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Household Saving Behavior in the Developing Economies: The Indonesian Case*

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1. Introduction

Econometric research on the determinants of household saving based on micro data drawn from the less developed countries has lagged far behind the pace set in advanced nations. It would appear that there has been limited hypothesis-testing in the LDC's beyond macro formulations of the consumption function. Furthermore, very little of the development literature attempts to isolate the impact of structural change on aggregate personal saving, since few studies provide meaningful disaggregation. This state of affairs seems paradoxical, given the currency of W. A. Lewis's remark that the central problem in development theory is to explain an increase in domestic saving from 4 or 5 percent of national income to 12 or 15 percent.¹

The dearth of empirical evidence on household saving appears all the more peculiar, given the current emphasis which marginal savings rates enjoy in a flourishing crop of growth models. Most of these ignore the sectoral components of savings, with their divergent behavior, and concentrate instead on aggregate savings performance. Per capita income, which is introduced as the independent variable, is required (a) to capture virtually all of the distributional changes underlying the growth process, and (b) to capture changes in other variables which have a significant impact on savings behavior, whether of households, corporations, or governments. The recent, and highly aggregative, Chenery-Strout model is just one example;² most growth models make aggregate domestic savings a simple function of per capita income, either current or lagged.³ On the one hand, this approach may yield simple, well behaved models and reasonably useful short-run forecasts. On the other hand, it offers only limited insight into the development process and contributes little to the policy-maker who seeks to understand the savings decision and how he might act upon it. Furthermore, household saving is usually left in the background, while the government and corporate sector receive attention as the major contributors to high marginal saving rates.

This state of affairs, if we have described it fairly, certainly cannot be

explained by the insignificant size of the household sector's share in economic activity or its contribution to domestic saving. A recent ECAFE publication shows the household's share in gross domestic saving in 1959 as ranging between a low of 57 percent for the Philippines and a high of 114 percent for South Korea.⁴ Furthermore, the ratio of personal saving to disposable income also varies enormously among the ECAFE nations, ranging from 4.3 percent for Taiwan to 14.5 percent for Japan. These figures dramatize the necessity of an intensive analysis of the determinants of household saving.

Perhaps our lack of knowledge can be better explained by data constraints prevailing in the developing nations.⁵ The LDC rarely possesses time series of sufficient length and quality to permit detailed analysis of personal saving. Additionally, the sample survey data which exist are typically presented in grouped form, such that successful analysis of all but a few determinants of saving is severely constrained. The original micro observations are usually unavailable. Statistical agencies in the developing nations normally do not possess the manpower, time, or expertise to submit the wealth of data at their disposal to intensive economic analysis, and thus much information is essentially if not actually lost.⁶ As a result of these conditions, the estimation of planning parameters and hypothesis-testing has been restricted in large measure to inadequate macro data,⁷ to international cross-sections,⁸ or in extreme cases to borrowing parameters estimated from contemporary North American and European experience.

The present paper provides an exploratory analysis of household saving behavior in the Jogjakarta region of Indonesia (1958–59). It examines the impact on savings of occupation and source of earnings. Life-cycle formulations are also investigated. We hope to demonstrate once again the usefulness of cross-section data in providing insights into the relationship between domestic saving and economic development.⁹

2. The Data

The data comprise a sample survey of 490 families¹⁰ from the Daerah Istimewa Jogjakarta region of Indonesia taken in 1959 by the Bureau of Economic Research-Faculty of Economics at Gadjah Mada University. The observations refer to the year covering August 1958 to August 1959 and include urban households in the city of Jogjakarta, as well as rural families in the region of Jogjakarta. The Indonesian survey, using the 1954 Ceylon Consumer Finance Study¹¹ as its model, includes data on income, consumption, savings, source of income, and the age, sex, place of birth, education, employment status of the household head, in addition to other selected economic and demographic information.¹²

The income variable (Y_i) used in the present paper represents the reported income figure from the survey. The survey also reported total family consumption (C_i); one can derive, residually, a measure for savings (S_i). The weaknesses of sample survey estimates of savings are well known

and have been discussed extensively in the literature. In the Jogjakarta survey an attempt was made to measure savings directly from family asset and liability data, but these estimates seemed to us too fragile to be utilized in the present analysis.

An extensive investigation of functional form is not our primary interest. The typical savings formulation used below is:

$$(S/N)_i = \alpha + \beta(Y/N)_i$$

where N = family size. These "per capita" functions belong to the larger family of more general forms where N is introduced explicitly, but the intercorrelation between Y and N clouded the results, and the more general approach was abandoned.¹³ Initially, an experiment was performed with five competing hypotheses regarding the consumption-income relationship. The results are given below for the total Jogjakarta sample:

- | | | |
|-----|---|-------------------------------|
| (1) | $(C/N) = 107.84 + 0.901 (Y/N)$ (26.63) (0.013) | $R^2 = 0.9133$ mpc = 0.901 |
| (2) | $\log(C/N) = 0.581 + 0.9162 \log(Y/N)$ (0.093) (0.0135) | $R^2 = 0.9036$ mpc = 0.900 |
| (3) | $(C/N) = -9320.7 + 1547.3 \log(Y/N)$ (472.0) (68.6) | $R^2 = 0.5107$ mpc = 1.197 |
| (4) | $(C/Y) = 1.070 - 0.000024 (Y/N)$ (0.024) (0.000011) | $R^2 = 0.0095$ mpc = 1.008 |
| (5) | $(C/N) = 145.17 + 0.8648 (Y/N) + 0.0000021 (Y/N)^2$ (33.64) (0.0236) (0.0000018) | $R^2 = 0.9139$ mpc = 0.870 |

The linear and double-log forms yield almost identical marginal propensities at the mean income level; neither differs greatly from the quadratic (5), but the coefficient of the second term of the latter is not significantly different from zero. Equations (3) and (4) yield nonsensical results. On the basis of this evidence, we have used the relatively simple linear "per capita" form throughout.¹⁴

3. Source of Income and Occupation as Determinants of Savings: A Review of the Literature

Models stressing source of income and occupation as determinants of aggregate household saving take several forms. The simplest of these appear in growth theories associated with the writings of Kaldor, Hahn, Kaleki, and Robinson.¹⁵ They postulate a two-factor growth framework which yields a differential response of saving to income from capital

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(profits) and from labor (wages). Assuming the propensity to save out of wage earnings is less than that out of profits, and in the extreme zero, aggregate savings rates are uniquely determined by the source distribution of income. The two-factor framework and a homogeneity assumption make these formulations compatible with Harrod-Domar dynamics.

W. A. Lewis's writings are couched in a somewhat more speculative theoretical vein. Lewis argues that the profit-making entrepreneurs are the significant savers in society, and that landlords, wage-earners, peasants, and the salaried middle classes contribute relatively little. To make matters worse, the saving of these nonentrepreneurial classes is typically channeled into relatively unproductive investment. Lewis offers little theoretical justification or empirical support for these hypotheses. Indeed, he notes that "there is very little evidence on savings out of wages, salaries, and peasant income" for the underdeveloped economies. Lewis does suggest in passing that an important determinant of saving out of these income sources is the availability of savings institutions and an organized capital market.¹⁶

The works of Houthakker, Friend and Kravis, and others, formulated with hypothesis testing as the main focus, provide a somewhat different approach.¹⁷ Houthakker's work has been empirical. Expanding on the classical tradition, the explanation of aggregate personal saving is found by an examination of personal income by source. Income recipients behave differently according to the source of that income, apart from its size.¹⁸

$$S = \alpha + \beta_1 L + \beta_2 U + \beta_3 D + \beta_4 R + \beta_5 T$$

where L , U , D , R , and T are, respectively, employee compensation, income from unincorporated enterprises, dividends, other property income, and direct taxes on households. Houthakker predicts, of course, that the coefficients attached to L would fall far below those associated with other income sources. We might argue that such differences would disappear if the model explicitly introduced income changes, wealth stocks, age, and family size. Houthakker proposes that capital market imperfections may in part justify the formulation.

A somewhat different approach, and one which is employed here, is to distinguish, at least conceptually, the entrepreneur (self-employed) from all other households. The theoretical justification lies in the recognition that for the farm and nonfarm entrepreneurial group, the firm and the household are no longer separable. For the wage-earning household, which offers only its labor services to the factor market, the determination of savings involves, in addition to an allocation between present and future consumption, a decision regarding the maintenance of the existing stock of human capital and the increments in that stock. The self-employed entrepreneur, on the other hand, receives income for labor services, for the use of his nonhuman earning assets, and for managerial abilities. To the extent that household saving decisions are simultaneously determined with those

based on entrepreneurial earning assets, then different consumption behavior compared to other occupational households is to be expected. This distinction becomes all the more important in the LDC, where the entrepreneur assumes a far greater role as a result of the relative size of the agricultural sector and also of the relative backwardness of the corporate movement in the nonagricultural sector.¹⁹

The distinctiveness of entrepreneurial saving can be explained by more than an appeal to sociological characteristics and the Puritan ethic.²⁰ First, wage and salary earners may find that outlets for saving (in the form of earning assets) are severely restricted, thus producing relatively low marginal and average savings rates for this class. Second, the entrepreneur will be a high *gross* saver, maintaining his depreciating stock of physical assets. Third, Klein has reminded us that the entrepreneur may possess a clear preference for his own funds for reinvestment since he may desire to retain control over the firm.²¹

Furthermore, in the LDC all occupational groups must operate in a world of extremely imperfect capital markets. In this situation, the internal rate of return on investment in the family enterprise can deviate substantially from the market rate. The availability of internally generated income determines his net savings position, just as it does that of the corporation, and thus the high marginal savings rates among entrepreneurs may reflect capital market imperfections, rather than inherent differences in time preference.

The role of the capital market imperfections in explaining divergent savings behavior by occupation or functional income type is certainly not ignored in modern consumption theories, and it may have powerful applications in the underdeveloped economies.²² A low rate of return on investment in land, for example, may encourage consumption, conspicuous or otherwise. The landlord, faced with capital market imperfections, and at the same time defending an archaic tenure system, may have low savings propensities totally unrelated to social class. Similarly, the wage earner does not undergo formal education and on-the-job training up to the optimum level (not a part of savings as traditionally measured, but certainly asset accumulation nevertheless), since the loan market is normally closed to him.

In summary, if the problem is formulated as a comparison of savings propensities of entrepreneurial and all other households, the following predictions can be made. The position and slope of the savings function will be higher for the entrepreneurial group, since the entrepreneur (1) manages a depreciating stock of capital; (2) possesses greater knowledge of capital market procedures, and thus can take advantage of investment opportunities which are less available to others; (3) may exhibit a preference for internal finance, in order to maintain control over assets; and (4) may face a greater internal rate of return on assets, given capital market imperfections. Additionally, the slope will be higher for the

entrepreneurial group, because of greater short-run instability of current income, and thus a divergence between measured and permanent household income.

3. Empirical Results

The total sample, numbering 490 households, is initially divided into six relatively homogeneous occupational groups. The occupational classifications, based on the structure of the household's income sources, are the following: (1) farmer, including farm laborers ($N = 296$); (2) traders and craftsmen ($N = 35$); (3) owners of business ($N = 33$); (4) government employees, including policemen and soldiers ($N = 43$); (5) other wage earners ($N = 47$); and (6) unclassified occupations ($N = 56$). The miscellaneous category is excluded from our analysis, except as it appears in the total sample. The farm group is the most heterogeneous, since it includes laborers, those who rent their land, and those who own their land. This group is examined in detail below.

The results given in Table 1 relate to the simple linear savings function $(S/N)_{ij} = \alpha_j + \beta_j(Y/N)_{ij}$, where the variables are defined as in section 2 above, and each variable is reported for an i^{th} household whose head is employed in the j^{th} occupation.

The range in the β_j coefficients over these occupational groups is very large. For the total Jogjakarta sample, the marginal propensity to save is approximately 10 percent, which compares favorably with marginal savings rates derived for households in advanced nations. This result may be due primarily to the heavy weight accorded to the entrepreneurial household in the LDC and the instability of household income in agrarian economies.²³ The wage and salary recipients possess *mps*'s equal to or far less than the Jogjakarta average. The government employee, with the highest income in the group, has very low average and marginal savings rates; part of this behavior may be explained by the group's high educational level. It would also appear that the farmer has a marginal savings rate roughly equal to that of the group sample—hardly surprising, given the farm group's preponderance in the Jogjakarta survey. The very high marginal savers are the nonfarm entrepreneurs—the trader and the owner of business, with β coefficients of 0.4257 and 0.3077, respectively.

Thus far our interest has been primarily in the slope of the saving function, in part because the biases of saving and income estimates from household surveys are often closely related to income by source, and thus the position of occupational savings functions are more likely to be in error than their slopes. Nevertheless, an attempt was made to examine the relative importance of income levels in influencing average savings rates by occupation. Income per family member ranges widely between the farm group, which has average income at 67 percent of the Jogjakarta average, and the highly educated government employee, whose income is approximately two-and-a-half times the average. Not surprisingly, the average

Table 1
 Estimated Parameters of the Savings Function, $S/N = \alpha + \beta Y/N$ By Occupational Class

| | α | β | N | R^2 | (Y/N) | APS at group mean of (Y/N) | APS at grand mean of (Y/N) | Education index (average years) | Age (average years) |
|--------------------------|-------------------|--------------------|-----|--------|---------|------------------------------|------------------------------|---------------------------------|---------------------|
| (1) Farmer | -93.6 (22.5) | 0.1071 (0.0218) | 276 | 0.0809 | 862.3 | -0.0014 | 0.0346 | 0.729 | 50.2 |
| (2) Trader and craftsman | -416.2 (79.5) | 0.4257 (0.0582) | 35 | 0.6187 | 1,186.5 | 0.0749 | 0.1035 | 1.571 | 47.9 |
| (3) Owner of business | -321.7 (110.2) | 0.3077 (0.0621) | 33 | 0.4423 | 1,289.3 | 0.0582 | 0.0586 | 0.515 | 46.5 |
| (4) Government employee | -160.6 (69.8) | 0.0475 (0.0132) | 43 | 0.2388 | 3,121.9 | -0.0039 | -0.0768 | 6.512 | 43.1 |
| (5) Other wage earner | -173.2 (61.9) | 0.1111 (0.0366) | 47 | 0.1699 | 1,433.0 | -0.0098 | -0.0230 | 1.851 | 45.0 |
| Total | -107.8 (26.6) | 0.0990 (0.0126) | 490 | 0.1129 | 1,291.6 | 0.0155 | 0.0155 | 1.553 | 49.4 |

Note: All the estimated coefficients are significant at the 99 percent level. The group observations will not sum to 490, since the unclassified occupations ($N = 56$) are excluded.

savings ratio for the entire Jogjakarta sample is only 1.6 percent, but again the range between occupational groups is large. The farmer, the government employee, and the urban wage-earner are all negative savers, while the trader-craftsmen and the owner of business have average savings ratios of 7.5 and 5.8 percent, respectively. These saving shares are estimated at the mean income of each group. If we use the total sample mean income of 1,291.6 throughout, then we shall have effectively standardized for the divergence between group mean income levels. This adjustment produces only two significant changes: the farmer becomes a net saver (+0.0346), and the government employee becomes an even higher negative saver (−0.0768).²⁴

As noted above, the farm class is especially heterogeneous. There is considerable variation within this group regarding the amount of income derived from owned land. In order to isolate source of income effects (as an index of control over productive assets), as opposed to occupational effects, we have stratified the farm group by share of income derived from owned land. The household, then, is in varying degrees an owner and/or manager of capital assets.

Following the argument presented above, for a given level of income we expect both the marginal and average savings ratio to increase with the degree of land or asset ownership.²⁵ Table 2 presents our results where cumulative subsamples are utilized, beginning with the total farm category (with zero percent or greater of the income from owned land) and concluding with those who derived 91 percent or more of their income from owned land. The detailed regression results generally confirm our expectations, since both the marginal and average savings rates increase with increasing degrees of landownership.²⁶ An exception appears in the highest three classes, where the marginal savings rates tail off sharply, but the average rates of saving increase consistently, with the sole exception of the highest class.

4. The Life-Cycle Hypothesis and Savings

The literature on the so-called life-cycle hypothesis examines many forms of age-specific relationships affecting human behavior.²⁷ Our present interest focuses on the life-cycle as it pertains to household savings and consumption in the LDC. To our knowledge, there has been little attempt to apply the life-cycle savings formulation to a situation of uncertainty regarding earnings and life span, or to an environment of extended family systems where children become the means of accumulating future productive earning assets which satisfy income requirements at retirement. We begin with the best known contributions to the life-cycle theory of consumption and savings, the Modigliani-Brumberg-Ando formulation, and attempt to confront it with Indonesian data.

The basic economic problem in the MBA framework is the maximization of utility over time. The household's decision is to establish the total

Table 2
Parameters of the Savings Function $S/N = \alpha + \beta Y/N$ for the Farm Sample

| Farmers (Percent of Y from owned land) | α | β | N | R ² | Y/N | APS at group mean Y/N | APS at grand mean Y/N | Education Index | Age |
|--|-------------------|--------------------|-----|----------------|---------|-----------------------------|-----------------------------|--------------------|------|
| (1) Total farm sample | -93.6 (22.5) | 0.1071 (0.0218) | 276 | 0.0809 | 862.3 | -0.0014 | -0.0014 | 0.729 | 50.2 |
| (2) Greater than 11% | -96.3 (24.0) | 0.1122 (0.0232) | 253 | 0.0856 | 864.7 | 0.0008 | 0.0005 | 0.729 | 49.0 |
| (3) Greater than 21% | -96.4 (24.7) | 0.1124 (0.0237) | 244 | 0.0851 | 866.5 | 0.0011 | 0.0006 | 0.733 | 49.0 |
| (4) Greater than 31% | -102.0 (26.3) | 0.1202 (0.0249) | 223 | 0.0956 | 875.4 | 0.0037 | 0.0037 | 0.740 | 51.1 |
| (5) Greater than 41% | -118.2 (28.5) | 0.1416 (0.0272) | 203 | 0.1189 | 870.0 | 0.0054 | 0.0045 | 0.749 | 51.5 |
| (6) Greater than 51% | -120.0 (30.2) | 0.1458 (0.0285) | 189 | 0.1224 | 876.1 | 0.0088 | 0.0066 | 0.730 | 52.0 |
| (7) Greater than 61% | -116.3 (32.5) | 0.1433 (0.0303) | 168 | 0.1185 | 882.2 | 0.0115 | 0.0084 | 0.738 | 52.1 |
| (8) Greater than 71% | -84.6 (28.1) | 0.1152 (0.0202) | 134 | 0.1383 | 926.0 | 0.0238 | 0.0171 | 0.800 | 51.7 |
| (9) Greater than 81% | -88.8* (33.7) | 0.1223 (0.0285) | 108 | 0.1486 | 973.0 | 0.0310 | 0.0193 | 0.870 | 51.3 |
| (10) Greater than 91% | -106.8* (51.4) | 0.1057 (0.0405) | 66 | 0.0975 | 1,045.1 | 0.0035 | -0.0182 | 1.167 | 52.3 |

Note: all the estimated coefficients are significant at the 99 percent level, with the exception of those marked with an asterisk. The latter are significant at the 95 percent level.

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value of consumption in each period. Under the usual simplifying assumptions,²⁸ the individual's consumption at age t becomes $C_t = V_t/L_t$, where $L_t = L - t + 1$ is the remaining lifetime, and V_t is the sum of current income, average expected incomes, and assets held at the beginning of the current year. Assets are set aside as part of the life plan to finance retirement. (Under the extended family system, this motivation may be greatly reduced, perhaps mitigating the model's applicability.)

Table 3
Average Saving, Income, Family Size, and Education by Five Age Groups,
for Urban, Rural, and All Households

| | No. obs. | \bar{Y} | \bar{S} | \bar{N} | \bar{Y}/\bar{N} | \bar{S}/\bar{Y} | \bar{E} |
|--------------|----------|-----------|-----------|-----------|-------------------|-------------------|-----------|
| <i>Urban</i> | | | | | | | |
| 20-29 | 15 | 8,201 | -290 | 2.33 | 3,520 | -0.035 | 9.60 |
| 30-39 | 25 | 9,586 | -55 | 5.00 | 1,917 | -0.006 | 5.52 |
| 40-49 | 15 | 11,366 | -34 | 5.33 | 2,132 | -0.003 | 4.60 |
| 50-59 | 11 | 4,853 | -73 | 2.64 | 1,838 | -0.015 | 1.27 |
| 60-69 | 15 | 4,558 | +19 | 2.60 | 1,753 | +0.004 | 0.87 |
| Total | 81 | 8,085 | -83 | 3.80 | 2,128 | -0.010 | 4.67 |
| <i>Rural</i> | | | | | | | |
| 20-29 | 17 | 3,655 | -16 | 3.41 | 1,072 | -0.004 | 2.29 |
| 30-39 | 75 | 4,301 | +123 | 4.77 | 902 | +0.029 | 1.73 |
| 40-49 | 127 | 4,278 | -61 | 5.01 | 854 | -0.014 | 0.91 |
| 50-59 | 81 | 4,727 | +267 | 5.01 | 944 | +0.056 | 0.36 |
| 60-69 | 55 | 3,854 | +80 | 4.33 | 890 | +0.021 | 0.35 |
| Total | 355 | 4,290 | +77 | 4.78 | 897 | +0.018 | 0.94 |
| <i>Total</i> | | | | | | | |
| 20-29 | 32 | 5,786 | -144 | 2.91 | 1,988 | -0.025 | 5.72 |
| 30-39 | 100 | 5,622 | +78 | 4.83 | 1,163 | +0.014 | 2.68 |
| 40-49 | 142 | 5,026 | -12 | 5.04 | 997 | -0.002 | 1.30 |
| 50-59 | 92 | 4,742 | +23 | 4.73 | 1,003 | +0.005 | 0.47 |
| 60-69 | 70 | 4,005 | +67 | 3.96 | 1,011 | +0.017 | 0.46 |
| Total | 436 | 4,995 | +19 | 4.60 | 1,086 | +0.004 | 1.63 |

To test adequately the life-cycle formulation on the Indonesian data, it would have been desirable to control for selected determinants of consumption, particularly those which are correlates of age, location, asset stock, and education, but the sample size made this approach impossible.²⁹ We have divided the sample into its rural and urban components since, among other things, the prevalence of the extended family system should vary considerably between these classifications. Tables 3, 4, and 5 present selected mean statistics relating to the age classes: number of households, income (\bar{Y}), savings (\bar{S}), family size (\bar{N}), income per family member

(\bar{Y}/\bar{N}), the savings ratio (\bar{S}/\bar{Y}), and years of education of the household head (\bar{E}). Unfortunately, the data is in a form allowing only for five age classes, so that considerable variation in the age variable will be attenuated by implicit smoothing.

Most cross-section data from the developed European and North American nations show average family income following a roughly parabolic path over the earning span, rising sharply to a peak in the 35–54 age range and declining moderately thereafter. Family size follows the same pattern, but with a more pronounced peak at age 35–44 and a *sharp* decline thereafter, as children establish independent households.³⁰ The resultant average income per member reaches a low at age 35–44, rising markedly thereafter. Table 3 suggests similar patterns in the Jogjakarta region, but not without some unique variation.

The rural sector exhibits less variation in \bar{Y} over the life cycle as compared to the urban sector. This may in part be explained by the greater scope for skill acquisition in the urban sector,³¹ while in rural activities, declining productivity of the family heads at later ages may be offset by increasing labor participation rates of children. Additionally, education, which is highly age specific in the Indonesian case, may have contributed to the difference between urban and rural family income patterns. In any case, the peculiar behavior of the total sample, with \bar{Y} declining throughout all age classes, indicates the relative youth of the urban population (the urban sample has a declining weight over age groups in the total sample) and the necessity of breaking up the sample in pursuit of life-cycle tests.

It would appear that \bar{N} peaks later in the Jogjakarta region than is typically the case for developed nations; in the urban sample \bar{N} peaks in the 40–49 age range, while in the rural sample the peak occurs in the 40–59 range. The evidence is consistent with the prevalence of the extended family system and with the obvious fact that the farm producing unit offers children greater employment opportunities than does the urban wage-earner's household.

Income per family member in the total and rural sample generally follows the predicted inverse pattern, with a low reached at age 40–49. The urban sample exhibits somewhat different behavior.

On the basis of the life-cycle patterns in family size and income in the typical developed nation, the simple life cycle model would predict high average savings rates in the age groups 45–64 (peaking in the 45–54 group) and low savings in the age groups 25–44 and at retirement. An application of this model to the Indonesian experience reveals somewhat different predictions of savings behavior. We follow Modigliani and Ando³² by assuming constant per capita consumption over the life cycle. This is taken as an average over households of all age groups: for the total sample, average per capita consumption is 1,082; for the urban sample, 2,106; and for the rural sample, 881. The test of the model rests not on total savings

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levels, nor average savings ratios, but in the variation of S/Y over age groups. Multiplying the per capita consumption figures by each age classes' average family size, we can predict consumption, \hat{C}_1 , savings, \hat{S}_1 , and the average propensity to save, \hat{S}_1/\bar{Y}_s . These figures are given in Table 4. The estimates for \hat{S}_2 and \hat{S}_3 attempt to control, however crudely, for the "equivalent adult" problem.³³ The "cost" to a household of a given family size is assumed to be proportional to $[1 + \alpha(N - 1)]$, where

Table 4
Actual Savings per Household (\bar{S}),
Household Savings Predicted by the Simple Life-Cycle Model
($\hat{S}_1, \hat{S}_2, \hat{S}_3$), and Household Savings Predicted from
 $S/N = \alpha + \beta Y/N, (\hat{S}_4)$: by Five Age Classes

| | \bar{S} | \hat{S}_1 ($\alpha = 1$) | \hat{S}_2 ($\alpha = 0.75$) | \hat{S}_3 ($\alpha = 0.50$) | \hat{S}_4 |
|--------------|-----------|---------------------------------|------------------------------------|------------------------------------|-------------|
| <i>Total</i> | | | | | |
| 20-29 | -144 | +2,637 | +2,518 | +2,303 | +259.0 |
| 30-39 | +78 | -396 | +417 | +433 | +35.3 |
| 40-49 | -12 | -427 | -394 | -341 | -45.9 |
| 50-59 | +23 | -376 | -369 | -358 | -40.2 |
| 60-69 | +67 | +283 | -326 | -402 | -30.5 |
| <i>Rural</i> | | | | | |
| 20-29 | -16 | +651 | +989 | +797 | |
| 30-39 | +123 | +99 | +56 | +44 | |
| 40-49 | -61 | -136 | -143 | -125 | |
| 50-59 | +267 | +313 | +558 | +543 | |
| 60-69 | +80 | -39 | +322 | +238 | |
| <i>Urban</i> | | | | | |
| 20-29 | -290 | +3,294 | +3,039 | +2,633 | |
| 30-39 | -55 | -944 | -738 | -416 | |
| 40-49 | -34 | +141 | +369 | +797 | |
| 50-59 | -73 | -707 | -903 | -1,215 | |
| 60-69 | +19 | -918 | -1,120 | -1,443 | |

all members beyond the first have a constant marginal cost. The estimates \hat{S}_1 assume $\alpha = 1$, while those for \hat{S}_2 and \hat{S}_3 assume $\alpha = 0.75$ and $\alpha = 0.50$, respectively.

The savings estimates generated by the simple life-cycle formulation suggest a number of tentative observations regarding the applicability of the model to the LDC environment. (1) The variation in average age-specific household savings predicted by the model is far greater than the actual mean savings levels. This places in doubt the assumption regarding constant consumption per family member over the life cycle. Indeed, it

tends to contradict the emphasis placed on the retirement motive, at least for the LDC environment. (2) Varying assumptions regarding the “adult equivalence” measure have little impact upon life-cycle savings behavior. (3) The predictions for the 20–29 age group are especially poor. (4) Excluding the 20–29 age group, however, the model would appear to identify age-specific *variations* (not levels) in savings fairly well for rural households and very badly for the urban households, just the reverse of our expectations. But clearly, at this point, we are plagued by the confines of a small sample size and by our inability to control for education and its important impact on expected future income and thus on present consumption by age. (5) The over-all savings function predicts saving levels by age group about as well as the life-cycle formulation.

As the discussion above indicates, initially the evidence would appear to cast some doubt on the applicability of the life-cycle hypothesis to the LDC household. Even given its highly restrictive assumptions, the simple model has survived very well the tests of micro data drawn from the developed nations, and very often the data has not been further stratified by occupation, education, and other attributes which might be systematically related to age. A more detailed examination of the attributes of these age groups in the Jogjakarta sample, however, suggests that the test of the life-cycle model is far more difficult to perform for the LDC. Literacy rates and levels of investment in human beings have increased dramatically in the developing nations in the post-World War II period. The Jogjakarta region of Indonesia is no exception. Table 3 presents data on the educational attainment by age class, both in urban and rural areas. The range within the rural sample is quite small, although the positive correlation between age and education is clear. The urban sample exhibits the most dramatic effects of age on education, perhaps suggesting why our tests of the life-cycle model were least satisfactory for that group. In the youngest class, aged 20–29, the average period of formal schooling is in excess of 9 years. The level drops sharply to 5.5 years in cohort 30–39, declining to 4.6 in the subsequent age group. A dramatic fall to 1.3 years for those aged 50–59 follows, and a level close to illiteracy is found in the oldest age group.

The evidence on investment in human capital is at odds with our implicit assumption that actual current income and expected income are closely related. In terms of the urban sample, the discounted expected future income stream would far exceed that based upon current income experience for the 20–29 age group. An adequate control for education would presumably revise upward our predicted family consumption figures for this young age group, thus bringing predicted savings levels into line with actual savings behavior. For those aged 30–39 and 40–49, much less divergence is to be expected, since the educational levels are close to the urban mean, and the number of years of expected return on the investment in education is less. In summary, this added evidence on investment in human capital offers one powerful explanation for the life-cycle model's

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gross overprediction of savings in young age groups. It also suggests the great necessity for analysis of large samples drawn from the LDC in order to explore adequately the impact of age and education on family savings decisions.

Our next step was to examine savings behavior *within* age groups. Because of the small size of the urban sample within age groups, we attempted only to estimate age-specific savings functions for the total and rural sample. Modigliani and Ando have pointed out that predictions relating to age-specific marginal propensities are very difficult, given the complexity of the life-cycle hypothesis.³⁴ Nevertheless, the model predicts a rise in the *m_{ps}* as the household grows older, because current and prospective income from employment declines as a share of total resources. This prediction is consistent with the Indonesian sample, since income per family member declines up to the age group 40–49 and stabilizes or rises only slightly thereafter.

Table 5 presents the estimated coefficients from the savings function $(S/N)_{ij} = \alpha_j + \beta_j(Y/N)_{ij}$, where $(S/N)_{ij}$ is saving per family member for

Table 5
Estimated Parameters of the Saving Function $S/N = \alpha + \beta Y/N$,
by Five Age Classes for Rural and All Households

| Age | Total | | | | Rural | | | |
|-------|----------|-------------------|--------------------|-----------------------|----------|-------------------|--------------------|-----------------------|
| | <i>N</i> | α | β | <i>R</i> ² | <i>N</i> | α | β | <i>R</i> ² |
| 20–29 | 32 | –197.9 (99.0) | 0.046 (0.018) | 0.178 | 17 | –146.0 (43.6) | 0.133 (0.032) | 0.528 |
| 30–39 | 100 | –59.1 (38.0) | 0.065 (0.019) | 0.101 | 75 | –247.5 (47.0) | 0.302 (0.043) | 0.399 |
| 40–49 | 142 | –6.6* (18.5) | –0.005* (0.014) | 0.001 | 127 | –3.0* (19.1) | –0.008* (0.016) | 0.002 |
| 50–59 | 92 | –249.9 (54.3) | 0.277 (0.040) | 0.350 | 81 | –318.8 (50.8) | 0.389 (0.041) | 0.536 |
| 60–69 | 70 | –676.8 (115.9) | 0.599 (0.061) | 0.583 | 55 | –752.4 (111.5) | 0.759 (0.063) | 0.734 |

Note: an asterisk indicates insignificance at the 90 percent level.

the *i*th family in the *j*th age class, and $(Y/N)_{ij}$ is the income per family member. The results indicate not only a great variation in the marginal propensity to save over age groups, but also a confirmation of this aspect of the life-cycle hypothesis. With the exception of the insignificant results in the 40–49 cohort, the marginal propensity to save does indeed increase as households age. Furthermore, the rate of increase is quite sharp. In the rural sample, it rises from 0.133 for the youngest group to 0.759 at or near

retirement (age 60–69). Presumably, the complications of intercorrelation which education presents in comparing average group savings behavior are far less prevalent *within* each group.

5. Implications

The implications of our findings regarding the relationship of household savings, source of income, and age are several. First, since both the age structure and the composition of income by source are changing systematically as development proceeds, the availability of internal financing will exhibit a response in size and direction according, in part, to the household savings patterns identified above. Secondly, if our hypotheses explaining the divergent savings behavior by income source are confirmed, especially those relating to the nature and significance of the capital market, then continued government attention to the development of a more sophisticated financial structure would seem warranted. Third, while the impact of education on consumption and savings is complicated, our results suggest that a precise identification of both the causation and its magnitude can be important in appraising the social rate of return in human capital formation. Fourth, and possibly most important, our results suggest that much could be learned from a similar investigation of larger micro samples, where modern models of household savings could more adequately be put to test with data from other developing nations. The rate of return, in the form of increasing our understanding of both consumer behavior and the process of economic growth, would appear very large indeed. Finally, the possibilities for building up aggregate personal savings relationships from micro data seem promising. We made no attempt to do so here, but such an approach would seem to be fruitful, in enabling us to capture the important changes in distribution, in life expectancy, in family size, and in other variables which have been and are accompanying growth in the developing countries.

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1 W. A. Lewis, "Economic Development with Unlimited Supplies of Labor," *The Manchester School* (May 1954), pp. 139–91.

2 H. B. Chenery and A. M. Strout, "Foreign Assistance and Economic Development," *American Economic Review* (September 1966), pp. 679–733.

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3 F. H. Hahn and R. C. O. Matthews, "The Theory of Economic Growth: A Survey," *Economic Journal* (December 1964), pp. 779–902; P. N. Rosenstein-Rodan, "International Aid for Underdeveloped Countries," *Review of Economics and Statistics* (May 1961), pp. 107–38; United Nations, ECAFE, *Review of Long-Term Economic Projections for Selected Countries in the ECAFE Region*, Development Programming Techniques Series No. 5 (Bangkok, 1964).

4 *Op. cit.*

5 There have been a few major empirical studies on household saving in the LDC's using budget data. One outstanding set of examples is the Indian research completed by the National Council of Applied Economic Research, based on Indian sample surveys taken in the 1960's. See National Council of Applied Economic Research, *Contractual Saving in Urban India* (New Delhi, July 1962); —, *Delhi Saving Survey* (New Delhi, July 1960); —, *Measurement and Analysis of Saving* (New Delhi, 1962); —, *Saving in India* (New Delhi, 1965); and —, *Urban Income and Saving* (New Delhi, 1962). For an excellent theoretical contribution which has been relatively ignored, see the piece by Bruton in Bert F. Hoselitz, ed., *Theories of Economic Growth* (New York: Macmillan, 1960), pp. 239–98.

6 This appears to have been the case, for example, with the seventeen separate Philippine surveys taken since 1956. See Philippine Bureau of the Census and Statistics, *The Philippine Statistical Survey of Households*, Numbers 1–17 (Manila, 1956–66).

7 J. C. H. Fei and D. S. Paauw, "Foreign Assistance and Self-Help: A Re-appraisal of Development Finance," *Review of Economics and Statistics* (August 1965), pp. 251–67; I. Friend and P. Taubman, "The Aggregate Propensity to Save: Some Concepts and Their Application to International Data," *Review of Economics and Statistics* (May 1966), pp. 113–23.

8 H. S. Houthakker, "An International Comparison of Personal Savings," *Proceedings of the 32nd Session of the International Statistical Institute* (1961), pp. 55–69; —, "An International Comparison of Household Expenditure Patterns, Commemorating the Centenary of Engel's Law," *Econometrica* (October 1957), pp. 532–51; and —, "On Some Determinants of Saving in Developed and Underdeveloped Countries," Memorandum No. 20 (Stanford: Research Center in Economic Growth, July 1962, mimeo.).

9 Cross-section data has recognized inherent limitations, relating primarily to the conflict of time-series and cross-section results. The literature on these issues is abundant: consult, for example, L. Klein, "Entrepreneurial Saving," in I. Friend and R. Jones, eds., *Proceedings of the Conference on Consumption and Saving*, Vol. II (Philadelphia, 1960), pp. 297–335; or Eva Mueller and I. R. K. Sarma, "Pattern of Income Distribution in an Underdeveloped

Economy: A Case Study of India: Comment," *American Economic Review* (December 1965), pp. 1173–78.

10 While the original sample numbered 503, some of the observations were discarded as a result of problems of data coding.

It should also be stressed that this was a period of significant price inflation for Indonesia. Quite obviously, price inflation can distort household saving behavior, especially when the data input is time-series or when inter-country comparisons are being made. In our sample, however, all households face the same set of prices and price changes. To the extent that all households do *not* face identical prices (including interest rates and absolute prices), then cross-section studies which ignore price variation are deficient. This seems to be an unlikely result in the Indonesian case.

11 Central Bank of Ceylon, Department of Economic Research, *Survey of Ceylon's Consumer Finances* (Colombo, 1954).

12 Bureau of Economic Research, *Consumer Finance Survey in the D.I.J.* (Gadjah Mada University, Faculty of Economics, 1959, mimeo.); E. D. Hawkins, *Consumer Finances in the Region of Jogjakarta: A Preliminary Report* (Jogjakarta, 1960, mimeo.).

13 This is unfortunate, given the emphasis Milton Friedman and others have placed on changing family size as a determinant of secular variations in aggregate saving. "This effect of changing size of family is hardly ever mentioned in discussions of the secular trend in savings; yet it may be one of the major factors at work." See M. Friedman, *A Theory of the Consumption Function* (Princeton: National Bureau of Economic Research, 1957), p. 123.

14 In the disaggregated models explored below, several nonlinear formulations were pursued. The results, as with the total sample, are generally negative.

15 For an excellent survey, see Hahn and Matthews, *op. cit.*

16 See W. A. Lewis, *The Theory of Economic Growth* (Homewood, Ill.: Richard D. Irwin, 1955), pp. 225–44.

17 See I. Friend and I. B. Kravis, "Entrepreneurial Income, Saving, and Investment," *American Economic Review* (June 1957), pp. 269–301; Friend and Taubman, *op. cit.*; and the three works by Houthakker cited above.

18 See Houthakker, "An International Comparison of Household Expenditure. . .," *op. cit.*; and —, "On Some Determinants. . .," *op. cit.* See also the comments by T. Watanabe in ECAFE, *op. cit.* The approach can be found in recent country studies, such as that by I. S. Gulati, "Household Saving and Income Distribution: An Interpretation of the Indian Case," *Indian Economic Journal* (July–September 1963), pp. 29–36.

19 Some well known observations might usefully be reviewed here. To the extent that the entrepreneur is a high-income recipient, a test which does not control for occupation will bias upward the positive association between

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income size and the saving-income ratio. Furthermore, *within* the entrepreneurial group, the *mps* may be larger, given the greater variability of entrepreneurial income. Thus, samples from rural areas tend to produce steeper savings functions than urban; presumably the same is true for farm as opposed to nonfarm and urban entrepreneurs as opposed to wage-earners.

20 The argument has been made, in the writings of Weber, Troeltsch, and Marx, for example, that the entrepreneurial class is a selective population regarding its attitudes toward uncertainty and risk.

21 Klein, *op. cit.*

22 Eisner makes much of this in developing an argument for greater equality of income distribution: "We are hence able to advance a proposition that, because of risk attached to expectations of return to investment in individual human beings, imperfections in capital markets which these in part engender, and externalities of return, . . . capitalistic economies are biased in the direction of levels of investment in education which are too low and suboptimum from the point of view of economic growth." R. Eisner, "Income Distribution, Investment, and Growth," *Indian Economic Journal* (April-June 1964), p. 410.

23 See Friedman, *op. cit.*, p. 235.

24 We fully appreciate the problems associated with savings estimates derived from sample surveys and the biases associated with income levels and sources. Having said as much in section 2, we make no further apologies.

25 Equally important, a share-cropping arrangement on rented land (where the landlord does not share the cost of inputs in an equal proportion) may result in underinvestment and thus low savings rates for nonlandowners.

26 It does seem likely that the range in group β 's can be explained by an appeal to unequal degrees of instability in farm income *within* each group. That aspect of the problem in comparing marginal saving rates across occupational groups is not present here, although it was present in our previous "occupational" tests.

27 M. R. Fisher, "Exploration in Savings Behavior," *Bulletin of the Oxford University Institute of Statistics* (August 1956), pp. 201-77; Friend and Jones, eds., *op. cit.*, pp. 49-174; K. Kurihara, ed., *Post-Keynesian Economics* (New Brunswick, N.J., 1954), pp. 388-436; H. F. Lydall, "The Life Cycle in Income Savings, and Asset Ownership," *Econometrica* (April 1955), pp. 131-50; F. Modigliani and A. Ando, "Tests of the Life-Cycle Hypothesis of Savings," *Bulletin of the Oxford University Institute of Statistics* (May 1957), pp. 99-124; and Modigliani and Ando, "The Life-Cycle Hypothesis of Saving," *American Economic Review* (March 1963), pp. 55-84.

28 The assumptions include: (1) constant prices and interest rates, (2) no inheritances or bequests, and (3) the postulate that the share of the individual's

total resources devoted to consumption in any period is a function of tastes and is invariant to the size of his resources. The first condition is satisfied when the hypothesis is tested with cross-section data. More restrictive assumptions include: (1) zero interest rates, and (2) a plan whereby the individual consumes a fixed proportion of his anticipated lifetime resources. See, for example, Fisher, *op. cit.*, pp. 218–20.

29 In an attempt to control for the influence of education, yet conserve on degrees of freedom, the following model is representative of over fifty formulations examined:

$$\begin{aligned}
 S/N = & \alpha_1 + \beta_1(Y/N) + \alpha_2A_1 + \beta_2(Y/N)A_1 + \alpha_3A_3 + \beta_3(Y/N)A_3 \\
 & + \alpha_4A_4 + \beta_4(Y/N)A_4 + \alpha_5A_5 + \beta_5(Y/N)A_5 + \gamma_1E_1 + \delta_1(Y/N)E_1 \\
 & + \gamma_2E_2 + \delta_2(Y/N)E_2 + \gamma_3E_3 + \delta_3(Y/N)E_3
 \end{aligned}$$

where S/N = per capita savings; Y/N = per capita income; A_1, \dots, A_4 = binary dummies for the age cohorts 30–39, . . . , 60–69, respectively; and E_1, \dots, E_3 = binary dummies for educational categories 1–3 years, 4–6 years and over 7 years, respectively. The illiterate category and the 20–29 age cohort are represented by the estimated parameters for α_1 and β_1 .

For the urban sample, fourteen out of the sixteen estimated parameters were insignificant at the 90 percent confidence level. While the rural estimates were somewhat better (nine out of sixteen were significant), the marginal savings rates were negative in several instances.

30 Lincoln H. Clark, ed., *Consumer Behavior*, Vol. II (New York: New York University Press, 1955), p. 28.

31 Jacob Mincer has shown, for example, that steeper age-income curves are prevalent among those groups with higher human capital inputs—namely, the professionals and the highly educated. See “Investment in Human Capital and Personal Income Distribution,” *Journal of Political Economy*, Vol. 66, No. 4 (August 1958), pp. 281–302.

32 “Tests of the Life-Cycle Hypothesis of Savings,” *op. cit.*, pp. 105–08.

33 Fisher, *op. cit.*, p. 224; Modigliani and Ando, “Tests of the Life-Cycle Hypothesis of Savings,” *op. cit.*, pp. 106–08.

34 “Tests of the Life-Cycle Hypothesis of Savings,” *op. cit.*, pp. 111–19.