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A NOTE ON THE INTERDEPENDENCE BETWEEN ECONOMIC AND WELFARE FACTORS IN THE RURAL FILIPINO HOUSEHOLDS

by

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Barry M. Popkin* and Gillian P. Hart**

It is fairly widely recognized that the labor force behavior of the mother is likely to be an important determinant of the young child's health and nutritional status. Empirical analyses of these potentially complex relationships are, however, notably lacking. The entrance of the mother into wage labor represents a trade-off between increments to household income and time available for child care. This note reports on research conducted in two rural areas in the Philippines which indicates that the entrance

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of the mother into the labor force increases household income and food expenditures ceteris paribus, but reduces the health and nutritional status of younger children.

The concepts on which the analysis is based are derived from recent developments in the new household economics, which views the household as both a production and consumption unit in which decisions as to the allocation of market and non-market production and consumption expenditures are made jointly. (Nerlove)

In terms of both productivity and efficiency in the allocation of labor time, the market and non-market labor activities of women are likely to be particularly crucial, insofar as women tend to be the major producers of direct welfare commodities which in turn are important determinants of health and nutritional status. (Becker) Further in low income rural households, these direct welfare commodities (or "z-goods") are likely to be relatively time intensive and the availability of goods and services which might substitute for time are probably low. Thus, as we shall show, some of the most important trade-offs between welfare and economic factors in the household are revealed in the analysis of women's allocation of time. This in turn focuses attention on the interactions between consumption household size, composition and labor supply.

The substitution of the woman's goods for time in the production of any z-good is one key issue. These z-goods which enter the household utility function are abstract goods or categories of need such as health or nutrition rather than specific commodities or services. Household time, home produced inputs and market purchased commodities and services are combined by the household to develop these z-goods. The greater the substitutability of goods for time, the more elastic will be the supply of the woman's labor. In a low income rural situation it is likely that the availability of goods and services (e.g. day care or convenient water) which substitute for women's time will be low. A fall in family income might result in a critical trade-off between market and non-market labor which might force the woman to enter the labor force. In doing this, child welfare may suffer which would be expected if child welfare is a normal good. It is the extent and nature of this decline in child welfare which is so interesting.

Our model posits a systematic set of relationships between household size and composition, consumption and female labor force participation and duration, all of which reflect interactions between economic and welfare factors. Consumption and household size composition are related, in that the ages and number of children are likely to be important in determining the consumption mix, and the

relative time and goods intensities of commodities consumed. Ceteris paribus, it would seem that the time intensity of household production is inversely related to children's age. Landsberger and Gronau discuss these issues. Further, the younger the child, the lower will be the elasticity of substitution of older children's for mother's time.[1/] We have estimated women's labor force participation (L_{wp})[2/]; time spent in household production by women (L_{wh}); household consumption (C_{hh}) and the health/nutritional status of children (N_c) in terms of the following model:

$$L_{wp} = f(Y_p, Y_t, W, A) \quad (1)$$

$$L_{wh} = f(Y_p, Y_w, W, A, H, T_f) \quad (2)$$

$$C_{hh} = f(Y_p, H, W, A, H, E) \quad (3)$$

$$N_c = f(L_{wp}, A, H, C_{hh}, V) \quad (4)$$

where Y_p = wealth/permanent income, Y_t = household transitory income, A = age/size composition of the household, W = woman's wage rate, T_f = time spent by the father in household activities, Y_w = mother's income, H = household size,

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1/ During the breast-feeding period it is very difficult to substitute the mother's time with that of the children. In a few African and Asian societies, milk nurses are available for this task though this practice is quite limited.

2/ Equations 1, 2, and 3 are derived mainly from the work of Mincer, Gronau and Landsberger. Equation 4 comes from the work of Popkin.

E = education of the person doing the shopping as an indicator of taste, and V = value of home produced foods. Equations 3 and 4 are an attempt to differentiate between the effects of L_{wp} on household and child welfare. We recognize there exists simultaneity in this over-identified system. Since our goal is the identification of some of the key parameters and our data is not as complete as we would need, we estimate only the reduced form equations of this model.

EMPIRICAL ANALYSIS

In this section we analyze empirically the equations outlined above. Although emphasis is placed on the interactions among variables endogenous to the household, these are discussed in the context of environmental determinants.

The geographic locale for the study is Cebu, a densely populated island nestled in the middle of the Philippines' 7000 islands. The families come from two ecological zones: coastal barrios and hinterland semi-mountainous barrios. These areas were selected because they represented two major economic and nutritional geographic groupings in terms of diet, market accessibi[illegible] sanitary conditions, labor markets, etc. Three separate

barrios were sampled in each zone. There were approximately 100 children aged 1-6 and 50 children aged 7-16 selected from each of the 6 barrios for a sample population of 847 children and 306 families.[3/] For the following analyses, it would have been desirable to group all the rural barrios together to increase the degrees of freedom; however the numerous interactions between the independent parameters and the zone would have been hidden by such a process.

1. Market and Nonmarket Labor Supply of Women.

While it would be most useful to examine the factors associated with each segment of the mother's total time, only data for her employment outside the home and work in the home garden were available. Each ecological zone is

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[3/] Stratified sampling procedures were followed in obtaining the necessary socioeconomic, clinical and biochemical information from each child and his/her family. Each barrio was separated into 10 sections and subsamples of 10 children 1-6 and 4 children 7-16 were taken per section. This paper discusses data collected during a survey conducted in July-September 1973 and a second survey conducted in February-March 1974 which preceded the beginning of a variety of programs designed to eliminate vitamin A deficiency in this region. The sampling procedure and overall project design are found in Popkin. Dr. Florentino S. Solon, Cebu Institute of Medicine, the project director and the other staff members are thanked for allowing us to use this data. The data comes from the Cebu Institute of Medicine-Cornell Vitamin A Deficiency Pilot Project. The principal funding for this project has come from the Philippine National Science Development Board (NSDB-CIT 7305 FN). Other support has come from the Nutrition units of WHO and AID.

analyzed separately to bring out fully the environmental differences which lead to a household income per capita of $102 in the coastal zone and $66 in the hinterland (mountain) zone with a much greater disparity in this income per capita between the third and fourth income quartiles in each zone ($85 versus $251 in the coastal barrios and $68 versus $137 in the hinterland barrios). Furthermore the labor force participation and educational attainment of women is much greater in the coastal barrios. For example, 36 percent of the mothers in the coastal barrios work in market production contrasted with only 26 percent of the hinterland barrio mothers.[4/]

Crosstabulations between various age composition factors and whether or not the woman works bring out some of the interesting age composition relationships (Table 1). The LFPR's of the mothers are significantly higher when children aged 7-12 are present in the household. Further-

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[4/] These data are not standardized by age as the age-employment profiles of the women in each zone are almost identical. The main occupations in the coastal zone of working women are bunched between dressmakers (26%) and vendor/peddlers (46%) while in the hinterland areas the occupations are widely distributed with 12-17% working in factories, their own small shops, farming, shoemaking and dressmaking. Twenty-six percent of hinterland women has 0-2 years education compared with 11% of the coastal women (Table 8, Popkin).

more, children aged 7-12 enhance the LFPR for these mothers who have a child in the 0-3 age group. These same effects are clear for the 13+ age group although they are not very great for rural hinterland mothers.

Without adequate permanent and transitory income parameters and a wage rate for females, regressions were run using participation of women in market labor as the dependent variable.[5/] Both ordinary least squares and multivariate probit analyses were run with similar results for the coefficient signs. The OLS results are presented in Appendix 1.

Interesting relationships exist in terms of the effect of older children of various age groups on the mother's participation. Each additional child in the 13 plus age group lowers her probability of work in both zones by 8 percent. This shows a possible intrahousehold trade-off between the labor force participation of the mother and the older children. The effect of additional children in

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[5/] Mincer has shown that female labor supply is related to both permanent and transitory income of other household members. The woman's labor supply response to transitory income is stronger than to permanent income. In our labor supply analysis, we were forced to use woman's education as a proxy for her wage rate and ignored the demand for labor, which is determined exogenously to the household.

the 7-12 age group produces a similar though smaller and less significant effect than that of the children in the 13 plus age group. The effect of the younger children (age 0-3) on the mother's labor supply is negative. Most likely, this reflects the relatively high degree of time intensity of infant care. The two interaction terms are a significant addition though it is difficult to explain their differential impact in each ecological zone without more information on the activities of the children. When children in the 7-12 or 13 plus age group are present in a household, the addition of children in the 0-3 age group is associated with an increased labor force participation by the mother.[6/] To clarify these relationships, information is needed on the marginal productivity of household time in child care relative to market labor, the time intensity of nonmarket labor and economies of scale (i.e. the effect of family composition as a whole), and the substitutability of children's for mother's time.

[6/] The greater impact of children in the 7-12 age group vis-a-vis the interaction with children aged 0-3 on the mother's labor supply in the hinterland barrios may reflect a cultural factor. Robert E. Evenson suggested from research of his in India that children aged 13+ may be unwilling to look after children whereas younger children aged 7-12 may be more willing to do this. Of course, the relationship differs in the coastal barrios and these apparent cultural factors may reflect marginal productivity or labor market characteristics.

These labor supply patterns are closely associated with the time spent by the mother in the home garden.[7/] A regression was run using hours spent by the mother in the garden as the dependent variable. Results are presented in Table 2.

In both areas the time the father spends in the garden complements that of the mother. In the hinterland barrios, for each additional hour the father spends in the garden the mother would spend an additional .34 hours. Whether their work represents a joint product in the sense that the father might perform certain tasks such as tilling the soil while the mother does other complementary tasks such as weeding was not determined.

The addition of each child aged 7-12 and 13+ was shown to be associated with a decrease in market labor force participation in both zones; as might be expected, the converse effect occurred for time spent in home gardening. Similarly, each additional child in the 0-3 age group led

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[7/] Only 16% of the coastal and 28% of the hinterland barrio families did not have home gardens. The contribution of the home gardens to the income of each quartile was meaningful. For example, it comprised 12% and 13% of the incomes of first quartile families in the coastal and hinterland barrios, respectively.

Table 1. Associations Between Mother's Labor Force Participation and Age Groupings of Children

Age Group	Rural Coastal %LFPR	Rural Coastal No. of Cases	Rural Hinterland %LFPR	Rural Hinterland No. of Cases
Age 7-12				
No. of children				
0	27	55	16	50
1	37	30	42	41
2	42	38	27	34
3+	41	29	23	31
Age 13+				
No. of children				
0	32	96	26	101
1+	40	58	27	55
No. of children in Age Group 0-3 if children aged 7-12				
0 (No. of children aged 7-12)	28	76	19	69
1+ (Children aged 7-12)	43	76	32	87
No. of children aged 0-3 if children aged 13+				
0 (No. of children aged 13+)	32	110	26	116
1+ (Children aged 13+)	45	42	28	40
Totals	36	152	26	156

to a decline in the labor force participation of women and to an increase in their home garden activity. It should be noted that this is the converse of the relationship between the effect of very young children on the market labor duration of coastal and hinterland women. This might be a reflection of zonal differences in the substitutability of mother's for older children's time However the effect of the size and age composition on mother's labor supply patterns is likely to be extremely complex and require detailed data on time allocation of all family members. When the older children (age 7-12 and 13+) were present, the addition of younger children aged 0-3 led to an increase in the labor force participation of the mothers. As might be expected, the converse, or a decline in home gardening activity occurred except for the 0-3 and 7-12 g grouping in the hinterland barrios.

Total household size was used as an additional variable in order to control for the size (scale) effects of both the number of children as well as additional relatives and other non-nuclear family household members.[8]

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[8] The average family and household size was 6.45 and 7.03 respectively in coastal barrios and 6.42 and 6.99 respectively in hinterland areas.

Table 2. REGRESSION: TIME MOTHER SPENDS IN THE GARDEN

(hours per week)

	Rural Coastal	Rural Hinterland
Constant	.99	-3.72
Size of household	-.33***	.35
	(.22)	(.57)
Income of father	-.0001	.005**
	(.0001)	(.003)
Father's education (No. years)	.03	.22
	(.19)	(.57)
Children aged 0-3 yrs. (No.)	1.09**	.31
	(.55)	(1.39)
Children aged 4-6 yrs. (No.)	.08	.68
	(.42)	(1.09)
Children aged 7-12 yrs. (No.)	.59***	.74
	(.45)	(.96)
Children aged 13+ yrs. (No.)	.67**	.93
	(.32)	(.82)
Children aged 0-3 yrs. (No.) if children in 7-12 age group	-.11	.57
	(.60)	(1.34)
Children aged 0-3 yrs. (No.) if children 13+ age group	-.29	-3.37**
	(.56)	(1.49)
Mother's education (No. years)	-.04	-.12
	(.23)	(.55)
Time father gardens	.10	.34*
	(.08)	(.08)
Income of mother	.0002	-.01
	(.003)	(.01)
R^2	.08	.22
F-ratio	.99	3.10
Number of cases	145	143

Standard errors shown in parentheses:

*Significant at .01 level.
**Significant at .05 level.
***Significant at .10 level.