and W_w are the market wages obtained by males and females respectively and V is non-wage income.

By definition, women who are participating in the labour market are being paid wages above their reservation wage while women who do not participate have been offered wages that are below their reservation wage. This is the rationale for including the reservation wage rate in Equation (2) for females who do not work in the market. Different socioeconomic characteristics e.g. male and female wages, age, education, and non-wage income etc. all affect both the reservation wage for

¹The model specification and derivation is not presented here because of space constraint. This is available with the authors on request.

women as well as the market wage and thus affect the labour supply decision.

- An increase in the woman's market wage rate increases her time allocated to the market activity and reduces both work at home and leisure. An increase in the male wage rate can reduce the female's time in market work.
- A change in non-wage income has a negative effect on a woman's time allocation in the market as well as at home since it increases the consumption of leisure. Asset value is used as a proxy for non-wage income.
- An increase in the educational level of a woman may work in two ways and leaves indeterminate the effect on the allocation of her time in market and at home. For example, if education increases her productivity in home tasks then she prefers to stay at home but if the opportunity cost of staying at home is larger for her after getting educated, then she will work in the market and earn wages.
- The allocation of time is also affected by the distance of the main market from home because this increases the cost of employment as well as the cost of market goods for which substitutes can be produced at home. An increase in this distance indicates a decrease in a woman's time in market work.
- The effect of inter district variations, as well as different societal expectations has been controlled for by introducing dummy variables for Attock, Faisalabad, and Badin. Dir district is the excluded category.

All women allocate some of their time to home production. However, the response of home time allocation to a change in the market wage may be biased if estimated with OLS. This is because the data relating to *market* labour supply are censored since there is full information on the socio-economic characteristics of all women, including those who do not supply labour to the market, but market wage rates are only observed for women who do, i.e. women who are offered a market wage above their reservation wage. In order to adjust for this bias we estimate the female market time function using a tobit model.

This study is based on round 11 of the IFPRI panel survey of rural households in selected districts.²

²For details please see Battese, Malik and Broca (1993) Production Functions for Wheat Farmers in Selected Districts of Pakistan: An Application of a Stochastic Frontier Production Function with Time-varying Inefficiency Effects. *The Pakistan Development Review* 32:3.

III. RESULTS

Our analysis focuses on 2454 women between the ages of 10 and 65 years. Among them, 131 women participate in the labour force as wage earners and a further 41 participate in market related activity, such as household handicraft making, the output of which is traded in the market. The means and standard deviations of the dependent and independent variables for the participating and non-participating women³ reveal that poorer women are more likely to engage in multiple activities, (e.g. unpaid domestic work as well as market work for wages) since the value of assets and previous years annual household income are lower for working women than for women who work only at home. This implies that in rural Pakistan a woman's participation in labour force is usually necessitated by the poor economic condition of the household. There is strong evidence that this is also true of the United States and many other societies as well. The predicted wage rate for males associated with non-participating women is higher while the predicted female wage rate is higher for working women. The domestic role of working women is found to be very important as they allocate more time to home production than do those women who prefer to stay at home perhaps because women who stay at home are wealthier and can afford to take leisure. Household size is larger for non-participating women. A larger proportion of home time is generally allocated to cooking, baking and dish washing.

This reflects the life pattern of women in selected areas of rural Pakistan. The decision to participate in the labour force is not independent of factors such as the existence of patriarchy and strong socio-cultural factors. Women appear to work only in adverse circumstances to provide financial support to their families.

All the women, whether or not they participate in the market, allocate some of their time to home production. Women's labour force participation is an endogenous phenomenon. The estimation of the full sample includes those women who do not participate in the market and if we use the truncated sample only for participating women then we face the problem of sample selection bias. In this situation OLS estimates give biased results. A partial correction is obtained if we use Heckman's (1979) two step procedure to adjusting for such selection bias in predicting the wage rates. In the first step a new regressor, the Inverse of Mill's Ratio is constructed by estimating a probit model for the probability that a woman is working for wages. Then in the second step wages are estimated using the Inverse of the Mill's Ratio as an additional regressor. The same procedure is then repeated

³Table not presented here because of space constraint. It is available with the authors on request.

for the males in the household. The Inverse of Mill's Ratio from this procedure can be used as an additional regressor in the OLS estimation of time allocation to correct for the selectivity bias.

In Table 1 we report the OLS estimates of the home time allocation functions using predicted wages from the Heckman two stage procedure.⁴ Instead of current

Table 1

Home Time Allocation of Participating, Non-participating and All Women (OLS Estimates)

Variables	Participating Women	Non-participating Women	All Women
Constant	340.87 (3.68)*	47.93 (11.24)*	41.43 (11.06)*
Women's Age	-0.14 (-1.68)**	0.14 (3.85)*	0.11 (4.42)*
Women's Education	-1.72 (-2.38)*	-0.51 (-2.27)*	-0.43 (-1.99)*
Annual per Capita Hhold Income	0.63 (1.25)	-0.08 (-0.66)	-0.06 (-0.46)
Number of Dependents	-0.23 (-0.88)	-0.59 (-8.33)*	-0.58 (-8.51)*
Predicted Male Wages	-0.48 (-1.78)**	-0.95 (-8.02)*	-0.76 (-7.35)*
Predicted Female Wages	0.28 (1.49)	1.61 (8.76)*	1.09 (8.14)*
Dummy for Market Participation	-	-	2.87 (1.76)**
Dummy for Faisalabad	-8.35 (-1.57)	-11.87 (-6.42)*	-7.69 (-5.01)*
Dummy for Attock	4.06 (0.83)	-8.37 (-4.27)*	-3.60 (-2.26)*
Dummy for Badin	6.27 (1.25)	-8.60 (-5.27)*	-3.21 (-2.37)*
Inverse of Mill's Ratio	-0.43 (-0.32)	-11.54 (-3.57)*	-
R ²	0.22	0.12	0.13
Sample Size	172	2282	2454

Note: The predicted male and female wages are based on separate regressions for participant men and women based on Heckman's (1979) two step procedure to adjust for selectivity bias.

Figures in parenthesis are *t*-ratios.

* Indicates significant at 5 percent level.

** Indicates significant at 10 percent level.

⁴Table not produced here because of space constraints. This is available with the authors on request.

income we use the previous years household income to derive per capita household income to avoid the simultaneity problem. The results indicate that the home time allocation of participating women is statistically significantly different and higher than that for non-participating women. This is confirmed by the sign and significance of the dummy variable for market participation reported in the column for all women. We find that the home time allocation for participating women is significantly and negatively dependent upon the woman's age, education and the predicted wages of the males in the household. As the woman's age or education or male family member's predicted wage increase the female's home time allocation drops. Presumably in such circumstances she allocates a greater amount of time to market activity or to leisure.⁵

For non-participating women, the home time allocation increases significantly with the woman's age and with predicted female wages. These predicted female wages are an estimate of the woman's reservation wage. As the reservation wage increases so does the home time. In this case the wage offer is, presumably, below the reservation wage otherwise the woman would have entered the workforce. In the case of the participating women the reservation wage is below the wage offer which is why they are in the workforce. The home time allocation is negatively and significantly affected by women's education, number of dependents and predicted male wage rate. The implication is that education increases women's efficiency in home task and thus reduces the time in home production. An increase in the number of dependents has negative effect on home time allocation because of the sharing of the home task. A negative effect of male wage rate is due to the wealth effect which increases the consumption of leisure and reduces time allocation at home.

There are significant regional differences in the home time allocation of both participating and non-participating women.

Selectivity corrected OLS and the tobit estimates of female market time allocation are reported in Table 2. This table reveals that both estimates are not different in signs and in the level of significance. The predicted male and female wages have a positive and significant impact. Market time is not significantly determined by the woman's age or her education. The fact that education does not have a significant effect on both her labour force participation decision and on her time allocation in market could be due to the characteristics of the sample which has very few women with significant education levels. An increase in the predicted

⁵We explore the determinants of market time later in this section.

Table 2

*Selectivity Corrected OLS and Tobit Estimates of
Market Time Allocation for Participating Women*

Variables	Selectivity Corrected OLS Estimates	Tobit Estimates
Constant	-1.03 (-0.13)	-2.26 (-0.29)
Women's Age	0.05 (0.84)	0.05 (0.87)
Women's Education	-0.35 (-0.65)	-0.29 (-0.57)
Annual per Capita Income	-0.05 (-0.13)	-0.09 (-0.24)
Number of Dependents	-0.74 (-0.38)	-0.11 (-0.60)
Dummy for Faisalabad	22.85 (5.78)*	22.48 (5.87)*
Dummy for Attock	6.48 (1.78)**	6.59 (1.86)**
Dummy for Badin	-0.30 (-0.08)	-0.52 (-0.14)
Predicted Male Wages	0.52 (2.56)*	0.55 (2.87)*
Predicted Female Wages	0.34 (2.41)*	0.29 (2.24)*
Inverse of Mill's Ratio	-1.09 (-1.09)	- -
Sigma	- -	9.62 (18.55)*
Log-likelihood	- -	-633.56
R ²	0.42	-
Sample Size	172	172

Figures in parenthesis are *t*-ratios.

* Indicates significant at 5 percent level.

** Indicates significant at 10 percent level.

female wage rate increases her time in market activities. The predicted male wages also have a positive and significant effect on female's market time allocation. This later finding appear to be counter intuitive. However, it should be borne in mind

that the predicted male wages for the participating women were significantly lower than those of the non-participating women. Women who participate in market activities come from households where the men have significantly lower expected wages. The positive impact of the predicted male wage variable could, therefore, represent some sort of a threshold effect. The women who participate are extremely poor. Their market time allocation increases with the increase in the expected wages of the male members of their households. This behaviour can be expected to obtain till the male wages reach a certain level. This however, requires further research which is outside the scope of the present study.

IV. CONCLUSIONS

The objective of this study was to determine the factors affecting the optimum time allocation between market and housework of females in rural Pakistan. In a male dominated society like Pakistan with strong cultural taboos, a woman's labour force participation can be expected to depend significantly on non-market factors. In this study we examined the determinants of female time allocation in both within the home and in market based activities.

The important finding of this study is that the home time allocation of participating women is statistically significantly different and, interestingly, higher than that for non-participating women. This is confirmed by the sign and significance of the dummy variable for market participation in the home time allocation function for all women. We find that the home time allocation for participating women is significantly and negatively dependent upon the woman's age, education and the predicted wages of the males in the household. As the woman's age or education or male family member's predicted wage increase the female's home time allocation drops.

The study of the market time allocation however, reveals that while both the predicted male and female wages have a positive and significant impact, market time is not significantly determined by the woman's age or her education. This implies that the drop in female home time allocation for participating women due to an increase in age or education as indicated by the home time allocation functions is diverted to the consumption of more leisure. The fact that education does not have a significant effect in the market time allocation could be due to the characteristics of the sample which has very few educated females. The results also indicate some sort of a threshold effect in the positive dependence of female market time on predicted male wages. This is subject for future research.

The results indicate that the need for taking measure to develop the female

labour market so that the more educated females can also participate. Efforts need to be made also to remove the cultural taboos against women's work outside the home.

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Comments on
“Determinants of Female Time Allocation in
Selected Districts of Rural Pakistan”

I would like to begin by commending the authors for focussing on rural women an extremely important area of research which has received little attention not only at the level of policy but also at the level of empirical inquiry.

The main objective of the study is to examine the influences on rural women’s decision to allocate time to market and home production. The core of the paper is devoted to the estimation of a time allocation model of rural women based on the IFPRI data set covering over 2000 women in four districts. Time allocation decisions between home and market production are presumed to be a function of various explanatory variables including the age and education of women as well as per capita household income, number of dependents, male and female wages and a dummy variables for the three districts.

While the authors spend a lot of time outlining the theoretical basis of the model and are thorough in their statistical procedures correcting for sample selection bias etc., basic issues related to problems of conceptualisation and measurement of what constitutes market and home production which are extremely important in the context of rural women are not given due attention. The definitions of market and home production are left very vague. What constitutes market as distinguished from home production needs to be spelt out clearly particularly in the context of rural societies where the dividing line between domestic work and economic activity is very fuzzy.

While there is a brief reference to market activity which is defined to include wage earners and women engaged in market related activities such as handicrafts what constitutes home production is not clearly defined. Home production seems to be limited to purely domestic chores where it is stated that a large proportion of women’s time is allocated to cooking, baking and dish washing. Therefore it seems that a whole range of activities including unpaid work on own farm, post harvest operations at the homestead, and household maintenance tasks such as gathering fuel and collecting water are either excluded from the time budget or classified as home production. If the time allocation is limited to only wage earning activities

and purely domestic chores the empirical exercise is of little relevance since it excludes the bulk of activities undertaken by rural women.

On the other hand if these activities are included under the category of home production then the results presented in Table 1 are a drastic understatement of home production time. The findings indicate that on average non-participating women spend only 16 hours per week on home production tasks that is less than 2 hours per day. This figure presumably includes farm work, livestock care, processing and storing of farm output, collecting water, gathering fuel in addition to cooking, cleaning, childcare, washing etc. A possible explanation of why the estimate of time input is lower than that for other studies could be that the time use of rural women is not accurately recorded. Alternatively given the large mean household size of the sample this could be attributed to the sharing of home related activities by a number of women in the household. Here it is interesting to note that while the mean household size is also quite high in the case of participating women the time input on home production is significantly higher in their case of 22 hours per week.

The study further finds that women who participate in market activity also spend longer hours on home production as compared to their non-participating counterparts. On the contrary time use in home production would have been expected to be lower for women participating in market production than for those who work only in home production an expectation which is borne out in similar studies for India and Bangladesh.

Also the data presented in Table 2 does not entirely support the *a priori* expectation as well as the papers conclusions that women undertaking market related activities belong to the poorest household. While the value of what are termed "other assets" is higher for the group of non-participating women, the mean size of landholdings which is probably the most important indicator of social and economic status in rural areas is higher for the group of participating women as compared to their non-participating counterparts. On average participating women belong to household owning over 9 acres of land which is substantial.

It is not clear why landholding size and possibly tenurial status were not included as explanatory variables in the model given earlier evidence for Pakistan of marked difference in female participation by these characteristics. It has been noted that women from tenant households tended to work the longest hours. Also a variable for number of females in the household rather than simply household size might have added to the explanatory power of the model since as the authors mentioned earlier the sex composition of the household has important implications for time allocated to home and market production.

The results of the tobit analysis indicate that male and female wages and the regional dummies for Faisalabad and Attock are positively and significantly related to time allocated to market activities by rural women. Unfortunately the paper does not make any attempt to explain the significant regional differences in both time allocated to market production as well as to home production of non-participating women. These findings could possibly be due to variation in economic opportunities or differences in the extent of cultural restrictions on women's mobility across the four districts sampled. The approach adopted in the paper focusses on factors influencing individual's decision of whether to work or not when possibly community level variables such as job opportunities or cultural constraints may be the more critical influences on time allocation of rural women between market and home production.

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