THE IMPACT OF FAMILY STRUCTURE ON HOUSEHOLD
DECISION MAKING IN DEVELOPING COUNTRIES:
A CASE STUDY IN URBAN KENYA

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Preface

Representatives from 132 nations assembled in Vancouver in June of 1976 to convene HABITAT, the United Nations Conference on Human Settlements. The Conference was a global inquiry into solutions of the critical and urgent problems of human settlements created by the convergence of two historic developments: unprecedentedly high rates of population growth and massive rural to urban migration.

Rapidly growing populations strain health and education budgets, complicate efforts to utilize a nation's manpower efficiently, and exacerbate problems connected with the provision of adequate supplies of food, energy, water, housing, and transport and sanitary facilities. A better understanding of the dynamics and consequences of population growth, particularly with regard to resource and service demands, is therefore an essential ingredient for informed policy-making.

The Human Settlements and Services Area at IIASA is developing a new research activity that is examining the principal interrelationships among population, resources, and growth. As part of the preparatory work directed at the design of a case study of urbanization and development in Kenya, the HSS Area invited Professor Allen Kelley, Chairman of the Economics Department at Duke University in the U.S. to visit IIASA in an advisory capacity. Kelley, who will be joining IIASA in January 1979 to head the Population, Resources and Growth Study, is a specialist in demoeconomic development and has published several books and articles on dualistic economic growth. In this paper, presented at IIASA, he and his coauthor attempt to assess quantitatively some of the economic impacts of the extended family in urban Kenya.

This paper is the sixth of a series dealing with population, resources and growth. Other publications of the series are listed at the back of this report.

Andrei Rogers
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INTRODUCTION

The recent increase in the study of household behavior by economists has not, to date, led to a corresponding increase in the analysis of household structure and family relationships. Research has focused on the nuclear family, the prevalent mode of household structure in high-income countries where the 'new home economics' research has largely taken place.* Although some demographers have indeed examined differences between extended and nuclear families, their research is typically quite narrow in its focus on demographic characteristics.** This paper provides a provisional examination of the relationships between household structure (nuclear or extended) and the household's income, its work force participation, and its composition of savings. Space constraints and the scarcity of theoretical and empirical studies on family structure require that the present paper be quite exploratory. However, the results presented below are encouraging, even though they may raise more issues than they resolve.

An examination of the nature of the household's structure is important not only to understand more fully microeconomic behavior, but also to assess the implications of systematic changes in household structure as economic development takes place. It is commonly alleged that extended families save less than nuclear families. As a result, a breakdown of the extended family will lead to higher rates of accumulation, and thereby enhance economic development. We know of no empirical study that has directly tested these important hypotheses. Even if the hypotheses are broadly applicable, it is still necessary to identify the quantitative significance of changes in family structure on saving behavior.

Extended families arose in a time of societal transition from hunting and fishing to herding and farming. Nuclear families dominated the hunting culture because small, nomadic groups did not place extensive demands on the natural productivity of the environment. Furthermore, communication systems were primitive,*** thereby diminishing the possibilities of integrating

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* Becker (1960), Michael (1973), and Willis (1973).
** See United Nations (1961), Pakrasi and Chittaranjan (1967), and Burch and Gendell (1972).
*** Nimkoff and Middleton (1968).

disjointed family units. The shift to settled cultivation increased the agricultural productivity of a given area and enabled the land to support a larger human population. In this setting, the extended family had several advantages. First, the extended family could pool risks of fluctuations in income and consumption and spread these risks over a larger number of individuals. Second, the extended family could organize production and consumption to take advantage of scale economies. The family could assign productive tasks which were compatible with the family member's age, experience and abilities; it could also capture economies of scale in consumption due to indivisibilities of some items, including most consumer durables. Third, the extended family could combine savings to finance large investments. This would have been particularly important in the early stages of development when capital markets were not highly developed and when savings were restricted primarily to physical capital formation and hoarded commodities. Finally, the extended family could provide insurance for old age by developing the tradition of supporting elderly relatives.

There are several factors accompanying the process of development that contribute to a restructuring of family units: the economy becomes more monetized and numerous institutions arise which act as intermediaries to channel saving into investment; population moves to urban areas; markets for factors of production and final products develop and expand; production becomes more interdependent and specialized; and the size and role of the government sector changes. These forces weaken the advantages of the extended family organization. For example, government welfare programs and private insurance schemes replace part of the extended family's role in pooling the risks of income fluctuations.* Additionally, the development of financial markets removes the direct link between savings and investment and enables the individual to participate indirectly in large investment schemes. Finally, the increased interdependence in production and the rise of factor markets diminishes the extended family's role in organizing production.

The present study will utilize cross-section data for urban Kenya to analyze family structures and their impact on economic decision making. A cross-sectional examination of the change in family structures is enhanced by the use of urban data, since recent rural-to-urban migrants are likely to maintain strong ties with their rural extended families, and settled residents are likely to be independent of their rural (or urban) family ties.

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*"...(with urbanization) disappears the informal security of the family and village. Urban populations must be supplied with formal social security, unemployment insurance, a complex cosmopolitan political machinery, and formal protection to replace the family and village functions." (Williamson, 1961, p.46.)

The first section discusses several of the main hypotheses we shall examine on the role of family structure in economic decision making. The second section presents the statistical models employed to explore the impacts of family structure, while the third section provides a description of the data. The results are presented and analyzed in the last section.

FAMILY STRUCTURE AND MICROECONOMIC DECISION MAKING

The Level of Income and Labor Force Participation

The level of household monetary income depends on the number of workers in the labor force, the intensity of work effort (the number of hours worked per week), and the wage rate. There are several systematic factors which could provide higher incomes in an extended family.

First, extended families are larger and typically contain more adults than nuclear families. The extended family's 'dependency ratio' especially in the Kenyan urban setting, is relatively low and the earning potential is correspondingly high.

Second, the larger extended family is able to capture scale economies of home production, thereby freeing more family members to participate in income-generating activities. These scale economies particularly apply to activities such as food preparation, bulk buying, and child care. The larger the family, the lower the unit cost of home production, and as a result, the higher the relative rate of market earnings.

Third, the average wage rate obtained in market employment may be higher for the extended family. The large household unit has greater opportunities to specialize its workforce in productive activity, including wage employment. For example, the returns to the division of labor relating to age, experience, and perhaps education may be increased when an older relative assumes child care responsibilities so that the young mother may enter the labor force. Because of its larger size, the extended household also enjoys greater possibilities for pooling risks. The household may undertake relatively risky occupations, within the family and enjoy a higher wage rate with the risk premiums.

Finally, there is some possibility that the average educational status of the extended family member may be higher and thus the average wage rate would be higher as a result. Reasons for expecting this differential in educational status by family structure will be considered below.

Savings

It is often thought that extended families save less than nuclear families. This hypothesis is based on the fact that the two household structures have different reasons for saving. For

example, extended families have less need to save for retirement since, by tradition, parents may rely on their children for support in their old age. Moreover, extended families have less need to save for precautionary reasons since, with the larger family unit, they can pool risks to hedge against income and consumption variations. These and other characteristics of the extended family are likely to lead to lower financial saving than in nuclear units. However, if the definition of savings is broadened to include human capital investments such as education, then the difference in savings (financial plus human-capital investments) between household structures may be relatively small owing to the possible propensity of extended families to substitute educational expenditures for financial savings. Extended families are better able to benefit from education because children are viewed both as consumer and producer durables. Children may provide for their parents in old age and they may contribute to current household income. Allocating a share of household income to children's education may therefore be viewed not only as current consumption but also as an investment to augment future income through remittances. Thus, to the parents in an extended family, the relevant rate of return on education may be higher than the return on a similar expenditure by nuclear family parents who cannot expect as large remittances in the future.

Empirically ascertaining the impact of the extended family on saving is difficult when it is only possible to view household units at a single point in time. Within the extended family, saving and dissaving are done simultaneously by different groups. If the family is made up of a network of households, only one aspect of saving might be observed by considering one of the family's households. For example, consider the household head and his wife as the primary decision-making unit. In a vertically integrated extended family (one including several generations), the primary unit may support both previous and subsequent generations. On the one hand, they may remit income to their parents, dissaving in the form of debt repayment. On the other hand, the couple may invest in the education of their children. The timing of these two activities will determine, at any point in time, the observed saving of the couple when they are viewed as a single household. This example illustrates the difficulty of using cross-section data to analyze differences in saving and income flows due to family structure. With these qualifications in mind, we now turn to a specification of the statistical model which is designed to provide a preliminary assessment of family structure on household income and saving in urban Kenya.

THE STATISTICAL MODEL

The dimensions of household behavior to be modeled are income and saving, hypothesized to represent interrelated decisions. Income is defined as the sum of all monetary income, irrespective of source, while total saving is made up of financial saving and human capital investments. As noted above, to the extent that

children's education represents an investment, educational expenditures should be included as part of the household's accumulation plan. Educational expenditures are taken as the sum of school, books, and uniform fees. This is a significant expenditure in Kenya.

Classifying household structures as nuclear or extended is somewhat arbitrary given the available data and the problems noted above. We have elected to examine two rather extreme categories and one intermediate category. At one end of the continuum are the nuclear units consisting of the household head, his wife and their children and having no obvious economic interdependence on other households. At the other end of the continuum are the extended units made up of households containing both a conjugal unit and one or more additional relatives. As an intermediate category, 'near-nuclear' households are those which contain a single conjugal unit with explicit economic interdependence on other individuals or households. In particular, near-nuclear households remit income to or receive income from other households. Since there are many fine gradations of household structures, alternative classification schemes are possible. However, this is an exploratory study, and we feel the three-way grouping of structures is sufficient to test the differences in income and saving among household types.

The model is presented in equations (1) and (2). Expectations concerning the direction of the partial impact of the variables on the right-hand side of the equation are indicated by superscripted signs. A question mark appears where the casual influences flow in both directions and the net influence is uncertain.

$$Y = a_0 + a_1 A^+ + a_2 A^{2-} + a_3 C^? + a_4 E_{ms}^+ + a_6 E_{fp}^+ + a_7 E_{fs}^+$$

$$+ a_8 Acre^+ + a_9 T_k^? + a_{10} T_l^? + a_{11} HH2^- + a_{12} HH2 \cdot Adults^+$$

$$+ a_{13} HH2 \cdot C^? + a_{14} HH3^- + a_{15} HH3 \cdot C_{own}^? + a_{16} HH3 \cdot C_{other}$$

$$+ a_{17} HH3 \cdot Adults^+ \ . \tag{1}$$

$$S_t = b_0 + b_1 Y^+ + b_2 A^- + b_3 A^{2+} + b_4 C^? + b_5 HH2^- + b_6 HH3^- \ . \tag{2}$$

where

A = age of household head
C = number of children in the household
E_{ij} = binary variable for the highest educational attainment of the household head ($i = m$) or his wife ($i = f$) as either primary ($j = p$) or some secondary or above ($j = s$)
Acre = number of acres of rural land owned
T_i = binary variable for tribal affiliation of the household head ($i = k$ = Kikuyu, $i = 1$ = Luo)
HH2 = binary variable for near-nuclear households
HH3 = binary variable for extended households
Adults = number of household members whose age exceeds 17
C_{own} = number of children of the conjugal unit in extended households
C_{other} = number of children of relatives in extended households.

The assumed interaction between savings and income leads to an endogenous treatment of the income variable in the savings equation. All other variables in (1) and (2) are exogenous although a more elaborate model could consider other variables, such as household structure, as endogenous. In view of the lack of theoretical analysis of the determinants of household structure, it seems premature to specify it as endogenous here. Moreover, such a specification results in a set of binary dependent variables which, when estimated in a system of simultaneous equations, presents notable econometric complications.

A justification of the variables, in the income equation is straight-forward. The age variable captures the life-cycle effect where income rises with a decreasing rate of increase and eventually its level is reduced as the household ages.* Education is expected to exert a positive impact on income. This effect may be quite large in the low-income setting where educated workers are relatively scarce. We further hypothesize that the education of the household head has a greater impact on income than his wife's education, and that secondary education has a greater impact on income than primary education. Land ownership represents a claim on a potential income-yielding asset and it is thus taken to exert a positive impact on income.

The influence of children on income and work force participation is uncertain. Children may deter the labor force participation of the mother or they may add directly or indirectly to the family's income. They may also induce adults to work longer and harder to support their children.

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* Modigliani and Brumberg (1974) and Kelley (1968).

Tribal status is often associated with different preferences for income versus leisure, for education, and for political and social access to various types of income-earning activities. The Kikuyu and Luo tribes are particularly powerful in urban Kenya and are therefore separately considered. We do not, however, analyze the direction and magnitudes of the specific tribal impacts on income.

Hypotheses on the impact of household structure on income were examined in the first section. To summarize, we expect extended families to have the highest income levels because they are unlikely to have more workers in the labor force who are able to work longer hours for a higher wage relative to workers from nuclear households. Near-nuclear households may be able to pool risks and so realize a relatively high wage rate, but their other characteristics resemble nuclear units, placing them between extended and nuclear households on the income scale.

In our saving model, the primary economic influence is the positive impact of income; the primary demographic influence is represented by a life-cycle plan. Given the influence of extended family relationships on saving patterns and the possibility that individuals in low-income countries have relatively short planning horizons, the life-cycle influences may not be particularly powerful.

The impact of children on total saving is uncertain. On the one hand, children are hypothesized to exert a negative impact on financial saving due to several considerations: children may represent a form of security and thus substitute for current financial saving; children increase current consumption expenditures, although scale economies in consumption may attenuate this effect; and large families provide greater security against uncertainty in income. On the other hand, children will exert a positive impact on human capital saving. The net impact of children on total saving (the sum of financial and human-capital savings) is therefore uncertain.

Two econometric considerations should be mentioned. First, the models are interactive in nature; they represent a household paradigm where decisions are made simultaneously. Two-stage least squares regression analysis is therefore employed. Second, the savings equation is likely to possess heteroskedastic residuals since there may be less variation in saving for lower-income families. Each saving equation will therefore be examined for heteroskedasticity using the Coldfeld-Quandt test. Where heteroskedasticity is found, the equations will be corrected using standard econometric procedures.*

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*The appropriate transformation of the variables was obtained by estimating the equation $\log |\varepsilon| = \gamma \log Y$. Each term in the equation was then divided by $Y^{\gamma/2}$ to correct for heteroskedasticity. This in theory, reduced the variance of the error term from $\sigma^2 Y^\gamma$ to σ^2. (Goldfield and Quandt, 1965).

$$Y = -1297.42^* + 73.13A^* - .74A^{2*} - 11.54C + 234.12E_{mp}^*$$
$$ (-3.44) \quad (3.82) \quad (3.21) \quad (-.60) \quad (3.00)$$

$$+ 1071.92E_{ms}^* + 70.77E_{fp} + 387.16E_{fs}^* + 1.07Acre$$
$$ (11.77) \quad (.99) \quad (2.94) \quad (1.62)$$

$$- 57.38T_k - 112.30T_1^* - 189.03HH2 + 82.76HH2 \cdot Adults$$
$$ (-.75) \quad (-1.72) \quad (-.92) \quad (1.10)$$

$$+ 31.61HH2 \cdot C - 612.54HH3^* + 87.08HH3 \cdot C_{own}^*$$
$$ (1.03) \quad (-3.71) \quad (3.13)$$

$$+ 63.34HH3 \cdot C_{other} + 188.49HH3 \cdot Adults^*$$
$$ (1.51) \quad (4.49)$$

t-statistics are in parentheses

*the coefficient is significant at the 95% level. (3)

The impact of children varies according to household structure. Only in extended households do children exert a positive and significant impact on income.* Of greater interest to the present research is the finding that the income levels of nuclear and near-nuclear households are independent of the household structure (all the coefficients of the HH2 variables are statistically insignificant) while the extended households have higher incomes because of their demographic make-up. In extended households, each adult contributes 188.5 shillings to income on the average; a child's contribution is approximately 75 shillings. An estimate of the differences in income levels between household structures is obtained by computing $\partial Y/\partial HHi$ (i = 2,3) in equation (3) and evaluating it at the mean number of adults and children for that household structure. Income in near-nuclear households exceeds that of nuclear units by 91 shillings; the comparable figure for extended households is 275 shillings. To evaluate the impact of the differences in demographic structures between household types, the calculation is repeated assuming that near-nuclear and extended families have the same number of adults and children as nuclear households. In this case, the income differentials are reduced to 89 and 44 shillings, respectively. The small change for near-nuclear households can be explained by the similarity of their make-up to nuclear units. The large income differential between nuclear and extended families is mainly attributable to the larger size of extended households. Extended households have more adults and more children, and the higher earnings derive largely from this.

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*$HH3 \cdot C_{own}$ and $HH3 \cdot C_{other}$ are jointly significant at the 95% level.

Three factors were considered above as explaining why extended families might have higher income. They could have (a) more individuals employed, (b) more hours worked per employed individual, and (c) higher wage rates. In this exploratory phase of the research, a model was not formulated to test these hypotheses directly, but some insight into these issues can be obtained by examining the results in Tables 1 and 2, which show the characteristics of adults and children in the various household types. Considering first the characteristics of the adults (Table 1), it is seen that the more extended the household, (a) the younger the age of the household head and his wife (the mean age of the household head decreases from 37.0 in nuclear households to 31.7 in extended households), (b) the more educated the household head and his wife (the percent of household heads with some secondary education rises from 22.0 in nuclear households to 36.3 in extended households), and (c) the greater the work force participation of the household head's wife (3.9% in nuclear households, 10.0% in extended households).* Therefore, the greater income of the extended household comes from its demographic structure and size, and also from higher levels of education of the adults. Moreover, wives of the household's head in an extended family, participate in the labor force more, largely because of the availability of other household members to undertake child care and household production activities. For example, only twenty percent of the relatives of the household's head in the extended family work, and those who do work do so with considerable intensity (50 hours per week). A more detailed analysis reveals that the relatives in the extended family are of two general types: those who are young and who hold multiple jobs and participate extensively in market activity, and those who are old and do not have employment outside the home.

Additional insight into the greater income of extended households can be obtained by reviewing the characteristics of the children in the various households as presented in Table 2. As with the adults, systematic variations occur as one moves from nuclear to extended households. In extended households 'own' children are younger (the mean age of children declines from 6.9 to 5.4); and school attendance of 'own' children is higher (for the 5 - 9 age cohort, the percent rises from 60.3% in nuclear households to 71.4% in extended households). We have also found that in extended households 'own' children tend to participate more extensively in outside employment, even for a

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*The table also reveals that near-nuclear households do not take on the dominant characteristics of either the nuclear or the extended households. Near-nuclear households are most similar to nuclear households in terms of work force participation, and to extended households in terms of the educational status of its members.

Table 1. Age, education and work force participation of adults by household type.

Status	Nuclear (HH1)			Near-Nuclear (HH2)			Extended (HH3)		
				Mean Age					
Head	37.0			35.3			31.7		
Wife	28.3			26.9			26.2		
Rel.							28.4		
				Percent in Work Force (Hours per Week)					
Head	91.2 (49.4)			95.9 (49.4)			96.4 (48.6)		
Wife	3.9 (40.6)			4.1 (40.7)			10.0 (42.5)		
Rel.							20.2 (50.4)		
				Percent Whose Highest Educational Attainment is:					
	None	Pri.	Sec.	None	Pri.	Sec.	None	Pri.	Sec.
Head	44.6	33.4	22.0	23.3	43.0	33.7	26.5	37.2	36.3
Wife	62.6	33.5	3.9	47.9	45.1	7.0	42.3	49.0	8.2
Rel.							34.8	34.2	31.0

Table 2. Age and activities of children by household type.

Age	Nuclear (HH1)	Near-Nuclear (HH2)	Extended (HH3) Own	Other
		Mean Age		
	6.9	5.8	5.4	9.4
		Percent Attending School		
5 - 9	60.3	63.9	71.4	50.0
10 - 14	84.4	93.6	93.8	62.5
15 - 17	70.9	66.7	70.8	62.7
		Percent Working by Age Groups		
5 - 9	0	0	0	4.2
10 - 14	0	0	0	7.2
15 - 17	3.6	0	8.3	8.5

given age group (for the 15 - 17 age cohort, the percent rises from 3.6% in nuclear households to 8.3% in extended households.) Furthermore, 'other' children in the extended household tend to be considerably older than 'own' children and their work force participation is correspondingly higher.

Savings

Two sets of saving models are presented in Table 3. The first set, equations (4) - (6), examines the direct net impact of household structure on saving; the second set, equations (7) - (9), attempts to clarify the various effects of the extended family's demographic structure on saving. In both models comparable results are found with respect to non-household-specific variables. The marginal propensity to save is positive

Table 3.   Regression Results.

ESD	Const.	$\hat{Y}$	A	A^2	C	HH2	HH3	HH3·C	HH3· Adults
(4)	47.52 (−.31)	.06* (1.92)	−2.15 (−.28)	.03 (.30)	3.99 (.64)	−65.30* (−2.02)	−85.21* (−2.68)		
(5)	−19.53 (−1.15)	.03* (7.94)	.58 (.68)	−.01 (−.72)	3.20* (4.59)	3.07 (.85)	1.39 (.39)		
(6)	67.05 (−.44)	.09* (2.78)	−1.57 (−.20)	.02 (.22)	7.19 (1.14)	−62.23* (−1.91)	−83.82* (−2.62)		
(7)	9.09 (−.06)	.05 (1.44)	−4.52 (−.58)	.06 (.65)	6.94 (.95)	−62.07* (−1.91)	−179.83* (−2.09)	−5.44 (−.41)	41.09* (1.73)
(8)	15.92 (−.93)	.03* (7.43)	.30 (.35)	−.01 (−.34)	3.77* (4.66)	3.22 (.89)	−1.12 (−.12)	−1.68 (−1.15)	2.81 (1.06)
(9)	−25.01 (−.16)	.08* (2.25)	−4.21 (−.54)	.06 (.61)	10.71 (1.46)	−58.85* (−1.80)	−180.95* (−2.09)	−7.12 (−.54)	43.90* (1.84)

ESD - Eq. Saving Defin.
4 - Financial, 5 - Educational, 6 - Total
7 - Financial, 8 - Educational, 9 - Total

The heteroskedasticity correction divided each variable by $Y^{.38}$
t - statistics are in parentheses
*coefficient is significant at the 95% level.

and approximately 0.085, one-third of which is attributed to educational investment and the remainder to financial saving. There is no evidence of a life-cycle savings relationship independent of the life-cycle pattern of income. It is notable that the number of children in the household does not influence the level of the total or financial saving. These findings are at variance with the commonly held view that children exert a negative impact on household saving, a result based on a simple adult-equivalency conceptualization of household spending behavior. In contrast, our empirical results are based on a more broadly formulated view of household behavior which emphasizes the substitution possibilities between consumption and saving, on the one hand, and work force participation, leisure and home production, on the other hand.*

The most important finding for the present study is that at a given level of income, the nuclear family tends to save more than the near-nuclear or extended family: 62 shillings less in the former and 84 less in the latter.** These results compare favorably with the widely-held view that a breakdown of the extended family will likely increase the aggregate rate of financial saving. It is notable, however, that contrary to our expectations, the extended family does not appear to invest relatively more heavily in its children's education.

In examining the effects of household structure on saving, one must analyze the differences in the household's demographic structure. Some insight into this can be obtained from equations (7) - (9). Looking only at (9), it is found that the number of children does not exert a significant impact on saving. In contrast, the number of adults has a significant positive direct effect, even after controlling for the level of income. Evaluating $\partial S/\partial HH3$ at the mean values of the number of children and adults in the extended households, an even larger negative impact of -100 shillings would be obtained. This result is consistent with the hypothesis that the extended family's lower saving derives in major part from differing behavioral responses. Apparently the greater security of the extended family, obtained by pooling risks over larger numbers of individuals and by saving for retirement by a system of inter- or intra-household transfers (depending upon the organization of the family), results in lower observed current savings. Our empirical results tend to support this widely held but seldom documented proposition. These findings are moreover sufficiently large, even taking into account the difficulty of interpreting observed saving rates in the extended family, to encourage the further exploration of the relationship between family structure and economic behavior, and the impact of changes in family structure on the process of economic development.

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*For further details see Kelley (1978).
**Tests of parameter differences reveal that the near-nuclear and extended family impacts on savings are not significantly different from each other.

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