Institute of Economic Development and Research
SCHOOL OF ECONOMICS
University of the Philippines

Discussion Paper No. 77-6 November 1977

POPULATION AND DEVELOPMENT IN SOUTHEAST ASIA: A FERTILITY MODEL

by

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1. Introduction

Recently Berelson (1976) has surveyed the considerable number of reviews of the current state of knowledge pertaining to population-development relationships. He has a long bibliography which can be extended further with the reviews by Birdsall (1977), Cassen (1976), Cochrane (1977), McGreevey et al. (1974, ch. 1), Paqueo (1977, ch. 2) and Williams (1976). To differentiate its product, the objectives of the present paper are twofold: the first is to provide a selective[2/] survey of the literature on Southeast Asia; the second (which the author considers a more important task) is to attempt an explanation of the sometimes seemingly conflicting research findings in the region by means of a model of fertility behavior. The focus will be on "determinants" rather than on "consequences," and on fertility and not on other demographic variables except in relation to fertility.

[1/] I am indebted to Peter S. J. Chen, Gavin W. Jones, Francis C. Madigan, Visid Prachuabmoh, and Lajman b. H. Sirat for leads to the literature. The contents of this paper, however, are my sole responsibility.

[2/] The word "selective" needs emphasis since the bibliography compiled by Fawcett et al. (1973) for Thailand alone contains 634 entries. For recent country overviews, see: Hugo (1975) for Indonesia; Palmore, Chander and Fernandez (1975) for Malaysia; Concepción and Smith (1977) for the Philippines; and Arnold, Retherford and Wanglee (1977) for Thailand.

The upshot of the model (to be described in section 2 below) is simply this: the size of a family is a nonlinear function of its income and the wife's educational level such that fertility is higher with more income and more education up to a certain point; beyond that point, fertility is less with more education but is little affected by income as such. The major implication is that we should expect population growth rates to rise during the earlier stages of economic development, unless counteractive policies are pursued. Only when a sufficient fraction of the population is beyond some critical point should we expect development to have a relatively automatic fertility-reducing effect in the aggregate.

Sections 3 to 6 survey the research findings on income and education, value of children and child mortality, labor force participation and internal migration -- all in relation to fertility. Some concluding remarks are made in section 7.

2. The model

First, we assume that desired family size is a decreasing function of the wife's educational level. (Needless to say, education, like income, is a multidimensional affair that is only crudely represented by years of schooling.) Justification for such an assumption can be approached from at least two directions. One would be in terms of the higher opportunity cost of the wife's time that more

education brings. Another would be in terms of the changing attitudes associated with more education. These two approaches are, of course, not incompatible. Economists would tend to favor the first and not the second, because of a preference for prices and incomes to explain behavior -- "tastes" being "given." Note, however, that in saying that desired family size is smaller with more education, we take it that tastes are given at each level of education.

The reluctance of most economists (Duesenberry 1960, Easterlin 1969 and Leibenstein 1974 are notable exceptions) to use tastes (or factors that determine tastes) as explanatory variables stems from the supposition that if one does so, then almost anything could be explained by simple reference to tastes. It would seem obvious, however, that this does not apply in the case where a systematic relationship is being posited between a tastes-determining variable and what is to be explained. In the present instance, surely we know that more educated women have higher aspirations for their children. Among other things, they would probably want their children to have at least the same level of education that they have had. Consequently, since more education entails higher costs, ceteris paribus a more educated woman would want less children. There are also expectations among one's social peers as to the level of inputs (time and commodities) that should go into

children. The range of choice is thus relatively narrow, as Duessenberry and Leibenstein have stressed.

The question of time is probably even more important. More education means a wider horizon of interests and a need for more time to pursue them, whether in or outside the home. There are things to do other than child-bearing and child-rearing. Yet more educated women apparently spend more time on each child than do the less educated (Popkin 1976). In brief, there are reasons why a more educated woman would want to have less children. Attitudes (tastes) no less than costs are involved, and clearly, education influences tastes.

Our second assumption is that the number of live births a woman can have -- call it CK -- is an increasing function of family income and her educational level. That income should affect CK is clear since more income can buy better nutrition and health, and better prenatal care. If a family's income is below some critical minimum (perhaps the statutory minimum wage), almost by definition the mother's nutritional intake must be inadequate and her health substandard. More income, permitting better food, etc., can then only lead to a greater capacity to bear children (cf. e.g., Tabbarah 1971, Easterlin 1975). The effect of more education would be similar, since the mother would thereby have better knowledge of health practices and nutritional values.

The third assumption is that the number of child deaths per family is a decreasing function of family income and education (for reasons corresponding to those in the preceding paragraph). Fourth, we assume that child deaths are (if possible) replaced. There seems to be no particularly compelling reason for this to be the case, but it seems plausible and also simplifies matters cosiderably.

We know that education and income are highly correlated. Suppose now, in order to have a simple diagram, that family income and wife's educational level are perfectly correlated. Then we can have something like Figure 1, where

CK = capacity number of children, i.e., the most a woman can have

CM = $h(E,Y)$ = number of child deaths in a family, or child mortality

CW = desired (or wanted) number of children

E = wife's educational level

Y = family income

(the points r, m and u can be ignored for the present; reference will be made to them later.) If we abstract from uncertainty aspects (e.g., contraceptive failures), what would then be observed for the number of live births per family -- call this CB -- would be given by the function f up to the point E^* and then by the function $g + h$ beyond that point. That is

$$CB = \begin{cases} f(E,Y) & \text{for } E \leq E^* \text{ and } Y \leq Y^* \\ g(E) + h(E,Y) & \text{for } E > E^* \text{ and } Y > Y^* \end{cases}$$

The relationship is nonlinear with a peak at E^* (or Y^*).

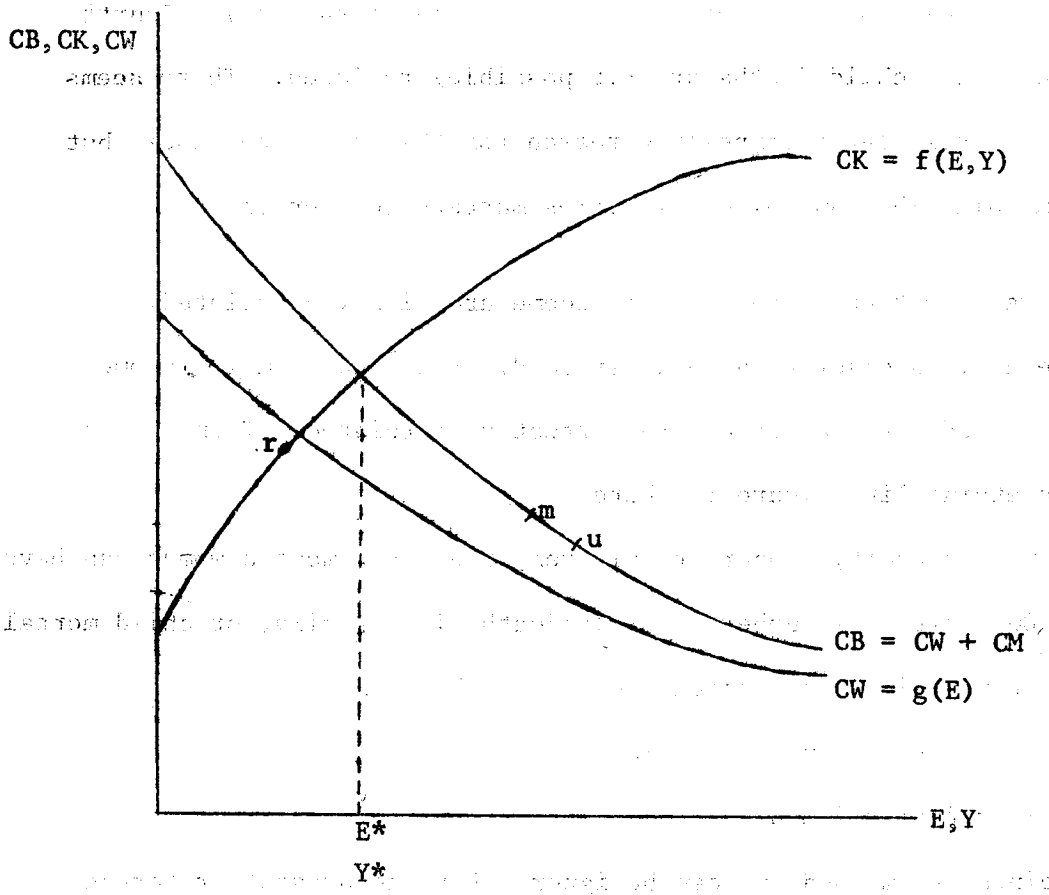

Figure 1

E and Y are not perfectly correlated, however, and one should consider both E and Y for statistical estimation of the relationship.

As usual, write min(a,b) for the smaller and max(a,b) for the larger of the two numbers a and b, and write

$$EN = \min(0,\ E - E^*)$$

$$EX = \max(0,\ E - E^*)$$

$$YN = \min(0,\ Y - Y^*)$$

$$YX = \max(0,\ Y - Y^*)$$

One can then use EN, EX, YN, YX and other possible explanatory variables in a multiple regression estimate with CB as dependent variable. (One could also use quadratic terms instead of a min-max formulation, but the latter seems to be more sensitive for detecting nonlinearities and the results are also easier to interpret. It may be noted that for a particular observation, either EN = 0 or EX = 0, and either YN = 0 or YX = 0.) From the assumptions, we expect the regression coefficients of EN and YN to be positive, and that of EX to be negative. As for the coefficient of YX, this would depend on the shape of CM = h(E,Y). We expect child mortality to fall with more income and more education, but it is possible that h(E,Y) becomes relatively flat over the ranges of E and Y beyond

E* and Y* respectively. If this is the case (which is an empirical matter), then the coefficient of YX will be zero or close to zero, as YX will add little or nothing to the explanation of CB already given by EX. The particular values of Y* and E* to use in computing the regression equation would have to be determined by trial and error, though the statutory minimum wage and several years of elementary schooling would be good starting points.

The elements (except the child mortality aspect) of the model described above are contained in previous papers of the author (Encarnación 1973, 1974), where Y* and E* were called threshold values. The term "threshold"[3/] seems a natural and convenient word to use in the context, though it may mislead if one thinks that threshold values are invariant. Evidently they are not. While they are simply what they are at a given moment of time, threshold values will change with shifts in the functions f, g and h. Public health and sanitation programs will shift f and h. Information and exhortation campaigns could shift g, as well as changes in the cost of children and the returns from them.

3/ It appears that some social scientists have an aversion towards the term. Caldwell (1976), for example, writes unfavorably about thresholds; yet his own notion of an "economic divide" between a net flow of income/wealth from the younger to the older generation and a later reverse flow is, apparently, itself a threshold concept.

A central implication of the model is that population growth is indeed affected by the income distribution and the education distribution, but not in the unidirectional manner commonly believed. A better income distribution does not imply a lower birth rate: much will depend on the relative proportion of families in the population that are below the threshold. (We will use the singular "threshold," unless specified in the context, to mean both the education and income thresholds.) The problem is that in most countries of Southeast Asia, as in other LDCs, the bulk of the population is clustered around or near the threshold.

3. Income, education and fertility

Most of the empirical findings relating to socio-economic determinants of fertility in Southeast Asian countries derive from cross-tabulations or multiple regression analysis. Tabular relationships could be misleading when there are other determinants not explicitly taken into account. Multiple regression analysis could also be misleading if the specifications assume linearity when the "true" relations are nonlinear.

The reported findings in the Philippines have been quite diverse. Pascual (1971) found fertility to be negatively related to income, Wery et al. (1974) found no significant relationship, while another (unpublished) study referred to by Bulatao (1976, p. 51)

apparently shows a positive relationship in several low-income communities. Harman (1970) did not find the wife's educational level significant, though Pascual did (negatively, as usually expected). Using aggregative data at the province level, Smith (1971) found SES levels negatively associated with overall fertility, though not with marital fertility. On the other hand, Pullum (1975) finds that higher fertility is associated with higher SES. Flieger (1975) also finds "regional health conditions... positively related to fertility levels."

Different samples, specifications and degrees of aggregation would account for such a diversity if the true relationships are as hypothesized in our model. Using a subsample (nuclear family households only) of the Philippines' 1968 National Demographic Survey, Encarnación (1974) gives estimates of a regression equation that has number of children born alive to a married woman as dependent variable, with the following as explanatory variables: EN, EX, YN, YX (as defined in section 2 above), the woman's age of marriage, dummy variables for age-cohorts, a labor force participation dummy variable, and an urban-rural residence dummy variable. Similar estimates are reported by Canlas and Encarnación (1977) for the 1973 National Demographic Survey, a sample drawn independently of the 1968 one. For 1968 the income threshold was taken to be equal to the legal minimum daily wage rate multiplied by 250 days; for 1973

an adjustment was made for inflation. For 1968 the value chosen for the education threshold corresponded approximately to completion of elementary schooling (six years); for 1973, it was somewhat less. For both years, the regression results are in accordance with the model: the marginal effects of income and education are both positive at levels below the theshold; at levels above, the marginal effect of education is negative while that of income is not significantly different from zero. (Not surprisingly because of the high correlation between income and education, when education is omitted from the specification, the marginal effect of above-threshold income becomes negative.)

Concepción (1973) writes that "analysis of the 1960 census and May 1956 and 1968 surveys revealed the persistent differences between the fertility levels of Metropolitan Manila and the rural areas. Outside the metropolitan area, the pattern of the urban-rural differentials was being determined largely by the standards of living present in the rural areas. In the least developed areas of the country where living conditions were poor both urban and rural areas had low fertility due likely to a higher incidence of miscarriages and still-births resulting from a lack of adequate prenatal care and nutrition." Concepción also finds, regarding the 1968 data, that "noteworthy was the fact that those with schooling produced more live births than those without for either urban or rural areas." In terms of our

hypothesis, this is not surprising with just two categories -- without schooling and with schooling -- in considering the size distribution of years of schooling. Indeed, Smith (1977) observes that "the overall pattern as assessed by total fertility rates (TFR) is curvilinear: the TFR rises with primary education and declines with successive levels of educational attainment above the primary."

Research findings in other Southeast Asian countries are also consistent with our hypothesis. In Indonesia, Hull and Hull (1977) observe that "an inverted U-shaped relation between schooling (hence economic class) and the mean number of children ever born is found in every age group, in both rural and urban areas." The great majority of families are to be found within the range where fertility rises with education, and Hull and Hull conclude from their intensive study of a Central Javanese village that fertility differentials can be attributed to three factors: marital disruption, patterns of post-partum abstinence, and differences in fecundity. (See also Hull 1976). Similar results are found by Oey (1975) in her study of migrants. Central Java is known to be the poorest region in Indonesia and also to have the lowest total fertility rate. Migrants to Lampung have higher fertility, and Oey remarks that "improved economic conditions, or increases in levels of subsistence... tend to support a Malthusian thesis that fertility increases as the

means of subsistence increases."

For Malaysia, Palmore and Ariffin (1969) report a number of results from the national probability sample of the West Malaysian Family Survey (carried out in 1966-67) which are largely not unexpected: e.g. women with more education marry later; urban women marry later. They have, however, one particularly interesting finding. Among women age 35-44, those with 1 to 5 years of schooling have had more children (6.2) than those with no schooling (5.8) and those with 6 years or more (4.8). Saw (1967) finds the usual urban-rural fertility differentials, but also finds that among the various Malayan states, lower fertility is to be found among those which are predominantly rural, agricultural and illiterate.

A nonlinear relationship also appears in Thailand. In Knodel and Prachuabmoh's (1973) report on the results of the first rounds of the Longitudinal Study of Social, Economic and Demographic Change in Thailand, their Table 19 shows that among ever-married women age 45 and over, fertility generally declines with more schooling but those with no schooling have lower fertility than those with a few years of schooling. An urban-rural breakdown gives the same results, as reported by Knodel and Pitaktepsombati (1973). Maurer, Ratajczak, and Schultz (1973), however, do not find any significant effect of education on fertility, but they used aggregative data from administrative units and employed a linear specification. The latter

is, in our model, inappropriate.

The research findings cited above appear consistent with our hypothesis, and we would expect (because of the preponderance of families below the threshold) that in general, there would be an increase in birth rates and population growth rates as development proceeds, before any downturn takes place. In the case of West Malaysia, Heller (1976) notes that "age specific fertility rates and the crude birth rate rose slightly between 1947 and 1957 and then dropped sharply by 1970." It thus appears that West Malaysia (which has the highest per capita income in Southeast Asia excepting Singapore) has entered the downturn phase.

Though our focus is on Southeast Asia, we must refer to Tabarrah's (1971) important article that cites various studies showing that the Western European experience had been one of rising birth rates before any decline took place, and that a majority of LDCs today have been experiencing increasing birth rates as a result of development.[4/] (The fact needs to be recognized by both scholars

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[4/] For other references to studies showing a positive relation (within the lower ranges) between fertility and education or income, see Cochrane (1977) and Hull and Hull (1977). Cochrane concludes that "the fairly extensive review of the evidence contained in this monograph shows that the relationship between education and fertility is not always inverse... there is theoretical and empirical evidence which indicates that education in the poorest regions may increase the biological supply of children" (p. 199).

and policymakers if the true dimensions of "the population problem" are to be measured realistically.) We also note that Tabarrah presents a model whose implications are broadly similar to ours. In his model, "the two most important variables affecting fertility trends are M [the maximum number of children likely to live to maturity which an average couple can expect to realize over their married life] and C [the average number of children desired by married couples in their completed family].... it is apparent that M tends to rise with improvement in nutrition, health, and medical services and that certain diseases have a greater restraining effect on it than others. Since improvements in nutrition, health and medical services usually take place with development, it is found that development is generally accompanied by a rising M. On the other hand, C seems to decline with such factors as the degree of urbanization and overcrowdedness, the level of education, the cost of children, and the standard of living at which couples desire to live, in brief, with factors that are generally intensified by the process of development." Tabarrah's model, however, dealing with averages,[5/] does not look into the composition of those averages, which our model does.

[5/] Easterlin's (1975) model is similar, though Easterlin goes farther by considering the costs of contraceptive practices.

4. Value of children, child mortality and fertility

Our model assumes that less educated women prefer more children. We need to add that such preferences are reinforced by economic returns from children relative to their costs, even if economic considerations alone cannot tell the whole story.

Research on the value of children shows that economic returns from children in low-income households are not insignificant. In their intensive study of a Javanese village, Nag, Peet and White (1976) show that children put in a considerable amount of time on work in and outside the home. Similar results are reported by Boulier (1976) for the Philippines. But do children's contributions to economic production cover their costs? The answer to this question would depend on the items included in the calculations and the rate of time discount that is used. Mueller (1976) has argued that children consume more than they contribute to production -- they are net consumers rather than net producers. We could accept this proposition (which seems plausible) without having to say that behavior is thus economically irrational, for children who eventually become adults can help their parents' later years. Nag, Peet and White describe how "elderly parents depend largely on their offspring for care and maintenance." The great majority lived with their sons and daughters, married or unmarried. As for those who lived alone, "many of them lived next

door to a household or two households belonging to their married children. The children provided them regularly with rice or cooked food every day."

There are also non-economic values. In his study of Philippine attitudes, Bulatao (1975) concludes that "the most salient values were found to be the happiness that children bring to parents and to the family, the assistance they provide in old age, and help with the housework. Regarding centrality, on the other hand, the most important values are love between parent and child, the incentive to work harder when one has children to provide for, the desire to share with children and to learn about life through having children, and having children as an expression of parental roles. Economic and practical assistance from children is highly salient but of less hierarchical importance than noneconomic values" (p. 197).

In a similar study for Thailand, Buripakdi (1977) found that: "(1) companionship and avoidance of loneliness; (2) economic and general help, especially in old age; (3) continuity of the family name (including continuity of bloodline" were most often cited as the advantages of having children. It is significant that "the middle class mentioned companionship most often, whereas the rural group mentioned it least often; the rural group mentioned economic help most often, the urban middle class least often" (p. 102). As for the

corresponding disadvantages, the financial burden of children was most prominent. "This burden was felt most by the urban lower class, somewhat less by the rural group, and least by the urban middle class" (p. 105).

The above findings seem broadly consistent with our hypothesis, viz. that below-threshold families place a relatively high value on children numbers. Saving in the usual sense is barely possible if family income does not exceed subsistence levels, but children constitute "human capital" who can serve as a retirement fund. From the viewpoint of the parents, high fertility makes sense.

Child mortality then matters, since it is only surviving children who can provide old-age insurance. Schultz (1976) has reviewed the relevant literature and concludes that "parents seem to respond to the decline in child mortality by having fewer births, perhaps to some extent because of the biological effect of an infant's death, which interrupts lactation and shortens the mother's sterile period following a birth. But this association also appears to reflect strong behavioral preferences of parents to replace an infant who dies." But as Cassen (1976) remarks, "it certainly seems to be the case that most studies find that fertility decline does not 'fully compensate' for mortality decline in the short run," with the result that the number of surviving children is larger. Here it

seems particularly useful to trace out some pertinent differences between below- and above-threshold families.

We know that for obvious reasons -- general nutrition and health, access to medical care, better living conditions, better knowledge of good health and sanitation practices, etc. -- child mortality is lower with higher income and education. Battad (1976) finds, for example, that family income and mother's education have positive effects on the nutritional status of children. As one would expect, commodity inputs into children are higher with income level, even if there are economies of scale with family size (Cabeñero 1977). Not surprisingly, infant mortality is higher in rural areas than in urban (Knodel and Pitaktepsombati 1973). Using West Malaysian data, Heller's (1976) regression results suggest that infant mortality is inversely related to female education. For the Philippines, Harman (1970) finds that a lower infant mortality rate has the expected effect on fertility, especially among older women, suggesting a replacement rather than an anticipation phenomenon.

Consider now a typical family just below the threshold and another one just above. While both families would have high fertility, child mortality would be lower for the above-threshold family. Suppose the situation is that of Table 1 (the absolute and relative magnitudes are chosen to make the arithmetic simpler).

Table 1

	Below-threshold	Above-threshold	Average
Children born	10	10	10
Child deaths	4	2	3
Surviving children	6	8	7

The "average" column is the average of the figures for the two families. On our assumption that below-threshold families are producing all the children that they can, it would not be appropriate there to speak of "replacement" births. On the other hand, we would say that there are two replacement births in the above-threshold family and that the desired family size there is eight children. Accordingly, with lower mortality, we may have Table 2.

Table 2

	Below-threshold	Above-threshold	Average
Children born	10	9	9.5
Child deaths	3	1	2
Surviving children	7	8	7.5

The reduction in fertility is only half as much as the fall in child mortality.

If this is the broad picture, the observed response of fertility to mortality is really the average of two quite different phenomena. Above-threshold families respond fully to mortality declines because they have education-determined limits on family size. Below-threshold families do not respond at all -- the mortality decline merely enables them to have more of the children that they want. The relative proportions of such families in a population thus assume major importance as to the aggregate effect of mortality declines on fertility, and the implications for the demographic transition are immediate: (i) some countries have had lower mortality for decades but still have high fertility, because of the preponderance of below-threshold families; (ii) some countries have experienced lower mortality and then lower fertility shortly afterwards, because of an above-threshold majority; and interestingly enough, (iii) there is the possibility, with rising education levels, of a decline in fertility even before a decline in mortality.

5. Labor force participation and fertility

It is often argued that female labor force participation in non-traditional activities has a negative effect on fertility. Goldstein, Goldstein and Tirasawat (1972), for example, conclude from their cross-tabulations of Thai data that "the analysis points to a differential relation between labor force participation and fertility in

rural, agricultural places and in the urban center of Bangkok. In the latter, fertility of women in the labor force is lower than that of housewives. In rural, agricultural places, the fertility of employed women is higher, although minimally so. This pattern suggests that the greater separation of work and family roles among employed women in the urban center lowers the fertility of urban working women, whereas the general absence of such conflict in rural society results in a minimum effect of labor force participation on fertility", (pp. 24-25). (See also Goldstein 1972.) Similar findings are reported by Concepción (1973) for Philippine data: the relationship between labor force participation and fertility is negative in the case of urban wives, positive in the case of rural.

According to our hypothesis, the explanation would simply be that rural families (the majority of which would fall below the threshold) with working wives would have higher incomes, ceteris paribus, than those without; consequently their fertility would be higher. As for urban wives, we would expect working women to have more education and therefore less children (see further below).

Cassen remarks that "the point is the nature of work, whether it is paid employment with long and regular hours away from the home.... Thus Concepción (1974), looking at a number of Asian countries, found that the difference was made by women's employment in non-traditional

occupations and by urban life-style rather than labour-force participation itself." The argument, in other words, is that work in or near the home (such as that of a farm wife or a cottage industry worker) is not incompatible with child care (or at least child care supervision, since older siblings can help in the task). Work in the modern sector, on the hand, would be incompatible with such a parental chore.

But modern sector employment and lower fertility would both seem explainable by the same variable, viz. a higher educational level. Employment in the modern sector generally calls for certain skills that require some minimum schooling, which is not the case for employment in the traditional sector. The question of working near or far from the home would seem to be largely incidental (think of highly-educated artists and writers who work at home), though admittedly it is reasonable to expect this factor to have some explanatory power additional to that given by the education variable.

Further to this point, on the basis of our earlier argument we would expect that the higher the education level above the threshold, the more likely is the wife's labor force participation (because of her broader interests which could be served by the work itself or pursued by means of the income from work). On the other hand, the lower is the education level below the threshold, the more likely is the husband's income to be lower, and the more likely is the wife's

need to work in order to supplement family income. If this is the case, then ceteris paribus we would observe a V-shaped relationship between labor force participation and wife's education. Such a relationship is found by Encarnación (1974) and by Canlas and Encarnación (1977) for Philippine data. It turns out, in addition, that husband's income in excess of the family income threshold has a zero marginal effect on the wife's labor force participation, but husban income if short of the income threshold has a negative marginal effect. In other words, the more that husband's income falls short of the income threshold, the more likely is the wife to be in the labor force. Apparently in this case, wife's employment supplements family income to such an extent that the net effect on fertility (despite the lower education level) is positive, which is consistent with our hypothesis.

6. Internal migration and fertility

√ The major migration streams in Southeast Asian countries have been largely from rural to urban areas,[6/] although there are also rural-to-rural government-sponsored movements (specially in Indonesia and the Philippines).

6/ However, urbanization does not seem to have been particularly rapid (Jones 1975, Hirschman 1976, Pernia 1976). Jones cites figures indicating that the level of urbanization in Southeast Asia was 14 perce in 1950 and 20 percent in 1970. Still, with rural fertility higher than urban and a smaller difference in urban-rural mortality rates (cf. Knode and Pitaktepsombati 1973), a rise in the level of urbanization implies a net migration to the cities (ignoring international migration which has been relatively insignificant).

Cariño (1976) suggests that migration in the Philippines is related to the presence of employment opportunities and educational institutions in the receiving areas, while "sending areas are usually characterized by high tenancy rates, high unemployment, low incomes, and low literacy rates" (p. 264). Empirical findings generally show migrants to be young adults with more schooling than the average in the places of origin and, in some cases, in the places of destination as well (Pascual 1966). Pernia (1977) finds educational level to be the strongest determinant in a logit model of migration choice. Hendershot (1976) also notes a positive relationship between SES levels and rural-urban migration. In Malaysia, Soon's (1974) study concludes that "analysis of the characteristics of urban migrants indicated that people who move were generally younger and better educated than the natives [and] the incidence of urban unemployment was also lower among migrants than the urban natives." Narayanan (1975) reports similar results.

What might further characterize migrants? Casual empiricism would suggest that ceteris paribus (including educational level in the ceteris), migrants are probably more enterprising, more ambitious, perhaps more able, than nonmigrants. This conjecture appears to be supported indirectly by Encarnación's (1975) regression results showing that among family heads with incomes, migrants have higher incomes than nonmigrants (holding other variables -- educational level,

age, occupation, sector of employment, urban or rural residence, etc. -- constant).[7]

The migrant thus appears, on average, to be more educated (relative to place of origin and, in some instances as noted above for the Philippines and Malaysia, relative to place of destination also) and apparently more able. We would expect him to come from an above-threshold family to have the necessary financing for transportation and maintenance until he gets employment, though a below-threshold family could borrow funds for the purpose (or sell whatever small assets it may have, with the hope of replacing them later when the migrant begins to remit funds to his parents). The "average migrant" is really a composite of these two categories, and according to our hypothesis, fertility behavior is quite different in the two cases. Further, we should distinguish more carefully between urban migrants and rural migrants (both from rural areas).

Because of the necessary financing needs and the fact that their educational level is higher than the rural average and also higher in some instances than the urban average, we would expect urban migrants' fertility to be lower than rural fertility.[8] This expectation is

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[7] It is possible that migrants have more non-human wealth to account for their higher incomes, but there are no data on this and there is no obvious reason why migrants would have more non-human wealth ceteris paribus.

[8] Given the typical distribution of education, rural and urban education averages would be represented by the points r and u in Figure 1. The urban migrants' average is shown at point m, though m could lie to the right of u.

corroborated by Hendershot (1976) with Philippine data. More striking is Goldstein's (1971) finding that migrants' fertility in Bangkok and other urban areas is less than nonmigrants'.(and as expected, also less than rural). (See also Goldstein and Tirasawat 1977). These results would be in conformity with our hypothesis if Thai urban migrants' education is higher than that of urban natives' (as in the Malaysian case); unfortunately the available data do not permit these two Thai studies to control for education. There is also the likelihood, even if urban migrants' education is lower than that of urban natives', that because of their greater ambition, migrants' aspirations for their children's education are significantly higher than those of the natives'. This could then account for their lower fertility.

In contrast to urban migrants, rural migrants appear to be quite different, especially those sponsored by government programs. In general, these would be people from very poor and densely-populated areas who are usually assisted financially by government to move to other areas. Jones (1977) writes of "a second clear emphasis in Indonesia's population policy, an emphasis which in fact considerably pre-dates the emphasis on reducing the birth rate. This other emphasis is on the need to resettle people from overpopulated areas of Java, Bali and, recently, Lombok to other areas of Indonesia.... Java-Bali contain 66 percent of Indonesia's population, living on 7 percent of

the land area." What is highly interesting in this connection is Oey's (1975) study, cited earlier, which "showed that Javanese migrants to Lampung have fertility levels intermediate between those of the Lampung-born population and the population in the Javanese source areas" (Jones 1977). The migrants are less poor in Lampung than in Java, hence their higher fertility.

The evidence from Thailand on this point is less clear. From a 1-percent sample of the 1960 Thai census data, Goldstein (1971) finds that "5-year migrants" (province of residence 5 years earlier different from current residence) in "rural, agricultural" areas had less children ever born (standardized for age) than the nonmigrants in the same areas. The figures are 4,242 for migrants and 4,468 for nonmigrants per 1,000 ever-married women. This is a 5-percent difference, the smallest among the five classifications of areas (Bangkok; other urban, nonagricultural; other urban, agricultural; rural, nonagricultural; rural, agricultural) Goldstein considered, which all showed lower fertility for migrants. On the other hand, "lifetime migrants" (province of birth different from current residence) in rural, agricultural areas had a fertility level (4,713) which was 5 percent higher than nonmigrants'. This is more consistent with our hypothesis, like the Indonesian finding which pertains to lifetime migrants in Goldstein's sense, and it seems likely that 5-year migrants (who, on average, would have made their move 2 1/2 years earlier, or even less if the flow of migrants had increased through time)

had not had sufficient time to improve their level of living and increase their fertility as a result.

The fertility implication of migration is thus a mixed one. Rural migrants apparently (probably) increase their fertility by moving to areas where they can make a better living. The fertility of urban migrants, on the other hand, while largely determined by their education, is probably lower yet than would be indicated by their level of education. In short, rural migrants have (probably) higher fertility and urban migrants (probably) lower fertility than would otherwise be the case. The net result for fertility in the aggregate would depend on the relative sizes of these two opposite directions of change.

7. Concluding remarks

This paper has discussed a threshold hypothesis that appears to have empirical support from various Southeast Asian studies. The policy implications are far-reaching and rather different from those deriving from the commonly-asserted (though false) proposition that fertility is a decreasing function of income and education. Policy decisions become more difficult than they already are, for about half (as in the Philippines) of families fall below the threshold. There is little one can (or should) do with the income-threshold where this corresponds (as one may expect) to some poverty line. The education-

threshold is different: it can be lowered by shifting the function g (in the relation CW = g(E) of section 2) through various means. This would be a broad and important area for policy-oriented research. In contrast, the child mortality function h (in CM = h(Y,E)) would probably shift as a matter of course over time, while the child capacity function f (in CK = f(E,Y)) is something which it would seem unnatural to do anything about.

Exposure to "new" consumer goods (which means, in effect, a lowering of the prices of those goods), a concomitant of development, is a possible (though not guaranteed) way by which g could shift. Madigan (1977) writes that "from a study of the socioeconomic impact of a large rural electricity cooperative... Madigan, Herrin and Mulcahy (1976) and Herrin (1976) were led to hypothesize that interaction between the opportunity costs of children and the availability of family planning had led to a sharp decline in fertility [in the cooperative's service area, noted by Madigan earlier]. The electricity and appliances, it is believed, were such great opportunities that a very large number of households bought them by postponement of a birth."

One last observation is worth making. It is known that the countries which have passed through their demographic transition in this century did so in a considerably shorter period of time than

did those countries which passed through theirs during the 18th or 19th centuries. What would account for this difference? Our hypothesis suggests that this is due to the much more rapid spread of secondary schooling in this century than in the previous ones.

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November 1977

/gv

REFERENCES

Arnold, Fred, Robert D. Retherford and Anuri Wanglee. 1977. "The demographic situation in Thailand." Papers of the East-West Population Institute, no. 45.

Battad, Josephine R. 1976. "Determinants of nutritional status among Laguna preschoolers, 1975." M.A. thesis, School of Economics, University of the Philippines.

Berelson, Bernard. 1976. "Social science research on population: a review," Population and Development Review, vol. 2, pp. 219-66

Birdsall, Nancy. 1977. "Analytical approaches to the relationship of population growth and development." Population and Development Review, vol. 3, pp. 63-102.

Boulier, Bryan. 1976. "Children's influence on household economic activity in Laguna, Philippines," in Recent Empirical Findings on Fertility: Korea, Nigeria, Tunisia, Venezuela, Philippines. Washington, D.C.: Smithsonian Institution, ICP Occasional Monograph No. 7, pp. 77-90.

Bulatao, Rodolfo A. 1975. The Value of Children: Philippines. Honolulu: East-West Population Institute.

_____ (ed.) 1976. Philippine Population Research. Makati, Rizal: Population Center Foundation.

Buripakdi, Chalio. 1977. The Value of Children: Thailand. East-West Population Institute and Institute of Population Studies, Chulalongkorn University.

Cabañero, Teresa A. 1977. "The 'shadow price' of children in Philippine rural households." M.A. thesis School of Economics, University of the Philippines.

Caldwell, John C. 1976. "Toward a restatement of demographic transition theory," Population and Development Review, vol. 2, pp. 321-66.

Canlas, Dante B. and José Encarnación, Jr. 1977. "Income, education, fertility and employment: Philippines 1973," Philippine Review of Business and Economics, vol. 14, forthcoming.

Cariño, Benjamin V. 1976. "Managing migration streams and population redistribution: alternative strategies and research needs," in Bulatao 1976, pp. 251-270.

Cassen, Robert H. 1976. "Population and development: a survey," World Development, vol. 4, pp. 785-830.

Cochrane, Susan H. 1977. "Education and fertility: what do we really know?" World Bank.

Concepción, Mercedes B. 1973. "Female employment and fertility in the Philippines," Philippine Economic Journal, vol. 12, pp. 524-535.

_____ 1974. "Female labour force participation and fertility," International Labour Review, vol. 109, pp. 503-518.

_____ and Peter C. Smith. 1977. "The demographic situtation in the Philippines: an assessment in 1977." Papers of the East-West Population Institute, no. 44.

Duesenberry, J. 1960. "Comment," in Universities-National Bureau Committee, Demographic and Economic Change in Developed Countries, Princeton University Press, pp. 231-34.

Easterlin, Richard A. 1969. "Towards a socioeconomic theory of fertility," in Fertility and Family Planning: A World View, ed. S.J. Behrman et al. University of Michigan Press, pp. 127-56.

_____ 1975. "An economic framework for fertility analysis," Studies in Family Planning, vol. 6, pp. 54-63.

Encarnación, José Jr. 1973. "Family income, education, labor force participation and fertility," Philippine Economic Journal, vol. 12, pp. 536-549; also in Flieger and Smith 1975, pp. 190-200.

_____ 1974. "Fertility and labor force participation: Philippines 1968," Philippine Review of Business and Economics, vol. 11, pp. 113-144.

_____ 1975. "Income distribution in the Philippines: the employed and the self-employed," in Income Distribution, Employment and Economic Development in Southeast and East Asia. Tokyo: JERC, and Manila: CAMS, pp. 742-75.

Fawcett, James, et al. 1973. Population Research in Thailand: A Review and Bibliography. East-West Population Institute, East-West Center; and Institute of Population Studies, Chulalongkorn University.

Flieger, Wilhelm. 1975. "Fertility levels and fertility trends," in Flieger and Smith, pp. 91-124.

_____ and Peter C. Smith (eds.) 1975. A Demographic Path to Modernity: Patterns of Early-Transition in the Philippines. Quezon City: University of the Philippines Press.

Goldstein, Sidney. 1971. Interrelations Between Migration and Fertility in Population Redistribution in Thailand. Institute of Population Studies, Chulalongkorn University, Research Report No. 5.

_____ 1972. "The influence of labor force participation and education on fertility in Thailand," Population Studies, vol. 26, pp. 419-36.

_____ and Penporn Tirasawat. 1977. "The fertility of migrants to urban places in Thailand." Papers of the East-West Population Institute, no. 43.

_____, Alice Goldstein, and Penporn Tirasawat. 1972. The Influence of Labor Force Participation and Education Fertility in Thailand. Institute of Population Studies, Chulalongkorn University, Research Report No. 9.

_____, Visid Prachuabmoh, and Alice Goldstein. 1974. Urban-Rural Migration Differentials in Thailand. Institute of Population Studies, Chulalongkorn University, Research Report No. 12.

Harman, Alvin J. 1970. Fertility and Economic Behavior of Families in the Philippines. Santa Monica, California: Rand Corporation.

Heller, Peter S. 1976. "Interactions of childhood mortality and fertility in West Malaysia: 1947-1970," Center for Research on Economic Development, University of Michigan.

Hendershot, Gerry E. 1976. "Social class, migration, and fertility in the Philippines," in The Dynamics of Migration: Internal Migration and Migration and Fertility. Smithsonian Institution, ICP Occasional Monograph No. 5, vol. 1, pp. 197-257.

Herrin, Alejandro N. 1976. "The employment effect of rural electrification in western Misamis Oriental," paper presented at a Council for Asian Manpower Studies seminar on labor supply.

Hirschman, Charles. 1976. "Recent urbanization trends in Peninsular Malaysia," Demography, vol. 13, pp. 445-61.

Hugo, Graame. 1975. "Demographic research in Indonesia: a review," Department of Demography, Australian National University.

Hull, Valerie J. 1976. The Positive Relation between Economic Class and Family Size in Java. Population Institute, Gadjah Mada University.

Hull, Terence H., and Valerie J. Hull. 1977. "The relation of economic class and fertility: an analysis of some Indonesian data," Population Studies, vol. 31, pp. 43-57.

Jones, Gavin W. 1975. "Implications of prospective urbanization for development planning in Southeast Asia," in Kantner and McCaffrey, pp. 99-117.

_____ 1977. "Indonesia." Typescript.

Kantner, John F., and Lee McCaffrey (eds.) 1975. Population and Development in Southeast Asia. Lexington, Mass.: Heath.

Knodel, John and Visid Prachuabmoh. 1973. The Fertility of Thai Women. Institute of Population Studies, Chulalongkorn University, Research Report No. 10.

_____ and Pichit Pitaktepsombati. 1973. "Thailand: fertility and family planning among rural and urban women," Studies in Family Planning, vol. 4, pp. 229-55.

Leibenstein, Harvey. 1974. "An interpretation of the economic theory of fertility: promising path or blind alley?" Journal of Economic Literature, vol. 12, pp. 457-479.

Madigan, Francis C. 1977. "Philippine population in the late seventies: slowing growth and governmental policies." Typescript.

_____, Alejandro N. Herrin, and William F. Mulcahy. 1976. "An evaluative study of the Misamis Oriental Rural Electric Service "Cooperation, Inc. (MORESCO)." Manila: U.S. Agency for International Development.

Maurer, Kenneth, Rosalinda Ratajczak, and T. Paul Schultz. 1973. Marriage, Fertility, and Labor Force Participation of Thai Women: An Econometric Study. Santa Monica, Calif.: Rand Corporation.

McGreevey, William P. et al. 1974. The Policy Relevance of Recent Social Science Research on Fertility. Smithsonian Institution, ICP Occasional Monograph No. 2.

Mueller, Eva. 1976. "The economic value of children in peasant agriculture," in Ridker, pp. 98-153.

Nag, Moni, Robert C. Peet, and Benjamin White. 1976. "Economic value of children among Javanese and Nepalese peasants: an anthropological inquiry," Columbia University.

Narayanan, Suresh. "Urban in-migration and urban labour absorption: a study of metropolitan urban Selangor," M.A. thesis, University of Malaya. 1975.

Oey, Mayling. 1975. "Pengaruh program transmigrasi kepada pola fertilitas para migran di Lampung" (Effect of the transmigration on the fertility pattern of migrants in Lampung), Ekonomi dan Keuangan Indonesia, vol. 23, pp. 131-57.

Palmore, James A., and Ariffin bin Marzuki. 1969. "Marriage patterns and cumulative fertility in West Malaysia: 1966-1967," Demography, vol. 6, pp. 383-401.

_____, Ramesh Chander, and Dorothy Z. Fernandez. 1975. "The demographic situation in Malaysia," in Kantner and McCaffrey, pp. 57-82.

Paqueo, Vicente B. 1977. "Economic-demographic interactions and the impact of investment in population control." Ph.D. dissertation, School of Economics, University of the Philippines.

Pascual, Elvira M. 1966. "Internal migration in the Philippines," in First Conference on Population, 1965. Quezon City: University of the Philippines Press, pp. 315-353.

Pernia, Ernesto M. 1976. "Urbanization in the Philippines: historical and comparative perspective." Papers of the East-West Population Institute, no. 45.

_____ 1977. "An empirical model of individual and household migration choice: Philippines, 1965-1973," School of Economics, University of the Philippines.

Popkin, Barry M. 1976. "The production of child welfare in rural Philippine households." School of Economics, University of the Philippines.

Pullum, Thomas W. 1975. "Differentials in marital fertility," in Flieger and Smith, pp. 153-69.

Ridker, Ronald G. (ed.) 1976. Population and Development: The Search for Selective Interventions. Johns Hopkins University Press.

Saw Swee-Hock. 1967. "Fertility differentials in early postwar Malaya." Demography, vol. 4, pp. 641-56.

Schultz, T. Paul. 1976. "Interrelationships between mortality and fertility," in Ridker, pp. 239-89.

Smith, Peter C. 1971. "Philippine regional and provincial differentials in marriage and family building: 1960," Philippine Sociological Review, vol. 19, pp. 59-181.

_____. 1975. "Changing patterns of nuptiality," in Flieger and Smith, pp. 41-81.

_____. 1977. "Educational differentials in overall and marital fertility, 1968-1972," in Population, Resources, Environment and the Philippine Future: Final Report, vol. III, pp. 180-89.

Soon, Lee Ying. "An economic analysis of internal migration in West Malaysia with special reference to economic imbalances and regional development," M. A. thesis, University of Malaya, 1974.

Tabbarah, Riad B. 1971. "Toward a theory of demographic development," Economic Development and Cultural Change, vol. 19, pp. 257-76.

Wéry, R. et al. 1974. "BACHUE-2: a population and employment model for the Philippines." Geneva: International Labor Organization, Population and Employment Working Paper No. 5.

Williams, Anne D. 1976. "Review and evaluation of the literature," in Population, Public Policy and Economic Development, ed. M. C. Keeley. New York: Praeger, pp. 119-59.

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Discussion Paper No. 77-7 December 1977

INCOME DISTRIBUTION IN MANILA, LUZON, THE VISAYAS AND MINDANAO

by

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1. Introduction

This paper is in the nature of a companion piece to an earlier one that looked into the income distribution of family heads, focusing on the employed and the self-employed.[1/] Geographical region of residence was there seen to be a significant factor (third in importance after education and occupation) in explaining income differences. The focus here is on income distribution in four regions: Greater Manila (or Manila for short), Luzon other than Greater Manila (Luzon for short), the Visayas and Mindanao. For each region, estimates are made of the relative contributions of several factors to income dispersion among heads of families. Though there are similarities, there are also differences among the four regions in the rankings of the factors as sources of income inequality.

We use the same data -- a sample obtained from the 1968 National Demographic Survey -- and the same statistical model. The earlier paper contains details and references missing in the quick

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[1/] J. Encarnación, "Income Distribution in the Philippines: The Employed and the Self-employed," in Income Distribution, Employment and Economic Development in Southeast and East Asia. Tokyo: JERC and Manila: CAMS, 1975, pp. 742-75.

c = the constant term

$$x_{mh} = \begin{cases} 1 & \text{if an individual belongs to } h \text{ of } m \\ 0 & \text{otherwise} \end{cases}$$

and similarly for the other dummy variables x_{1k}, x_{2j}, ... The a'_{1k}, a'_{2j}, ..., a'_{mh} are regression coefficients.

Beta coefficients can be defined to measure the relative contributions of the classificatory variables to the explanation of y variation, β_i^2 being the proportion of the variance of y that is due to variable i. Thus if, for example, β_1 is greater than β_2, then more of the variation in y is due to 1 than to 2. Finally, an approximate F-test can be used to test the significance of a variable in explaining y dispersion.

3. Data and notation

There is some indication that the income data in the 1968 National Demographic Survey involve some under-reporting, which is probably more so for rural than for urban areas. Since rural incomes are lower to start with, this makes measures of dispersion larger than they would be otherwise. A post-enumeration survey also suggests that the completion of some questionnaires may have resulted merely from guesswork on the part of interviewers. There is no feasible way, however, of segregating such entries. While there may be data defects, therefore, there seems to be no systematic reason why they should affect the relative importance of the factors as sources of

income inequality.

We use the following notation (all pertaining to family heads):

AG, for age:
- 0 = ages 15-24
- 1 = 25-34
- 2 = 35-44
- 3 = 45-54
- 4 = 55-64
- 5 = 65 and over

CW, for class of worker: 0 = self-employed, 1 = employee

EH, for education level:
- 0 = no schooling
- 1 = grades 1-4
- 2 = grades 5-7
- 3 = one to three years of high school
- 4 = high school graduate
- 5 = one to three years of college
- 6 = college graduate

HH, for hours worked during survey week:
- 0 = 1-19 hours
- 1 = 20-39
- 2 = 40-49
- 3 = 50 and over

LR, for location of residence: 0 = urban, 1 = rural

LY, for natural logarithm of Y

MS, for migrant status: 0 = nonmigrant, 1 = migrant

OC, for occupational code:
- 0 = farm tenants and owner-tenants, farm laborers, fishermen and loggers
- 1 = farmer-owners
- 2 = service and unskilled (non-farm)
- 3 = skilled workers and transportation and communications workers
- 4 = clerical and sales
- 5 = professional, administrator, management

SE, for sector of employment:
0 = agriculture, forestry and fishing
1 = manufacturing and mining
2 = construction
3 = transport, communications and utilities
4 = commerce
5 = service

SX, for sex: 0 = male, 1 = female

Y, for annual income, in thousand pesos

4. Sample properties

Suppose that Y is lognormally distributed in each region. Then computations give the following:

	Manila	Luzon	Visayas	Mindanao
mean LY	.90155	-.00751	-.35262	-.19870
s.d.(LY)	.73837	.98354	.85758	1.03424
median Y	2.463	.993	.703	.820
mean Y	3.235	1.610	1.015	1.399
s.d.(Y)	2.808	2.109	1.045	1.834
sample size	763	3158	1774	1161

An F-test indicates that the difference between the LY variances for Manila and the Visayas is statistically significant at the .01 level, as also the difference between those for the Visayas and Luzon. The difference between Luzon and Mindanao is not statistically significant at the .05 level. It would thus appear that measuring the degree of income inequality by the variance of income logarithms, Manila has least inequality, followed by the Visayas,

while Luzon-Mindanao has most inequality. This is not to say, of course, that the Visayas has a better income distribution than Luzon-Mindanao, since the variance criterion abstracts from mean levels. The latter consideration is clearly also taken into account in making judgments about income distributions (see the Appendix).

Tables 1 to 9 give the relative distributions of the categories of the variables for the regions. Table 1 shows Manila with more education and a median level of EH4 (high school graduate) compared to the other regions whose median levels are all at EH1 (one to four years of schooling). Such a distribution of education would not be unrelated to the finding that migrants to Manila have more education than the average in the source areas.[2/]

Table 2 does not seem to show any striking differences in regard to age distribution, but it is noteworthy that Manila has the lowest proportion of AG0 (age 15-24) and of AG5 (65 and over). Manila residents marry later and a sizable fraction apparently return to the provinces after retirement. The median (and modal) age group is AG2(age 35-44) in each region. Table 3's occupational distributions conform to general expectations. The modal group in Manila is OC3 (skilled workers, etc.) and its proportion of professionals is three times that of Luzon. The modal group in Luzon

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[2/] Cf. E.M. Pernia, "An Empirical Model of Individual and Household Migration Choice: Philippines, 1965-1973," Discussion Paper 77-1, School of Economics, University of the Philippines, 1977, who shows education as the strongest single determinant of the migration decision.

and the Visayas is OC0 (farm tenants, etc.), while in Mindanao it is OC1 (farmer-owners) -- Mindanao having been the destination area for government-encouraged migration from the Visayas and parts of Luzon. (Settlers acquire public lands after meeting certain conditions.)

The proportions for sector of employment in table 4 are also not unexpected. Manila is relatively high on SE5 (services), SE1 (manufacturing), SE4 (commerce) and SE3 (transport, communications and utilities). The other regions are predominantly in SE0 (agriculture, forestry and fishing), though Luzon leads the other two in all sectors except SE0. Hours of work figures in table 5 show Manila with the smallest proportion of "underemployed," defining this by HH0 and HH1 combined (1 to 39 hours); it also has the lowest proportion of HH3 (50 or more hours). Underemployment in the other regions range from 10.6 to 16.5 percent, with the Visayas having the highest. The Visayas also has the most HH3, or "overemployed."

Table 6 shows Luzon's somewhat higher level of urbanization compared to the Visayas and Mindanao, which is not surprising. Table 7 indicates that about 5 percent of family heads are women. Table 8 on migrant status[3/] conforms to expectations. Manila has

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[3/] In order to reduce processing time, a nonmigrant was defined as a person whose 1960 residence (city or province), 1968 residence and father's residence were all the same. Some persons are thus classified as migrants who, under more standard definitions, would not be so classified.

the highest proportion of migrants, Mindanao the next highest. Finally, table 9 shows Manila with the highest proportion of employees Mindanao has the highest proportion of self-employed (who, one infers from table 3, are mostly farmer-owners).

5. EH, AG, OC and SE category effects

The results of the procedures sketched out in section 2 are summarized in tables 10 to 15. In all that follows except where noted in the tables, F-values are significant at the .01 level.

Table 10 uses the specification LY: (EH), i.e. LY regressed on the dummy variables after the colon -- (EH) being short for EH1, EH2, ... (The other sets of dummy variables are abbreviated similarly.) Eight columns of figures are given in the table, the first four of which are the regression coefficients obtained (with t-values underneath) from the four regional subsamples. R^2 and the standard error of estimate (s.e.) are also stated for each equation. The last four columns are the category effects, the first row corresponding to EH0. (F-values are reported in the last row.) The relative magnitudes of the effects conform to expectations, being greater at higher educational levels. Table 10A gives the income corresponding to the different education categories. Manila has the highest income at every educational level and, excepting EH0 (no schooling), the Visayas has the lowest.

In tables 11 and 11A using LY: (AG), one would expect single-peaked distributions with peak incomes at AG4 (age 55-64). This is the case with the Visayas and Mindanao. However, Manila's top income is at AG5, probably as a result of property income,[4/] and AG3 has higher income than AG4, though the difference is not statistically significant.[5/] For Luzon, AG3, AG4 and AG5 have regression coefficients that do not differ significantly from zero and are lower than that of AG2 (age 35-44). This is surprising on the face of it, but the inclusion of more variables for determining LY (see further below) makes AG3 rank higher and regression coefficients become significant (as often happens when a more correct specification is used).

Tables 12 and 12A are based on LY: (OC). Except in the case of OC5 (professional, etc.), the regression coefficients for Manila are not significant, in contrast to the other regions. Incomes generally rise from OC2 to OC5 with their indices, except in the Visayas where OC2 (services and unskilled (non-farm)) is higher than OC4 (clerical and sales). It may be that domestic servants in rich homes (whose living conditions would be reflected

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[4/] Table 9 shows that in Manila, employees constitute the large majority; they usually retire at age 65 and then earn less, unlike the self-employed and the rentier class. Also, the poor die earlier.

[5/] The criterion used is the standard textbook one for testing the difference between two means, treating the regression coefficients as means.

in their income in kind) were over-represented in the sample. As for OC0, and OC1, there appears to be no clear direction as to their relative incomes.

Sectoral income distributions in tables 13 and 13A show regression coefficients that are again not significant for Manila -- they are for the other regions. Within sectors as well as occupations, Manila thus has relatively wider variations in income. As may be expected, higher incomes obtain in Manila for every category. In all regions, lowest incomes attach to SE0 and highest to SE5. There is no uniform ranking in regard to the other four sectors.

Table 14 uses the education, age, occupation and sector variables to determine LY. β^2s and F-values are given in the bottom panel and also $\sum\beta^2$. ($\sum\beta^2$ is not necessarily equal to R^2.) The patterns of EH effects follow table 10 except in the case of Mindanao where (the effect of) EH3 is now greater than EH4 and EH5 is also larger than EH6. There appears to be no explanation for these strange results except inaccurate data or a very unusual sample. The AG pattern for Manila repeats that of table 11; in the case of Luzon, AG4 is still less than AG2, but the difference is not significant. Regarding OC, OC3 is now higher than OC4 in the rankings for Manila and Luzon, though the Manila OC coefficients are not significant, as also a third of the coefficients for the other regions. As for the SE classification, the rankings are rather

different from those of table 13, and three-quarters of the coefficients in the four regions (including all in Manila) are not significant.[6/]

6. Additional variables

Other variables that presumably affect income variation include: HH, hours spent at work; LR, urban or rural residence; CW, class of worker, i.e. self-employed or employee; SX, male or female; and MS, nonmigrant or migrant. These variables can be included with the four variables already considered in section 5, individually or all together, to give different regression equations for LY. We mention here briefly the results (omitting details) for the separate inclusions of these additional variables.

In the regression LY: (EH), (AG), (OC), (SE), (HH), the magnitudes of the HH effects are larger with the index except in the case of Mindanao where HH3 is less than HH2. With (LR) in place of (HH) in the equation, rural residents come out with lower incomes. Using (CW) instead, all CW1 coefficients are significantly positive: employees have higher incomes than the self-employed. With (SX), females turn out to have lower incomes. Finally, the

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[6/] One should not make too much out of the lack of significance of one or more regression coefficients in themselves. Any importance this may have would be reflected through the F-test, which is the relevant criterion for deciding the significance of a classificatory variable. It does turn out that the sector variable for Manila is significant, but cf. the occupation variable for Manila in table 15.

(MS) results show that migrants have higher incomes except in Manila where MS1 is not significant.

7. All variables included

When all the variables are included in the regression, we have table 15. (The Manila equation omits the urban-rural variable.) The EH patterns are much the same as in table 14 (with the curious results for Mindanao), though EH2 is now slightly (but not significantly) higher than EH3 for Manila. The AG patterns show a peak at AG4 for the Visayas; in the other regions AG5 is highest. AG4 is significantly less than AG3 in Manila, while Luzon's AG4 is significantly less than AG2. In the Visayas, AG1 is slightly (not significantly) greater than AG2. There seems to be no clear explanation for Mindanao's EH pattern and the unusually low AG4 effect for Manila and the Visayas outside of sample imperfections.

Regarding OC, we have the expected result that the effects rise with the index from OC2 to OC5 except in the case of the Visayas previously noted (OC2 higher than OC4). OC5 is highest in all regions except Manila where OC5 is second to OC1 (but the difference is not significant[7/]). While OC1 is the lowest in the rankings for Luzon

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7/ The Manila OC1 observations number only 4 and probably involve misclassifications as well. Some persons fancy themselves as "farmer-owners" who manage rather than work their farms. They would properly classify under OC5.

and the Visayas, it stands in the upper half for Mindanao, probably because of the larger farm sizes in the last region.

The rankings by SE show no uniform pattern over the regions, though SE0 and SE2 tend to be in the lower half of the rankings, and SE1 and SE4 in the upper half. Not surprisingly with all variables included, the SE rankings are different from those in table 14 and different again from table 13.

HH effects have the expected relative magnitudes for Manila and Luzon. In the Visayas, HH0 is higher than HH1 but the difference is not significant. Mindanao has an HH0 effect greater than that of HH2, but there are only 3 observations for HH0. They could well be propertied individuals. LR1, CW1 and SX1 have the expected signs in all regions. The same is true also for MS1 except in the case of Manila where it is not significant.

The regression for Manila has the highest R^2, the other regions having about the same value. This would be related to the fact that the great majority in Manila are employees rather than self-employed. Criteria for compensation are more standardized among the former. $\sum\beta^2$ is also highest for Manila. By the F-test, all variables are significant except SE and MS for Manila, AG for Luzon, and LR and MS for Mindanao.

Ordering the variables by size of β^2 gives table 15A, which also has the ordering for all regions combined for comparison.

By far the most important variable is education, though in the Visayas this is second to hours spent at work. (As noted earlier, the Visayas has the most underemployment and overemployment, which weights the low and high category effects more heavily in the computation of β^2.) Occupation has high importance, either second or third from the top in all regions. The hours at work variable occupies the middle position in the ordering, excepting the Visayan case. The sex variable is also about medium in importance.[8/] Class of worker is relatively low, and migrant status is at the bottom. On balance, urban-rural residence is on the low side, while quite mixed results appear for the age variable and sector of employment.

Though it stands in the upper half of the "all" ordering and second only to education in Luzon, the sector variable is one of the least useful for explaining income distributions in Manila and the Visayas. One might have expected otherwise, considering that the various sectors have different capital-labor ratios which would presumably reflect themselves in different levels of labor productivity ceteris paribus. Evidently the ceteris (including the percentage distribution of individuals among the sectors, to say nothing of production functions) are not paribus.

[8/] It would seem that sex discrimination is more severe in Manila and Luzon than in the other two regions, but is very probably related to the fact that Manila and Luzon have relatively less self-employed.

Another variable that does not stand up well is migrant status. In the earlier paper this was significant at the .01 level for the self-employed and .05 for employees. With Manila having relatively few self-employed, that this variable is not significant for Manila is perhaps not too unexpected. On the other hand, it also lacks significance in Mindanao where two-thirds are self-employed. The error variance is simply too large relative to the variance that can be attributed to this variable.

8. Concluding remarks

Within each region excepting the Visayas, education is the strongest factor determining income variation. In the Visayas, education is a close second to the amount of time spent at work. Occupation is of high importance, being second or third from the top in each region. Excepting the Visayas, amount of working time is of medium importance in the list of nine factors. The sex variable has about equal importance. Worker class (self-employed or employee) has relatively low importance, and migrant status is at the bottom of the list. Although the urban-rural variable is fourth in the Visayas ordering, it appears to be on the low side overall.

The sector and age variables occupy quite scattered places in the several lists. This lack of uniformity is, of course, not disclosed by the "all" ordering for the country as a whole, which

has these two variables near the middle of its list. It is not clear why the sector variable should figure so highly for Luzon and so insignificantly for Manila, or why the age variable is second from the top in Mindanao and second from the bottom in Luzon. (It does not seem likely that such disparities are due merely to data defects.) It is possible that the inclusion of interaction effects which we have not considered, might give leads to the underlying reasons.

Given that a reduction in income inequalities is a national concern (as it is in the current perspective plan), what policy conclusions may be drawn? Higher incomes obtain in Manila because the level of education there is considerably higher and larger proportic of income-earners are in the higher paying occupations. Scarcity values are involved. Over the long stretch, raising the general level of education would reduce income differentials. Meanwhile, th best single variable to work with seems to be the amount of time spent at work. Heads of families do not choose to work fewer hours than the normal amount -- they cannot find more work. What is calle for, therefore, is an institutional development where anyone who wan to work can be given productive work. The government, or government controlled corporations, would have to be employers of last resort.

APPENDIX

ON A PREFERENCE ORDERING OF INCOME DISTRIBUTIONS

It is known that if incomes x are lognormally distributed, or y is $N(y|\mu,\sigma^2)$ where $y = \ln x$, then the Gini concentration ratio (the area bounded by the Lorenz curve and the diagonal/the area under the diagonal in a Lorenz diagram) -- an often-used measure of the degree of income inequality -- is a monotone increasing function of σ^2 but independent of μ.[1/] It is also known that the lognormal curve is a good approximation to the size distribution of incomes except possibly at the upper ranges. Suppose, then, that the lognormal assumption holds empirically. The question we wish to pose is the following: When does one say that one (income) distribution is better than another? In other words, how does one order, in terms of preference, alternative distributions?

Under the assumption, a distribution is to be described by two parameters, μ and σ^2. With σ^2 constant, it is clear that a higher μ is better since the distribution is farther to the right along the income axis. In particular, mean income α is higher since

$$\alpha = \exp(\mu + \sigma^2/2).$$

Alternatively, therefore, with σ^2 constant, a higher α is better.

[1/] J. Aitchison and J.A.C. Brown, The Lognormal Distribution, Cambridge University Press, 1957, pp. 112-13.

On the other hand, with μ constant, it is not clear that everyone would agree on a smaller σ^2 being always better, since mean income (and therefore aggregate income) would be lower. What appears to be the more generally accepted value judgment is that for given α, a smaller σ^2 is better. For the median income would then be higher (since μ is the logarithm of the median x) and some low-income individuals would have more income even if at the cost of some high-income individuals having somewhat less. This suggests that from a preference-ordering viewpoint, distribution are more directly and conveniently represented in terms of α and σ^2 rather than in terms of μ and σ^2.

One value judgment increasingly heard of late is the proposition that per capita income growth rates being sufficiciently high, more policy attention should be paid to the reduction of income inequalities. Presumably, as in the past, income growth would have precedence over questions of income inequality if income growth is not sufficiently high. In other words, at any given time, income growth (hence also α) is in one of two classes: sufficiently high (satisfactory), or less than sufficiently high. In case of the latter, income growth is pursued; in case of the former, the degree of income inequality becomes the focus of attention, though subject to achieving a satisfactory α.

Accordingly, the preference ordering can be simply defined in terms of a lexicographic ordering.[2/] That is, distribution a is preferred to distribution b if and only if (i) or (ii) holds:

(i) $\min(\alpha_a, \alpha^*) > \min(\alpha_b, \alpha^*)$

(ii) $\min(\alpha_a, \alpha^*) = \min(\alpha_b, \alpha^*)$ and $-\sigma_a^2 > -\sigma_b^2$

where α^* is the satisfactory value of α. Put otherwise, the preference ordering of distributions is determined by the lexicographic ordering of vectors $(\min(\alpha, \alpha^*), -\sigma^2)$. We suggest that this formulation represents faithfully the main features of preferences over income distributions.

[2/] See P.C. Fishburn, "Lexicographic Orders, Utilities and Decision Rules: A Survey," Management Service, Vol. 20, July 1974, pp. 1442-71, esp. pp. 1450-53 on "pragmatic modifications and examples," for a review of similar applications of the lexicographic principle in describing choice behavior.

Table 1. Sample Proportions in Categories of EH

	Manila	Luzon	Visayas	Mindanao
EH0	.016	.143	.172	.279
EH1	.102	.359	.357	.323
EH2	.224	.292	.315	.243
EH3	.140	.063	.094	.065
EH4	.207	.085	.032	.046
EH5	.101	.019	.017	.015
EH6	.210	.039	.013	.029
All	1.000	1.000	1.000	1.000

Table 2. Sample Proportions in Categories of AG

	Manila	Luzon	Visayas	Mindanao
AG0	.024	.026	.030	.040
AG1	.256	.246	.255	.298
AG2	.346	.300	.329	.320
AG3	.231	.237	.202	.212
AG4	.125	.140	.139	.096
AG5	.018	.051	.045	.034
All	1.000	1.000	1.000	1.000

Table 3. Sample Proportions in Categories of OC

	Manila	Luzon	Visayas	Mindanao
OC0	.017	.434	.512	.286
OC1	.005	.198	.233	.493
OC2	.160	.083	.064	.048
OC3	.455	.167	.121	.078
OC4	.220	.071	.060	.069
OC5	.143	.047	.010	.026
All	1.000	1.000	1.000	1.000

Table 4. Sample Proportions in Categories of SE

	Manila	Luzon	Visayas	Mindanao
SE0	.019	.628	.760	.793
SE1	.280	.093	.078	.053
SE2	.087	.059	.031	.020
SE3	.157	.053	.030	.022
SE4	.169	.061	.051	.054
SE5	.288	.107	.050	.058
All	1.000	1.000	1.000	1.000

Table 5. Sample Proportions in Categories of HH

	Manila	Luzon	Visayas	Mindanao
HH0	.005	.011	.013	.003
HH1	.038	.128	.152	.103
HH2	.556	.370	.324	.441
HH3	.401	.491	.511	.453
All	1.000	1.000	1.000	1.000

Table 6. Sample Proportions in Categories of LR

	Manila	Luzon	Visayas	Mindanao
LR0	1.000	.243	.193	.189
LR1	.000	.757	.807	.811
All	1.000	1.000	1.000	1.000

Table 7. Sample Proportions in Categories of SX

	Manila	Luzon	Visayas	Mindanao
SX0	.942	.952	.942	.947
SX1	.058	.048	.058	.053
All	1.000	1.000	1.000	1.000

Table 8. Sample Proportions in Categories of MS

	Manila	Luzon	Visayas	Mindanao
MS0	.318	.846	.870	.663
MS1	.682	.154	.130	.337
All	1.000	1.000	1.000	1.000

Table 9. Sample Proportions in Categories of CW

	Manila	Luzon	Visayas	Mindanao
CW0	.144	.417	.444	.665
CW1	.856	.583	.556	.335
All	1.000	1.000	1.000	1.000

Table 10 LY: (EH)

	Regression Equations				Category Effects			
	Manila	Luzon	Visayas	Mindanao	Manila	Luzon	Visayas	Minda
const.	0.1185	-0.6872	-0.5660	-0.5862	-0.7831	-0.6797	-0.2134	-0.38
EH1	0.3518 (1.74)	0.5561 (11.3)	0.0895 (1.57)	0.3341 (4.60)	-0.4313	-0.1236	-0.1238	-0.05
EH2	0.5452 (2.80)	0.7337 (14.4)	0.2414 (4.15)	0.4220 (5.41)	-0.2379	0.0540	0.0280	0.03
EH3	0.5717 (2.88)	0.9633 (12.8)	0.3969 (5.05)	0.7950 (6.52)	-0.2114	0.2836	0.1835	0.40
EH4	0.7791 (3.20)	1.1104 (16.2)	0.7917 (6.72)	1.0316 (7.27)	-0.0040	0.4307	0.5783	0.64
EH5	0.9341 (4.62)	1.4944 (12.4)	1.1757 (7.64)	1.6667 (7.00)	0.1510	0.8147	0.9623	1.27
EH6	1.3789 (7.07)	2.1101 (23.3)	1.7064 (9.68)	1.8300 (10.6)	0.5958	1.4304	1.4930	1.44
R^2	.228	.191	.099	.148				
s.e.	0.651	0.885	0.816	0.957				
F					37.2	124.0	32.2	33.3

Table 10A. Calculated Incomes Based on EH

	Manila	Luzon	Visayas	Mindanao
EH0	1.1258	.5030	.5678	.5564
EH1	1.6005	.8771	.6210	.7771
EH2	1.9419	1.0476	.7228	.8485
EH3	1.9941	1.3180	.8444	1.2322
EH4	2.4537	1.5268	1.2532	1.5611
EH5	2.8651	2.2416	1.8398	2.9459
EH6	4.4701	4.1492	3.1281	3.4686

Table 11. LY: (AG)

	Regression Equations				Category Effects			
	Manila	Luzon	Visayas	Mindanao	Manila	Luzon	Visayas	Mindanao
const.	0.5605	-0.1875	-0.6518	-0.7364	-0.3410	-0.1800	-0.2992	-0.5377
AG1	0.2697 (1.53)	0.2142 (1.87)	0.2702 (2.21)	0.3974 (2.52)	-0.0713	0.0343	-0.0290	-0.1402
AG2	0.3548 (2.03)	0.2917 (2.57)	0.2855 (2.37)	0.5233 (3.33)	0.0138	0.1117	-0.0138	-0.0144
AG3	0.3805 (2.15)	0.1703 (1.48)	0.3437 (2.78)	0.5977 (3.70)	0.0395	-0.0097	0.0445	0.0600
AG4	0.3678 (1.99)	0.0396 (0.33)	0.4567 (3.58)	1.0293 (5.83)	0.0267	-0.1404	0.1575	0.4916
AG5	0.8599 (3.33)	-0.1232 (-0.92)	0.0826 (0.55)	0.7820 (3.58)	0.5188	-0.3032	-0.2166	0.2444
R^2	.018	.013	.012	.041				
s.e.	0.734	0.978	0.854	1.015				
F					2.7*	8.1	4.4	9.8

Table 11A. Calculated Incomes Based on AG

	Manila	Luzon	Visayas	Mindanao
AG0	1.7515	.8290	.5211	.4789
AG1	2.2939	1.0271	.6827	.7125
AG2	2.4976	1.1098	.6932	.8081
AG3	2.5626	.9829	.7348	.8705
AG4	2.5302	.8625	.8227	1.3403
AG5	4.1387	.7329	.5660	1.0467

*Significant at .05 level.

Table 12. LY: (OC)

	Regression Equations				Category Effects			
	Manila	Luzon	Visayas	Mindanao	Manila	Luzon	Visayas	Minda
const.	0.6242	-0.2338	-0.4661	-0.4586	-0.2774	-0.2262	-0.1135	-0.259
OC1	0.4499 (1.16)	-0.1316 (-3.02)	-0.0939 (-1.95)	0.1478 (2.24)	0.1725	-0.3579	-0.2074	-0.112
OC2	-0.0521 (-0.26)	0.4084 (6.70)	0.7045 (8.70)	0.4587 (3.31)	-0.3295	0.1821	0.5910	0.198
OC3	0.1673 (0.88)	0.6187 (13.4)	0.3286 (5.33)	0.5459 (4.79)	-0.1101	0.3924	0.2151	0.286
OC4	0.3143 (1.62)	0.7349 (11.3)	0.5832 (7.03)	1.0186 (8.53)	0.0369	0.5087	0.4697	0.758
OC5	0.9666 (4.88)	1.3538 (17.3)	1.5311 (7.92)	2.0288 (11.1)	0.6892	1.1275	1.4176	1.768
R^2	.170	.159	.106	.144				
s.e.	0.675	0.902	0.812	0.959				
F					30.9	119.3	42.0	38.9

Table 12A. Calculated Incomes Based on OC

	Manila	Luzon	Visayas	Mindanao
OC0	1.8667	.7916	.6274	.6322
OC1	2.9272	.6939	.5712	.7329
OC2	1.7719	1.1908	1.2692	1.0001
OC3	2.2066	1.4695	.8715	1.0913
OC4	2.5560	1.6506	1.1242	1.7507
OC5	4.9073	3.0649	2.9008	4.8078

Table 13. LY: (SE)

ndanao		Regression Equations				Category Effects			
		Manila	Luzon	Visayas	Mindanao	Manila	Luzon	Visayas	Mindanao
.2599	const.	0.7354	-0.2786	-0.4840	-0.3590	-0.1661	-0.2711	-0.1314	-0.1603
.1121	SE1	0.1479 (0.73)	0.6790 (11.8)	0.5031 (6.85)	0.2419 (1.89)	-0.0182	0.4079	0.3716	0.0816
.1988	SE2	0.0267 (0.12)	0.5404 (7.70)	0.5382 (4.76)	0.5895 (2.88)	-0.1394	0.2693	0.4067	0.4292
.2860	SE3	0.0252 (0.12)	0.7435 (10.0)	0.4305 (3.74)	0.8877 (4.61)	-0.1409	0.4724	0.2991	0.7274
.7587	SE4	0.2262 (1.10)	0.7770 (11.2)	0.3693 (4.15)	0.6784 (5.38)	0.0600	0.5059	0.2378	0.5181
.7689	SE5	0.2778 (1.37)	0.8282 (15.3)	0.8831 (9.77)	1.3734 (11.2)	0.1117	0.5571	0.7517	1.2130
	R^2	.018	.131	.085	.127				
	s.e.	0.734	0.918	0.821	0.968				
.9	F					2.7*	94.9	32.9	33.5

Table 13A. Calculated Incomes Based on SE

	Manila	Luzon	Visayas	Mindanao
SE0	2.0864	.7568	.6163	.6983
SE1	2.4191	1.4923	1.0192	.8895
SE2	2.1428	1.2993	1.0556	1.2592
SE3	2.1396	1.5918	.9478	1.6967
SE4	2.6159	1.6460	.8916	1.3763
SE5	2.7546	1.7325	1.4904	2.7575

*Significant at .05 level.

Table 14. LY: (EH), (AG), (OC), (SE)

	Regression Equations				Category Effects			
	Manila	Luzon	Visayas	Mindanao	Manila	Luzon	Visayas	Mind
const.	-0.2659	-0.9598	-0.8817	-1.2728	-0.8296	-0.5969	-0.2044	-0.3
EH1	0.4495 (2.24)	0.5386 (11.0)	0.1275 (2.23)	0.3047 (4.30)	-0.3801	-0.0583	-0.0770	-0.0
EH2	0.6242 (3.22)	0.6536 (12.6)	0.2466 (4.11)	0.4501 (5.84)	-0.2054	0.0567	0.0422	0.1
EH3	0.6690 (3.38)	0.7996 (10.4)	0.3064 (3.67)	0.7649 (6.38)	-0.1606	0.2027	0.1019	0.4
EH4	0.8526 (4.38)	0.8524 (12.0)	0.5829 (4.78)	0.6062 (4.07)	0.0230	0.2556	0.3784	0.2
EH5	1.0084 (5.00)	1.2498 (10.3)	0.9542 (5.93)	0.9736 (3.84)	0.1787	0.6529	0.7498	0.6
EH6	1.2954 (6.50)	1.6928 (15.2)	1.3172 (6.71)	0.7686 (3.46)	0.4658	1.0959	1.1127	0.4
AG0					-0.3001	-0.2255	-0.2715	-0.5
AG1	0.2134 (1.39)	0.1835 (1.82)	0.2263 (2.01)	0.4364 (3.01)	-0.0868	-0.0420	-0.0453	-0.1
AG2	0.3055 (2.01)	0.2362 (2.35)	0.2216 (1.99)	0.4967 (3.40)	0.0053	0.0107	-0.0500	-0.0
AG3	0.3605 (2.32)	0.2808 (2.75)	0.3472 (3.03)	0.5857 (3.89)	0.0604	0.0552	0.0757	0.0
AG4	0.3295 (2.03)	0.2277 (2.15)	0.4730 (3.96)	0.9712 (5.89)	0.0294	0.0022	0.2015	0.4
AG5	0.8568 (3.77)	0.2159 (1.79)	0.1170 (0.83)	0.9587 (4.74)	0.5567	-0.0096	-0.1545	0.4
OC0					-0.0598	-0.0484	-0.0282	-0.1
OC1	0.3662 (0.96)	-0.1644 (-3.92)	-0.1557 (-3.28)	0.1519 (2.37)	0.3065	-0.2128	-0.1839	-0.0

Table 14 (Continued)

	OC2	-0.1610 (-0.55)	0.1057 (0.90)	0.4568 (4.32)	0.1489 (0.75)	-0.2208	0.0573	0.4286	-0.0249
danao	OC3	0.0688 (0.24)	0.2346 (2.10)	0.0184 (0.17)	0.2480 (1.03)	0.0090	0.1862	-0.0098	0.0742
3222	OC4	-0.0101 (-0.03)	0.2059 (1.55)	0.4379 (2.37)	0.6334 (2.40)	-0.0698	0.1575	0.4096	0.4596
0175	OC5	0.3819 (1.27)	0.3957 (2.86)	0.6735 (2.91)	1.1199 (3.97)	0.3221	0.3473	0.6453	0.9460
1278	SE0					0.0221	-0.0815	-0.0249	-0.0393
4426	SE1	-0.0008 (-0.00)	0.2547 (2.22)	0.1902 (1.69)	-0.0074 (-0.03)	0.0213	0.1732	0.1654	-0.0468
2840	SE2	-0.0146 (-0.04)	0.1626 (1.34)	0.3215 (2.39)	0.1413 (0.49)	0.0075	0.0811	0.2966	0.1020
6514	SE3	-0.0391 (-0.12)	0.2891 (2.36)	0.2262 (1.55)	0.5575 (2.00)	-0.0170	0.2076	0.2014	0.5181
4463	SE4	-0.0618 (-0.18)	0.3277 (2.41)	-0.2502 (-1.33)	-0.0126 (-0.05)	-0.0396	0.2462	-0.2751	-0.0520
5387	SE5	-0.0140 (-0.04)	0.1183 (0.99)	0.1250 (0.98)	0.4352 (1.83)	0.0081	0.0368	0.1001	0.3958
1024	R^2	.288	.248	.169	.235				
0421	s.e.	0.632	0.856	0.786	0.913				

	Manila		Luzon		Visayas		Mindanao	
0470								
4324		β^2	F	β^2	F	β^2	F	β^2	F
4199	EH	.161	27.6	.120	82.9	.056	19.6	.058	14.2
	AG	.020	4.1	.002	2.2*	.016	6.6	.037	11.0
1738	OC	.044	9.2	.024	20.2	.047	19.6	.044	13.0
0219	SE	.001	0.2**	.014	11.6	.015	6.2	.016	4.6
	$\Sigma\beta^2$	.226		.160		.134		.155	

*Significant at .05 level.
**Not significant

Table 15. LY: (EH), (AG), (OC), (SE), (HH), (LR), (CW), (SX), (MS)

	Regression Equations				Category Effects			
	Manila	Luzon	Visayas	Mindanao	Manila	Luzon	Visayas	Min
const.	-0.9868	-1.2785	-0.9692	-0.7708	-0.7214	-0.5329	-0.1576	-0.
EH1	0.3995 (2.07)	0.4814 (9.95)	0.0962 (1.72)	0.2897 (4.09)	-0.3219	-0.0514	-0.0615	-0.
EH2	0.5697 (3.05)	0.5854 (11.3)	0.1841 (3.13)	0.3987 (5.14)	-0.1517	0.0525	0.0265	0.
EH3	0.5503 (2.88)	0.7083 (9.27)	0.2553 (3.15)	0.7292 (6.13)	-0.1711	0.1754	0.0977	0.4
EH4	0.7420 (3.94)	0.7510 (10.6)	0.4269 (3.59)	0.4967 (3.34)	0.0206	0.2181	0.2693	0.2
EH5	0.8488 (4.33)	1.1020 (9.14)	0.8232 (5.33)	0.8855 (3.50)	0.1274	0.5691	0.6656	0.5
EH6	1.1273 (5.82)	1.5289 (13.8)	1.0179 (5.37)	0.6404 (2.90)	0.4059	0.9960	0.8603	0.3
AG0					-0.3420	-0.2387	-0.2885	-0.5
AG1	0.2283 (1.56)	0.1806 (1.82)	0.2300 (2.14)	0.4646 (3.19)	-0.1137	-0.0581	-0.0585	-0.1
AG2	0.3348 (2.31)	0.2563 (2.60)	0.2224 (2.09)	0.5549 (3.78)	-0.0072	0.0175	-0.0661	-0.02
AG3	0.4440 (2.99)	0.2878 (2.87)	0.3531 (3.23)	0.6287 (4.15)	0.1020	0.0491	0.0646	0.04
AG4	0.3714 (2.40)	0.2396 (2.30)	0.5216 (4.58)	0.9993 (6.01)	0.0294	0.0009	0.2331	0.41
AG5	1.0427 (4.75)	0.3060 (2.56)	0.2923 (2.16)	1.0120 (5.00)	0.7007	0.0673	0.0038	0.43
OC0					-0.1200	-0.0630	-0.0516	-0.19
OC1	0.6011 (1.61)	-0.0486 (-0.94)	-0.0019 (-0.03)	0.2726 (3.08)	0.4810	-0.1116	-0.0535	0.0744

Table 15 (Continued)

OC2	-0.1147 (-0.41)	0.0542 (0.47)	0.3683 (3.63)	-0.0972 (-0.49)	-0.2347	-0.0087	0.3167	-0.2953
OC3	0.1003 (0.36)	0.2094 (1.89)	0.0211 (0.21)	0.1931 (0.81)	-0.0197	0.1465	-0.0305	-0.0050
OC4	0.1116 (0.39)	0.2130 (1.62)	0.3145 (1.78)	0.4232 (1.61)	-0.0084	0.1501	0.2629	0.2250
OC5	0.4550 (1.58)	0.3864 (2.84)	0.6974 (3.15)	0.9440 (3.38)	0.3350	0.3235	0.6458	0.7458
SE0					0.1072	-0.0929	-0.0201	-0.0794
SE1	-0.0928 (-0.29)	0.2737 (2.43)	0.1549 (1.43)	0.3042 (1.28)	0.0144	0.1808	0.1348	0.2248
SE2	-0.1330 (-0.40)	0.1670 (1.39)	0.2241 (1.74)	0.1320 (0.46)	-0.0258	0.0741	0.2041	0.0527
SE3	-0.1606 (-0.49)	0.2524 (2.09)	0.0092 (0.06)	0.5280 (1.90)	0.0534	0.1595	-0.0109	0.4486
SE4	-0.0747 (-0.23)	0.4118 (3.05)	-0.0854 (-0.47)	0.3288 (1.20)	0.0326	0.3189	-0.1054	0.2494
SE5	-0.1103 (-0.34)	0.1755 (1.49)	0.1044 (0.85)	0.5389 (2.25)	-0.0031	0.0826	0.0844	0.4596
HH0					-0.6977	-0.3925	-0.2612	0.5372
HH1	0.3019 (0.89)	0.2789 (1.87)	-0.0293 (-0.18)	-0.6875 (-1.45)	-0.3958	-0.1136	-0.2905	-0.1504
HH2	0.6675 (2.06)	0.3133 (2.14)	0.1632 (1.03)	-0.4193 (-0.90)	-0.0302	-0.0792	-0.0981	0.1178
HH3	0.7862 (2.43)	0.4908 (3.36)	0.4167 (2.66)	-0.6219 (-1.33)	0.0885	0.0983	0.1554	-0.0848
LR0						0.1058	0.2532	0.0979
LR1		-0.1398 (-3.54)	-0.3140 (-5.88)	-0.1206 (-1.40)		-0.0340	-0.0607	-0.0228
CW0					-0.1651	-0.0658	-0.0944	-0.0586
CW1	0.1929 (2.60)	0.1129 (2.80)	0.1699 (3.36)	0.1748 (1.94)	0.0278	0.0471	0.0755	0.1162

Table 15 (Continued)

SXO					0.0320	0.0231	0.0234	0.026
SX1	-0.5544 (-5.33)	-0.4855 (-6.42)	-0.4069 (-4.80)	-0.4926 (-3.80)	-0.5224	-0.4625	-0.3835	-0.466
MSO					0.0187	-0.0142	-0.0198	-0.025
MS1	-0.0274 (-0.57)	0.0922 (2.16)	0.1525 (2.78)	0.0756 (1.27)	-0.0087	0.0781	0.1327	0.050
R^2	.356	.277	.253	.265				
s.e.	0.603	0.840	0.747	0.898				

	Manila		Luzon		Visayas		Mindanao	
	β^2	F	β^2	F	β^2	F	β^2	F
EH	.118	22.0	.096	68.8	.036	13.8	.046	11.7
AG	.032	7.3	.003	2.8**	.018	8.3	.039	11.8
OC	.049	10.9	.015	12.7	.023	10.6	.034	10.2
SE	.002	0.4**	.018	15.2	.005	2.5*	.026	7.9
HH	.022	8.3	.011	15.5	.040	30.6	.012	6.0
LR			.004	16.0	.021	48.4	.002	3.2**
CW	.008	9.4	.003	13.8	.010	22.4	.006	9.6
SX	.031	34.2	.011	47.5	.012	28.2	.011	17.4
MS	.000	0.3**	.001	4.9*	.004	8.2	.001	1.8**
$\Sigma\beta^2$	.262		.162		.169		.177	

*Significant at .05 level.
**Not significant

Table 15A. Ordering of Variables by Size of β^2

Manila	Luzon	Visayas	Mindanao	All
EH	EH	HH	EH	EH
OC	SE	EH	AG	OC
AG	OC	OC	OC	SX
SX	SX	LR	SE	SE
HH	HH	AG	HH	HH
CW	LR	SX	SX	AG
SE	CW	CW	CW	CW
MS	AG	SE	LR	LR
	MS	MS	MS	MS