

Khandker, Shahidur Rahman

**Working Paper**

## Labor Market Participation of Married Women in Bangladesh

Center Discussion Paper, No. 514

**Provided in Cooperation with:**

Yale University, Economic Growth Center (EGC)

*Suggested Citation:* Khandker, Shahidur Rahman (1986) : Labor Market Participation of Married Women in Bangladesh, Center Discussion Paper, No. 514, Yale University, Economic Growth Center, New Haven, CT

This Version is available at:

<https://hdl.handle.net/10419/160437>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

ECONOMIC GROWTH CENTER

YALE UNIVERSITY

Box 1987, Yale Station  
New Haven, Connecticut

CENTER DISCUSSION PAPER NO. 514

LABOR MARKET PARTICIPATION OF MARRIED WOMEN IN BANGLADESH

Shahidur Rahman Khandker

Postdoctoral Fellow

Yale University

July 1986

Notes: Center Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Discussion Papers should be cleared with the authors to protect the tentative character of these papers.

## ABSTRACT

For a country such as Bangladesh, a nested multinomial logit model is utilized to test whether female time allocation is inflexibly fixed by local customs and whether informal activity is an independent category in a woman's choice structure of work. The econometric analysis of cross-sectional women's time-use data from rural Bangladesh suggests that a woman's activity as an unpaid labor in a family enterprise is not a distinct category in her choice structure of work. The results support the alternative hypothesis, however, that women's time-use patterns are not exclusively fixed by the society, but are partially influenced by individual-, household-, and community-level economic constraints.

# LABOR MARKET PARTICIPATION OF MARRIED WOMEN IN BANGLADESH\*

## Introduction

In many developing countries limited opportunities force many women to work in the "informal sector" as an unpaid family worker which consists of self-employment in a family enterprise such as cottage industry. Women's labor market participation status is, thus, determined by whether women produce cash income from employment in a family enterprise or from employment outside the family (i.e., market wage production) or produce no cash income (i.e., work at home in home production). Although a woman's choice may differ among these three categories of work due to the transactions cost involved with each category, it is, however, important to ascertain whether women's three-way choice structure of work is appropriate (Hill, 1983).

Empirical results using households survey data from Bangladesh suggest that rural women in Bangladesh find it easier to substitute employment in a family enterprise for employment outside the family enterprise. Results also indicate that women's time allocation is not preordained by the society but is determined by a variety of individual, household, market, and community-level constraints.

The paper is organized in the following order. Section two outlines the econometric framework of the multinomial logit (MNL) model that is utilized to predict the categorical responses of women's work patterns in Bangladesh. Section three presents the survey data. Section four reports the empirical results. Section five discusses the policy simulation results based on the estimates of the model. Finally, the results are summarized in the concluding part of the paper.

## II. Labor Force Participation Model of Bangladeshi Women

Time budget studies from rural Bangladesh show that more married women work in familial production than in nonfamilial production (Farouk and Ali, 1975; Khandker, 1985). One interpretation of this pattern is that powerful norms of female seclusion due to "patriarchy" extend to the labor market which may severely restrict women from working outside the family (Cain et al., 1979). The other interpretation is consistent with the predictions of the time allocation model pioneered by Becker (1965). Since household production is one important and efficient method of obtaining consumption goods, households may find it more advantageous for women to work more in familial production than in nonfamilial production when there are few opportunities and, hence, low wages for women who work outside the home.<sup>1</sup>

It would be more useful to examine the factors influencing the allocation of time by married women than their simple participation in each activity. It is, however, important to know the factors influencing the choice structure of women's work, since this structure has an important implication for the estimates of a time allocation model. Because time allocation of a woman to any category of work is contingent upon her participation in other activities, a time allocation model may suffer from sample selection bias to the extent that women's presence in any one type of work category is endogenously determined (Heckman, 1979). Thus, before estimating a time allocation model for Bangladeshi women, one must determine the number of independent activities in which women can potentially participate, as well as the factors influencing their participation decisions. This paper is restricted to identifying the factors that influence women's choice of work, using a MNL model.

Assume that each woman selects one among the three mutually exclusive alternatives: (i) producing cash income from market employment (indexed m), (ii) producing cash income from employment in the family enterprise (indexed f), and (iii) not producing cash income (indexed h).<sup>2</sup> The probability function of choosing the jth activity by the ith woman can be written as:

$$(1) \quad P_{ji} = \frac{\exp(\beta_j'X_i)}{\left[ \exp(\beta_m'X_i) + \exp(\beta_f'X_i) + \exp(\beta_h'X_i) \right]},$$

$j = m, f, h.$

where  $X_i$  is a vector of exogenous variables explaining women's labor market participation and  $\beta_j$  is the unknown parameter vector (Hill, 1983).

Assuming the errors are independently and identically distributed and the independence of irrelevant alternatives (IIA), Hill (1983) carried out a test within the above MNL framework to determine whether two of the three parameter vectors ( $\beta$ 's) are identical. Hill's test of the equality of the parameter vectors is, however, a very strong test of the choice structure of the model. The more subtle tests are two Hausman and McFadden (1984) tests which are tests of the error structures. One test is built in within the MNL framework that tests the IIA assumption of the MNL model. The second test is built into the framework of a nested multinomial logit (NMNL) model that relaxes the IIA assumption and also allows for correlation among the error terms.

Assume that in the decision hierarchy, a decision is first made whether to produce cash income. Then, a decision is made on whether to produce cash income from employment in a family enterprise (f) or to produce cash income from employment outside the family enterprise (m).<sup>3</sup> The null hypothesis that

the MNL model reduces to a NMNL model depends on how an individual woman forms a weighted average of the characteristics of these two categories, which is called an inclusive value and defined as:

$$(2) \quad I = \log (e^{(\beta_m'/\lambda)X_i} + e^{(\beta_f'/\lambda)X_i})$$

where  $I$  characterizes women's labor force participation, and  $\lambda$  is a scalar parameter that measures the degree of independence between formal (m) and informal (f) labor market work alternatives. The choice probabilities of the NMNL model can be written as:

$$(3.a) \quad P_{hi} = \left[ e^{(\beta_h'/\lambda)X_i} \right] / \left[ e^{(\beta_h'/\lambda)X_i} + e^{\lambda I} \right]$$

$$(3.b) \quad P_{fi} = \left[ e^{(\beta_f'/\lambda)X_i} \cdot e^{\lambda I} \right] / \left[ e^{(\beta_h'/\lambda)X_i} + e^{\lambda I} \right] e^I$$

$$(3.c) \quad P_{mi} = \left[ e^{(\beta_m'/\lambda)X_i} \cdot e^{\lambda I} \right] / \left[ e^{(\beta_h'/\lambda)X_i} + e^{\lambda I} \right] e^I$$

Note that tests of significance applied to the coefficient of the inclusive value,  $\lambda$ , can be used to test the IIA property or the validity of the MNL model (Maddala, 1983).

**Explanatory Variables:**

Different reasons can justify the inclusion of market prices, income earning (individual and household) assets, and individual- and household-level constraints as explanatory variables in the participation equations.

Market-determined prices are community-level wage rates of three categories of labor: adult male, adult female, and child labor.<sup>4</sup> The adult male wage is included since it may reflect the effect of husband's earning independent of any human capital endowment, such as husband's education, on wife's time-use. An increase in husband's market wage will induce an increase in the supply of husband's labor to market work, thereby inducing a corresponding decrease of women's participation in market work.

An increase in women's wage rate, other things being equal, is expected to increase the labor market participation of women, if community wage rates measure the opportunity cost of women's time-use in home production. The child's wage rate measures the extent of pecuniary returns of children in parental decision-making. An increase in the child wage rate reduces the shadow price of producing children at home so that women devotes more time to home production.

Household distance to the nearest school will proxy variation in the price of quality of children. Since there may exist a trade-off between quality and quantity of children, an increase in the price of schooling due to an exogenous increase in the school distance decreases the quality per child. This induces a corresponding decrease in the shadow price of children, thereby increasing the number of children in the family. If women and children are close substitutes in production, this means children can substitute mother's time at home work, thereby releasing the mother for generating cash income either at home or outside the home.<sup>5</sup>



Household distance to the town or market center may proxy variation in:

(i) the transactions cost in purchasing goods for which the household can produce substitutes and (ii) the costs of employment both inside and outside the home. One may hypothesize that an increase in the household distance to market center means a higher transactions cost for purchasing home produced goods from the market, and also higher employment costs for market-oriented work, which together may imply a decrease in the probability of women's participation in labor market production relative to home production.

An individual characteristic that one can treat as an explanatory variable in the participation equation is a woman's education, which may indicate her earnings potential. Thus, an increase in the level of woman's schooling, holding wages constant, can increase the probability of her participation in producing cash income, because of higher opportunity costs for not producing cash income. In contrast, husband's education and the amount of resources the husband brought to the marriage affect a woman's participation in the reverse direction. This may occur due to the positive wealth effects of potential earnings influenced by physical and human capital endowments of the husband.

The household's assets variable such as landholding may affect women's time use and hence labor market participation decision. This variable may act as a proxy for productive household assets which may exert both a price effect (raising the marginal product or shadow "wage" of woman's labor) and an income effect (encouraging the household to consume more of a particular good even at its given opportunity cost) on women's labor market participation.

### III. The Data and Its Characteristics

The data on which this paper is based is drawn from 500 sample survey questionnaires I recently (1983-84) administered in eight Upazilas in Bangladesh. The sample comprises households from both farming and nonfarming populations as well as landed and near-landless groups. The eight Upazilas were selected from regions north, east, and west of Dhaka as well as a central part of Bangladesh.<sup>6</sup>

Women's time allocation data has been classified under three mutually exclusive categories: not producing cash income, producing cash income in the family enterprise, producing cash income outside the family enterprise.<sup>7</sup> Data analysis is also restricted to women aged 15-49. Thus, we are left with 444 out of 500 observations. Out of 444 married women, 119 housewives participate in producing cash income outside the family enterprise, 95 women participate in producing cash income in the family enterprise, while the remaining women do not produce cash income. The means and standard deviations of the dependent and independent variables are presented in Table 1.

The characteristics that divide women into either of these three categories of work differ substantially for each category. For example, women engaged not in producing cash income are older (by four or five years) than those in producing cash income either inside or outside the family enterprise. Women engaged in producing cash income outside the family enterprise have much more education (as do their spouses) than women producing cash income in the family enterprise or producing no cash income. Premarriage assets are two to three times higher for women producing no cash income than for women producing cash income either inside or outside the family enterprise. Women producing

cash income in the family enterprise possess half as much land as women producing no cash income. School distance is the highest for women producing no cash income. Market distance is half as high for women producing cash income from employment outside the family enterprise as for women in the other two categories.

#### IV. Empirical Results

Table 2 reports the maximum likelihood parameter estimates, and the asymptotic t-statistics of the MNL model. The value of the log-likelihood at the maximum likelihood estimates is -245.35, compared with a value of -487.78 when all coefficients are zero. Using the statistic,  $\rho^2 = 1 - (\text{Log-unrestricted} / \text{Log-restricted})$ , which measures the share of the variation in the dependent variable explained by the independent variables, one finds that the MNL model correctly explains about 50 percent of the observed variations in women's labor market participation in terms of individual, household, market, and community characteristics. This in turn suggests that women's time-use patterns in rural Bangladesh are not preordained by the society but are partially influenced by economic constraints. With the beta vector for producing cash income in the family enterprise normalized to zero, woman's age, landholding, school distance, market distance, wages for male and female labor are statistically significant for not producing cash income choice, while woman's education, landholding, and market distance are significant for the market-oriented production choice. Although there appear to be substantial differences across the three work outcomes, the Hausman and McFadden specification test rejects the IIA property of the MNL model.<sup>8</sup>

Results of the MNML model are shown in Table 3.<sup>9</sup> The estimated inclusive value coefficient, although negative, is not significantly different from zero.<sup>10</sup> Thus, the MNL model is not a correct specification of the labor force participation status of Bangladeshi rural women.<sup>11</sup> This suggests that the MNML model is more appropriate to represent women's choice of work in rural Bangladesh. Furthermore, women's employment in a family enterprise and employment outside the family enterprise are highly substitutable.

As Table 3 shows, women's schooling seems to play an important role in determining women's participation in home production relative to labor market production. The higher the education of a woman, the higher is the opportunity cost for her not producing cash income and, hence, higher is the probability that she works in labor market production that produces cash income. Conversely, husband's education has a negative effect on a woman's work in labor market production for cash income, presumably working as the effect of the husband's earnings on the woman's time-use patterns.

Both husband's premarriage assets and household's current landholding have positive effects (although not significant) on women's not producing cash income in Bangladesh, again presumably working as wealth effects on women's time allocation.<sup>12</sup>

The school distance increases the probability of women's working for cash income. If school distance measures the price of quality of children in terms of schooling, then an increase in the price of schooling due to an increase in household distance to school decreases the quality but increases the quantity of children. This induces women to work more for cash income but less in home production since children can substitute mother's work in home production.<sup>13</sup>

Table 1. Mean and Standard Deviation (S.D.) of Variables

<u>Variable name</u>	<u>Producing no</u>		<u>Producing cash</u>		<u>Producing cash</u>	
	<u>cash income</u>		<u>income in family</u>		<u>income outside</u>	
			<u>enterprise</u>		<u>family enterprise</u>	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Woman's age (in years)	34.22	8.38	29.22	6.52	30.23	5.61
Woman's education (years)	2.31	3.22	2.69	3.10	9.24	4.23
Husband's education (yrs)	5.23	4.68	5.01	4.19	10.50	4.33
Husband's premarriage						
asset (in current Taka)	51.49	77.72	19.52	31.57	16.55	33.62
Landholding (hectare)	1.29	1.14	0.61	0.78	1.09	2.06
School distance (Km)	1.04	1.18	2.54	3.83	1.30	2.93
Market distance (Km)	7.03	3.60	7.42	3.50	2.90	3.98
Community male wage (Tk.)	17.84	2.55	17.63	2.84	18.76	2.87
Community female wage	8.12	1.11	8.37	1.43	9.24	1.79
Community child wage	9.02	3.10	9.10	2.03	10.22	2.11
Sample size	230		95		119	

Note: Husband's premarriage asset is expressed in current '000 Taka. Distance variables are calculated on the basis of individual household's responses. The household distance to market center refers to Upazila headquarter, the source of all institutional services such as family planning, health, and credit. Community wages (Taka per manday without food) are Union-level averages of wages observed during the period prior to the data collection period. There are ten such Union-level averages of each community wage rate. One Taka is equivalent to U.S. dollar 0.32.

**Table 2. Maximum Likelihood Estimates of MNL Model of Women's Labor Force Participation**

Exog. variables	$\beta_h$	$\beta_m$
Woman's age	0.059 ( 2.800)	0.038 ( 1.344)
Woman's education	-0.042 (-0.546)	0.507 ( 5.458)
Husband's education	0.078 ( 1.375)	-0.102 (-1.386)
Husband's premarriage assets	0.005 ( 1.327)	-0.004 (-1.284)
Landholding	0.776 ( 2.832)	0.521 ( 1.840)
Distance to school	-0.328 (-3.927)	0.114 ( 1.618)
Distance to market center	-0.121 (-2.201)	-0.353 (-5.424)
Community male wage	1.420 ( 5.927)	0.125 ( 0.528)
Community female wage	-3.027 (-6.545)	-0.455 (-1.251)
Community child wage	-0.114 (-0.703)	0.024 ( 0.107)
Sample size	444	
$\rho^2$	0.4970	

Note: Parameter coefficients are obtained by assuming that  $\beta_f = 0$ . The asymptotic t-Statistics are given in parentheses.

**Table 3. Estimates of MNML Model of Women's Labor Force Participation**

Exog. variables	$\beta_h$	t-Statistic
Woman's age	0.014	0.433
Woman's education	-0.539	-3.354*
Husband's education	0.176	2.327*
Husband's premarriage assets	0.011	0.828
Landholding	0.222	0.828
Distance to school	-0.346	-2.945*
Distance to market center	0.272	2.194*
Community male wage	0.951	3.196*
Community female wage	-2.052	-3.792*
Community child wage	0.041	0.187
Inclusive coefficient	-0.077	-0.195
Sample size	444	
$\rho^2$	0.6465	

Note:  $\beta_h$  is estimated using the inclusive values obtained in the first stage ML estimation of being in the family enterprise (f) relative to nonfamilial market work (m). The t-statistics are the ones appropriate to the two-step estimation procedure. The log-likelihood is -179.97, compared with a value of -307.76 when all coefficients are zero. Asterisk refers to significance level of 5 percent or better.

The effect of the market center distance also seems to confirm the a priori expectation. An increase in the distance to market center implies an increase in both transactions and employment costs of labor market work, thereby inducing women to work more in home production but less in the family enterprise or in nonfamilial market production.

The effect of the adult male wage rate is to increase the probability of women's working more in home production than in labor market production. Thus, an increase in the male wage rate implies an increased opportunity cost of husband's time in the home production so that a woman substitutes for male labor on the home production, thereby releasing the husband's time to other cash-income earning activities.

An increase in the female wage decreases the probability of a woman's working in the home production relative to producing cash income in the market-oriented production, results which are consistent with a priori expectations. However, contrary to expectations, children's wages have no effects on mother's choice of work pattern.

## **V. Policy Simulations**

It is important for policy purposes to distinguish the factors that influence the probability of women's participation in the labor market from the factors that keep women away from market-oriented activities. In Bangladesh, the policy variables of particular interest may be women's education, market interventions concerning wages, public delivery system of schooling and modernization programs. While the household distance to school measures the effect of price of quality of children exogenously varied with government interventions, the distance to the market center may proxy government modernization programs aimed at improving rural well-being. Simulations of



these policy variables are shown in Table 4.14

**Table 4. Change in Probability of Labor Market Participation When Changes Occur in Selected Explanatory Variables**

Exogenous Variable	Change from Mean	Change in probability
<u>Category A</u>		
Woman's education	Increase by 10%	0.0463
Woman's wage	Increase by 10%	0.0955
<u>Category B</u>		
Distance to school	Decrease by 10%	-0.0157
Distance to market center	Decrease by 10%	0.0190

A 10 percent increase in women's education from its mean value of 4.25 years of schooling increases the probability of women's participation in labor market production by 4.6 percent. On the other hand, a 10 percent increase of women's wage from its mean value of Tk. 8.47 increases the probability of a woman's participation in labor market production by almost 10 percent. Thus, women's wages have more impact than has woman's education on women's labor market participation. This is perhaps not surprising. An increase in average education of a woman by 10 percent will increase both her home and market productivity, and can, therefore, be expected to have a smaller effect on her labor market production than a 10 percent increase in a variable that only affects a woman's market opportunities, such as a 10 percent increase in the market wage of women.

A 10 percent decrease in the price of schooling decreases the probability of women's participation in labor market production by 1.6 percent. A decrease in the price of quality will mean an increase in the quality of children (because own price substitution effect is always negative) as well as a decrease in the quantity of children (because there exists a trade-off between quantity and quality of children). This in turn may imply a substitution of women's time for children's in home production so that women participate less in market-oriented activities.<sup>15</sup> In contrast, urbanization, which creates employment opportunities for women both inside and outside the home to produce cash income, will reduce the costs of such market-oriented employment and will attract more women into the labor force. Thus, a 10 percent reduction in the transaction costs in the form of reducing household distance to market center increases the probability of women's labor market participation by almost 2 percent.

## VI. Conclusions

The objective of this paper is to identify the factors that affect the labor force participation decision of rural women in Bangladesh. An analysis of a multinomial logit framework used in predicting the three-way choice structure of women's work in rural Bangladesh suggests that these choices are not exclusively fixed by the society but are partially influenced by woman's own endowments as well as economic constraints at the individual household level. This implies that the alternative hypothesis that the women's time allocation in rural Bangladesh is inflexibly fixed by local customs can be rejected.

Appropriate specification tests, however, reveal that working in the informal sector as unpaid family worker is not an independent choice for rural women in Bangladesh. In fact, a specification test within the framework of a nested multinomial logit model suggests that a woman's participation in a family enterprise is highly substitutable with her participation in activity outside the family enterprise. This may imply that women's market-oriented production in rural Bangladesh remains at its premodern level so that a woman does not find it difficult to substitute her employment in a family enterprise for employment outside the family enterprise.

Human capital variables, such as women's education, appear to contribute significantly to women's participation in the labor market. On the other hand, urbanization is a way of reducing transactions and employment costs for women's market-oriented employment and can thereby increase women's participation in the labor force. Policy interventions which raise women's wages appear to have large effects on women's participation in the labor force.

Government provision of schooling in the form of reducing schooling costs for children may increase the quality and reduce the quantity of children. Thus, if women and children are substitutes in production, this may reduce women's involvement in market-oriented production. Thus, although reducing schooling costs may reduce women's current participation in market production, a program to accomplish this is more relevant for achieving long run policy objectives such as raising the quality but reducing the quantity of children and must be justified accordingly.

**Footnotes**

- \* The author acknowledges financial support from the Ford and Rockefeller Foundations and wishes to thank Robert Evenson, Vassilis Hajivassiliou, Paul Schultz, and John Strauss for helpful comments, and Paul McGuire for computer assistance. The usual disclaimer applies.
- 1 However, as economic development proceeds, the opportunity costs of producing home goods becomes higher so that women increasingly participate in the labor force, even if patriarchy exists. Evidence suggests that as development proceeds sex segregation patterns in the labor market that are cultural in origin break down in the face of changes in labor market demand in many developing countries (Youssef et al., 1980).
- 2 This specification does not allow for the possibility of working simultaneously in more than one category of job. This restriction perhaps is unreasonable if a woman works concurrently in nonfamilial and familial productions. However, our dataset excludes the possibility that a woman has more than one employment status.
- 3 Alternatively, a decision is first made whether to produce cash income from employment outside the family (m). If a decision is made not to participate in employment outside the family, then a decision is made on whether to produce cash income from employment in a family enterprise (f) or not to produce cash income (h). This alternative decision hierarchy and the hierarchy mentioned in the text are, however, not mutually exclusive so that specifying one hierarchy precludes the other.
- 4 Using community wage rates bypasses the selectivity problem by assuming that every woman faces these wage rates irrespective of her ability, education, and experience, thereby implying that the rate of return on human capital investment is zero. Of course, the community wage rate for women (or for men) may not accurately represent a woman's home productivity. For instance, education is likely to improve a woman's productivity both in the home and in the market. In such a case, one may use predicted wage based on the estimated wage offers for women working outside the home using the approach suggested by Heckman (1979). Note, however, that this method will generate inconsistent parameter estimates if the two subsamples (those who work and those do not) differ in unmeasured characteristics. Conversely, children's community wage might accurately represent a child's productivity at home and in the market, since children presumably have less variance in human capital levels.

- 5 Another partial effect of an increase in school distance is to increase the mother's time in home production for childbearing, if not for childrearing. Thus, whether a women will participate in labor market production due to an increase in school distance depends on two opposing partial effects.
- 6 Upazilas are "upgraded" Thana administrative units, covering roughly an area of 100 sq. miles, and consisting of several Unions. Unions in turn are collection of a number of villages. The Upazilas covered under this study are respectively, Baidyerbazar (Dhaka district), Ghatail (Tangail district), Kownia and Kotwali (Rangpur district), Sherpur (Jamalpur district), Laksam (Comilla district), Ishardi (Pabna district), and Gabtali (Bogra district). For more detail of the data collection, see Khandker (1985).
- 7 Producing no cash income involves house chores such as cooking, cleaning, fetching water and firewood, caring for the children and the elderly, washing and serving food. It also includes post-harvest operations of crops, such as threshing, drying, winnowing, and sifting for paddy, kitchen gardening, and tending domestic animals, which are also essential parts of women's domestic work in rural Bangladesh. Producing cash income in family enterprise includes activities such as family business, sewing, handicrafts, and rice husking which are done primarily by the family at home where a women works either as a partner or an unpaid family worker. Producing cash income from employment outside the family includes those activities that require women to work outside the home, such as teaching, nonagricultural wage work, and other salaried services.
- 8 The Hausman and McFadden test statistics for deleting, respectively, the categories of producing no cash income (h) and producing cash income from employment outside the family enterprise (m) are 756.98 and 872.41. These test statistics are asymptotically chi-square with ten degrees of freedom.
- 9 The NMNL model is estimated using a sequential estimation procedure which is asymptotically less efficient than full ML estimation. Thus, the usual estimates of the covariance matrix of second-stage estimates are not the correct ones, because they are based on the inclusive values obtained from first-stage ML estimates of the probability of being in the category f relative to m. This is why the restricted log-likelihood values of Tables 2 and 3 are not the same. Appropriate correction, however, was applied to obtain the t-Statistics of Table 3. See Maddala (1983), page 75 for estimation problems of the NMNL model.
- 10 The estimated inclusive value coefficient of the alternative decision hierarchy model (footnote 3) is -0.646 with a standard error of 0.495 which is statistically significant at a 19 percent confidence level. Since the  $\lambda$  coefficient almost statistically falls beyond the unit interval, this is perhaps evidence of a specification error.

- 11 Our finding is in sharp contrast with that of Hill (1983). Hill found that a Japanese woman working in a family enterprise finds it difficult to switch from self-employment either to home production or to nonfamilial market production. This is perhaps not surprising, given the level of development in Bangladesh and in Japan.
- 12 Note that the correlation between husband's premarriage assets and current landholding is only 0.29, which perhaps may not bias the estimates.
- 13 Results thus confirm that the partial effect of child's labor substitution for mother's in home production dominates the partial effect that increases mother's involvement in home production.
- 14 The simulation is done to predict the change in probability of being in the labor force when changes occur in one of the explanatory variables, while leaving the mean values of other explanatory variables constant. The parameter coefficients for this exercise are taken from the NMNL estimates in Table 3.
- 15 This need not necessarily be the case. As children particularly female ones receive more education following a decrease in schooling costs, they may choose more market work as adults. As this occurs, it is likely that at some point children will stop being substitutes for women in home production, and instead become pure consumption goods (requiring more home production by the mother). This would mean that more education for the mother will mean fewer children and also more participation of mothers in labor market production. This is currently observed in more developed countries, and it seems likely that this partial effect is also present in Bangladesh, although currently it may be dominated by the substitutability effect.

**Bibliography**

- Becker, G. S., 1965, "A Theory of the Allocation of Time," Economic Journal, (September): 493-517.
- Cain, M., S. R. Khanam and S. Nahar, 1979, "Class, Patriarchy, and Women's Work in Bangladesh", Population and Development Review, 5: 405-438.
- Farouk, A., and M. Ali, 1975, The Hard-working Poor: A Survey of How People Use Their Time, Dhaka: The Bureau of Economic Research, University of Dhaka.
- Hausman, J., and D. McFadden, 1984, "Specification Tests for the Multinomial Logit Model." Econometrica, 52: 1219-1240.
- Heckman, J. J., 1979, "Sample Selection Bias as a Specification Error", Econometrica, 47: 153-161.
- Hill, M. A., 1983, "Female Labor Force Participation in Developing and Developed Countries--Consideration of the Informal Sector." Review of Economics and Statistics, 65: 459-468.
- Khandker, S. R., 1985, "Women's Role in Household Productive Activities and Fertility in Bangladesh," Discussion Paper No. 488, Economic Growth Center, Yale University, New Haven, CT. (Journal of Economic Development, forthcoming)
- Maddala, G. S., 1983, Limited-dependent and Qualitative Variables in Econometrics, London: Cambridge University Press.
- Youssef, N. H., et al., 1980, "Keeping Women Out: A Structural Analysis of Women's Employment in Developing Countries." Report prepared for USAID, Washington, D.C: International Center for Research on Women.