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tional attainments suggests the usefulness of special training programs for unskilled immigrants. Further, the persistence of racial differentials underscores the importance of the enforcement of anti-bias employment regulations to protect non-white immigrants. Recent changes in immigration law under the Refugee Act of 1980 will increase uncertainty regarding the composition of future immigration waves. It is likely, however, that the proportion of immigrants for whom specialized training and anti-bias regulation enforcement can hasten the traditional catch-up process which has historically characterized the immigrant economic experience will continually increase. Additional research using more recent data will allow both the efficacy of the recommendations advanced and the persistence of the observed patterns to be tested.

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THE SOCIOECONOMIC IMPACT OF SCHOOLING IN A DEVELOPING COUNTRY

Jere R. Behrman and Barbara L. Wolfe*

Abstract—This pioneering sibling study of adult socioeconomic outcomes in a developing country has two basic results: (1) Family background is quite important in determining socioeconomic outcomes, and possibly more important in the developing country under study than in the United States. (2) Standard estimated returns to schooling in terms of adult socioeconomic outcomes in this developing economy are biased upwards because of the failure to control for unobserved ability and motivation. Therefore standard estimates may result in over optimism about the probable impact of devoting considerable resources to schooling in the developing world.

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This paper presents the first adult sibling study of socioeconomic outcomes in a developing country, using a new female sibling data set which has some advantages over the adult sibling samples used previously for developed countries (see section II). By doing so we gain insight into the role of family background in determining socioeconomic success for females and into possible biases in the standard estimates of the impact of schooling within a developing country context. We find evidence of a considerable direct and indirect role of one's childhood family in determining adult socioeconomic outcomes and some evidence that genetic endow-

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ments and mother's efficiency and preferences all have significant roles. We also find that the standard approach probably overestimates the returns to schooling in the developing country considered. Therefore the standard estimates—which have been used for policy recommendations by the World Bank (1980), Colclough (1982) and others—may be misleadingly optimistic about the impact of schooling in developing countries.

I. Model and Estimation Procedure

A. Model

We focus on the determinants of schooling and of two adult socioeconomic outcomes, socioeconomic status (SES) and current household income.¹ We posit that each of these three dependent variables depends upon a reduced-form representation of demand and supply factors, including both observed and unobserved variables, that can be approximated adequately by linear forms in a recursive system:

$$\underline{Y} = \underline{A}'\underline{Y} + \underline{B}_o'S_o + \underline{B}_u'S_u + \underline{C}_o'D_o + \underline{C}_u'D_u + \underline{V} \quad (1)$$

where

- \underline{Y} is the vector of outcomes of interest (i.e., schooling, socioeconomic status, and household income),
- \underline{S}_i is a vector of supply factors (where the subscript $i = o$ indicates observed factors and $i = u$ indicates unobserved factors),
- \underline{D}_i is a vector of demand factors (with the same interpretation for the subscripts),
- \underline{V} is a vector of stochastic disturbance terms each of which has mean zero, constant own variance, and zero covariances across outcomes for a given individual and across same or different outcomes for different individuals,
- \underline{A} is a lower triangular coefficient matrix to be estimated, and
- \underline{B}_i and \underline{C}_i are coefficient matrices (with the same interpretation as indicated above for the subscripts).

Since the rationale for similar systems has been discussed in the recent literature on sibling studies for the United States,² we do not present a detailed discussion

¹We also have estimated relations for a third adult socioeconomic variable, recent days ill. However, our estimates, though statistically significant, are consistent with very little of the sample variation (only 3% at a maximum) and do not indicate any significant impact of the other recursive variables on recent days ill. Therefore we do not present these estimates in this paper.

²See Behrman, Hrubec, Taubman and Wales (1980), Behrman and Taubman (1976, 1983), Chamberlain and Griliches (1975, 1977), Griliches (1979), Olneck (1977), and Taubman (1977).

here. However, four points merit mention. (i) Family background (including unobserved components) may enter directly into the relations for schooling and for adult outcomes. For schooling, family background may affect demand through genetic endowments and family-determined environment and may affect the supply of funds due to imperfect capital markets (Becker, 1967 and 1981). For adult outcomes, family-background-determined ability and motivation may be important, as may be family connections and status. (ii) The recursive structure reflects that the schooling decision was made when the individual was young and that socioeconomic status is generally considered to be a more permanent construct (akin to permanent income) than is current income.³ (iii) Household income is used instead of own income because most individuals in our sample spend a substantial proportion of their adult lifetime in households in which their spouses or companions are major contributors to household income. Therefore assortative mating may be critical, as we discuss in detail in Behrman and Wolfe (1983). (iv) Schooling and family background may affect adult outcomes other than those included in our specification, but we limit the adult outcomes in this study to socioeconomic status and income because they are important ones which have been widely studied and we wish to keep the study manageable.⁴

B. Estimation

We estimate three variants of this model with ordinary least-squares procedures.⁵

³Socioeconomic status, based on occupational prestige, is widely used by sociologists and recently has been used by a number of economists (see survey and references in Behrman, Hrubec, Taubman and Wales, 1980). Chamberlain and Griliches (1977) provide an illustration in which occupation is used as a long-run expected or permanent income representation. At the suggestion of a referee, we explored whether reversing the recursive ordering of socioeconomic status and current income changed our results; the total effects on which we focus below are not altered substantially by such a reordering.

⁴A referee suggested that the impact of schooling on household productivity may be important. We agree, but we have the usual difficulty of representing empirically household productivity beyond our exploration of fertility and child quality in Behrman and Wolfe (1984) and recent days ill as discussed in note 1.

⁵The alternative of using latent variable techniques to represent the unobserved factors has been used in sibling studies by Behrman, Hrubec, Taubman and Wales (1980) and by Chamberlain and Griliches (1975, 1977). Such an approach is attractive in the abstract, but does not lead to substantially different estimates than the deviation method in the one study in which both are presented and has no other advantage unless variance-decomposition of the unobserved factors is of interest. Since latent variable estimation techniques are computationally more difficult and the expected gains are small, we have not used them in the present study.

In the first variant we estimate relations (1) for all *individuals* in the sample. This is equivalent to standard procedures and gives us a set of estimates that can be compared with the others that we obtain. In this procedure the relevant parameter estimates in A , B_o and C_o are biased if there are unobserved variables in S_u and D_u that are correlated with included variables in Y , S_o and D_o .

Our second variant is to estimate relations (1) with each observation being a (weighted⁶) family *mean*. These estimates indicate the importance of various factors in explaining interfamilial differences in adult outcomes. In this procedure the right-side variables are purged of intrafamilial differences. If these differences have strong random components, this purging is equivalent statistically to removing random measurement error, and thus tends to result in larger absolute coefficient estimates than do individual regressions. However, these mean estimates are subject to substantially less omitted variable biases than the individual estimates only if the omitted variables in the individual estimates are dominated by intrafamilial (as opposed to interfamilial) variations, which does not seem likely.

Our third variant is to use *deviations* from family means as the unit of observation. These estimates indicate the importance of various factors in the intrafamilial variation of adult outcomes. These estimates also are less contaminated by omitted variable biases because they control for unobserved common characteristics of the siblings (e.g., common genetic endowments, role models, neighborhoods, local health conditions as children, quality of schooling, etc.). Therefore, the magnitudes of omitted variable biases are likely to be substantially less for the deviation estimates than for the individual or the mean estimates.⁷

II. Data

Our data are from a cross-section, area-stratified random sample of women age 15–45 which we collected in

the developing country of Nicaragua in 1977–78. For a subsample of about 500 women, we collected sibling data by interviewing the sister closest in age to the original respondent.⁸ The last column of table 1 gives the means and standard deviations of the variables used in our analysis for the 991 sisters in our sample. The recursive variables are the three dependent variables in our analysis mentioned in the previous section. The background variables pertain to age, observed narrowly-defined family background characteristics (i.e., number of siblings, presence in childhood and schooling of each parent), and observed factors related to supply prices (i.e., percentage literate and upbringing in urban areas and in the central metropolis of Managua since schooling and higher earnings are more available in the urban than in the rural areas), and population size. We utilize all of these variables in our analysis of the next section since, as argued above, they may represent relevant supply and demand factors directly as well as work through the recursive structure.

III. Estimated Individual, Mean and Deviation Recursive Relations for Socioeconomic Outcomes

We summarize our estimates in three tables. Table 1 gives estimates of the three regression variants for each of the three outcomes in our recursive system of relations (1). From this table one can read the direct effects of any included observed variable on a particular outcome. But the total effects include these direct effects plus indirect ones transmitted through the recursive structure. Therefore table 2 indicates the total effects in all cases in which the underlying coefficient estimates are significantly nonzero at the 5% level.⁹ Since we are interested for some purposes in whether the coefficient estimates differ significantly between two of our variants, table 3 summarizes *t*-tests for the difference between individual and deviation regression coefficient estimates and between mean and deviation estimates in all cases in which at least one estimate in the respective pair is

⁶The weights are to adjust for the fact that for a few families the sample design resulted in more than two siblings.

⁷Bishop (1976) and Griliches (1979) have argued that the deviation estimates are more subject to measurement error due to the differencing involved, and thus are more downward biased. Their point is valid if measurement errors across siblings are not very correlated, but the bias may be relatively upward in deviation estimates if the measurement errors are highly correlated across siblings (Behrman, 1983). Quite possibly the measurement errors are highly correlated across siblings. For example, Behrman and Birdsall (1983) suggest that using years of schooling alone to measure the effect of schooling in another Latin American sample may result in important biases due to school quality differentials. But the "measurement error" due to the failure to incorporate school quality is likely to be highly correlated between siblings since they often attend the same schools and, therefore, have schooling of very similar quality.

⁸This adult sibling sample has some special characteristics in comparison with others currently available. (i) It is the only one for a developing country. (ii) It is the only one with a focus on women. (iii) It is more representative of the population under examination than most others (which depend on school records in a particular city like Kalamazoo or Indianapolis or on military records or twin registries). (iv) Since it includes some half sibs raised in the same household, it permits more insight into the role of genetic factors versus family environment than do most other samples. (v) It also is as large or larger than many other sibling samples (though there are a few larger ones). Of course it shares with other sibling samples the inherent characteristic of possibly not being representative of families who have only one surviving child of the sex being investigated.

⁹Unless otherwise qualified we use a 5% level of significance throughout.

TABLE 1.—INDIVIDUAL, MEAN AND DEVIATION ESTIMATES FOR RECURSIVE SOCIOECONOMIC OUTCOME MODEL FOR NICARAGUAN FEMALE SIBLINGS AND SAMPLE MEANS AND STANDARD DEVIATIONS^a

	Schooling			Socioeconomic Status			Household Income			Sample Means (S.D.) ^b
	Individual	Mean	Deviation	Individual	Mean	Deviation	Individual	Mean	Deviation	
Recursive Variables										
Schooling				1.8 (19.5)	2.0 (18.6)	1.2 (9.6)	0.100 (11.8)	0.097 (8.7)	0.086 (8.2)	5.0 (3.7)
Socioeconomic Status ^c							0.008 (3.1)	0.012 (3.2)	0.000 (0.0)	29.3 (10.7)
Household Income ^d										0.791 (0.804)
Background Variables										
Age	-0.11 (7.6)	-0.09 (4.8)	-0.11 (8.3)	0.22 (5.5)	0.36 (8.2)	0.08 (1.5)	0.016 (5.0)	0.012 (3.3)	0.011 (2.5)	29.4 (7.2)
Number of Siblings	-0.03 (1.0)	-0.03 (0.7)	-0.01 (0.4)	-0.03 (0.4)	0.07 (0.6)	-0.06 (0.5)	0.016 (2.1)	0.014 (1.5)	0.004 (0.5)	5.4 (3.0)
Father's Schooling	0.20 (4.7)	0.23 (3.7)	0.08 (1.9)	-0.04 (0.3)	-0.10 (0.6)	0.11 (0.7)	0.022 (2.2)	0.018 (1.6)	0.037 (2.8)	3.1 (3.4)
Mother's Schooling	0.37 (8.2)	0.38 (6.1)	0.11 (2.4)	0.25 (1.9)	0.19 (1.2)	-0.10 (0.5)	-0.01 (1.0)	-0.007 (0.5)	-0.035 (2.3)	2.6 (2.7)
Father Present ^c	0.27 (1.1)	0.57 (1.5)	-0.27 (1.2)	0.40 (0.6)	-0.41 (0.6)	0.13 (0.2)	-0.04 (0.7)	-0.00 (0.1)	-0.11 (1.7)	0.65 (0.48)
Mother Present ^c	-0.48 (1.5)	-0.29 (0.6)	-0.05 (0.2)	-0.60 (0.7)	1.7 (1.5)	-1.9 (1.9)	-0.10 (1.3)	-0.10 (1.1)	-0.17 (2.0)	0.87 (0.34)
Urban Upbringing ^c	1.6 (5.3)	2.1 (4.9)	0.48 (1.8)	0.22 (0.3)	1.2 (1.1)	-0.10 (0.1)	-0.02 (0.3)	-0.06 (0.7)	-0.01 (0.2)	0.85 (0.36)
Managuan Upbringing ^c	-0.01 (0.0)	-0.01 (0.0)	0.00 (0.0)	0.24 (0.4)	1.5 (1.8)	0.25 (0.2)	0.12 (2.2)	0.07 (1.1)	0.31 (3.2)	0.37 (0.48)
Population	0.000 (0.1)	-0.007 (0.8)	-0.007 (0.9)	-0.010 (0.5)	0.076 (3.3)	0.036 (1.2)	-0.001 (0.7)	0.001 (0.6)	0.000 (0.1)	31.0 (24.1)
Percentage Literate	0.029 (2.5)	0.039 (2.8)	0.037 (2.9)	-0.061 (1.9)	-0.027 (0.8)	0.012 (0.2)	0.005 (1.9)	0.03 (1.1)	0.001 (0.3)	69.0 (15.0)
Constant	3.9 (4.6)	1.4 (2.1)	-0.00 (0.0)	18.2 (7.5)	6.6 (4.3)	0.00 (0.0)	-0.65 (3.3)	-0.34 (2.8)	0.00 (0.0)	
\bar{R}^2	0.29	0.35	0.09	0.34	0.53	0.09	0.29	0.42	0.09	
Standard Error	3.1	1.8	1.5	8.6	4.2	5.9	0.34	0.34	0.48	

^aBeneath the point estimates are the absolute values of *t*-statistics. All statistics for the mean estimates are corrected for the proper number of degrees of freedom to reflect the number of families.

^bIn this column are the sample means (and standard deviations in parentheses) for the 991 women in the sample for 1977–1978.

^cSociologists have devised these indices from interviews about occupational prestige, using the relationship between the interviewed-determined prestige and mean income and schooling for each occupation for interpolation. For more details, see Behrman, Hrubec, Taubman and Wales (1980) and the references therein.

^dIn 1000 cordobas per fortnight (about 3700 U.S. dollars per year).

^eDichotomous variable with value of one in indicated state, otherwise zero.

significantly nonzero.¹⁰ We now discuss the major features of these results with reference to these tables.

A. Direct Effects of Observed Background Variables

These direct effects are strongest and most pervasive for schooling. Presumably this is the case because our

¹⁰It is possible for the difference between two estimates to be significantly nonzero although neither of the estimates is significantly nonzero, but we do not have any such cases.

observed background variables relate primarily to the respondents' childhood, and the effects of childhood factors fade over the life cycle. These observed background variables account for about a third of the variance in schooling in the individual and mean relations.

Age is the only one of these variables which has significant direct impacts on all three outcomes. In standard individual estimates age confounds general secular changes (e.g., in the availability and therefore the price of schooling), birth-order effects within the

TABLE 2. — TOTAL (DIRECT AND INDIRECT) SIGNIFICANT EFFECTS IMPLIED BY ESTIMATES IN TABLE 1

	Socioeconomic Status			Household Income		
	Individual	Mean	Deviation	Individual	Mean	Deviation
Recursive Variables						
Schooling	1.8	2.0	1.2	0.114	0.121	0.086
Background Variables						
Age	0.03	0.14	-0.13	0.017	0.009	0.002
Number of Siblings				0.016		
Father's Schooling	0.36	0.42	0.10	0.42	0.022	0.044
Mother's Schooling	0.92	0.76	0.13	0.039	0.037	-0.026
Mother Present						-0.170
Urban Upbringing	2.9	4.0		0.180	0.204	0.003
Managua Upbringing			0.120		0.310	
Population		-0.076			-0.001	
Percentage Literate	-0.001	0.078	0.044	0.007	0.004	

family, and life-cycle developments. Our three variants enable us to separate somewhat among these effects.

For schooling, age has significantly negative coefficient estimates for all three variants. The negative estimates suggest a positive secular improvement in the availability of schooling. That the one for deviations is not significantly larger than that for the means suggests that birth-order effects (e.g., due to greater child care

responsibilities of older sisters) and parental life cycle income constraints (given imperfect capital markets) are *not* important factors; if these considerations were important the coefficient estimate from the deviation form would be significantly larger than that from the mean relation.

For SES and household income, age has significantly positive direct effects in all but one of the relations. This

TABLE 3. — *t*-TESTS FOR SIGNIFICANCE OF DIFFERENCES BETWEEN SIGNIFICANT POINT ESTIMATES IN TABLE 1
FOR INDIVIDUAL - DEVIATION AND MEAN - DEVIATION

	Schooling		Socioeconomic Status		Household Income	
	Individual- Deviation	Mean- Deviation	Individual- Deviation	Mean- Deviation	Individual- Deviation	Mean- Deviation
Recursive Variables						
Schooling			0.6 (3.9)	0.8 (4.9)	0.014 (1.0)	0.011 (0.7)
Socioeconomic Status					0.008 (0.3)	0.012 (0.5)
Background Variables						
Age	0.00 (0.0)	0.02 (0.8)	0.14 (2.1)	0.28 (4.1)	0.005 (0.9)	0.001 (0.2)
Number of Siblings					0.012 (1.1)	
Father's Schooling	0.12 (2.0)	0.15 (2.0)			-0.015 (0.9)	-0.019 (1.1)
Mother's Schooling	0.26 (4.0)	0.28 (3.6)	0.35 (1.1)		0.045 (1.4)	0.028 (1.4)
Mother Present					0.07 (0.6)	0.07 (0.6)
Urban Upbringing	1.1 (3.1)	1.6 (3.2)				
Managuan Upbringing					-0.19 (1.7)	-0.24 (2.1)
Population				-0.112 (3.0)		
Percentage Literate	-0.008 (0.5)	0.002 (0.1)	-0.074 (1.1)		0.004 (0.8)	

pattern suggests that life-cycle considerations dominate: older respondents are higher on upward SES trajectories and perhaps upward household income trajectories.¹¹ For household income (but not for SES) the significant coefficient estimate in the deviation form is of the same magnitude as in the mean relation; that the deviation estimate is not significantly larger suggests that age represents a life-cycle effect and not a birth-order effect.

We find strong direct positive effects of *parental schooling* on respondent's schooling in the individual, mean, and deviation specifications, and significant positive impacts of father's schooling on individual and deviation household income and of mother's schooling on individual SES. There also is a significantly negative estimate for mother's schooling in the deviation form for household income. Parental schooling appears to be an important direct factor and is one of the few observed background variables clearly associated with childhood which has significant direct estimated effects on the adult outcomes. Our estimates permit some sorting out of the possible causal paths. The direct impact of parental schooling is most important in the individual and mean schooling relations; in both cases the point estimates are significantly positive but those for the mother are more than one and a half as large (and significantly greater) than those for the father's schooling. The significance of the father's schooling suggests that factors other than household productivity are important since in this culture males contribute very little to household production (e.g., Engle, 1980). The substantially larger impact of the mother's than of the father's schooling on the respondent's schooling suggests that there are important household efficiency and perhaps taste effects (i.e., if women have more interest in investing in children and if more-schooled women have a greater say in family investments in children, as Engle suggests) beyond whatever mechanism the father's schooling represents. The significant effects of parental schooling in the deviation schooling relation suggest that genetic endowments are important since half sibs, generally raised in the same household with the same permanent income constraint, are part of the sample. But the significantly smaller parental schooling coefficient estimates in the schooling deviation relation than in the schooling individual and mean relations suggest that in the nondeviation relations schooling is representing more than just genetic factors.

The number of siblings does not appear to be an important variable; only in the individual relation for

household income is the coefficient estimate significant.

Urban upbringing has significantly positive direct effects in the schooling individual and mean relations, but not elsewhere. As we suggest above, we interpret this variable to reflect the sharp urban-rural dichotomy in the price of schooling due to differential schooling availability, possibly reinforced by lower opportunity costs for the time children spend in schooling in urban than in rural agricultural areas. The point estimates indicate that such effects are considerable, equivalent to about a third of the average schooling level. An upbringing in Managua has a further significant positive impact on individual and deviation household income. This suggests that those raised in the central metropolis had advantages in labor and marriage markets, perhaps because they were plugged into the richest of those markets from the time of childhood.

Population size relates to similar differences in environments and markets that depend on the degree of urbanization. The significant negative effect on mean socioeconomic status, however, has to be interpreted with care. It possibly reflects the differential SES scores given to those not engaged in market activities in urban versus rural areas (i.e., housewives versus family farm workers). Because of this problem of interpretation and the lack of significance elsewhere, we do not place much emphasis on the population coefficients.¹²

The *percentage literate* also refers to the environment in a sense similar to the previous two variables. The significant positive coefficient estimates for mean, individual, and deviation schooling probably reflect the availability of schooling and thus reinforce our interpretation of urban upbringing, though alternatives such as taste effects or altered expected returns through role models in the local community also are possibilities. The significant positive effect on individual household income probably reflects the association between local literacy rates and market returns to skilled labor and quality and quantity of preventative and curative health services. The significantly negative estimate on individual socioeconomic status may be another result of the SES score assignment mentioned in regard to population.

B. Indirect Effects of Observed Background Variables

Because of the recursive nature of the model and because many of the background variables have their primary direct impact on schooling, the total effects may differ substantially from the direct effects. A comparison of the significant direct effects in table 1 with the significant total effects in table 2 suggests two observations. (i) The indirect effects through schooling of

¹¹These trajectories may approach an asymptote or turn down at older ages, but our sample is limited to respondents 45 or under so such effects are not important in it. This interpretation implies that SES is not an unchanging measure of adult status, but it still may be a more permanent measure than current income, as is suggested above.

¹²The other estimates are not altered significantly if the population variable is excluded from the specification.

some of the childhood variables on adult outcomes are considerable, even though the direct effects in table 1 are not widely significant (e.g., parental schooling and urban upbringing). (ii) Even for some background variables with significant direct effects, the addition of the indirect effects changes the implications substantially. For example, the total impact of age on adult SES and household income is substantially less algebraically than the direct effects because the negative inter- and intrafamilial impact on schooling reduces positive direct life-cycle effects. Another important example regards the total role of mother's schooling in individual and mean adult household income, which is of the same order of magnitude as that of father's schooling even though there is no direct effect of the mother's schooling.

C. *Impact of Unobserved Background Variables*

The deviation estimates can be used to estimate the total impact of the unobserved background factors in "explaining" the variation in individual outcomes as in Chamberlain and Griliches (1977) and Olneck (1977). The residual variances in the deviation estimates are the unexplained individual variances given controls for interfamilial factors. They can be used to calculate adjusted coefficients of determination to reflect what proportion of the total variance would be "explained" were family-specific dummy variables included in the individual relations to control for unobserved common family background effects on siblings. Such calculations relate to the role of unobserved family background in the variation of socioeconomic outcomes for the generation of the respondents.¹³ By such calculations the proportions of the overall variance due to unobserved family-related variables are 0.51 for schooling, 0.34 for

SES and 0.53 for household income; thus they account for as much of the total variance as observed family-related characteristics for SES, and for much more than the observed characteristics for the other two outcomes. Family-related background, including the implications regarding factors like the availability of schooling or such family decisions as where to live, are very important in explaining the distributions of the socioeconomic outcomes considered for the population under study.¹⁴ And the unobserved components of this family-related background are somewhat more important than the observed ones, even when the urban-rural location decision is included with the latter group.

D. *Are There Biases in Returns to Schooling as Estimated in Standard Procedures?*

A major point emphasized in some sibling studies for the United States is that standard estimates of the returns to schooling may be upward biased substantially due to failure to control for unobserved family background characteristics related to ability and motivation.¹⁵ What do our estimates indicate? For SES, our individual schooling coefficients estimate is 50% above the deviation estimate, with the difference significant. The total impact of schooling on household income, incorporating the indirect effects through the recursive SES variable, is 33% greater in the individual estimates than in the deviation form (table 2). Therefore, we conclude that returns to schooling may be substantially overestimated by standard procedures due to omitted family background controls just as in the United States.¹⁶

The exaggeration of returns to schooling due to omitted variable bias related to family background in standard estimates, however, does not necessarily mean that the returns to schooling are insubstantial. Under

¹³Of course, as with any decomposition of variance, they do *not* indicate what would happen if the underlying prices, institutions, etc. were changed. To know what would happen with such changes, the structural coefficients of the unobserved variables would have to be known. Therefore, the interpretation of such variance decomposition needs to be made with care, and inappropriate extrapolations regarding the impact of policy changes, etc. should be avoided. But we think that the question of how important are such unobserved variables in explaining the variances in socioeconomic outcomes in the given institutional, policy, and market environment which our sample (and the population from which it is drawn) experienced is a relevant one for understanding the significance of family and family-related background in that context.

Lest the reader think we are being overly cautious in stating what should and what should not be deduced from such calculations, we point out that much of the emotional and continuous debate about heritability analysis is due to confusion on these issues. For more extended discussion, see Goldberger (1977, 1978), Taubman (1981) and references therein.

¹⁴Family background seems to have been more important for women in this developing society than for men in the United States as analyzed in Behrman, Hrubec, Taubman, and Wales (1980), Chamberlain and Griliches (1977), and Olneck (1977). This may be due to the greater role of family background in more traditional developing societies than in the United States, for women than for men, or to both of these considerations.

¹⁵For example, for Kalamazoo brothers, Olneck (1977, p. 148) reports a coefficient estimate for schooling in an individual ln earnings relation that is 25% higher than that in the comparable deviation relation, though he does not find significant differences for his SES relations. For fraternal twins, Behrman, Hrubec, Taubman and Wales (1980, pp. 161–2, 174) report schooling coefficient estimates 32% greater for initial SES and 23% greater for ln earnings from the individual form than from the deviation form, but no difference for mature SES. In both studies the authors argue that these differences are larger than are likely to be explained by measurement errors alone.

¹⁶Though, as mentioned in the introduction and in note 14, our estimates are for a different sex as well as for a different type economy.

the assumption that there are no other biases in the estimates, the deviation estimates imply *private* expected household income returns to women's schooling at the point of sample means of over 11%.¹⁷ These are quite considerable. The social returns are lower, however, because (1) social costs of public schooling need to be deducted and (2) a large part of the private return to female schooling is the household income gain from having a more-schooled spouse, which is not a social return except to the extent that it reflects an increase in the spouse's productivity due to her schooling (see Behrman and Wolfe, 1983).

IV. Concluding Remarks

Our empirical investigation has led to a number of important insights about the roles of family background and of schooling in determining socioeconomic outcomes in a developing country. We find that family background has considerable impact on patterns of female schooling and adult outcomes, and possibly a stronger role than for males in the United States.

Among the important family-related background characteristics are location of upbringing, and parental schooling, particularly that of the mother. These characteristics primarily affect adult outcomes indirectly through schooling, though there is some limited evidence of effects through other channels. The relatively larger impact on schooling of mother's schooling in comparison to that of the father, the significance of parental schooling in the deviation relations for half-sibs, time allocation patterns and the composition of household income suggest that parental schooling is representing a combination of genetic endowments, household efficiency and taste effects, and *not* exclusively income or wealth.

Our findings also suggest that standard approaches result in substantial overestimates of the impact of schooling on adult socioeconomic outcomes in developing economies due to the failure to control for unobserved family-background characteristics. In the case of income, for example, our findings suggest that conventional estimates may be approximately one-third above the true effects. For SES, the implied bias in standard estimates is about half. If biases of this order of magnitude are common, the standard estimates may result in over optimism about the probable gains from investments in schooling.

¹⁷There also may be other private returns beyond those included in income, such as related to health and nutrition.

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