

# Married Female Labor Force Participation in a Less Developed Country

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## I. Introduction

Development strategists have increasingly emphasized the role of human resources in the economic growth process [Harbison (1973), Shearer (1973)]. They have begun to recognize that ultimately it is the quantity and quality of human efforts that determine the pace and direction of economic growth. Generally such human resource development issues involve problems of underdevelopment and underutilization of human talents. Availability, even large excess supply, of raw labor inputs is assumed. Seldom do we see explicit concern for the development of *new* sources of labor supply because the problems of better utilization of existing labor supplies loom so large for most less developed countries (LDC's). Yet, as current experience in a few LDC's suggests, the assumption of the adequacy of previous sources of labor supply may be invalid. Several Middle East and other oil-rich countries, with the aid of abundant supplies of financial capital acquired from the sale of their natural resources, have adopted large-scale industrialization projects that have taxed available labor supplies to the point that these countries now have to rely substantially on foreigners to fill labor shortages. In such situations, concern for development of new sources of labor supply naturally arises.

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Married women, of course, represent the largest untapped source of new labor supply in LDC's. If experience in Western industrialized countries is any guide, the potential magnitude of this source of supply is astonishing. Cain (1966), for example, reports that between 1950 and 1960, three-fifths of U.S. labor force growth was accounted for by increased participation of women in the category, "married, husband present." Married female labor force participation (LFP) in the U.S. has continued to rise to the point that today over 45 percent of married women are participants, and they account for about one-fourth of the total labor force. Other industrialized Western nations have had parallel experiences despite rapidly rising real incomes.

While no cause/effect relationship is suggested in the tendency of economic development and married female labor market activity to advance together, world experience suggests that countries that have achieved economic growth without coincident rise in the labor market status of women are few, indeed (Ginzberg -1971). Economic growth and female labor market activity appear to be simultaneously related. Growth stimulates the demand for human resources and tends to weaken the institutional and cultural barriers that once hampered development of underutilized human resources. In turn, increased utilization of new sources of labor with attendant spillovers into new domains of employment not only directly contributes to society's real output, but, in addition, further erodes the cultural barriers that inhibit growth. Increased female participation has other impacts on economic growth. As suggested by Youssef (1974, p. 1), LFP provides an alternative outside of homemaking and childrearing responsibilities to wives that can potentially relieve population pressures and, thereby, raise per capita income. Therefore, from a population policy perspective, for conducive-to-growth changes in social and customary practices that are attendant with rising female LFP, and for development of new sources of labor supply, it behooves policymakers in LDC's to encourage females to seek market-work.

Unfortunately, we have very little knowledge of the determinants of married female participation in LDC's. With a few notable exceptions, the research that has been done is largely based on United Nations and ILO publications that are highly aggregative.<sup>1</sup> Particularly lacking are analyses of the participation decision at the individual or microeconomic level. As a conse-

<sup>1</sup> Research by McCabe and Rosenzweig (1976) and Harmon (1970) are notable exceptions to the generally aggregative nature of research on married females in LDC's.

quence, the ability of planners and policymakers to predict the labor supply responses of females to alternative policy actions is limited. In addition, assessments are needed of the applicability that standard theoretical tools and econometric models have for LDC's. These tools and models have proved valuable in analysis of labor supply responses in Western countries. However, because cultural and societal factors are likely to be more pronounced in LDC's, the appropriateness of such marketbased models is easily challenged. Direct implementation of the Western model of married female participation on an LDC should provide valuable insight on the general applicability of the neoclassical approach.

In this paper, we present the results of micro-analysis of the married female market-versus nonmarket-work decision for the city of Tripoli, Libya. The random sample conducted in the fall of 1977, on which this study is based, contains approximately 1300 cases.<sup>2</sup> The major finding of this study is that married female LFP in a nonagricultural sector of this LDC is well-described by the neoclassical theory of labor supply. While the generality of this finding is impossible to assess without additional testing in other LDC's, the overall strength of our results, as measured by conventional methods, demonstrates that the neoclassical model of labor supply should receive more emphasis in LDC's as a tool for analysis and policy formation. The paper is divided into four sections. In the first section we present a brief discussion of the neoclassical approach to labor supply and its extensions. The second section provides a compact description of the empirical model and econometric techniques. The third section is devoted to a discussion of the theoretical expectations of the effects of independent variables on married female choice and a presentation of empirical results. Both the Linear probability model and maximum-likelihood logit analysis are used to analyze the data. In the concluding section, some comparisons of the findings of this study with existing assessments of married female labor supply are made and policy implications drawn.

## II. Neoclassical Theory of Labor Supply and Extensions

Analysis of the labor force participation decision has been for some time the primary basis for assessment of labor supply. Because of high marriage rates in many LDC's and in Libya in par-

<sup>2</sup> Further details on the sampling process including copies of the questionnaires are available from either author.

ticular where only 4.1 percent of females of age 15 years and over were never married in 1964 [Youssef (1974), p. 69], analysis of married female participation is tantamount to analysis of female labor supply. The conceptual model underlying recent economic research of LFP is couched in price theory terminology with notable extensions. Within this general framework, the amount of a commodity consumed is affected by its relative price and the income of the consumer. A change in relative price induces both income and substitution effects as the consumer seeks to reestablish the optimum, utility-maximizing, combination of goods.

The application of price theory concepts to labor supply questions is a simple one in which the worker is the consumer, the relevant goods are income and leisure, and the wage rate is the price of leisure. On the assumption that leisure is a normal good, the standard analysis of work/leisure choices implies a positive substitution effect and a negative income effect of work effort in response to variations in the real wage rate. An increase in the wage rate makes leisure time more expensive, thereby, through the substitution effect, leading to a reduction in hours of work supplied. However, a rise in the wage also increases income at all levels of hours worked and, therefore, offers the opportunity to purchase more of all goods including leisure. The direction of hours-of-work change on balance cannot be determined *a priori* as it depends on the relative strengths of the two effects. At low wage levels, the substitution effect generally prevails, although this dominance is weakened and eventually overtaken by the income effect as the real wage increases leading to the familiar concept of the backward bending supply of labor curve.

The neoclassical theory of labor supply provides an extremely useful framework for conceptualizing the decision of "whether" and "how much" to work. Yet, for analysis of the work decision of married females, the framework has severe limitations. Principally these limitations are related to the simple division of the theory of choice into two categories: work or leisure. Researchers have found it necessary to extend the neoclassical approach in other directions in order to capture the complexities of the married female LFP decision in a theoretical mold.

The contribution of Jacob Mincer (1962) have been "the foundation from which virtually all subsequent analyses of labor supply and labor force participation have proceeded." [Parnes (1970), p. 5] Mincer's extensions are three-fold. First, he recognized that the simple work/leisure dichotomy needs to be extended for married

females because of the alternative productive uses of time in the home. Second, Mincer added the reference point of the family as the appropriate decision-making unit. A rise in the market-work opportunities of one member of the household should rationally lead to a realignment of responsibilities of other family members, thereby providing a release from, say, housemaking responsibilities of the wife to take advantage of market-work opportunities. Even with general dominance of the income effect we can theoretically incorporate a shift to market-work for a given family member with the addition of this construct. Third, Mincer added a variant of Friedman's permanent income hypothesis in order that the model might reflect possible temporary changes in LFP by family members in response to transitory changes in income. These extensions, largely based on the greater substitution possibilities for married women and peculiarities of their supply response in the context of familial circumstances, enabled Mincer to resolve the apparent contradiction of rising married female participation over time in the face of rising real income levels and the inverse cross-sectional relationship between participation of the wife and income of the husband.

Compactly, then, we can use the neoclassical framework to express the LFP decision as a functional relationship:

$$\text{LFP}_{\text{mw}} = f \left( \begin{array}{l} \text{transitory family income, permanent} \\ \text{family income, wealth, nonmarket wages,} \\ \text{earnings potential, demographic factors} \end{array} \right).$$

A transitory drop in family income, due to, say, unemployment of the head of the household, is expected to lead to a higher participation probability for the married female. Permanent income and wealth are expected to exert a negative influence on the participation probability in conformance with the income effect of standard supply theory. Market and nonmarket earnings are incorporated to reflect the extended choice setting for the married female, and it is the magnitude of one in relation to the other type of earnings potential, other things equal, that influences the participation decision. Demographic factors, such as age, education, and size of family, are added to the model in order to capture additional familial and social circumstances under which the participation decision is made. More importantly, because of empirical implementation problems discussed below such factors are needed in the model in order to reflect the relative opportunity costs in the use of time in market and nonmarket activities.

### III. Empirical Model and Econometric Techniques

Other things equal, the decision to work rests on a comparison of the woman's market wage ( $W$ ) with the opportunity cost of the first hour of work ( $W^*$ ). Let  $y_i$  be a binary variable with a value of one signifying market-work and zero, no market-work for the  $i$ -th married female.

Formally, the decision can be written as

$$y_i = g [ W_i/W_i^* ] \quad (1)$$

where

$$g [ \cdot ] = \begin{cases} 1 & \text{if } W_i/W_i^* > 1 \\ 0 & \text{if } W_i/W_i^* \leq 1. \end{cases} \quad (2)$$

Severe missing data problems are presented by this intuitive approach to examination of the market-work decision. The opportunity cost or shadow price of time is unobservable, and the market wage is unknown for women who do not work. With sufficient sample information, which we do not have, it would be possible to form consistent estimates for these variables [Heckman (1974)]. In situations where separate sample information is not available, researchers, principally Heckman and Willis (1977), have offered a reduced form approach for studying the participation decision. As will be seen, a distinct advantage of this approach is that it not only offers a means around the missing data problem but also suggests the vehicle for estimation.

The reduced form approach operates through a specification of different functional relationships governing the  $W$  and  $W^*$  variables. Earnings potential depends on a variety of factors, including intelligence, education, training, experience, demand for labor, intensiveness of search, and random events. Similarly, the shadow price of time is a function of a variety of household factors, including wife's earnings, employment status of husband, household productivity, current and expected future values of wages and prices, tastes for market-work, and variables reflecting past choices, including age of children and size of family. Let  $Z_i$  and  $Z_i^*$  represent the vector subsets of observable market and

household variables, and let  $E_i$  and  $E_i^*$  reflect the contributions to the alternative wages of idiosyncratic factors, unobserved variables, and chance events. Then, we can express the two alternative wages as

$$\ln W_i = f(Z_i) + E_i \quad (3)$$

and

$$\ln W_i^* = h(Z_i^*) + E_i^* \quad (4)$$

Substituting and equivalent expression into (1) we have

$$y_i = g [ f(Z_i) - h(Z_i^*) + E_i - E_i^* ] \quad (5)$$

If the expression in brackets is positive,  $g[\cdot] = 1$  and market-work is chosen. For empirical research the expression  $[f(Z_i) - h(Z_i^*)]$  is generally assumed to be linear in parameters, while the random error variables are assumed to be drawn from independent Weibull distributions. If we let

$$X_i' \beta = f(Z_i) - h(Z_i^*) \quad (6)$$

where  $X$  is a vector of observed variables, and  $\beta$  is a vector of unknown weights then, under the assumed distribution of random variables, Domencich and McFadden (1975, pp. 63-65) demonstrate that we can write the probability of market-work as

$$P_i = \Pr [ y_i = 1 ] = \frac{e^{X_i' \beta}}{1 + e^{X_i' \beta}} = (1 + e^{-X_i' \beta})^{-1} \quad (7)$$

This form proves convenient for maximum likelihood estimation of parameter values.

We will use logit analysis to estimate the  $\beta$ -parameter values and their standard errors. This technique and its extensions are now commonly used for empirical questions dealing with qualitative choice such as occupational and travel-mode choice where the dependent variable has no natural interval or ratio scale measure. What we seek in maximum likelihood estimation are the

$\beta$ -values that would generate the sample results more frequently than alternative  $\beta$ -values.<sup>3</sup> This intuitive approach enables us to express the log-odds of the probability of working to nonmarket-work as a linear combination of explanatory variables in the context of the proven asymptotic properties of maximum likelihood estimation. For comparison purposes, we will also use binary-dependent variable multiple regression analysis. There are numerous objections to the use of linear regression to analyze the probability of occurrence of an event.<sup>4</sup> Yet, the linear probability model still receives widespread use, and because one objective of this study is to compare results for an LDC with more industrialized countries, we will present the linear probability results also.

<sup>3</sup> Let  $P_i = P_r(y_i = 1)$ . The likelihood of the sample in the binary choice case is defined to be

$$L = \prod_i \pi^{y_i} (1 - \pi)^{1 - y_i}$$

Taking the log of this expression, substituting (7) for  $P_i$ , and manipulating yields

$$L^* = \ln L = \sum_i y_i X_i' \beta - \sum_i \ln(1 - e^{-X_i' \beta})$$

A nonlinear simultaneous equations program is needed in order to solve for the maximum of  $L^*$ . The program iteratively seeks the solution of  $k$ -parameters such that

$$\frac{\partial L^*}{\partial \beta} = 0, \quad (i = 1, \dots, k).$$

Once the solution set of  $\beta$ -values is identified, the covariance matrix of parameter estimates is obtained from the information matrix which has  $(i, j)$  elements equal to

$$\left[ \frac{\partial^2 L^*}{\partial \beta \partial \beta} \right]^{-1}, \quad (i, j = 1, \dots, k).$$

The standard error of the  $i$ -th parameter estimate is the square-root of the  $(i, i)$  element of this matrix.

<sup>4</sup> Nerlove and Press (1973, pp. 3-9) enumerate these objections: (1) heteroscedastic error structure; (2) no constraint on the probabilities to lie within the zero-one closed interval; (3) lack of a constraint on predicted probabilities to sum to one; (4) potential bias in parameter estimates when observations on explanatory variables vary from high-to-low extremes depending on event outcome. To their objections to the linear probability model might be added a related problem of assumed constancy of partial effects ( $\beta_j = \partial P_i / \partial X_j$ ). The partial effect is independent of the level of the explanatory variable which, indeed, accounts for the possibility of a predicted value greater than one or less than zero. With the logit model the partial effect is equal to  $P_i(1 - P_i)\beta_j$ . Thus if the probability of an event is very high based on values of other explanatory variables, the effect of a change in  $X_j$  is considerably reduced. We see here, also, that the logit model is naturally interactive because of this dependence of partial effects on the already determined level of the probability.



#### IV. Data, Hypotheses, and Empirical Results

With the economic theory of labor supply as a guide, data was collected on family income, assets, employment status of household head (generally the husband), age and number of children, educational attainment and age of the married female. The woman was considered to be working if she received wages in return for work either inside or outside the home or if she worked in a family-owned business. This definition of work-participation seems to be more appropriate for females in an LDC. The 14 explanatory variables are as follows:

- (1)  $C = 1$  : Constant term equal to 1 for all cases.
- (2)  $UH = 1$  : Unemployed family head; O, otherwise.
- (3)  $HO = 1$  : Family owns the home it is living in and is not supported by a state-financed interest-free loan;  
O, otherwise.
- (4)  $AC1 = 1$  : Children of age five or less are present;  
O, otherwise.
- (5)  $AC2 = 1$  : Children of age 6-15 years are present;  
O, otherwise.
- (6)  $AW1 = 1$  : Age of woman is between 16-24 years;  
O, otherwise.
- (7)  $AW2 = 1$  : Age of woman is between 25-34 years;  
O, otherwise.
- (8)  $AW3 = 1$  : Age of woman is between 35-44 years;  
O, otherwise.
- (9)  $AW4 = 1$  : Age of woman is between 45-54 years;  
O, otherwise.
- (10)  $ED1 =$  : Education level less than or equal to high school; O, otherwise.
- (11)  $ED2 = 1$  : Education level higher than high school;  
O, otherwise.
- (12)  $NA =$  Number of major labor-saving appliances owned by the household.
- (13)  $SF =$  Size of family.
- (14)  $IX =$  Annual family income excluding the earnings of the married female.

Reflected in the constant term are the implicit effects of no children, age of woman more than 55 years, and no formal schooling.

Expressing the probability of working in log-odds form, we have

$$\ln \left[ \frac{P_i}{1 - P_i} \right] = \beta_1 + \beta_2 UH + \beta_3 HO + \beta_4 AC1 + \beta_5 AC2 + \beta_6 AW1 \\ + \beta_7 AW2 + \beta_8 AW3 + \beta_9 AW4 + \beta_{10} ED1 + \beta_{11} ED2 \\ + \beta_{12} NA + \beta_{13} SF + \beta_{14} IX, \quad (8)$$

where

$$P_i = P_r [y_i = 1].$$

The theoretical expectations are:  $\beta_2, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11} > 0$ ;  $\beta_3, \beta_4, \beta_5, \beta_{13}, \beta_{14} < 0$ ; and  $\beta_{12}$ , indeterminate. Unemployment of the household head, in that it represents a transitory deviation from permanent family income, should tend to increase the participation probability. Using Western experience as a guide, age variables are expected to present a spectrum of rising then declining participation probabilities as women approach and surpass the prime-working-age group (25-34 years). The participation probability is expected to turn down somewhat for those of advanced years of age. Education variables are expected to be positively related to the participation probability. This is particularly true for the ED2 variable. Frequently cited in the literature are the nonpecuniary benefits of jobs requiring higher levels of education. But the pecuniary rewards that come with more education should not be ignored either. Furthermore, the social/cultural view of working professional women may substantially differ among countries. Youssef (1974, p. 34) notes a distinct preference for the professions among Middle Eastern women. Thus, for a variety of pecuniary, psychich factors, and social/cultural reasons, we expect the educational variables, particularly the higher education variable, to have a positive impact.

The variables that we expect to impinge on the participation probability primarily reflect the income effect from standard labor supply theory or a high nonmarket wage. Home ownership is expected to impact negatively on participation although the magnitude of the negative effect is not expected to be large. On one hand, home ownership represents a wealth effect. Females from wealthier families would be expected to have less need to

work. Also, to the extent that home ownership represents an attendant rise in household responsibilities, we would expect an augmentation of the wealth effect. On the other hand, however, home ownership may increase the fixed financial obligations of household, thereby raising the propensity to seek market work. This offsetting influence may reduce this variable to insignificance. Presence of children of preschool age represents a prime homemaking responsibility that is expected to be a substantial determinant of the shadow price of time. Presence of older children and size of family are also proxies for homemaking responsibilities. High family income excluding the married female's is, of course, expected to exert considerable negative influence on the market-work decision. Number of appliances, whose sign we believe to be indeterminate, may represent wealth effect, thereby tending to be inversely related to participation. As a measure of household productivity, our primary view of this variable, we expect it to be positively related. The theoretical expectations of the  $\beta$  coefficients, then, are as follows:  $\beta_2, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11} > 0$ ;  $\beta_3, \beta_4, \beta_5, \beta_{13}, \beta_{14} < 0$ ; and,  $\beta_{12}$ , indeterminate.

Table 1 presents the empirical results from both the logit and linear probability statistical models for married females in Tripoli, Libya. Only three variables are insignificant in the logit results: home ownership, children age 6-15 years, and number of appliances. Remaining variables are significant at the 5 percent level or better, (two-tailed test), and have the hypothesized signs. A similar pattern of statistical significance and coefficient signs is found with the linear probability model. The only exception of any importance is the number of appliances variable which is negative and significant at the 10 percent level. Both statistical models yield what can be described as very good fits for cross-section analysis of nearly 1300 individuals.

Beyond the similarities in sign and significance, there are substantial differences in the two techniques of estimation. For comparison purposes, the partial derivative of  $P_1$  with respect to the corresponding independent variable is also shown in Table 1. The partial is evaluated at the mean proportion of working women in the sample, approximately 35 percent.<sup>5</sup> The parameter estimates of the linear probability model (which also measure par-

5 The proportion of working women in our sample seems, at face value, to be extremely high for an LDC. We offer four reasons for this finding. First, it must be remembered that our sample pertains to a metropolitan area, that is, a non-agricultural population. Second, we applied a liberal definition of working-work in the home for wages was counted, for

tial effects) can be compared to the logit partials for the purpose of examining relative elasticities. Two variables, unemployed head of household and preschool children, yield partial effects that are roughly equal. For all remaining statistically significant variables, the logit partials are substantially higher in absolute value in comparison with those of the linear probability model: Logit partials for the age variables (AW1-AW4) are 50-100 percent higher. High school education or less produces a partial effect that is nearly double that reported by the linear model, while post-high school education exhibits nearly 50 percent higher partial effect. In addition, income excluding married female earnings shows a partial effect that is 3.5 times that of the linear model. The effect of size of family is also larger in the logit model although both models report comparatively small coefficients.<sup>6</sup>

One disadvantage of logit analysis is that translation of parameter estimates into predicted probabilities is not quite as straightforward as it is with the linear mode. To overcome this difficulty and to provide a convenient framework for assessing the influence of variables, a series of predicted work-participation probabilities has been calculated based on varying values of explanatory variables. These probabilities range from .02 (young married women with no education, with at least one preschool child, employed husband, and higher-than-average family income) to .97 (age 25-34 years, post-high school education, no preschool children, unemployed husband, sample mean family income).

The most striking feature of these tabled values is the strong impact of education on the probability of market work. The differences in participation probabilities of women with no formal education and post-high school education are, indeed, large. But, even between consecutive education levels, differences between corresponding cell probabilities of 25-30 percentage points are frequent and differences of 45-50 percentage points are not uncommon.

Age effects on participation appear to rise sharply between the

example--that we believe is applicable to an LDC. Third, high levels of recent economic activity in Libya undoubtedly have encouraged increased participation. Fourth, even though great care was taken to randomly select households for interview, we cannot dismiss the possibility of potentially wide sampling variation.

6 The finding of higher elasticities of the logit model in comparison to the linear probability model has been noted by others [Nerlove and Press (1973, pp. 53-58)]. Apparently the inherent characteristics of the logit specification, including nonlinearity, constrained probability estimates, and variable interaction explicit in the partial derivatives, enable this technique to capture a greater share of the underlying complexity of the data

first two age groups and then fall to a point about midway between the 16-24 and 25-34 years of age groups for the 35-44 year olds. The not-tabled probabilities for the 45-54 year olds are only slightly lower than those of the 35-44 age group. Thus a stabilizing of participation rates appears to occur to a point quite late in working lives. Presence of children induces about a 20-25 point drop in participation probability while unemployment of family head produces a 25-30 percentage point increase at mid-range rates. Comparing corresponding values in Tables II and III shows that a 500 dinar increase in annual family income decreases the participation rate by about 10 percentage points. All differentials tend to taper off as the participation probability approaches limiting values.<sup>7</sup>

The empirical results leave us with several general impressions of married female labor supply responses in this LDC. First and foremost is the apparent appropriateness of the standard neoclassical approach to cross-section labor supply estimation commonly employed in studies of LFP in developed countries. We have attempted to follow the general approach of previous Western studies. We find results that closely parallel those found for advanced industrialized countries in terms of direction of the theoretically expected relationships. In addition, taking sample size into account, we find a degree of goodness-of-fit of the neoclassical equation that compares very favorably with those recorded in Western studies.

Although the variables that prove important in this study have the aforementioned parallels, the magnitude of supply response to changing circumstances appears to be larger than is commonly identified in other studies. We see substantial change in the probability of market-work owing to variation in employment status of husband, presence of preschool children, age, education, and family income. Especially large is the effect of higher education which presumably is a proxy for considerable earning power and psychic income generally associated with better jobs. There is reason to suspect that this variable is also capturing sizeable social/cultural influences. In Middle Eastern countries, female employment in the professions evidently carries a degree of social

7 Tables II and III are designed to show the influence of the most important explanatory variables. Variables of limited importance are held constant. Some explanation of the structure of these tables may be required. The tables are divided into three levels. On the first level we have family income excluding the married female's earnings: 2.83 thousand dinars, Table II; 3.33 thousand dinars, Table III. The second level is a two-way division by age and education. Within each combination of second level division there is a third level division by unemployment of head of household and presence of preschool children.

acceptance not present in many other employments. Youssef (1974, pp. 34-35) reports that about 14 percent of professional jobs in Middle Eastern countries are held by women. Their professional employment is highly concentrated in nursing and teaching. Nonetheless, the proportion of women in professional jobs is twice the proportion in all nonagricultural employment. The foothold that educated women have established in the labor market has obvious policy implications for a country desiring to tap this potentially abundant source of labor. However, the high variability of work participation indicated by these results suggests that economic growth may exert a considerable depressing influence on participation.

### V. Policy Implications

Our finding that married female participation in this LDC closely follows neoclassical labor supply predictions is a result that could well serve policymakers and planners in LDC's. The generality of these findings for other LDC's is, of course, not known. Few other studies of LDC's exist and reasoning from a sample of one is certainly dangerous. Nevertheless, these results offer credence to those who use the neoclassical framework to formulate and evaluate governmental labor market policy towards women. Even more support for the neoclassical position is found when one is cognizant of the constraining social environment that women are subject to in Middle Eastern countries. Social acceptance of female market-work is a fairly recent phenomenon in many Western societies. In the U.S. it is only since World War II that sweeping changes have occurred. It is not surprising to find LDC's lagging behind in this regard. But as reported by Youssef (1974), the countries of the Middle East tend to even lag behind other LDC's in the level of social acceptance of working women in several employment domains. As evidenced by female penetration in various employment sectors, she finds widespread patterns of seclusion from service occupations, factory work, activities related to trade, and even clerical occupations. In sharp contrast to many countries, she states that "Middle Eastern countries are noted for manning their elaborate bureaucratic networks with men, from the bottom rungs of the clerical and administrative ladder to the top echelons." [Youssef (1974), p. 36] But the patterns of seclusion of the past and present are the opportunities for advancement in the future. Many of the sectors that have been relatively closed to women in the Middle East are the same ones that have been so ideally suited to them in Western economies.

Cultural factors and social acceptability are certainly significant in the determination of the LFP of married females in LDC's. Unfortunately, cross-sectional empirical results tell us very little about how to manipulate social attitudes. They can, however, suggest the domains that should be concentrated on in attempts to raise married female LFP. In this vein it is important to know how the results differ, say, from Western societies where female participation has been growing rapidly despite growth in per-capita real income. Through such comparisons we can gain insight on the relative strengths of explanatory variables and, thereby, identify public policy variables that will produce more favorable responses. It is not possible to find exactly-matching empirical studies; therefore, only general observations are made. Bowen and Finegan (1969) and Spencer (1973) supply linear probability estimates of married female participation using disaggregated data for the U.S. and Toronto, Canada, respectively. Their models have a fairly close correspondence to the one we have employed, in fact, they are the closest we have been able to identify.<sup>8</sup>

Several large differences exist in the U.S and Canadian studies in comparison with our results. The employment status of the husband has, in our study, an impact that is several times that found in the U.S. and Canadian studies where only 6 and 3 percentage point effects are noted. Preschool children has a very large negative effect in the U.S. and Canada, about 40 percentage points, which is nearly twice as high as we have estimated. Age and other family income effects, on the other hand, appear to be substantially higher in Libya. Age/participation profiles appear to be much flatter in both the U.S and Canada for married women, and a small percentage change in income from mean levels, as illustrated in Tables II and III, produces only a meager response in both countries. The differentials in education effects, as near as can be seen given varying specifications of these variables, are also quite large. Bowen and Finegan find about a 19-point effect of high school graduate over limited or no schooling. Post-high school effects add about 3-9 more percentage points to the participation probability except for those with more than four years college which adds about 22 points. Spencer uses detailed types of education to describe the effect on participation; as a consequence, his results are somewhat difficult to summarize. The major impact he identifies is for a university science degree (including social science)

<sup>8</sup> See Bowen and Finegan (1969), p. 670, for the complete regression results. The regression results we refer to in Spencer are from Table 1, Column (2).

of 32 points above elementary school or less. Primary teacher's college and nursing school produce effects of only 10 and 18 points above the base group, and high school graduation, only a 10-point increase. On the surface, these educational impacts appear to be substantially smaller than those that we have found.

In summary, age, education, and the effects of children appear to operate to the relative advantage of married female work participation in Libya. Of significance is the lower estimated effect of preschool children on the married female's market-work decision in Libya, a result also noted in another LDC [McCabe and Rosenzweig (1976)]. However, operating against these tendencies toward relatively higher married female participation is a sizeable income effect, both in its permanent and transitory guises. Assuming that the cross-section parameters carry forward in the future, accelerated economic growth can be expected to reduce female participation through lower unemployment rates for family heads and rising real family income. For combatting these sizeable income effects, educational policy towards females is the major public instrument. With increased female participation as an objective, LDC's such as Libya on a program of rapid industrialization are seen to be in a race to raise educational opportunities for females. Fortunately, for Middle Eastern countries, there are mitigating factors that indicate that this race can be won (assuming there are no large-scale changes in public attitudes toward working women): (1) There appears to exist a social acceptance of educated women working in certain sectors that could potentially spill over to other sectors; (2) Employment opportunities for women in what are, in fact, traditionally female jobs in many countries can be expanded; and, (3) The proportion of females in schools and colleges is so low in relation to males that substantial increases in education-participation seem possible [Habiby (1976)]. Once again we see the close ties of education policy with human resource development. These linkages can be exploited to achieve national development objectives.



**Table I**  
**ECONOMETRIC RESULTS ON THE MARRIED FEMALE'S**  
**PROBABILITY OF WORKING**  
**TRIPOLI, LIBYA**  
**FALL, 1977**  
 (1t1)

Variable	Logit Results	Logit Partial <sup>(1)</sup>	Linear Probability Model
C	-.373 (.89)	-----	.377*** (7.10)
UH	1.309*** (5.84)	.297	.274*** (8.82)
HO	.003 (.01)	.001	-.011 (.43)
AC1	-1.049*** (4.09)	-.238	-.212*** (5.75)
AC2	-.017 (.07)	-.004	-.016 (.44)
AW1	1.048** (2.46)	.238	.150*** (2.62)
AW2	2.207*** (5.17)	.500	.312*** (5.54)
AW3	1.664*** (4.40)	.377	.183*** (3.85)
AW4	1.635*** (4.91)	.371	.191*** (4.84)
ED1	1.266*** (4.86)	.287	.148*** (4.12)
ED2	3.332*** (9.27)	.756	.517*** (10.05)
NA	.011 (.13)	.002	-.023* (1.86)
SF	-.109*** (3.07)	-.025	-.005* (1.70)
IX	-.847*** (9.91)	-.192	-.055*** (8.55)
Chi-Squared <sup>(2)</sup> = 765.5			F = 56.02
Likelihood Ratio <sup>(3)</sup> = .427			R <sup>2</sup> = .363
N = 1292			N = 1292

**Table II**  
**PREDICTED PARTICIPATION PROBABILITIES**  
**AT MEAN FAMILY INCOME<sup>(1)</sup>**

Age Group	Education												
	None			High School or Less			Post High School						
	UH			UH			UH						
A. 16-24 years	0	.084	.252	0	.244	.545	0	.718	.904	0	.472	.768	
													1
	AC1												
	B. 25-34 years	0	.225	.518	0	.508	.792	0	.890	.968	0	.740	.913
		AC1											
C. 35-34 years		0	.144	.385	0	.375	.689	0	.825	.946	0	.623	.860
		AC1											

(1) Assumed values for other explanatory variables: Home Ownership = 1; Children 6-15 years = 0; Number of Appliances = 2.5; Size of Family = 6.47; Family Income Excluding Wife's = 2.83 thousand dinars. UH is un-employed head of household. AC1 is presence of preschool children.

**Table III**  
**PREDICTED PARTICIPATION PROBABILITIES**  
**AT HIGH FAMILY INCOME<sup>(1)</sup>**

Age Group	Education												
	None			High School or Less						Post High School			
	UH			UH						UH			
A. 16-24 years	0	AC1	0	1	0	1	0	1	0	1	0	1	
			.056	.181									.175
	1	AC1	0	1	0	1	0	1	0	1	0	1	
			.020	.072									.069
	B. 25-34 years	0	AC1	0	1	0	1	0	1	0	1	0	1
				.160	.413								
1		AC1	0	1	0	1	0	1	0	1	0	1	
			.062	.198									.191
C. 35-44 years		0	AC1	0	1	0	1	0	1	0	1	0	1
				.100	.290								
	1	AC1	0	1	0	1	0	1	0	1	0	1	
			.037	.125									.121

(1) Assumed values for other explanatory variables: Home Ownership = 1; Children 6-15 years = 0; Number of Appliances = 2.5; Size of Family = 6.47; Family Income Excluding Wife's = 3.33 thousand dinars. UH is un-employed head of household. AC1 is presence of preschool children.

### References

- Bowen, William and T. A. Finegan, *The Economics of Labor Force Participation*, Princeton University Press, 1966.
- Cain, Glen G., *Married Women in the Labor Force: An Economic Analysis*, University of Chicago Press, 1966.
- Domencich, T. and D. McFadden, *Urban Travel Demand: A Behavioral Analysis*, North-Holland Press, 1975.
- Ginzberg, Eli, *Manpower for Development: Perspectives on Five Continents*, Praeger Publishers, New York, 1971.
- Habiby, R., *The Libyan Women: Progress and Modernization, (Mimeo)*, Department of Political Science, Oklahoma State University, 1979.
- Harbison, F. H., *Human Resources as the Wealth of Nations*, Oxford University Press, New York, 1973.
- Harmon, A. J., *Fertility and Economic Behavior of Families in the Philippines*, The Rand Corporation, RM-6385-AID, 1970.
- Heckman, James, J., "Shadow Prices, Market Wages, and Labor Supply," *Econometrica*, Vol. 42, PP. 679-94, 1974.
- Heckman, James, J. and Robert J. Willis, "A Beta-logistic Model for the Analysis of Sequential Labor Force Participation by Married Women," *Journal of Political Economy*, Vol. 85, pp. 27-58, 1977.
- McCabe, James L. and Mark R. Resenzweig, "Female Labor Force Participation, Occupational Choice, and Fertility in Developing Countries," *Journal of Economic Development*, Vol. 3, pp. 141-160, 1976.
- Mincer, Jacob, Labor Force Participation of Married Women: A Study of Labor Supply, in: *Aspects of Labor Economics*, Princeton University Press, pp. 63-105, 1962.

- Nerlone, Marc and S. James Press, *Univariate and Multivariate Long-Linear and Logistic Models*, The Rand Corporation, R-1306-EDA, 1973.
- Parnes, Herbert S., "Labor Force Participation and Labor Mobility" *A Review of Industrial Relations Research*, Industrial Relations Research Association, Madison, Wisconsin, 1970.
- Shearer, John C., "Intra and International Movements of High-Level Human Resources," J. J. Heaphey, ed., *Spatial Dimensions of Development Administration*, Duke University Press, Durham, North Carolina, 1973.

