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Potential Effects of Income Redistribution on Economic Growth Constraints: Evidence from Taiwan and South Korea

By

Dennis Leslie Chinn

A.B. (University of Washington) 1968

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

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of the

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Approved:

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Committee in Charge

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PREFACE

This dissertation was completed during my year in Asia as Fulbright-Hays Doctoral Dissertation Research Abroad Fellow in 1972-73 for which opportunity I wish to express my sincere gratitude. I also wish to acknowledge my debt to the University of California at Berkeley for continuous financial support during my tenure as a graduate student.

Bent Hansen gave freely of his time in offering encouragement, advice, comments and corrections, all of which were at some stage necessary to the completion of this study. Inasmuch as through his influence on my development as an economist he is indirectly responsible for whatever merit this study may possess, it is only with great reluctance that I yield to tradition and free him from responsibility for whatever inaccuracies may remain.

I also wish to thank Albert Fishlow and Shigeru Ishikawa for comments on an earlier draft.

My greatest debt is to my wife Sandra who has endured much, complained little, and would do it all over again if asked.

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I. INTRODUCTION : A PROBLEM OF NEGLECT

A publication of the United Nations Economic Commission for Asia and the Far East lists among the most commonly accepted objectives of economic policy, "(i) A rapid increase in per capita income, (ii)..., (v) A reduction of inequalities in income distribution,..."[1] or what for short, ignoring serious definitional problems[2], we will call "growth" and "equity," respectively. No particular significance is given to the order but in practice, with respect to the developing countries, this ranking seems appropriate. That is, while all developing countries strive to achieve rapid growth, much less emphasis has been given to reducing social inequities. Whether there has been no serious desire to promote equity, or this apparent neglect has resulted from shortages of administrative skills and other resources which preclude doing everything at once or whether it is because the two objectives have been felt to be conflicting is unclear and probably varies from country to country. However, the feeling that it is the latter is strengthened by the expression that the notion of a conflict between equity and growth has been given in the literature on economic development. This in spite of the fact that few systematic analyses of the relation between the two have been made.

Manifestations of the notion are easy to find in the literature. Gustav Papanek in his analysis of Pakistan's development argues that "...the inequalities in income contributes to the growth of the economy, which makes possible a real improvement for the lower-income groups."[3] The French economist Jean Marchal has stated on the question whether the stage of semi-development should involve increasing

inequality of incomes that he "...thought this worsening in income distribution necessary in order to increase savings and to provide for incentives to production."[4] W.A. Lewis states that "the less developed countries have awakened into a century where everybody wishes to ride two horses simultaneously, the horse of economic equality and the horse of economic development. The U.S.S.R. has found that these two horses will not go in the same direction, and has therefore abandoned one of them. Other less developed countries will have to make their own compromises."[5] Hopefully these choices will be made on the basis of better information than is now available as to the nature of the choice.

Only recently has interest in this topic arisen which may in time serve to generate information sufficient to allow policymakers to design economic policies which will reduce the degree of inequity in developing countries. In addition to the speeches of R. McNamara in his capacity as president of the World Bank which have served to focus attention on the problems of equity and growth, studies by H. Oshima, I. Adelman and C. Morris, S. Morley and G. Smith, W. Cline, and others have helped to fill the void.[6] However, there is yet much to be done.

In addition to the lack of policies specifically aimed at income redistribution, a further consequence of this past neglect has been that policies designed to further economic growth have been looked at only in light of that objective. That is, the distributional effects of economic policies have not been given much weight in the decision process. A key, or at least a step in the right direction, to alleviating human suffering, and this we shall take as the proper

goal, is to integrate distributional objectives into policy making. For example, if this can be done, currently practiced policies of holding prices paid to peasant farmers low in order to appropriate the economic surplus may become less attractive and the inequitable effects of economic policy reduced.

Our feeling that lack of knowledge about the relation between equity and growth is mainly responsible for many policy choices made in the past may of course be said to neglect political reality, but in any case the existing preconceptions do provide convenient support for those who would postpone income redistribution for any reason. The study of this most important relationship is above the need for justification.

The present study represents a beginning attempt to provide an analysis of the relation between equity and growth from a planning point of view for the cases of Taiwan and South Korea. The statistical data for these two cases, although subject to some critique, are unsurpassed among the developing nations of Asia, and although in principle it is highly unlikely that there are universal economic laws to be discovered, it is hoped that some of the results may be transferable to other countries in the region.

Simply put, we attempt to provide statistical measures of the potential effects of changes in the size distribution of income, however achieved, via induced changes in the structure of consumer demand, on foreign trade, domestic savings, employment of unskilled labor, capital and "skill" requirements, value added ratio, share of labor in national income, and hence on economic growth prospects. The purpose of this study is to generate information which can be

used in designing policies so as to minimize any conflict between the objectives of social equity and economic growth.

The tentative conclusion of the study based on this piece of evidence is that in the world outside the simple growth models that economists traditionally have in mind when considering social equity, income redistribution and economic growth may not, and given appropriate policies, need not be in conflict. This suggests that there is no real justification for sacrificing equity at the altar of economic growth. Those who for other reasons would postpone income redistribution indefinitely should state those reasons.

II. THE THEORETICAL BASIS OF THE NOTION OF A CONFLICT BETWEEN INCOME REDISTRIBUTION AND ECONOMIC GROWTH : EXTENSIONS OF THE MODEL

The theoretical model on which the notion of a conflict between equity and economic growth is apparently based, although seldom made explicit when the assertion of a conflict is made, is basically an extension of the Harrod-Domar or the Solow neoclassical aggregate growth model.[1] The extension is simply to divide the populace into two groups which possess different savings propensities so as to bring income distribution into the model. The initial effort in this direction was made by Kaldor.[2] In the model thus formed output is limited only by fixed capital formation which in turn cannot exceed domestic savings since the model is closed. The aggregate marginal propensity to save is simply the sum of the class marginal propensities to save weighted by the class income shares. Since empirical observation seems to confirm that the high income groups are indeed the high marginal saver groups it is obviously "true" that redistribution of income from high to low income groups will result in a diminished level or rate of growth of output. However, government is not considered so within the model all effects of income redistribution, which itself must be somehow imposed from outside the model since there are no policy instruments, are effects which would occur in the absence of public policy. Hence assertions as to the inevitability of diminished future output level or rate of economic growth if income inequality is reduced, are based on a closed model with a single scarce factor which apriori excludes public policy.

Extensions of such models have been made in several directions.

It is a relatively simple matter to build in government instruments such as tax rates as done in a recent analysis of the long run effects of tax policy.[3] Another direction has been to extend the model to include an increased number of income groups.[4] The most interesting direction has been the movement away from the simple single constraint model to the consideration of multiple constraints on economic growth.[5]

In the context of developing countries emphasis has been placed on the concept of the foreign exchange constraint. Due to the limited range of consumption goods that typically are produced in such countries, many developing countries are characterized by a high propensity to import consumption goods. At the same time such countries typically rely heavily on imported capital goods and intermediate inputs since these can generally be produced more cheaply in more advanced countries. The upshot is that foreign exchange takes on the role of a separate scarce resource for which in the short run domestic savings are not perfectly substitutable. To achieve or maintain a specific target rate of economic growth, not only must an adequate proportion of gross national product be saved, but also adequate foreign exchange must be generated as well. Models which capture this aspect of the growth of developing countries have been termed "two-gap" models, the gaps being the deficiencies between amounts of savings and foreign exchange required to achieve or maintain a target growth rate and available amounts.[6]

Such models can in principle easily be extended to include any number of scarce resources. Of particular relevance is the so-called generalized "skill" constraint which includes administrative skill, research skill and all types of training which are embodied in skilled

industrial labor. This "skill" constraint is extremely difficult to quantify empirically; in spite of the fact that development economists almost universally agree about its importance, little can be said about its severity relative to other constraints on economic growth.

The companion problem of unskilled labor absorption is also often a serious problem, itself intimately related to the problem of poverty in developing countries. Migrants to urban areas from farming backgrounds regard industrial employment as the solution to their problem, and the inability of the industrial sector to absorb this flow leads to problems of urban un- and under-employment.

The empirical analysis of the relation between equity and growth requires a model which incorporates all the above extensions of the simple growth model. The large number of factors and the extreme complexity of their interaction preclude an attempt to specify a complete model formally. Our procedure will be to use a partial model employing an input-output model, demand analysis, and industrial input coefficients. Formal specification of the final link between the economic growth factors we consider and the rate of growth itself is beyond the scope of the present study, both because of its complexity and because the relationships may vary between countries. General comments on the relative importance of the various factors in each country context will be given in conjunction with the discussion of the numerical results below.

III. STATISTICAL DATA

1. TAIWAN

The source of income and expenditure data for Taiwan used for this study is the Report on the Survey of Family Income and Expenditure in Taiwan for 1966 published by the Bureau of Accounting and Statistics of the Taiwan Provincial Government. The 1966 survey is the second in a series of biannual all-Taiwan surveys begun in 1964.

A stratified sampling procedure was used to draw a sample from the household registration records. The sample size for the interview survey taken at the end of 1966 was 3,000 household, 400 of which also kept detailed daily account books for all of 1966. The more detailed account book data were used as a supplement to the interview survey data in correcting for incomplete or inaccurate recollections and presumably for effects of seasonal variations.

The population from which the sample was drawn was all ordinary households whose heads live in Taiwan and are of nationality of the Republic of China, and have an independent household in household registration. Hence single member households, with the exception of single professional servicemen who live in camp, and households the head of which is unemployed are included, while foreigners are excluded.

The Taiwan surveys seem well planned and carefully executed, and the data collected are extremely detailed. Data on income by sources and current and capital expenditures are collected and presented in terms of family income classes, occupational groups, age of household head, and geographic zones, as well as data on family composition, ownership of consumer durables and tax payments.

Income and expenditure in kind are valued at retail prices and included at the interview level, as are imputed house rents for families that own their own homes. A measure of family size which allows for differences in age-sex composition is also computed and recorded.[1] In our computations to follow this measure, the number of male adult equivalent units, is denoted by N.

The data are of course still subject to the usual types of errors that plague survey data. Most important is the tendency of sample households to understate income due to fear of the tax collector or unwillingness to divulge information of such a personal nature. Computations made by H. Oshima show that "multiplying up" the Taiwan sample survey personal income data for 1964 results in an estimate of total personal income which accounts for 80 percent of the value of personal income in the national accounts, which compares favorably with the 75 percent accounted for by survey data for Japan and the U.S. "multiplied up" in the same manner and compared with the respective national accounts values of personal income.[2] As comforting as such a comparison may be with respect to the Taiwan survey data, it is nonetheless impossible to accurately determine what part of the unaccounted for 20 percent is due to the inclusion of items in the national accounts which surveys typically exclude, and what part is due to under-reporting of income in the surveys.

More important for our purposes is the extent to which the underreporting of income bias varies over income levels. Unfortunately, no reliable alternative source of data on income distribution is available. In particular data derived from income tax records are highly suspect due to widespread evasion and administrative difficulties

which prevent reliance on income taxation as a source of government revenue; in 1966 the Taiwan income tax accounted for only 7.4 percent of all tax revenues.[3] However, using the tax data for comparison with the income and expenditure survey estimates of total income, a recent study suggests that there is significant under-representation of or under-reporting by high income groups in the survey data. The table below reproduces some of that author's computations.

Table III.1 : COMPARISON OF INCOME TAX RECORD AND SURVEY ESTIMATES OF TOTAL INCOME, NT$ MILLION

INCOME CLASS	TAX RECORD TOTAL INCOME NT$ MILLION	SURVEY TOTAL INCOME NT$ MILLION
UNDER NT$65,000	30,671	60,774
65,000 to 100,000	3,941	7,457
100,000 to 150,000	3,136	5,583
150,000 to 200,000	869	1,711
OVER NT$200,000	1,137	957
TOTAL	39,761	76,496

Source : Kuo, S., The Economic Structure of Taiwan 1952-1969, Graduate Institute of Economics, National Taiwan University, Dec. 1970, Table 5-8, p.95.

Unfortunately the definitions of the terms used by that author are not given, but presumably the first column gives the combined total personal income of all those who filed 1966 income tax returns and the second column gives total personal income for all families as estimated by the sample survey for 1966; both by income classes and in million new Taiwan dollars (NT$). That the two sets of estimates are not comparable is immediately clear from the last row of the table; the tax record data account for only slightly more than half of the survey estimate of total personal income.

However, for each income class below NT$200,000 the survey estimates of total income significantly exceed the corresponding tax record estimates whereas for the class 'OVER NT$200,000' the latter exceeds the former. While this is suggestive of under-representation of or under-reporting by high income groups in the survey data, due to the questionable accuracy of the tax record estimates, that conclusion may not be warranted.

Inaccuracies due to errors or misinterpretations on the part of the survey enumerators in the Taiwan survey data seem to have been minimized through careful selection and training of personnel, through the provision of a very detailed list of instructions and procedures to be followed in recording the household responses, and the creation of a working group to handle any unresolvable problems that might arise.

Hence, although as survey data the Taiwan income and expenditure data are automatically subject to some unresolvable doubts, their use seems completely justifiable; not only because for considering the problem at hand there is at present no alternative source of data, but also because they are the best we are likely to get in a developing Asian country in the near future.

The input-output tables used in this study were compiled for 1966 by the Council for International Economic Cooperation and Development (CIECD) of the Republic of China. They contain 76 industrial sectors and hence are adequately detailed for our purposes. There was no way to evaluate the 1966 tables with respect to their quality, but since they are the second set of large scale input-output tables produced by CIECD for Taiwan, the first being for 1964[4], they at least embody the experience gained in preparing the earlier tables.

All other data required on characteristics of individual industries are taken from the Survey of Commerce and Industry of Taiwan for 1966.

2. KOREA

The Korean income and expenditure data used in this study were for 1963 and 1964 as published in the Annual Report on the Family Income and Expenditure Survey 1964 by the Bureau of Statistics, Economic Planning Board, Republic of Korea. Equivalent surveys have been carried out for each year since and the results up to 1970 summarized in the Annual Report on the Family Income and Expenditure Survey 1970. In all these surveys sample households were drawn by a stratified sampling method from the group of all eligible households, which excludes, among others, households of foreigners, families engaged in agriculture or fisheries, and single member households.

The total sample sizes were 1703 and 1712 households for 1963 and 1964, respectively. Data on household income were collected only for wage and salary earner households, some 955 and 974 households for the two respective years. This resulted in the exclusion of all families the head of which is engaged in an unclassifiable occupation - presumably this includes the unemployed - almost all sales workers, two-thirds of managers and officials, and more than half of all professional and technical workers. The result is that income data are available only for sample households representing urban wage and salary earners, less than 14 percent of the estimated number of all families in Korea at the end of 1963. Hence estimates of the overall income distribution based on these data are seriously open to question;

in particular since single member households and unemployed are excluded, as are farm households.

Our study, since income data were not collected for other households, relies on the detailed expenditure data presented for urban wage and salary earner households by income classes. The effect of the exclusion of families other than wage and salary earner families on the reliability of our estimated regression equations depends on the extent to which consumption patterns vary with occupation of family head, independently of disposable income level, which unfortunately cannot be checked from the published data.

The expenditure data collected are quite detailed. The data dealing with expenditures on food were recorded 10 days of each month by each sample household and all other data were collected during quarterly visits by survey enumerators so that the influence of both seasonal variations in prices and reporting errors should be minimized. The income concept used includes income in kind but excludes imputed rent of owned houses.

For 1963 and 1964 a rather unexpected finding emerges from the survey data; the urban wage and salary earner group as a whole is found to be a net dis-saver group, total outgo exceeds total income. For both years average dis-saving as a percent of total income was 4.9 percent. In view of the divergence of this finding from the cases of Japan and Taiwan in which the urban wage and salary earner groups seem to be high positive saver groups, it seems apparent that part of the recorded dis-saving in the Korean surveys for 1963 and 1964 is due to under-reporting of income.[5] However, why responses to similar surveys in different contexts should differ so widely is not

clear. For the 1965 Korean survey the same savings behavior is exhibited but for 1966 and each year after net savings is positive, although quite small, the largest being 2.7 percent of total income in 1966. The apparent understatement of income in the 1963 and 1964 surveys need not necessarily have any significant effect on our estimates of the marginal propensities to expend for households of different income levels, except to the extent that it casts doubt on the basic accuracy of the survey data.

The 43 sector input-output tables used for the Korean case are published by the Bank of Korea, entitled Interindustry Relations Table for 1963, and all other data dealing with industrial sectors are from the Report on the Mining and Manufacturing Census 1963, Economic Planning Board, Republic of Korea.

IV. METHODOLOGY

At this point it becomes necessary to embark on a rather laborious detailed explanation of the methodology used in the computations to follow. It is suggested that readers not interested in such things turn to chapter V. The procedure is to simulate changes in the farm and nonfarm distributions of family disposable income, and by use of estimated expenditure equations and detailed input-output tables, to translate these changes into potential effects on the various factors related to the process of economic growth mentioned previously.[1]

It must be clearly understood that the methodology to be set out below is for estimating what can be roughly characterized as the lowest common denominator of all successful redistribution policies; the changes directly induced by the shift in the structure of the size distribution of income through the pattern of consumer demand. Measurement of effects which do not act through this mechanism or are specific to particular policies is beyond the scope of the present study. Hence, for example, the differential incentive effects of using profits taxation as opposed to income taxation to finance the transfers to the poor groups are not considered.

In anticipation of response to the rather mechanical approach to income redistribution taken in what follows a word of caution seems in order. This study should not be construed as merely an analysis of the effects of a "once and for all" confiscatory redistribution of income flows, rather it is to be interpretted as a first attempt to bridge the gap between the current economic development conditions and those that would exist if income were permanently distributed more equitably.

The methodology set out below is specific to the Taiwan case. The differences between these procedures and those used for the Korean case are noted in section IV.7 below. The Korean study was first undertaken as a test of the methodology so hopefully the Taiwan case study embodies some improvements.[2]

1. NOTATION

All symbols are defined in the text as they appear. However, due to the unavoidable complexity it seems wise here to supply some important definitions and notes in order to minimize the degree of confusion. First we define 7 symbols which occur in conjunction with several variables.

k	as a superscript indicates values corresponding to farm(F) and nonfarm(NF) families; k = F/NF
e	indexes sample data income intervals and population income groups 1,...,31
$(\ )^s$	denotes a sample family value
$(\hat{\ })$	denotes an estimated income group e value
$(\bar{\ })$	denotes an estimated population mean
d	represents a change
$(\underset{\sim}{\ })$	denotes a vector

Next we define 5 variables related to the expenditure side of the methodological procedure.

Y^k	family disposable income in new Taiwan dollars (NT$) per annum; takes values $\hat{Y}^k_e$, e = 1,...,31
N^k	number of male adult equivalent units per family; takes values $\hat{N}^k_e$, e = 1,...,31

1^k population shares

E^k total family current expenditures

C_i^k expenditures on individual expenditure items $i = 1,\ldots,n;o$ where o is "other" expenditures not individually classified in the sample data

Each of the first 6 symbols defined above appears in conjunction with the variables Y^k, E^k and C_i^k, $i = 1,\ldots,n;o$. For example we have

Y_e^k actual income group e disposable income for the average family

$(Y_e^k)^s$ income interval e average sample family disposable income

$\hat{Y}_e^k$ an estimate of Y_e^k

dY_e^k postulated change in income group e average family disposable income

$\bar{Y}^k$ estimated mean disposable family income for all sector k families

$d\bar{Y}^k$ change in $\bar{Y}^k$

For E^k and C_i^k, $i = 1,\ldots,n;o$, we have corresponding symbols, while for N^k and 1^k, respectively, we have only $(N_e^k)^s$ and $\hat{N}_e^k$, and $(1_e^k)^s$ and $\hat{1}_e^k$.

The final results of the expenditure side of the methodological procedure are two column vectors

$$\underset{\sim}{\bar{C}}^k = \begin{bmatrix} \bar{C}_1^k \\ \\ \bar{C}_n^k \end{bmatrix} \quad ; \quad d\underset{\sim}{\bar{C}}^k = \begin{bmatrix} d\bar{C}_1^k \\ \\ d\bar{C}_n^k \end{bmatrix} \qquad \text{where}$$

$\bar{C}_i^k$, $i = 1,\ldots,n$, is the sector k average family estimated annual expenditure for item i and $d\bar{C}_i^k$ is the estimated change in that value induced by income redistribution.

For the input-output side of the methodological procedure a few

definitions should suffice to eliminate confusion.

A	the n x n input-output coefficient matrix
M_i	total "competing" imports of the commodity produced by industrial sector i
C_i	total private household demand for the commodity produced by industrial sector i
m_i	$= dM_i/dC_i$, i = 1,...,n, the ratio of the induced change in total "competing" imports of industrial sector i output to the corresponding induced change in total consumption
m	the diagonal matrix of the m_i , i = 1,...,n
$\bar{X}^k$	the vector of domestic output required to support the initial average farm/nonfarm family pattern of expenditure
$\bar{S}^k$	average farm/nonfarm family initial annual savings
$\bar{C}_M^k$	average farm/nonfarm family initial value of total "competing" imports
$\underline{a}_r$	$= (a_{r1},...,a_{rn})$, the vector of industry growth factor coefficients, r = K,M,S,L,V,W
$\bar{A}_r^k$	initial average farm/nonfarm family value of the index for growth factor r, r = K,M,S,L,V,W

2. THE ANALYTICS OF REPRESENTING INCOME REDISTRIBUTION

As is usual for such surveys, the Taiwan 1966 income and expenditure survey data are presented in terms of arbitrary intervals along the income scale. For the sample families, denoted by $(\ )^s$, the share of families falling into each income interval $(l_e^k)^s$, the mean family annual disposable income level $(Y_e^k)^s$, and mean family level $(E_e^k)^s$ and mix $(c_{1e}^k,...,c_{ne}^k;c_{oe}^k)^s$ of expenditure for items 1,...,n and other(o), where e = 1,...,31 indexes the income intervals and k = farm(F)/nonfarm(NF), are given or can be easily computed. The particular income intervals used are chosen only for convenience in presenting the data so there

is no reason why they should be central to our analysis.

We shall instead employ the notion of farm/nonfarm total population income groups where each group is defined and indexed by the income interval which it initially occupied; e.g., farm income group 1 is the set of all farm families in Taiwan that initially, in 1966, had family income less than or equal to NT$6,000, farm income group 2 is the set of all farm families that initially fell into the interval NT$6,000 - NT$8,000, and so on. For each sector the same 31 income intervals are used so we have in principle 31 farm and 31 nonfarm income groups.[3] Again, in all that follows the term income group by definition refers to all families in Taiwan, not just the sample families.

For each farm/nonfarm income group e we adopt the corresponding sample family income interval disposable income level $(Y_e^k)^s$, the share of sample families $(1_e^k)^s$, and the average number of male adult equivalent units $(N_e^k)^s$ as estimates, denoted by $(\hat{})$, of the income group mean values. That is

$$(1) \qquad \begin{aligned} \hat{Y}_e^k &= (Y_e^k)^s \\ \hat{1}_e^k &= (1_e^k)^s \\ \hat{N}_e^k &= (N_e^k)^s \end{aligned} \qquad e = 1,\ldots,31 \; ; \; k = F/NF$$

Then the average family disposable income level for all farm/nonfarm families $(\bar{Y}^k)$ can be estimated as

$$(2) \qquad \bar{Y}^k = \sum_e \hat{1}^k \hat{Y}_e^k \qquad e = 1,\ldots,31 \; ; \; k = F/NF$$

The redistribution procedure we employ in our simulations is to adopt one of the estimated income group mean family disposable income

levels ($\hat{Y}_e^k$) given in (1) above as the "poverty" level and to raise the mean family disposable income levels of all income groups initially below the "poverty" level up to that level and to lower the above-"poverty" income group mean family disposable income levels to compensate. For example, setting $\hat{Y}_9^k$ as the "poverty" level, after income redistribution we would have

$$Y_1^{k'} = \ldots = Y_9^{k'} < Y_{10}^{k'} < \ldots < Y_{31}^{k'} \qquad k = F/NF$$

where (') indicates a post-redistribution value. Then the income redistribution scheme can be represented as a set of changes in the income group mean family disposable income levels (dY_e^k) defined as

$$(3) \qquad dY_e^k = Y_e^{k'} - \hat{Y}_e^k \qquad e = 1,\ldots,31 \; ; \; k = F/NF$$

Using this method any change in the size distribution of family disposable income can be represented as a set of changes in the initial income group estimated mean incomes.

3. INDUCED CHANGES IN THE LEVEL AND MIX OF PRIVATE DEMAND

Thus far we have, from (1) above, estimates of population share ($\hat{l}_e^k$) and average family disposable income level ($\hat{Y}_e^k$) for each income group e, and from (3) above, the method of representing any given income redistribution in terms of changes in those mean income levels. In this section the method for estimating the level (E_e^k) and mix ($C_{1e}^k,\ldots,C_{ne}^k;C_{oe}^k$) of expenditure for <u>each</u> income group e, and the respective changes induced by a change in disposable income (dE_e^k) and ($dC_{1e}^k,\ldots,dC_{ne}^k;dC_{oe}^k$) will be set out. Again, C_{ie}^k represents the average sector k income group e family expenditure on item i, and

$d\hat{C}^k_{ie}$ represents the induced change in that value. Lastly, using these estimates, the change in the all-Taiwan average farm/nonfarm family level and mix of expenditure can be computed. We first restrict our attention to estimating the expenditure pattern of each income group e.

The most obvious estimation method would simply be to use the income interval e sample family values $(\ )^s$ as estimates of the income group e values (^) so that

$$(4) \qquad \begin{aligned} \hat{Y}^k_e &= (E^k_e)^s \\ (\hat{C}^k_{1e},\ldots,\hat{C}^k_{ne};\hat{C}^k_{oe}) &= (C^k_{1e},\ldots,C^k_{ne};C^k_{oe})^s \end{aligned} \qquad e = 1,\ldots,31$$

Then the effects of a change in disposable income on income group e's pattern of expenditure could be written

$$(5) \qquad \begin{aligned} d\hat{E}^k_e &= [(E^k_{e+1}-E^k_e)^s/(\hat{Y}^k_{e+1}-\hat{Y}^k_e)]\, dY^k_e \qquad e = 1,\ldots,30 \ ; \ k = F/NF \\ d\hat{C}^k_{ie} &= [(C^k_{ie+1}-C^k_{ie})^s/(\hat{Y}^k_{e+1}-\hat{Y}^k_e)]\, dY^k_e \qquad i = 1,\ldots,n;o \end{aligned}$$

where d denotes a change as always and dY^k_e is as defined in (3) above. That is, the sample data could be used to compute cross-section marginal propensities to consume for each item which could then be multiplied by the appropriate income change to yield the estimated induced changes.

However, this procedure has two drawbacks which offset the advantage of its simplicity. First, it implicitly assumes that the sample families are exactly representative of the population from which the sample was drawn. Second, and more important for our purposes, since family disposable income and family size are positively correlated, for those expenditure items the expenditures on which vary directly

with family size, e.g., food, clothing, the above estimates would tend to overestimate the effects of a change in income alone. Hence the simple procedure is unsatisfactory.

The procedure we adopt is to relate sample family total expenditure $(E^k)^s$ and expenditure on each item individually $(C_1^k,\ldots,C_n^k;C_o^k)^s$ to disposable income $(Y^k)^s$ and family size[4] $(N^k)^s$ statistically by simple regression analysis. In each sector k = F/NF we have 31 observations corresponding to the initial mean values for the sample families falling in each of the 31 arbitrary income intervals indexed by e. The result of the regression procedure is a set of n+2 regression equations of the general form

$$(6)\qquad \begin{aligned} E^k &= f_E^k(Y^k,N^k) && k = F/NF \\ C_i^k &= f_i^k(Y^k,N^k) && i = 1,\ldots,n;o \end{aligned}$$

For total expenditure and for each item individually several functional forms were fit to the sample data. For those items for which family size had no significant independent effect regardless of the functional form, equations were refit using disposable income level as the sole explanatory variable. The final regression equations, chosen on the basis of statistical fit criteria alone[5], are presented in the supplementary tables.

For each farm/nonfarm income group e, the initial level (E_e^k) and mix $(C_{1e}^k,\ldots,C_{ne}^k;C_{oe}^k)$ of expenditure are estimated by the predicted values of equations (6) above. We have

$$(7)\qquad \begin{aligned} \hat{E}_e^k &= f_E^k(Y^k,N^k)\Big|_{\hat{Y}_e^k,\hat{N}_e^k} && e = 1,\ldots,31\ ;\ k = F/NF \\ \hat{C}_{ie}^k &= f_i^k(Y^k,N^k)\Big|_{\hat{Y}_e^k,\hat{N}_e^k} && i = 1,\ldots,n;o \end{aligned}$$

where the notation $\Big|_{\hat{Y}_e^k,\hat{N}_e^k}$ means evaluated at $(\hat{Y}_e^k,\hat{N}_e^k)$.

By partial differentiation of equations (6) with respect to Y^k we can express the estimated changes in income group e average family level and mix of expenditure induced by a change in disposable income level as

$$(8)\qquad \begin{aligned} d\hat{E}_e^k &= (\partial f_E^k/\partial Y^k)\Big|_{\hat{Y}_e^k,\hat{N}_e^k}\, dY_e^k \qquad e = 1,\ldots,31 \;;\; k = F/NF \\ d\hat{C}_{ie}^k &= (\partial f_i^k/\partial Y^k)\Big|_{\hat{Y}_e^k,\hat{N}_e^k}\, dY_e^k \qquad i = 1,\ldots,n;o \end{aligned}$$

Using equations (7) above and the estimated population shares from (1) above we construct estimates of the all-Taiwan total population farm/nonfarm average family level ($\bar{E}^k$) and mix ($\bar{C}_1^k,\ldots,\bar{C}_n^k;\bar{C}_o^k$) of expenditure. Arranging $\bar{C}_i^k$, for i = 1,...,n, as a column vector $\underset{\sim}{\bar{C}}^k$ for later convenience we have

$$\bar{E}^k \;;\; \underset{\sim}{\bar{C}}^k = \begin{bmatrix} \bar{C}_1^k \\ \\ \bar{C}_n^k \end{bmatrix} \;;\; \bar{C}_o^k \qquad k = F/NF$$

$$(9)\qquad \begin{aligned} \bar{E}^k &= \sum_e \hat{1}_e^k\, \hat{E}_e^k = \sum_e \hat{1}_e^k\, f_E^k(Y^k,N^k)\Big|_{\hat{Y}_e^k,\hat{N}_e^k} \qquad e = 1,\ldots,31 \\ \bar{C}_i^k &= \sum_e \hat{1}_e^k\, \hat{C}_{ie}^k = \sum_e \hat{1}_e^k\, f_i^k(Y^k,N^k)\Big|_{\hat{Y}_e^k,\hat{N}_e^k} \qquad i = 1,\ldots,n;o \end{aligned}$$

Likewise we can construct estimates of the potential changes in these estimates induced by income redistribution. Again using the vector notation for expenditure items i = 1,...,n we have

$$d\bar{E}^k \;;\; d\underset{\sim}{\bar{C}}^k = \begin{bmatrix} d\bar{C}_1^k \\ \\ d\bar{C}_n^k \end{bmatrix} \;;\; d\bar{C}_o^k \qquad k = F/NF$$

$$(10)\qquad d\bar{E}^k = \sum_e \hat{1}^k_e \, d\hat{E}^k_e = \sum_e \hat{1}^k_e \, (\partial f^k_E/\partial Y^k)\Big|_{\hat{Y}^k_e, \hat{N}^k_e} dY^k_e \quad e = 1,\ldots,31$$

$$d\bar{C}^k_i = \sum_e \hat{1}^k_e \, d\hat{C}^k_{ie} = \sum_e \hat{1}^k_e \, (\partial f^k_i/\partial Y^k)\Big|_{\hat{Y}^k_e, \hat{N}^k_e} dY^k_e \quad i = 1,\ldots,n;o$$

We have thus far considered the demand side of the procedure. In the next section we discuss the method of using the input-output model to translate the vector $d\underset{\sim}{\bar{C}}^k$ into a vector of total induced changes in domestic output requirements. As noted above the index $i = 1,\ldots,n$ is used to index both expenditure items and input-output sectors. In principle the allocation of expenditure items over the input-output sectors involves no problems but in practice some arbitrariness is involved. The allocation used is given in the supplementary tables. In what follows we shall simply assume that the allocation is 1 to 1 and continue to use the index i to represent both expenditure items and input-output sectors.

4. INDUCED EFFECTS ON DOMESTIC PRODUCTION : THE INPUT-OUTPUT MODEL

In translating estimates of induced changes in the expenditure mix into estimates of required changes in domestic production two problems must be dealt with. First, it must be determined what part of any change in total expenditure for the output of each industry will be satisfied through direct "competing" imports and what part through domestic production. Second, it is not sufficient to consider each industry independently due to the inter-dependence between industries through input and output linkages. Both of these problems can be handled within the context of the standard input-output model to which we now turn.

We begin with the schematic input-output table below.[6]

(11)

		absorbing sector j			final demand					
		1	2 ...	n	C	G	$\dot{K}$	Z	X	M
producing sector i	1	A_{11}	A_{12} ...	A_{1n}	C_1	G_1	$\dot{K}_1$	Z_1	X_1	M_1
	2	A_{21}								
	.									
	.									
	.									
	n	A_{n1}		A_{nn}	C_n	G_n	$\dot{K}_n$	Z_n	X_n	M_n
value added	A_V	A_{V1}		A_{Vn}						
total input	I	I_1		I_n						

The symbols are private consumption expenditure (C), government expenditures (G), total investment including changes in stocks ($\dot{K}$), total exports (Z), domestic output (X), "competing" imports (M), total value added (A_V), and total input (I). All entries are in value terms. For $1 \leq i,j \leq n$ A_{ij} is the value of sector i output used as an input into sector j. The usual input-output relations hold. We have

$$
\begin{aligned}
& X_i = \sum_j A_{ij} + C_i + G_i + \dot{K}_i + Z_i - M_i && i,j = 1,\ldots,n \\
(12) \quad & I_j = \sum_i A_{ij} + A_{Vj} && i,j = 1,\ldots,n \\
& X_i = I_j && i = j = 1,\ldots,n
\end{aligned}
$$

The domestic input coefficient matrix A is constructed by dividing each element A_{ij} $i,j = 1,\ldots,n$ by the total value of output of the industry corresponding to the column index. We have

$$(13) \quad A = ((a_{ij})) = ((A_{ij}/X_j)) \qquad i,j = 1,\ldots,n$$

The interpretation of the matrix A is that each column j, j = 1,...,n gives the inputs in value terms required to produce a single value unit of output of industry j.

Using matrix notation the input-output model and its solution can be summarized as

$$(14) \qquad \begin{aligned} \underline{X} - A\underline{X} &= \underline{C} + \underline{G} + \dot{\underline{K}} + \underline{Z} - \underline{M} \\ \underline{X} &= (I-A)^{-1}(\underline{C} + \underline{G} + \dot{\underline{K}} + \underline{Z} - \underline{M}) \end{aligned}$$

where $\underline{X}$, $\underline{C}$, $\underline{G}$, $\dot{\underline{K}}$, $\underline{Z}$ and $\underline{M}$ are the n-element column vectors shown in the schematic input-output table (11) above, A is the input-output coefficient matrix defined above in (13), and I is the n x n identity matrix. For the present we assume that only private consumption expenditures (C) and "competing" imports (M) are affected by changes in the size distribution of private family income; government expenditures (G), total investment ($\dot{K}$) and exports (Z) are not directly affected by a change in income size distribution itself, although they may be affected by particular redistribution policies, and of course the indirect effects on investment may be significant. Under this assumption the potential induced effect of a change in the size distribution of family income on the vector of total domestic production can be written

$$(15) \qquad d\underline{X} = (I-A)^{-1}(d\underline{C} - d\underline{M}) \quad \text{where}$$

$$d\underline{X} = \begin{bmatrix} dX_1 \\ \\ dX_n \end{bmatrix} ; \; d\underline{C} = \begin{bmatrix} dC_1 \\ \\ dC_n \end{bmatrix} ; \; d\underline{M} = \begin{bmatrix} dM_1 \\ \\ dM_n \end{bmatrix}$$

For (15) to yield a determinate $d\underline{X}$ we must provide an estimate of $d\underline{M}$. To this we now turn.

Ideally, independent estimates of the induced changes in total "competing" imports dM_i, $i = 1,\ldots,n$ should be made. However, the income and expenditure data for obvious reasons do not distinguish between domestically produced and foreign produced expenditure items. For example, the item 'alcoholic beverages' includes both domestic and foreign brews, and an automobile is recorded as an automobile regardless of where it was produced. Hence it is not possible to predict income redistribution-induced changes in "competing" imports independently on the basis of the expenditure survey data.

The only recourse seems to be to define a set of coefficients $m_i = dM_i/dC_i$, $i = 1,\ldots,n$, and to assume values for these directly. The Taiwan 1966 input-output tables give for <u>each</u> industry i both the total value of household final demand for the output of the industry, and in a separate table, the value of "competing" imports going directly to final household use. Using this information, we can compute for each industry i the proportion of total household demand for the output of that industry which was directly imported into Taiwan in 1966. Then we assume that the total farm/nonfarm redistribution-induced change in expenditure on each item i will be divided between imported and domestically produced varieties in such a way as to preserve this 1966 ratio. That is, we assume

$$(16) \qquad m_i = dM_i/dC_i = \frac{\text{"competing" imports of item i to household use in 1966}}{\text{total household final demand for item i in 1966}}$$

This is equivalent to assuming that for the average farm/nonfarm family the income elasticities of expenditure for domestic and foreign produced varieties of each commodity are identical. The elasticities,

however, in general do vary between farm and nonfarm sectors. It must be of course admitted that there is no firm basis for such an assumption, but most probably it is better than the two polar alternatives of assuming that all induced changes in expenditures are accommodated through "competing" imports, $m_i = 1$; or assuming that "competing" imports are not affected by changes in the size distribution of income, $m_i = 0$, both for $i = 1,\ldots,n$.

Arranging the assumed m_i, $i = 1,\ldots,n$ as an $n \times n$ diagonal matrix m, equation (15) can be written as

$$(17) \qquad d\underset{\sim}{X} = (I-A)^{-1}(I-m)d\underset{\sim}{C}$$

The redistribution-induced changes in expenditure mix discussed in the previous section were expressed in terms of changes in the farm/nonfarm <u>average</u> family expenditure mix, denoted $d\bar{\underset{\sim}{C}}^k$, $k = F/NF$ from (10) above. Hence we rewrite equation (17) in average family terms as

$$(18) \qquad d\bar{\underset{\sim}{X}}^k = \begin{bmatrix} d\bar{X}_1^k \\ \\ d\bar{X}_n^k \end{bmatrix} = (I-A)^{-1}(I-m)d\bar{\underset{\sim}{C}}^k \qquad k = F/NF$$

where $d\bar{X}_i^k$, $i = 1,\ldots,n$, is the change in domestic production of commodity i required to satisfy the change in the mix of expenditure of the average farm/nonfarm family induced by income redistribution.

As a basis for comparison, and as a result of assumption (16), we also can express the initial vector of domestic production required to satisfy the average farm/nonfarm family initial 1966 mix of expenditure as

$$(19) \qquad \bar{\underset{\sim}{X}}^k = \begin{bmatrix} \bar{X}_1^k \\ \\ \bar{X}_n^k \end{bmatrix} = (I-A)^{-1}(I-m)\,\bar{\underset{\sim}{C}}^k$$

where $\bar{\underset{\sim}{C}}^k$ is as defined in (9) above and $\bar{X}_i^k$, i = 1,...,n, is the value of output of industry i required to satisfy the initial expenditure pattern of the average *farm/nonfarm family*.

Note that in (18) above $d\bar{\underset{\sim}{X}}^k$ includes both <u>direct</u> effects written

$$(20) \qquad d\bar{\underset{\sim}{X}}^k(\text{dir.}) = (I-m)d\bar{\underset{\sim}{C}}^k \qquad k = F/NF$$

and <u>indirect</u> effects through input-output linkages.

5. INDUCED CHANGES IN ECONOMIC GROWTH FACTOR INDICES

The final methodological step is to translate $d\bar{\underset{\sim}{X}}^k$ into changes in economic growth factor indices. The factors we consider are savings (S), "competing" imports (C_M), capital requirements (A_K), imports of productive inputs (A_M), skilled labor requirements in the modern sector (A_S), unskilled labor absorption (A_L), total value added (A_V), and the wage share (A_W). Although the general significance of each of these factors with respect to the process of economic growth is easily understood in principle, their relative importance may vary between countries. A few comments on the relative importance of these factors in the Taiwan context will be made later in conjunction with the discussion of results.

Estimated initial average farm/nonfarm family annual savings ($\bar{S}^k$) is simply the difference between the estimated initial levels of disposable income ($\bar{Y}^k$) and total expenditure ($\bar{E}^k$) as given in equations (2) and (9) above, respectively, and the induced change in average family savings ($d\bar{S}^k$) is the corresponding difference between the changes ($d\bar{Y}^k$) and ($d\bar{E}^k$), the former varying with the particular redistribution scheme postulated and the latter as estimated in (10) above. We have

$$(21)\qquad \begin{aligned} \bar{S}^k &= \bar{Y}^k - \bar{E}^k \\ d\bar{S}^k &= d\bar{Y}^k - d\bar{E}^k \end{aligned} \qquad k = F/NF$$

For each of the remaining growth factors it is necessary to include a correction term denoted by *( ) to counteract a statistical bias in the results due to the so-called "adding up" problem of demand analysis. This problem and the definitions of the correction terms are discussed in the following section.

Using the assumed m_i, $i = 1,\ldots,n$, given in (16) above, we form expressions for the average farm/nonfarm family initial total value of expenditure on "competing" imports of consumption goods ($\bar{C}_M^k$) and the corresponding induced change ($d\bar{C}_M^k$). We have

$$(22)\qquad \begin{aligned} \bar{C}_M^k &= \sum_i m_i \bar{C}_i^k - *(\bar{C}_M^k) \\ d\bar{C}_M^k &= \sum_i m_i d\bar{C}_i^k - *(d\bar{C}_M^k) \end{aligned} \qquad i = 1,\ldots,n$$

where $\bar{C}_i^k$ and $d\bar{C}_i^k$, $i = 1,\ldots,n$, are defined in (9) and (10) above.

For each of the remaining growth factors A_r, $r = K, M, S, L, V, W$, given above we compute a vector of industry coefficients $\underset{\sim}{a}_r = (a_{r1},\ldots a_{rn})$ where, for example, a_{ri} represents the value of a particular resource required to produce a single value unit of industry i output. Descriptions of the construction of $\underset{\sim}{a}_r$ for each r will be given in conjunction with the discussion of the respective numerical results. Given the vectors $\underset{\sim}{a}_r$, $r = K, M, S, L, V, W$, the initial average farm/nonfarm family value of each growth factor index ($\bar{A}_r^k$) and the redistribution-induced change in that value ($d\bar{A}_r^k$) can be estimated as

$$(23)\qquad \begin{aligned} \bar{A}_r^k &= \underset{\sim}{a}_r \bar{\underset{\sim}{X}}^k - *(\bar{A}_r^k) \\ d\bar{A}_r^k &= \underset{\sim}{a}_r d\bar{\underset{\sim}{X}}^k - *(d\bar{A}_r^k) \end{aligned} \qquad \begin{aligned} &k = F/NF \\ &r = K,M,S,L,V,W \end{aligned}$$

where $\bar{X}^k$ and $d\bar{X}^k$ are estimated according to (18) and (19) above.

Again the direct effects alone can be estimated as

$$(24) \qquad d\bar{A}_r^k(\text{dir.}) = \underset{\sim}{a}_r \, d\bar{X}^k(\text{dir.}) - *(d\bar{A}_r^k(\text{dir.}))$$

where $d\bar{X}^k(\text{dir.})$ is as given in (20) above.

6. THE "ADDING UP" PROBLEM : A METHOD OF CORRECTION

In section IV.3 above we outlined a procedure for estimating the all-Taiwan average farm/nonfarm family level ($\bar{E}^k$) and mix ($\bar{C}_1^k,\ldots,\bar{C}_n^k;\bar{C}_o^k$) of expenditure from the sample data. Since the final form of the regression equation for each item was chosen on the basis of statistical fit criteria alone, the resultant set of equations does not satisfy what in demand analysis is known as the "adding up" criterion; that is $\bar{E}^k \neq \sum_i \bar{C}_i^k + \bar{C}_o^k$, i = 1,...,n, estimated average family total expenditure is not equal to the sum of the estimates of its component parts.[7] More importantly for our purposes, for each change in the farm/nonfarm family size distribution of disposable income considered we also have that $d\bar{E}^k \neq \sum_i d\bar{C}_i^k + d\bar{C}_o^k$, i = 1,...,n ; i.e., the estimates of the induced changes in expenditure on individual items do not sum to the estimated change in total expenditures as they should.

The usual way of "dealing" with the "adding up" problem in demand studies in which individual item demand projections over time are of primary interest is simply to note that the discrepancy $(\sum_i \bar{C}_i^k + \bar{C}_o^k - \bar{E}^k)$ is small relative to $\bar{E}^k$, and to proceed as if the problem did not exist. In the context of the present study in which we wish to consider simultaneously the level and mix of total expenditure, and the changes in both induced by a change in the size distribution of disposable income,

such a procedure will not suffice.

In principle it would of course be possible to impose a "consistent" set of equations on the data. However, this would require that the equations for each individual expenditure item and total expenditure be linearly related to disposable income. If this were the case then all the partial derivatives in equations (10) above would not depend on family size (N^k) and would be constant for all income levels. Under a change in the size distribution of disposable income which preserved the initial average farm/nonfarm family level of disposable income ($\bar{Y}^k$), viz., a set of dY_e^k, e = 1,...,31, such that $d\bar{Y}^k = \sum_i \hat{1}_e^k \, dY_e^k = 0$, we would have from (10) that $d\bar{E}^k = 0$ and $d\bar{C}_i^k = 0$ for i = 1,...,n;o, so indeed the consistency requirement $d\bar{E}^k = \sum_i d\bar{C}_i^k + d\bar{C}_o^k$ would be trivially satisfied. Although there would be a shift in expenditures between below- and above-"poverty" level income groups under such a redistribution scheme, there would apriori be no changes in the economic growth factor indices. In equations (21), (22) and (23) above, $d\bar{S}^k$, $d\bar{C}_M^k$ and $d\bar{A}_r^k$, r = K,M,S,L,V,W, all would equal zero. However, since our statistical analysis has shown that family expenditures in total and for most individual items are not linearly related to family disposable income, the cost of imposed consistency in the set of regression equations would be a large measure of accuracy in the numerical results.

The alternative adopted here is to include a correction term $b(\bar{C}_o^k - \bar{E}^k)$ or $(\sum_i d\bar{C}_i^k + d\bar{C}_o^k - d\bar{E}^k)$ where relevant, in each of the estimates $\bar{C}_o^k - \bar{E}^k)$ or $(\sum_i d\bar{C}_i^k + d\bar{C}_o^k - d\bar{E}^k)$ where relevant, in each of the estimates as shown in (22) and (23) above. No correction terms are required in equations (21) because only the single equation for total expenditures is involved in those estimates.

For equations (22) above the correction terms are

$$(22') \qquad \begin{aligned} *(\bar{C}_M^k) &= [\ ](\textstyle\sum_i \bar{C}_i^k + \bar{C}_o^k - \bar{E}^k) && k = F/NF \\ *(d\bar{C}_M^k) &= [\ ](\textstyle\sum_i d\bar{C}_i^k + d\bar{C}_o^k - d\bar{E}^k) && i = 1,\ldots,n \end{aligned}$$

where the square bracketed term

$$[\ ] = \frac{\sum_i m_i \bar{C}_i^k}{\sum_i \bar{C}_i^k} \qquad i = 1,\ldots,n$$

is a measure of the average "competing" import ratio of all expenditure items.

For equations (23) above the correction terms are

$$(23') \qquad \begin{aligned} *(\bar{A}_r^k) &= [\ ](\textstyle\sum_i \bar{C}_i^k + \bar{C}_o^k - \bar{E}^k) && k = F/NF\ ;\ r = K,M,S,L,V,W \\ *(d\bar{A}_r^k) &= [\ ](\textstyle\sum_i d\bar{C}_i^k + d\bar{C}_o^k - d\bar{E}^k) && i = 1,\ldots,n \end{aligned}$$

where the square bracketed term

$$[\ ] = \frac{\underline{a}_r(I-A)^{-1}(I-m)\bar{\underline{C}}^k}{\sum_i \bar{C}_i^k} \qquad i = 1,\ldots,n$$

is a measure of the average growth factor index value for all expenditure items.

For equation (24) we also have

$$(24') \qquad *(d\bar{A}_r^k(\text{dir.})) = [\ ](\textstyle\sum_i d\bar{C}_i^k + d\bar{C}_o^k - d\bar{E}^k) \qquad k = F/NF\ ;\ r = K, M,S,L,V,W$$

where the square bracketed term is

$$[\ ] = \frac{\underline{a}_r(I-m)\bar{\underline{C}}^k}{\sum_i \bar{C}_i^k} \qquad i = 1,\ldots,n$$

7. THE METHODOLOGY FOR THE KOREAN CASE

The methodology used for the Korean case is in general the same as that described above for the Taiwan case except for minor differences necessitated by the relative lack of detail in the available data for Korea. The Korean survey data are given in won (US$1=255won)[8] per month in terms of 8 arbitrary income intervals, '≤2,000,' '2,000-4,000,'..., '14,000≤' won, so for the sake of comparability with the Taiwan results, the changes dY_e^k given by applying equation (3) to the entries of Table V.4 below were converted to annual changes before the potential effects on economic growth factors were calculated. The Korean income and expenditure data apply only to urban wage and salary earner families. With two changes in interpretation, i.e., $e = 1,\ldots,8$ and k represents only urban wage and salary earner households, all the equations set out above for the Taiwan case apply to the Korean case as well. In fitting the regression equations to the Korean sample data, survey results for 1963 and 1964 were pooled in order to increase the number of observations to 16.

In hypothesizing changes in the size distribution of income a slightly different procedure was followed as will be explained in section V.3 below. Rather than setting a "poverty" level as in the Taiwan case, it was decided to consider the effects of raising the mean income levels of the lowest two income groups, groups 1 and 2, each by 30 percent and distributing the burden on the upper 6 groups. This difference itself is not significant but it does add to the difficulties in comparing the numerical results in the two country cases as noted below in chapter VIII.

The allocation of the expenditure survey items, which themselves

differ between the two countries in the degree of detail, to the input-output table sectors of course differs between the two cases. The allocation used for the Korean case is also given in the supplementary tables.

The 1963 Korean input-output tables did not provide the means to assume values for the coefficients $m_i = dM_i/dC_i$, $i = 1,\ldots,n$, as described above. Instead we assumed that the effect on net "competing" imports of any small change in final demand is such as to preserve the pre-redistribution ratio of net imports to total final demand for each industrial sector; i.e., $m_i = m_i^{1963}$. Note that this is not equivalent to (16) in section IV.4 above for the Taiwan case. For the Korean case we also carried out the computations under the two extreme assumptions; Case I : $m_i=0$ and Case II : $m_i=1$, as well as for Case III : $m_i=m_i^{1963}$, all for $i = 1,\ldots,n$. Note also that for the Korean case the m_i refer to net imports, that is, the difference between imports and exports, rather than to imports alone. This accounts for the negative values for certain sector m_i^{1963} coefficients shown in the appendix table on page 127; the sectors for which m_i^{1963} is negative were net exporting sectors in 1963.

For the Korean case no correction was made for the "adding up" problem. First, because the quality of the data did not seem to warrant it, and second, because the difference $(\sum_i \bar{C}_i^k + \bar{C}_o^k - \bar{E}^k)$ from equations (22') and (23') above, calculated in terms of the general expenditure categories was only 2 percent of $\bar{E}^k$ as given by equation (9) in section IV.3 above. However, later examination suggested that the difference $(\sum_i d\bar{C}_i^k + d\bar{C}_o^k - d\bar{E}^k)$ may be significantly negative. Hence the Korean results may embody a downward bias which has been corrected for in the Taiwan case.

V. THE INCOME DISTRIBUTION "PROBLEM"

The view of the income distribution "problem" which underlies the whole of our analysis is that in developing countries there may exist groups at the lower end of the income scale which are disenfranchised to the extent that they do not materially participate in the production nor consumption of total output and as a result live under conditions which would fulfill even the most stringent definition of poverty. The purpose of redistribution policy, then, is to improve the welfare of these possibly large groups by bringing them into the economic sphere. From this point of view it becomes perfectly reasonable to speak in terms of policies which may not be strictly in the interest of middle income groups as well as high income groups; the income distribution "problem" as we see it is really primarily poverty rather than inequality per se. Income redistribution is a means to an end, as well as an end in itself.

At no point do we argue that economic growth is not necessary to solving the poverty problem; rather we suggest that economic growth need not and should not necessarily precede the implementation of measures to improve the relative position of the low income groups. Bringing these groups into the economic sphere may provide a strong positive impetus for growth. Furthermore, there is as yet little evidence to suggest that economic growth is sufficient to increase the relative welfare of the poor groups. In fact a recent UN ECAFE paper summarizes evidence that suggests that in the Philippines over the period 1956-65 and in India over the period 1953/55-1961/64 the overall degree of income inequality as measured by the concentration ratio tended to increase.[1] A recent paper finds the same tendency in Puerto

Rico, Argentina, and Mexico.[2] That such findings are consistent with Kuznets' generalization that in early stages of development relative inequality tends to increase and in later stages to decrease[3] is of little comfort since when, or even whether, the stages of declining inequality will be reached is uncertain, depending upon government policies, the nature of the growth path selected, and sources of existing inequities, as well as a multitude of other factors specific to individual countries. In addition it seems highly likely that economic growth itself and the policies used to promote it may themselves create vested interests opposed to redistribution of any kind. Hence, policies must be developed which will further both the objectives of growth and equity simultaneously. And if such policies prove illusive, then development priorities must be re-ordered.[4]

At early stages of development the most important policy for reducing social inequity may be the redistribution of land rights since existing inequities are often based in the distribution of those rights. That the carrying out of widespread land reform can also lead to significant increases in output is shown by the cases of Taiwan and Japan.[5] Consideration of land reform policies is beyond the scope of the present study. However, their neglect herein should not be interpretted as a reflection of their relative importance in the context of the discussion of the relation between economic growth and social equity.

1. EXISTING SIZE DISTRIBUTIONS OF INCOME

It may be useful first to note the position of Taiwan and Korea in Asia, and in contrast with the U.S., in terms of per capita income

level. The table below gives 1970 national income per capita in terms of U.S. dollars in the first column, and the average annual rates of growth of GDP per capita valued in market prices in the second column.

Table V.1 : COMPARATIVE STATISTICS ON PER CAPITA INCOME, US$

country	national income per capita in 1970, US$	average annual rate of growth of GDP per capita at mkt. prices
U.S.	4,356	
1950-60		1.2%
1960-68		3.7
JAPAN	1,669	
1952-60		6.8%
1960-68		9.2
TAIWAN	295	
1951-60		3.8%
1960-68		7.1
S. KOREA	240	
1953-60		2.5%
1960-68		5.6
PHILIPPINES	150	
1950-60		3.7%
1960-68		1.1

Source : Taiwan Statistical Data Book 1972, Council for International Economic Cooperation and Development, Executive Yuan, Rep. of China, pp.253, 261.

In 1970 Taiwan's per capita national income level amounted to less than 1/15 of the U.S. level or 1/6 of the Japanese level, and Korea's was even lower. In the past decade both Taiwan and Korea have performed well in terms of increasing GDP per capita, but neither has been able to match the performance of Japan. That the developing countries in general will never be able to catch up to the advanced nations in

terms of per capita income level is quite clear, but given rapid economic growth as in the cases of Taiwan and Korea, there is little doubt that with proper distribution of the gains from that growth the worst forms of poverty can in time be eliminated.

a. TAIWAN

In this section we attempt to characterize the existing size distribution of income in Taiwan as of 1964-66.[6] The Taiwan survey data for 1964 and 1966 show almost the same degree of overall relative inequality; the Gini ratio for both years is 0.36 and Oshima's index of decile inequality[7] is 0.26 for 1964 and 0.27 for 1966. In terms of these indices Taiwan compares favorably with Japan and the U.S. - Oshima's index has values of 0.28 for the U.S. in 1959 and 0.25 for Japan in 1963, and the corresponding Gini ratios are 0.37 and 0.35, respectively.[8] Whether this result reflects deficiencies in the Taiwan survey data or whether Taiwan indeed has surpassed the degree of relative equality the U.S. had reached in 1959 is extremely difficult to determine. Note, however, that it is by no means clear that what degree of inequality can or should be permitted is independent of the absolute average level of living. In particular, it may be that the lower is the average level of income the less tolerable, in terms of political stability, humanitarianism, or whatever, is any given degree of relative inequality. For the case of Taiwan, international comparisons aside, casual observation is enough to suggest that there is much to be done in this field.

A comparison of the Taiwan farm and nonfarm sector distributions for 1966 yields two interesting points. First, the mean annual house-

hold income of the farm sector, NT$32,320, is almost as high as that for the nonfarm sector, NT$34,080; and second, the Gini ratio for both sectors, after rounding, is 0.36 and the decile shares themselves show only minor differences.[9] With regard to the first point, calculating the average agricultural and non-agricultural household income levels from the Taiwan national accounts data suggests the same inter-sector relationship.[10] Concerning the second point, a plausible explanation for the low degree of inequality in the Taiwan farm sector is the land reform program initiated in 1949.[11] The success of the measures employed in raising levels of production and hence the average level of farm income[12] also serves to explain in part the low degree of overall inequality noted above. However, since in the 1966 survey it is estimated that 69 percent of all families were nonfarm families, this explanation alone is not sufficient.

A perhaps more meaningful way to characterize income distribution is in terms of occupational groups, or more precisely, according to the occupation of the family head. Table V.2 below presents the various occupational groups ranked in order of average annual disposable income. All income figures are in terms of U.S. dollar equivalents (US$1=NT$40). Column 1 gives average family total annual disposable income, column 2 gives disposable income per family member, and column 3 gives disposable income per male adult equivalent unit, as explained above, a measure of family size adjusted for age-sex composition. The numbers in parentheses give the rank of each occupational group in the respective income scales.

Table V.2 : DISPOSABLE INCOME RANKINGS OF FAMILIES BY OCCUPATION OF FAMILY HEAD IN 1966, US$

occupation of family head	family disposable income, US$		
	1 total family	2 per family member	3 per adult equivalent unit
MANAGERS OR SUPERINTENDENTS	2044 (1)	346 (1)	496 (1)
PROFESSIONALS	1296 (2)	272 (2)	389 (2)
EMPLOYEES OF PRIV. ENTERPRISE	1284 (3)	238 (4)	350 (4)
EMPLOYEES OF PUB. ENTERPRISE	1200 (4)	216 (5)	325 (5)
EMPLOYEES OF ASSNS.& NONPROFIT ORG.	1189 (5)	244 (3)	374 (3)
OWNERS OF SMALL FIRMS	1003 (6)	163 (9)	250 (9)
GOVT. EMPLOYEES , TEACHERS & SERVICEMEN	909 (7)	179 (8)	274 (8)
OTHER INDUSTRIES	768 (9)	202 (7)	279 (7)
GENERAL LABORERS	698 (10)	143 (10)	180 (11)
INDUSTRIAL LABORERS	646 (11)	122 (11)	189 (10)
PERSONAL SERVICE & REPAIR WORKERS	623 (12)	114 (12)	179 (12)
UNEMPLOYED & RETIRED	524 (13)	211 (6)	305 (6)
ALL NONFARM FAMILIES	844	160	237
ALL FARM FAMILIES	798 (8)	111 (13)	144 (13)

Source : Report on the Survey of Family Income and Expenditure in Taiwan 1966, Bureau of Accounting and Statistics, Taiwan Provincial Govt., June 1968.

We first note that with the exception of the rank order of 'general laborers' and 'industrial laborers' the rankings in terms of per family member and per male adult equivalent unit are identical. Since the latter is in fact the better indicator of absolute family welfare we shall in what follows compare the rank order of column 3 with that of column 1.

In terms of total family disposable income, column 1, farmers are ranked 8th and the lowest two groups are 'personal service and repair workers' and 'unemployed and retired.' The average farm and nonfarm family total disposable income levels differ by only 6 percent of the

former. Adjusting for family size, moving to column 3 in the table, results in some noteworthy changes. First, the rank of 'farmers' falls from 8th to 13th and the difference between the average farm and non-farm family disposable incomes per male adult equivalent unit is some 65 percent of the former. Some allowance must of course be made for cost of living differences but even so these computations suggest that in Taiwan the poverty problem is by far the most serious in the farm sector. Secondly, the group 'unemployed and retired' is raised from 13th position in column 1 to 6th position in column 3, presumably due to the presence of high or middle income small family units the head of which is retired and the fact that the unemployed are probably largely singles. Both in terms of total family disposable income and disposable income per male adult equivalent unit the poorest nonfarm occupational groups are 'general laborers,' 'industrial laborers,' 'personal service and repair workers,' and presumably the 'unemployed' who unfortunately cannot be separated from the 'retired' in the survey data as published.

b. KOREA

The extreme incompleteness of the Korean data, as discussed in section III.2 above, renders an attempt to characterize the overall size distribution of income futile. Hence, we shall simply give the distribution of urban wage and salary earner family disposable monthly income in Table V.4 below along with the hypothesized distributions and note here that Oshima's index of decile inequality has value 0.21 indicating, as expected for such a homogeneous group, a low degree of relative inequality.

2. TAIWAN : HYPOTHESIZED SHIFTS IN THE FARM AND NONFARM SIZE DISTRIBUTIONS OF DISPOSABLE FAMILY INCOME

In line with the above view of the income distribution "problem" we postulate income redistribution schemes that entail raising low income families up to some specified "poverty" level and allocating the "burden" on families initially above that minimum. For expositional convenience we shall speak in terms of redistributive transfers and implicit tax rates. Although tax and transfer policies in the future conceivably could contribute to income redistribution in Taiwan, it is unlikely that under existing tax laws and administration much could be achieved at present exclusively through their use. Again, we must emphasize that these terms are used only for expositional convenience to represent changes in the size distribution of income however achieved.

The income concept appropriate for our study is disposable income. The definition we employ is that disposable household income is equal to total income, in cash and in kind, of the household from all sources less all tax payments. We do not deduct interest payments and transfers as is usually the case in national income accounting. Our rationale for including the latter item in disposable income is that transfers are mostly gifts to private individuals and hence are subject to the discretion of the household, and for including the former the rationale is that interest payments are an index of the real gain gotten through the use of borrowed capital which should not be excluded.

We first consider nonfarm families. The first problem is to set the "poverty" level of family disposable income. In the 1966

sample data the lowest ranked occupational group, "retired and unemployed," is listed as having average annual family disposable income of NT$20,968 (US$524). We noted above that in per male adult equivalent unit terms this group is ranked much higher. As a convenient approximation to the average "retired and unemployed" family disposable income we adopt the mean disposable income level of nonfarm income group 9, NT$21,858, as the "poverty" level for a "large" redistribution scheme. That is, a "large" redistribution scheme in the nonfarm sector raises the average annual disposable income of each low income group up to NT$21,858 per annum, and allocates the implicit tax burden on income groups initially above that level according to four alternative plans :

(A) equal absolute burden

(B) equal proportional burden

(C) progressive burden

(D) progressive burden with implicit tax revenue equal to the sum of total transfers and the fall in private savings.

Alternatives (A) and (B) are self-explanatory. Alternative (C) entails setting an exemption level of NT$21,858 per family and calculating the constant implicit rate of tax that would generate tax revenues just sufficient to finance the transfers to the sub-"poverty" level families. Such a tax is progressive in terms of total disposable income.

In Taiwan it does indeed seem to be true that the marginal savings rate increases with disposable income level so any decrease in inequality which does not alter the mean of the distribution will result in a fall in private savings. Alternative (D) above involves the same exemption level of NT$21,858 but the implicit tax rate is raised

to the point at which tax revenues generated equal the sum of all income transfers and the fall in private savings so that total, private plus public, domestic saving is maintained at its pre-redistribution level. The significance of this is further discussed in conjunction with the discussion of the potential effects of redistribution on the savings-investment gap.

What does a change in the size distribution of nonfarm family disposable income of the magnitude envisioned entail? Initially, 35.6 percent of all nonfarm families are in income groups the mean disposable income level of which are at or below the assumed "poverty" level of NT$21,858. The initial average disposable income of these groups considered together is NT$16,529 so that the effect of redistribution is to raise this by NT$5,329 up to NT$21,858. Hence the magnitude of the "large" redistribution scheme for the nonfarm sector can be characterized as raising the level of living of one third of all nonfarm families, some 550,000 families, by an average of some 30 percent. In terms of those who finance the implicit transfers, for alternatives (A), (B) and (C) the implicit "tax bite" on the average above-"poverty" level family is NT$2,941 or 6.8 percent of the initial average disposable income of NT$43,271. For alternative (D) the required tax bite is slightly higher at 7.1 percent. These figures are given in Table V.3 below.

In the table F/NF represents farm/nonfarm, A, B, C and D refer to "large" redistribution schemes, and E and F, as will be explained below, refer to "small" redistribution schemes in either sector. Hence, for example, NF-C represents a "large" redistribution in the nonfarm sector in which the burden of the implicit transfers is allo-

Table V.3 : HYPOTHESIZED INCOME REDISTRIBUTION SCHEMES

income groups	percent of sector k families	ave. initial annual disp. income, NT$ Y	changes in average annual disposable income hypothesized for sector k				cumulative disp. income shares	
nonfarm "large" redistn. scheme			NF-A,NF-B,NF-C	% of Y	NF-D	% of Y	initial	post-red.
1-9	35.6	16,529	+5,329	+32.2	+5,329	+32.2	17.4	23.0
10-31	64.4	43,271	-2,941	-6.8	-3,079	-7.1	82.6	77.0
nonfarm "small" redistn. scheme			NF-E	% of Y	NF-F	% of Y	initial	post-red.
1-6	16.7	12,568	+3,305	+26.3	+3,305	+26.3	6.2	7.9
7-31	83.3	38,012	-663	-1.7	-693	-1.8	93.8	92.1
farm "large" redistn. scheme			F-A,F-B,F-C	% of Y	F-D	% of Y	initial	post-red.
1-9	37.7	15,697	+4,957	+31.6	+4,957	+31.6	18.7	24.6
10-31	62.3	41,475	-3,005	-7.2	-3,488	-8.4	81.3	75.4
farm "small" redistn. scheme			F-E	% of Y	F-F	% of Y	initial	post-red.
1-6	17.7	12,061	+2,760	+22.9	+2,760	+22.9	6.7	8.3
7-31	82.3	35,977	-593	-1.6	-701	-1.9	93.3	91.7

cated according to alternative (C) as explained above.

In terms of cumulative disposable income shares this "large" nonfarm sector redistribution can be characterized as a rise in the lowest 35.6 percent of nonfarm families' share of disposable income from 17.4 to 23.0 percent. Note that after income redistribution, due to our definition of income groups, we cannot accurately construct the traditional measures of overall income inequality such as the Gini ratio and the coefficient of variation. This is because after hypothetical redistribution it is not necessarily true that each household in income group 2 has disposable income higher than each household in group 1, that each household in income group 3 has disposable income higher than each household in group 2, and so on. However, since our target is framed in terms of improving the lot of the lower groups rather than in terms of achieving some specific reduction in the value of some such overall index of inequality, and in view of the deficiencies of such traditional measures,[13] we shall be quite content to gauge the size of a hypothetical redistribution scheme in terms of its effect on the income share of the low income groups.

In view of practical considerations and political reality it seems wise to consider an alternative "small" nonfarm redistribution scheme involving setting a "poverty" level of NT$15,873. The "small" redistribution scheme raises the disposable income levels of some 16.7 percent of all nonfarm families from an initial average level of NT$12,568 to NT$15,873, a 26.3 percent increase. The required implicit tax bite on families initially above the "poverty" level averages less than 2 percent of average initial disposable family

income for both alternatives (E) and (F), the "small" redistribution counterparts to alternatives (C) and (D), respectively. That is, alternative (E) embodies a progressive implicit tax rate sufficient to generate tax revenue to offset the transfers only, and (F) embodies a slightly higher tax rate so that total domestic savings does not fall following "small" redistribution. In terms of cumulative shares the disposable income share of the lowest 16.7 percent of nonfarm families increases from 6.2 to 7.9 percent.

Among the reasons for considering nonfarm and farm families separately, two seem most important; the kinds of policy measures that can be used to influence the income size distribution are likely to differ between sectors, and family responses to the induced changes in disposable income may differ as well. The latter prompted the adoption of the following procedure. In order to be able to gauge the inter-sector differences in the effects of income redistribution we consider farm sector redistribution schemes of roughly the same magnitudes as those outlined for nonfarm families above. The relevant figures are also presented in Table V.3.

For the farm sector the alternative "poverty" levels for "large" and "small" redistribution schemes were set at NT$20,655 (US$516) and NT$14,821 (US$371), respectively, and the burden of the implicit transfers was alternatively allocated according to the same procedures used for the nonfarm sector redistribution schemes. Hence in the lower half of Table V.3, F-A, F-B, F-C and F-D correspond to "large" farm sector redistribution, and F-E and F-F correspond to "small" redistribution, where both F-D and F-F by construction embody no fall in total domestic savings.

"Large" farm sector redistribution raises the average disposable income of the lowest 37.7 percent of all farm families by NT$4,957, some 31.6 percent of the initial level, and raises the cumulative disposable income share from 18.7 to 24.6 percent. "Small" farm sector redistribution raises the average disposable income of the lowest 17.7 percent of farm families by NT$2,760, some 22.9 percent of the initial level, and raises the cumumlative income share from 6.7 to 8.3 percent. The implicit tax burden on the upper income groups for each farm sector redistribution scheme is, as can be seen from the table, roughly equivalent in percentage terms to the burden for the corresponding nonfarm sector redistribution scheme. For example, for NF-D -7.1 percent is roughly equivalent to the -8.4 percent for F-D, for NF-E and F-E the respective values are -1.7 and -1.6, and so on.

Note that this rough equivalence we have constructed is in terms of each sector treated separately, not in terms of the economy as a whole. For Taiwan as a whole the redistribution schemes obviously are not of equal magnitude, "large" redistribution schemes in the nonfarm sector benefit some 550,000 families as opposed to 266,000 for farm sector "large" schemes. However, each farm/nonfarm sector "large" redistribution involves an average increase in the level of living of the poorest third of all families in the respective sector of over 30 percent at an average implicit tax cost to the above-"poverty" groups of 7 to 8 percent of disposable income. Hence, the redistribution-induced effects on the average family of each sector can be directly compared in terms of magnitude as well as direction. For "small" redistribution schemes the same relationship holds.

In many contexts, since the difference between the urban and

rural mean family income levels is large, policies which transfer income from the urban to the rural sector are likely to be effective in reducing the overall degree of inequality; for example, such policy measures as financing rural health care facilities through urban taxation and altering the urban-rural terms of trade come to mind. However, for the Taiwan farm and nonfarm sectors the inter-sector difference in the mean family disposable income levels, as discussed in section V.1.a. above, is not an important source of inequality in the overall distribution of income. While it is of course still sensible to speak of redistribution from the nonfarm rich to the farm poor, the near equality of the Gini ratios for the two sectors suggests that within-sector income transfers would be as effective in reducing the incidence of poverty. For these reasons, no attempt was made to estimate the potential effects of inter-sector redistribution schemes.

3. KOREA : HYPOTHESIZED SHIFTS IN THE URBAN WAGE AND SALARY EARNER FAMILY SIZE DISTRIBUTION OF DISPOSABLE INCOME

For the Korean case we are only able to simulate income redistribution within the group of urban wage and salary earner families, less than 14 percent of all families. We have eight income groups indexed in ascending order of mean disposable family income by $e = 1, \ldots, 8$. The simulation procedure, except for minor differences, is equivalent to that used for the Taiwan case. For the Korean case we consider only a single set of implicit income transfers which raise the average family disposable incomes of the poorest two groups, groups 1 and 2 which are about 35 percent of all urban wage and salary earner families, by 30 percent each. Given these transfers, the

burden is distributed on the upper 6 income groups, as in the Taiwan case, according to (A) absolute equal burden, (B) equal proportional burden, (C) progressive burden, all such that urban wage and salary earner average family disposable income is held at its pre-redistribution level, $\bar{Y}^k$ = 5774 won per month (US$22.60), and (D) progressive burden with implicit tax revenues sufficient to offset both the income transfers and the induced fall in private saving. Alternatives (C) and (D) involved setting an exemption level of 3835 won per month and computing the required constant marginal rates of tax. The resultant urban wage and salary earner disposable income distributions are given below in Table V.4.

Table V.4 : KOREA : INITIAL (1963) AND HYPOTHESIZED URBAN WAGE AND SALARY EARNER FAMILY DISTRIBUTIONS OF DISPOSABLE INCOME, WON PER MONTH

income group	initial distn.		$Y_e^{k'}$: post-redistn. mean disposable income			
	$\hat{1}_e^k$	$\hat{Y}^k$ mean disp. income (1)	$d\bar{Y}^k = 0$			total savings constant (5)
			absolte. equal burden (2)	prop. equal burden (3)	prog. burden (4)	
1	.0733	1,490	1,937	1,937	1,937	1,937
2	.2796	2,950	3,835	3,835	3,835	3,835
3	.2859	4,850	4,417	4,569	4,729	4,702
4	.1424	6,550	6,117	6,171	6,227	6,155
5	.0901	8,520	8,087	8,027	7,963	7,838
6	.0503	10,350	9,917	9,751	9,576	9,402
7	.0241	12,450	12,017	11,730	11,426	11,196
8	.0545	17,110	16,677	16,119	15,532	15,178
total	1.0000	5,774	5,774	5,774	5,774	5,711

The redistribution schemes themselves are represented, as before

for the Taiwan case, as sets of changes dY_e^k , e = 1,...,8, k = urban wage and salary earner families, derived from the table by subtracting the entries of column (1) from those of column (2)-(5) according to equations (3) in section IV.2; $dY_e^k = Y_e^{k'} - \hat{Y}_e^k$. Corresponding to the Taiwan nonfarm "large" redistribution schemes we have four income redistribution schemes A, B, C and D representing the move from column (1) in Table V.4 to columns (2), (3), (4) and (5), respectively.

The implicit tax cost of the income transfers to the poorest two income groups, the burden for redistribution schemes A, B and C, amounts to some 5.8 percent of the average family income of groups 3-8 taken together of 7480 won per month. The benefit to the poorest 35 percent of all urban wage and salary earner families is a rise in the standard of living of some 30 percent. In terms of cumulative disposable income shares these redistribution schemes can be characterized as a rise in the share of the poorest 35 percent of all urban wage and salary earner families from 16.2 percent to 21.0 percent. Note that this roughly corresponds to "large" nonfarm redistribution for Taiwan as shown in Table V.3.

VI. TAIWAN : ESTIMATED POTENTIAL EFFECTS OF INCOME REDISTRIBUTION

1. ON THE MIX OF PRIVATE FARM AND NONFARM FAMILY EXPENDITURE

The potential effects of income redistribution we attempt to measure are those which work through the pattern of private expenditure. Hence it is the induced changes in that pattern which determine the magnitudes of the effects on economic growth prospects. In this section we shall look at the estimated potential income redistribution-induced changes in the farm and nonfarm average family expenditures for the major categories of expenditure as given in the 1966 Taiwan family income and expenditure survey. Separate equations were fit to each general category of expenditure, for example total food, as well as to each sub-item, rice, flour, sweet potato, etc., using the procedures outlined in the chapter on methodology above. Hence, in general the equations used in constructing the entries in Table VI.1 below do not correspond to those for the more detailed breakdown of private expenditures allocated over the industrial sectors of the input-output table.[1]

The entries in the table are the percentage changes in the average farm/nonfarm family expenditure pattern induced by the various redistribution schemes [2], computed according to equations (10) above, also rewritten below the table for reader convenience. Since we are primarily interested in the induced changes in the mix of private expenditures we shall focus our attention on redistribution schemes F-D, F-F, NF-D and NF-F since by construction they embody no change in the level of average farm/nonfarm family expenditures.

The impression which emerges is that for "large" redistributions F-D and NF-D in the farm and nonfarm sectors, respectively, the induced

Table VI.1 : ESTIMATED POTENTIAL PERCENTAGE CHANGES IN AVERAGE FARM/NONFARM FAMILY EXPENDITURE PATTERN INDUCED BY INCOME REDISTRIBUTION

	nonfarm redistribution schemes					farm redistribution schemes				
	"large"			"small"		"large"			"small"	
	NF-A	NF-C	NF-D	NF-E	NF-F	F-A	F-C	F-D	F-E	F-F
1. TOTAL FOOD	0.81	1.21	1.01	0.42	0.36	0.20	0.47	0.13	0.14	0.04
2. TOTAL CLOTHING & PERSONAL EFFECTS	-1.44	-1.63	-1.90	-0.57	-0.65	0.36	0.52	-0.34	0.16	-0.10
3. TOTAL RENT & WATER CHARGES	-0.58	-0.60	-0.86	-0.22	-0.30	1.02	1.44	0.79	0.46	0.27
4. TOTAL FUEL & LIGHT	1.85	2.37	2.20	0.89	0.83	1.32	1.81	1.31	0.60	0.44
5. TOTAL FURNITURE, FURNISHINGS & HOUSEHOLD EQUIPMENT	-2.90	-3.66	-3.99	-1.19	-1.29	-1.65	-2.55	-3.88	-0.74	-1.13
6. TOTAL HOUSEHOLD OPERATION	0.19	-0.47	-0.82	-0.10	-0.20	0.92	1.67	1.28	0.44	0.32
7. TOTAL PERSONAL & MEDICAL CARE	1.63	1.97	1.75	0.73	0.67	0.28	0.55	0.28	0.17	0.09
8. TOTAL TRANSPORTATION & COMMUNICATION	-2.28	-2.63	-2.91	-0.89	-0.97	8.10	14.68	10.78	3.85	2.68
9. TOTAL RECREATION & AMUSEMENT	3.30	6.82	6.31	1.95	1.79	5.14	3.82	1.83	1.30	0.71
10. TOTAL MISCELLANEOUS CONSUMPTION EXPENDITURES	-4.72	-6.27	-6.65	-1.89	-2.00	-1.87	-2.43	-3.11	-0.67	-0.86

Each entry is computed as $(d\bar{C}_i^k/\bar{C}_i^k) \times 100$ where

$$d\bar{C}_i^k = \sum_e \hat{l}_e^k \left(\partial f_i^k/\partial Y^k\right)\Big|_{\hat{Y}_e^k, \hat{N}_e^k} dY_e^k$$

$$\bar{C}_i^k = \sum_e \hat{l}_e^k \, f_i^k(Y^k, N^k)\Big|_{\hat{Y}_e^k, \hat{N}_e^k}$$

$i = 1,\ldots,10$; $e = 1,\ldots,31$; $k = F/NF$

percentage changes are generally small, except for the 10.8 percent increase in farm sector expenditures on TOTAL TRANSPORTATION & COMMUNICATION, the changes in nonfarm sector TOTAL RECREATION & AMUSEMENT and TOTAL MISCELLANEOUS CONSUMPTION EXPENDITURES - including financial services, education and research, ceremonial expenditures and others - of 6.31 and -6.65 percent, respectively, and the decrease in expenditure on TOTAL FURNITURE, FURNISHINGS & HOUSEHOLD EQUIPMENT of just under 4 percent for each sector. For "small" redistribution schemes F-F and NF-F the direction of change for each item is the same as for the corresponding "large" redistribution schemes and the magnitudes are correspondingly smaller.

It must be emphasized that these estimates are for the average farm/nonfarm family in response to income redistribution. There are no inferior commodities so expenditures on each item by sub-"poverty" level income groups rise as their income rises while for above-"poverty" level income groups expenditures fall as a result of the decline in their incomes. Hence, for example, for redistribution scheme NF-D the 3.99 percent decline in average nonfarm family expenditure on TOTAL FURNITURE, FURNISHINGS & HOUSEHOLD EQUIPMENT means simply that the decline in expenditure by above-"poverty" level groups exceeds the increase in expenditure on the part of sub-"poverty" level groups.

Comparison of the farm and nonfarm sector responses to redistribution schemes F-D and NF-D, respectively, shows that the signs correspond except for TOTAL RENT & WATER CHARGES, TOTAL HOUSEHOLD OPERATION and TOTAL TRANSPORTATION & COMMUNICATION. For these three expenditure categories the average nonfarm family response is negative while that for the farm sector is positive. For the other seven expenditure

categories, the absolute values of the changes for nonfarm families exceed the corresponding absolute values for farm families, even though by construction redistribution schemes F-D and NF-D are roughly equivalent in magnitude as are F-F and NF-F. From this we tentatively conclude that the farm sector mix of expenditure is somewhat less sensitive to changes in the size distribution of family disposable income than is that for the nonfarm sector[3], whereas, as we shall see shortly, for the level of total expenditure the opposite holds true.

2. ON THE SAVINGS-INVESTMENT GAP

a. SETTING AND SUMMARY OF FINDINGS

In applying the concept of the savings-investment gap, as usually defined, to the case of Taiwan mention must be made of the role of U.S. aid in financing capital formation. For the whole aid period 1951-65 27.9 percent of all capital formation in Taiwan was financed by U.S. aid.[4] However, as all forms of aid, except PL480, rapidly decreased and came to an end in 1965, net domestic investment as a percent of NNP continued to increase rapidly, the gaps left by decreased aid being partly filled by foreign investment, but mostly by domestic savings which rose from 7 percent of NNP in 1960 to some 28 percent currently.[5] This rapid increase in the domestic savings ratio was in part due to rapid improvement of financial institutions, the general rise in per capita income, and, most importantly for our purposes, the extensive campaign waged by the Chinese government to increase private savings. That this emphasis on the role of private savings still continues is clearly shown in the current long range plan for 1971-80. In order to fulfill the growth target of an 8.5 percent

annual rate of growth of GNP, private savings must rise from 16.8 percent of disposable income in 1970 to 19.6 percent in 1980 while the latter is to more than double.[6] For our present purposes the significance of this emphasis seems clear: The potential effects on domestic savings may be crucial for the prospects of implementing income redistribution policies of any kind in Taiwan in the near future.

We have previously suggested that the widely held belief that social equity and economic growth are conflicting policy objectives in developing countries can often be traced to the empirical observation that high income groups seem to have a higher marginal savings rate out of disposable income than do low income groups. Hence any transfer of income from high to low income groups will result in a fall in private savings. In the context of the simple growth models usually considered by economists this of course implies that net capital formation declines and hence so does the level or rate of growth of output. In what follows we shall argue that this causal sequence need not in general hold. In particular for the case of Taiwan we present estimates that suggest that while it is indeed likely that a shift in the size distribution of income, however achieved, would result in a decline in savings by private households, this decrease would be extremely small in relation to the size of the redistribution; furthermore, if private sector demand were not allowed to rise following implementation of a redistribution policy, this decline in private savings would not imply a fall in total, private plus public, domestic savings availability. Assuming that tax and transfer policies were effected both to redistribute the income and to keep private demand from rising, it makes little sense to speak of a fall in total saving as a reason for post-

poning income redistribution. The obstacle to redistribution is redistribution itself, not the potential effect on net investment.

There is yet another side of the potential effect on the savings-investment gap. The amount of capital required to satisfy domestic private household demand depends on the pattern of that demand which is determined by tastes and relative prices, among other things, as well as the size distribution of income and wealth. We shall also present evidence that suggests that another potential effect of income redistribution is to shift the pattern of private household demand toward commodities which require relatively less capital in their production and hence to lower capital requirements for the economy as a whole.

The final analytical step of this section is to "multiply up" and combine the estimated potential average family changes in domestic savings and capital requirements for comparison with the actual 1966 savings-investment gap for Taiwan. We tentatively conclude that the net potential effects on that gap are extremely small in relation to the sizes of the shifts in the size distribution of income considered; and if demand management measures are simultaneously used to prevent private expenditures from rising, the net effects on the gap become negative; that is, growth prospects may be improved rather than worsened.

b. ESTIMATING AVERAGE FAMILY SAVINGS

At the family level savings is in general determined as a residual, disposable income less total current expenditures. For this reason and for reasons of statistical convenience, the procedure we adopt is to estimate average farm/nonfarm family savings indirectly according to equation (21) in section IV.5 as the difference between the mean family

disposable income level ($\bar{Y}^k$) and mean family total current expenditures ($\bar{E}^k$) as estimated by equations (2) and (9), respectively.

Our procedure for estimating $\bar{E}^k$ is, as previously explained in detail, to use simple regression analysis to fit equations to the sample survey data on total current expenditures, disposable income, and a measure of family size, and to use the predicted values from the resultant equations as the estimated population values. As a correction for sampling errors, this "smoothing" procedure of course leaves much to be desired, but in any case it does seem preferable to taking the actual sample values as population values.

As is usual in demand analysis several functional forms were tried but for both farm and nonfarm families the best statistical fit, the only criterion used in selecting final equations, was achieved using the constant elasticity form $E^k = f_E^k(Y^k, N^k) = AY^bN^p$, k = farm/nonfarm, A represents a constant term and b and p are the constant elasticities of total expenditure with respect to disposable income Y^k and family size N^k, respectively.

The final regression equations used in the computations, fit logarithmically, are given with t values in parentheses and R^2 below:

$$\text{FARM}: \quad \text{Log}E^F = 2.9993 + \underset{(12.6)}{.6371}\text{Log}Y^F + \underset{(3.9)}{.3558}\text{Log}N^F \quad R^2 = .9915$$

(25)

$$\text{NONFARM}: \quad \text{Log}E^{NF} = .8171 + \underset{(63.2)}{.9037}\text{Log}Y^{NF} + \underset{(2.9)}{.0808}\text{Log}N^{NF} \quad R^2 = .9978$$

All coefficients are highly significant and the high R^2 coefficients indicate that the equations quite adequately account for the variance in the logarithm of total family expenditure for both nonfarm and farm families.[7] As one would expect the two equations do differ. Although

for families in both sectors disposable income is the major determinant of total expenditure, a change in disposable income level would have a much larger percentage effect on total expenditure in the nonfarm sector than in the farm sector, which would be important for redistribution from the nonfarm to the farm sector, but the opposite relationship holds for changes in family size.

It should be noted that although the constant elasticity function necessarily passes through the origin, it does allow the possibility of net dis-saving by low income families. In fact the equation for farm families does predict net dis-savings for the lowest 6 income groups. In the sample family survey data the lowest 4 groups dis-save. All nonfarm income groups are net positive savers in the sample data and this is also reflected in the predicted values from the nonfarm regression equation. Hence, the predicted distributions of farm and nonfarm family savings closely conform to the sample family distributions except that the estimated mean values, as shown below in Table VI.2, exceed the sample family mean values. This is not regarded as a serious distortion because the percentage differences are very small and in any case the effect is to counteract to some extent the bias toward underreporting income characteristic of income and expenditure surveys.

Table VI.2 : COMPARISON OF ESTIMATED AVERAGE FAMILY ANNUAL SAVINGS WITH SAMPLE FAMILY VALUES, NT$

sector	estimated number of families	sector popul. shares	ave. family disposable income $\bar{Y}^k$	sample value $(S^k)^s$	predicted value $\bar{S}^k$	savings ratio $\bar{S}^k/\bar{Y}^k$
NONFARM	1,575,583	.6907	33,762	2,825	2,983	.09
FARM	705,452	.3093	31,746	4,672	4,944	.16

$$\bar{S}^k = \bar{Y}^k - \bar{E}^k \qquad k = F/NF \qquad (21)$$

From the table we also note that the average farm family seems to save a much larger percent of disposable income than does the average nonfarm family. Data for other countries show the same tendency,[8] and in view of periodic large capital outlays for seeds, fertilizer and other farming inputs required of farm families, but for which nonfarm wage and salary groups have no counterpart - small businesses of course require inventories - such a phenomenon is consistent with what one would expect.

Ideally we would like to check the consistency of our estimates of household savings with the national income accounts data for 1966. However, this proved impossible due to the fact that the latter present only the combined savings of households, non-profit private organizations and private corporations; for 1966 some NT$16,800 million. "Multiplying up" our average family estimates for both sectors and summing yields an estimate of total private household savings of NT$8,188 million. Hence, all that can be said is that our estimate is not inconsistent with the national accounts data.

c. THE "SAVINGS PROBLEM"

We now turn to the potential effect of income redistribution on average farm/nonfarm family annual savings. Here we encounter the most compelling reason for using the regression procedure to estimate total expenditures. We wish to examine the potential effect of a change in disposable income alone, and regression analysis allows us to do just that; family size can be statistically held constant. More precisely, this is accomplished by taking the partial derivative of the farm/nonfarm constant elasticity expenditure equation with respect to disposable

income, in general $\partial f_E^k / \partial Y^k = AN^p bY^{b-1}$, k = F/NF, where the elasticities b and p are as given in the equations (25) above, and A is the antilog of the constant term for each equation. Employing these partial derivatives evaluated for each income group, $\partial f_E^k/\partial Y^k \Big|_{\hat{Y}_e^k, \hat{N}_e^k}$, in the computational equation (10) from section IV.3 above yields the desired estimates of $d\bar{E}^k$. Note that the partial derivatives, representing the marginal propensities to expend, do vary between income levels even though the elasticities are constant. It is this variation which gives rise to the changes we estimate in Table VI.3 below.[9]

Table VI.3 : ESTIMATED POTENTIAL CHANGES IN AVERAGE FAMILY ANNUAL SAVINGS INDUCED BY INCOME REDISTRIBUTION, NT$

	initial average savings $\bar{S}^k$	"large" income redistribution				"small" redistn.	
		$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
		absolte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM		NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
$d\bar{S}^{NF}$	2,983	-18	-45	-72	-89	-21	-25
(%)	-	(-0.6)	(-1.5)	(-2.4)	(-3.0)	(-0.7)	(-0.8)
FARM		F-A	F-B	F-C	F-D	F-E	F-F
$d\bar{S}^F$	4,944	-74	-115	-155	-301	-46	-89
(%)	-	(-1.5)	(-2.3)	(-3.1)	(-6.1)	(-0.9)	(-1.8)

$$d\bar{S}^k = d\bar{Y}^k - d\bar{E}^k \qquad k = F/NF \qquad (21)$$

$$(\%) = (d\bar{S}^k/\bar{S}^k) \times 100$$

Recall that for the first three "large" redistribution schemes of each

sector, NF-A, NF-B and NF-C in the nonfarm sector and F-A, F-B and F-C in the farm sector, average family disposable income is unchanged, $d\bar{Y}^k = 0$. For each sector the schemes A, B and C differ only in the progressivity of the burden of financing the transfers to the low income groups. From Table VI.3 it is clear that the potential fall in private savings is positively related to the progressivity of the redistribution scheme. However, for the most progressive of the three nonfarm schemes, NF-C, the fall in average family savings is only 2.4 percent of the initial savings level or 0.2 percent of initial disposable income; for F-C the corresponding percentages are 3.1 and 0.5, respectively. Hence, the cost of significant income redistribution in terms of private savings may not be too great. For the "small" redistribution schemes with progressive burden and $d\bar{Y}^k = 0$, F-E and NF-E for farm and nonfarm sectors, respectively, the decreases in private savings are correspondingly smaller.

For all the redistribution schemes thus far discussed, A, B, C and E for both farm and nonfarm families, direct tax revenue does not change because total private income is unchanged. Hence, as a first approximation, ignoring changes in public revenue from commodity and import taxes due to the changes in the mix and level of private expenditure, public savings would not change. Hence, in Table VI.3 the entries corresponding to redistribution schemes A, B, C and E can in principle be directly "multiplied up" to give rough estimates of the potential fall in <u>total</u> savings. This fall in total domestic savings is what we shall term the "savings problem" of income redistribution. For redistribution schemes NF-C and F-C the respective estimates are some NT$113 million and NT$109 million.

d. ELIMINATING THE "SAVINGS PROBLEM"

The significance of the four remaining redistribution schemes, NF-D, NF-F, F-D and F-F, touched on earlier, can now be explained in greater detail. Suppose, for expositional convenience, that the measures used to alter the size distribution of income are direct tax and transfer policies. Although some income redistribution could be achieved in Taiwan in this way, the exclusive use of tax and transfer policies to achieve a redistribution of the size considered under the present tax laws and administration cannot be considered as even near the realm of feasibility; in particular since revenue from all direct taxes accounted for only 17 percent of all government revenues in 1969.[10] Again, we reiterate that we use these terms only for expositional convenience to represent changes in the size distribution of private household disposable income, however achieved.

Suppose that the redistributive direct tax rates on the upper income groups are set so that direct tax revenues increase by more than enough to offset the income transfers to the low income groups. This will of course further reduce private savings but the extra tax revenue provides public savings to offset the fall in private savings to some extent. As the direct tax rate is raised even further, although the potential fall in private savings increases, the magnitude of the fall in <u>total</u>, private plus public, savings declines. Given the set of income transfers to the low income groups, either "large" or "small" in the present terminology, there is some implicit direct tax rate at which the fall in private savings is just offset by the increase in direct tax revenue so that total domestic savings would not fall as a result of the income transfers. It is this tax rate, which of course

varies with the size of the redistribution and between nonfarm and farm sectors, that is embodied in income redistribution schemes NF-D, NF-F, F-D and F-F.

Hence, for example, the potential change in average nonfarm family annual savings for NF-D is NT$89 as shown in Table VI.3, which amounts to some NT$140 million for the economy as a whole, but at the same time public savings increases by just enough to offset this fall in private savings. For income redistribution schemes NF-D, NF-F, F-D and F-F the "savings problem," which again refers to total domestic savings, does not exist.

It could be said that what is needed is income redistribution to the poor and the government. Then elimination of the "savings problem" for "large" nonfarm sector redistribution would require a less than 0.6 percent increase in total government revenue. For "large" farm sector redistribution the increase required would be just over 0.8 percent of 1966 total government revenue.[11]

The opposite side of eliminating the "savings problem" is of course simply preventing private household consumption demand from rising after the income transfers are made. Total domestic savings is the difference between aggregate income and aggregate consumption. If public consumption is unchanged and private consumption is not allowed to rise, then since aggregate income is not changed by redistributing it among families, clearly total savings will not be changed.

Still supposing the instruments of redistribution to be direct tax and transfer policies we can calculate the approximate additional average tax burden on the upper income groups, that is, above and beyond the redistributive tax burden required to offset the income

transfers to the poor groups, required to eliminate the fall in total domestic savings. This will give us a rough measure of the magnitude of the "savings problem" relative to the problem of increasing the incomes of the poor itself.

In the nonfarm sector for the "large" redistribution scheme the tax burden on the average family of the above-"poverty" groups must rise from 6.8 percent of initial disposable income to 7.1 percent as shown in Table V.3, or in other words moving from NF-C to NF-D requires less than a 5 percent increase in the redistributive tax burden. The elimination of the "savings problem" for "small" nonfarm redistribution also requires a less than 5 percent increase in the redistributive tax burden, from 1.7 to 1.8 percent of the initial disposable income level for all above-"poverty" level nonfarm families as shown in Table V.3. For the farm sector redistribution schemes considered, because of the much larger effects on private savings as shown in Table VI.3, the required additional percent increases in the redistributive tax burden are correspondingly larger than for the nonfarm sector. Moving from F-C to F-D requires a 16.1 percent rise in the average tax burden required to finance the transfers, while moving from F-E to F-F requires an 18.2 percent increase. Of course, in each case we are considering allocating the burden progressively which accentuates the fall in private savings considerably. If we considered the case of proportional allocation of the tax burden, the required increases in the average tax burden on the upper income groups would be much smaller.

Even so, the percentage estimates given above, in particular for nonfarm families, are small enough to tentatively suggest that it makes little sense to regard the "savings problem" as a legitimate reason

for postponing income redistribution to alleviate poverty. If the problem of political infeasibility of redistribution itself can be overcome, then it seems that there need be no significant adverse effect on total domestic savings availability.

Two further points should be made. First, increased public savings need not imply public investment. For example, the additional tax revenues might be used to subsidize private investments in accordance with the development plan, as well as to finance public projects. However, it may be the case that in areas lacking social infrastructure the rate of social return on public projects exceeds that for private sector projects. Secondly, from an equity point of view, public ownership of capital may be essential to keeping distributional inequities from increasing over time because of private wealth accumulation.

e. PRIVATE SECTOR CAPITAL REQUIREMENTS

We now turn to the other side of the potential effect of income redistribution on the savings-investment gap, the effect through the pattern of private household expenditure on total capital requirements. The method for estimating the vector of changes in average farm/nonfarm family expenditure pattern which would result from successful alleviation of the extent of poverty in Taiwan has already been explained in detail. Due to differences in capital-intensity of production between industries, as the expenditure pattern changes so in general do total capital requirements.

It must be made clear precisely what we mean to estimate. In the context of income redistribution it makes little sense in principle

to say that we shall compute the income redistribution-induced change in total capital requirements to achieve the pre-redistribution value of the output index, say NNP, because the prices on which the NNP computation is based will change as the demand pattern changes. While it may be true that based on pre-redistribution prices the index of output would show a decrease after income redistribution, it is equally as probable that based on post-redistribution prices NNP would be lower before redistribution than after. Hence we must retreat from the usual sorts of output considerations and simply compare the total capital requirements to satisfy the post-redistribution pattern of private expenditure with the total capital requirements to satisfy the pre-redistribution pattern.

Specifically, we estimate the potential income redistribution-induced changes in the value of the capital stock required to support the average farm/nonfarm family's pattern of demand, both directly and in total, i.e., including effects from input-output linkages. The measure of capital we employ is total capital in operation at the end of 1966 as tabulated in the Taiwan 1966 industrial census which includes plant, land, machinery, equipment, stock, cash, deposit and other assets. Hence it includes both fixed and working capital as defined in economic theory, as well as land. However, it proved impossible to compute a measure closer to what the economist has in mind when he speaks of net capital formation. The computational formulas, explained in detail earlier, are presented with the numerical results in Table VI.4. $\underline{a}_k$ is a row vector of the ratio of capital in operation at the end of 1966 as defined above to total 1966 value of output for each sector.[12] Both total effects $d\bar{A}_K^k$ and direct effects $d\bar{A}_K^k(\text{dir.})$, k = F/NF, are given.

Table VI.4 : ESTIMATED POTENTIAL CHANGES IN THE VALUE OF THE CAPITAL STOCK REQUIRED TO SUPPORT THE AVERAGE FARM/NONFARM FAMILY PATTERN OF DEMAND INDUCED BY INCOME REDISTRIBUTION, NT$

	initial average value $\bar{A}_K^k$	"large" income redistribution				"small" redistn.	
		$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
		absolte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM		NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
$d\bar{A}_K^{NF}$	34,619	-35	-29	-23	-85	-20	-30
$d\bar{A}_K^{NF}$(dir.)	19,025	-13	-12	-10	-47	-6	-14
FARM		F-A	F-B	F-C	F-D	F-E	F-F
$d\bar{A}_K^{F}$	28,085	21	64	106	-67	34	-17
$d\bar{A}_K^{F}$(dir.)	14,332	26	53	78	-14	24	-3

$$d\bar{A}_K^k = \underline{a}_K \, d\underline{\bar{X}}^k - *(d\bar{A}_K^k) \qquad k = F/NF \qquad (23)$$

$$d\bar{A}_K^k(\text{dir.}) = \underline{a}_K \, d\underline{\bar{X}}^k(\text{dir.}) - *(d\bar{A}_K^k(\text{dir.})) \qquad (24)$$

In general the potential direct and indirect linkage effects through the input-output table operate in the same direction. For example, for F-C the direct effect is to increase average farm family capital requirements by NT$78 over the pre-redistribution level; and including the indirect effects through input linkages raises the magnitude of the increase to NT$106 as shown in the table. For F-D including the indirect effect raises the magnitude of the direct decrease in capital requirements for the average farm family to NT$67. For the nonfarm sector the same relation between the direct and indirect effects holds for each

redistribution scheme, i.e., the direct and indirect effects in general have the same sign.

For present purposes, we are interested mainly in the total effects $d\bar{A}_K^k$ as shown in the table. For both "large" and "small" redistribution schemes average farm family capital requirements rise if private total expenditure is allowed to rise after redistribution, but fall if private total expenditure is held at the pre-redistribution level, i.e., for F-D and F-F $d\bar{A}_K^F < 0$. For the nonfarm sector the potential effect of each of the postulated income redistribution schemes is to reduce average family capital requirements whether or not private total expenditure is allowed to rise. Two factors interact to produce this inter-sector difference.

From Table VI.3 it is clear that in the farm sector the potential rise in average family total expenditure for each redistribution scheme far exceeds the increase for the corresponding nonfarm redistribution scheme. This in itself accounts for much of the inter-sector difference in capital requirement response. The other factor, the relative strength of which can be seen from comparing F-D with NF-D and F-F with NF-F in Table VI.4, is the shift in the mix of expenditure, apart from any increase in the total level of expenditure, towards commodities which use relatively less capital in their production.

The most significant point to note seems to be that for income redistribution in both the farm and the nonfarm sectors the use of demand management policies to eliminate the "savings problem" also insures that the value of the stock of capital required to satisfy the pattern of private demand decreases, freeing investment funds previously used for replacement for new projects.

f. THE COMBINED EFFECT ON THE SAVINGS-INVESTMENT GAP

For present purposes we define the savings-investment gap simply as the difference between the values of total net investment and net domestic savings,[13] which of course equals the amount of net investment which must be financed, or was financed, by foreign capital inflows. For Taiwan this gap has decreased from over 55 percent of net investment in 1951 to about 10 percent in recent years. In 1966 9.3 percent of net investment in Taiwan was financed by external sources.[14]

In the previous section we considered the induced effects on the value of capital stock. To consider the potential effects on the Taiwan savings-investment gap, (S-I)GAP, a flow concept, we must make an assumption with respect to the way the change in capital stock will occur over time; that is, we must determine how the level of investment will be altered.

Most probably the adjustment would take several years. In particular a decrease in the capital stock could simply occur through the process of depreciation with selected capital implements not being replaced. However, for simplicity we shall here assume that the stock of capital will adjust in the first year.

Under this assumption the effect on the (S-I)GAP in the first year can be computed by subtracting the estimated effects on total domestic savings (dS^k) - computed by "multiplying up" the entries in Table VI.3 for redistribution schemes A, B, C and E for both farm and nonfarm sectors, for D and F, recall, $dS^k = 0$ by construction - from the "multiplied up" entries of Table VI.4 (dA_K^k). That is d(S-I)GAP for year 1 = ($dA_K^k - dS^k$), and for each succeeding year d(S-I)GAP = dS^k since by assumption the required adjustment in capital stock has already been

made.

These results are presented in Table VI.5 below. For comparison purposes the percentages of the 1966 actual savings-investment gap of NT$1,991 million are also given.

Table VI.5 : ESTIMATED POTENTIAL CHANGES IN TAIWAN'S SAVINGS-INVESTMENT GAP INDUCED BY INCOME REDISTRIBUTION, NT$ MILLION

	"large" income redistribution				"small" redistn.	
	$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
	absolte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM	NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
$d(S-I)GAP_{year\ 1}$	-25.9	25.9	77.6	-133.4	2.0	-47.8
(%)	(-1.3)	(1.3)	(3.9)	(-6.7)	(0.1)	(-2.4)
$d(S-I)GAP_{years\ 2,...}$	28.4	70.9	113.4	0	33.1	0
(%)	(1.4)	(3.6)	(5.7)	(0.0)	(1.7)	(0.0)
FARM	F-A	F-B	F-C	F-D	F-E	F-F
$d(S-I)GAP_{year\ 1}$	67.1	125.4	183.2	-47.8	55.8	-11.9
(%)	(3.4)	(6.3)	(9.2)	(-2.4)	(2.8)	(-0.6)
$d(S-I)GAP_{years\ 2,...}$	52.2	81.1	109.3	0	32.5	0
(%)	(2.6)	(4.1)	(5.5)	(0.0)	(1.6)	(0.0)

$d(S-I)GAP_{year\ 1} = dA_K^k - dS^k$ $\qquad k = F/NF$

$d(S-I)GAP_{years\ 2,...} = dS^k$

(%) = percent of the Taiwan 1966 actual savings-investment gap

A positive value indicates an increase in the size of the savings-investment gap; a negative value, corresponding to a decrease in the

size of the gap, then indicates an improvement in economic growth prospects. The magnitudes of the effects, particularly for "large" redistribution schemes cannot be regarded as insignificant although, for example, for NF-C it is difficult to say what a first year increase of 3.9 percent in the size of the savings-investment gap might mean in terms of potential economic growth.[15]

In general, the farm and nonfarm redistributions potentially increase the size of the savings-investment gap if total savings are allowed to fall, and decrease the gap if total savings are held at the pre-redistribution level. For the nonfarm sector redistribution scheme NF-C, in the first year the savings-investment gap would be NT$77.6 million larger than before redistribution, and in the second and all succeeding years the gap would be NT$113.4 larger than it would have been in the absence of redistribution. For F-C the gap would increase by NT$183.2 million in year 1, and in year 2 it would decrease by NT$73.9 million, the difference between the year 1 and year 2 changes in the table, and would in that and all succeeding years maintain a level NT$109.3 million higher than it would have been in the absence of redistribution.

However, if total savings is not allowed to fall, for example as for NF-D, the savings-investment gap decreases, for NF-D by NT$133.4 million, in the first year; by assumption the gap is unaffected by redistribution from year 2 on. In reality, however, it is more likely that there would be an adjustment process whereby the gain of NT$133.4 million would be spread out over a longer period, but this makes no difference to our result that for F-D, NF-F and F-F, as well as for NF-D, income redistribution potentially yields a significant gain in

terms of the savings-investment gap. Again, whether or not private demand can be kept from rising may determine whether potential growth prospects are improved or worsened.

To consider the effect of using any two of the postulated income redistribution schemes together, one in the nonfarm sector and one in the farm sector to approximate the effects of more general sets of income redistribution measures on the size distribution of income, we simply add the corresponding entries in Table VI.5. For example, redistribution schemes F-C and NF-C together would represent eliminating poverty in both sectors and placing the burden progressively on the upper income groups, but leaving the average family disposable income at the pre-redistribution level. The first year result would be a 13.1 percent increase in the savings-investment gap. With demand management policies used simultaneously to eliminate any increase in total expenditure, policies F-D and NF-D, the savings-investment gap would be 9.1 percent less than it would be in the absence of redistribution.

3. ON THE TRADE BALANCE

a. SETTING AND SUMMARY OF FINDINGS

Having a thin resource base and not possessing a well-developed capital goods sector, Taiwan has had to rely heavily on imported capital goods and industrial and agricultural raw materials to sustain its rapid rate of economic growth. For the period 1964-68 these items accounted for 92 percent of total imports, while total imports amounted to 23 percent of GDP.[16] Under such conditions, domestic savings may not be perfectly substitutable with foreign exchange in terms of

economic growth objectives; that is, to sustain or achieve a given target rate of growth a high domestic savings ratio may be necessary but not sufficient; it may also be necessary to increase exports to generate sufficient foreign exchange to allow import of the necessary inputs. In this setting the balance of trade situation becomes an independent indicator of the prospects for rapid self-financed economic growth.

For Taiwan the trade balance became positive in 1970 for the first time, but because of a net deficit in service transactions the balance on current account was a deficit of US$12 million. For 1971 a trade surplus of US$293 million resulted in a net current account surplus of US$160 million, a substantial improvement over 1970.[17] This development was primarily due to the success of various export promotion measures, such as tax rebates and the establishment of export processing zones, employed by the Chinese government under the "all-out promotion of exports" guidelines.[18] On the import side, although the system of tariffs and direct controls employed has been geared mainly to the protection of domestic industries, it does seem that the tariff structure is such as to encourage import substitution for imported consumption goods.

For our present purposes it may suffice to note that the high degree of dependence of the Taiwan economy on capital goods and raw materials from abroad will continue and hence any potentially harmful effects of income redistribution on the trade balance may be regarded as unacceptable by policymakers.

In what follows we shall consider the potential effects of income redistribution on the trade balance of Taiwan. Two aspects of the

private household sector's influence on the trade balance must be considered. First, private imports of consumption goods compete with imports of productive inputs for available foreign exchange so any increase in such "competing" imports may hinder economic growth prospects. Second, since different domestic industries differ in the degree of dependence on foreign inputs, the pattern of private expenditure in part determines import requirements for the economy as a whole. We first consider each factor separately and then combine the resulting estimates to determine the effect on the trade balance of the whole economy.

The numerical results suggest that the potential effects of income redistribution on the trade balance differ between farm and nonfarm sectors. For farm family redistribution schemes, preventing a rise in total expenditure may be sufficient to insure no harmful effects on the trade balance, whereas for nonfarm schemes some further restriction of consumption imports may be required. In any case, in relation to the size of income redistribution considered, the effects are extremely small.

b. "COMPETING" IMPORTS OF CONSUMPTION GOODS

Table VI.6 below presents the results of our computations with respect to average farm/nonfarm family "competing" imports. We first note that estimated initial "competing" imports for the average family ($\bar{C}_M^k$) is a rather small amount, only about 4.0 and 4.5 percent of total expenditure for the average farm and nonfarm family, respectively. This is in part due to the fact that at low income levels the demand for imported consumption goods is low, but more importantly reflects

the exchange and tariff policies followed by the Chinese government on Taiwan. Through the use of such policies imports of consumption goods have been reduced from some 13 percent of total imports in the early 1950's to just under 7 percent currently.[19]

Table VI.6 : ESTIMATED POTENTIAL CHANGES IN AVERAGE FAMILY ANNUAL "COMPETING" IMPORTS INDUCED BY INCOME REDISTRIBUTION, NT$

	initial level $\bar{C}_M^k$	"large" income redistribution				"small" redistn.	
		$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
		abslte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM		NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
$d\bar{C}_M^{NF}$	1,387	10	11	12	9	3	3
FARM		F-A	F-B	F-C	F-D	F-E	F-F
$d\bar{C}_M^{F}$	1,087	+0	2	3	-1	1	-0

$$d\bar{C}_M^k = \sum_i m_i \, d\bar{C}_i^k - *(d\bar{C}_M^k) \qquad k = F/NF$$
$$\bar{C}_M^k = \sum_i m_i \, \bar{C}_i^k - *(\bar{C}_M^k) \qquad i = 1,\ldots,n \qquad (22)$$

Turning to the redistribution-induced changes, for the nonfarm sector the estimated potential change in "competing" imports ($d\bar{C}_M^{NF}$) is positive for each redistribution scheme. In relation to the initial level the magnitudes are extremely small; even for the most progressive "large" redistribution scheme, NF-C, the increase is less than 1 percent. From NF-D it is apparent that most of the potential increase is due to the shift in the mix of expenditure, apart from any change in the level of total expenditure, towards commodities a relatively high proportion

of which are imported.

For farm sector redistribution schemes the signs of the estimates depend on whether total expenditure is allowed to rise or not. However, because of the minute magnitudes of the changes, the direction of the shift in the expenditure mix of the average farm family cannot be determined with any certainty. Perhaps the only conclusion warranted is that farm family demand for imported consumption goods is insensitive to significant changes in the size distribution of income.

c. IMPORTS OF PRODUCTIVE INPUTS

The other potential effect we are able to measure is that which operates through imports of intermediate productive inputs, or what in input-output analysis are termed complementary imports. The methodological procedure for translating the induced change in the vector of average family expenditure into a change in total imported inputs required to support the average family's pattern of expenditure is identical to that used to compute changes in capital requirements in section 2.e. of this chapter. The numerical estimates are presented below in Table VI.7. In the computational formulas the vector $\underset{\sim}{a}_M$ is simply the row vector of the ratios of total value of imported inputs used in 1966 to total value of output for each sector, computed directly from the 1966 Taiwan input-output table.

Both direct and total effects, including linkage effects through the input-output table, are given in order to show a difference between the responses to farm and nonfarm redistribution schemes. For the nonfarm sector redistribution schemes the direct and indirect (not shown) effects act in opposite directions. For example, for nonfarm

scheme NF-C the direct effect is an increase of NT$15 and the indirect effect is a decline of some NT$8 so the total effect as shown is a potential increase of NT$7 in imported input requirements for the average nonfarm family. Apparently the nonfarm average family expenditure mix shifts in favor of sectors which themselves rely relatively heavily on imported intermediate inputs, but those same industries are supported through input linkages by other sectors which use relatively small amounts of imported inputs. Since the positive direct effects dominate, the total effects are positive. For the farm sector redistribution schemes the indirect effects reinforce the direct effects as was the case for average family capital requirements as noted above in Table VI.4. For example for scheme F-C the direct effect is NT$5 and the total effect is NT$8.

Table VI.7 : ESTIMATED POTENTIAL CHANGE IN AVERAGE FAMILY ANNUAL IMPORTED INPUT REQUIREMENTS INDUCED BY INCOME REDISTRIBUTION, NT$

	initial level $\bar{A}_M^k$	"large" income redistribution				"small" redistn.	
		$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
		absolte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM		NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
$d\bar{A}_M^{NF}$	2,455	5	6	7	3	1	1
$d\bar{A}_M^{NF}$(dir.)	905	13	14	15	14	5	5
FARM		F-A	F-B	F-C	F-D	F-E	F-F
$d\bar{A}_M^{F}$	2,044	3	5	8	-6	2	-1
$d\bar{A}_M^{F}$(dir.)	726	3	4	5	-0	1	-0

$$d\bar{A}_M^k = \underline{a}_M(I-A)^{-1}(I-m)d\bar{C}^k - *(d\bar{A}_M^k) \; ; \; \bar{A}_M^k = \underline{a}_M\bar{X}^k - *(\bar{A}_M^k) \qquad (23)$$

$$d\bar{A}_M^k(\text{dir.}) = \underline{a}_M(I-m)d\bar{C}^k - *(d\bar{A}_M^k(\text{dir.})) \qquad k = F/NF \qquad (24)$$

For those redistribution schemes for which the "savings problem" does not exist, NF-D, NF-F, F-D and F-F, the estimated total effects differ in sign between the farm and nonfarm sectors. For farm families the shift is toward commodities which require relatively smaller amounts of imported inputs while for nonfarm families the opposite is true; for F-D and F-F $d\bar{A}_M^F < 0$, and for NF-D and NF-F $d\bar{A}_M^{NF} > 0$. A further difference between farm and nonfarm sector response to roughly equivalent redistribution schemes is apparent from comparison of Tables VI.6 and VI.7. For all the nonfarm schemes the magnitudes of the potential effects on average family "competing" imports exceed the estimated potential effects on imports of productive inputs, but for the farm sector schemes the effects on the latter dominate.

d. THE COMBINED EFFECT ON THE TRADE BALANCE

The potential effects of income redistribution on the Taiwan trade balance itself remain to be estimated. Adding the entries of Table VI.6 to the corresponding entries of Table VI.7 for each redistribution scheme and multiplying by the estimated total number of farm/nonfarm families yields an estimate of the potential changes in the value of total imports for the economy as a whole.

Previously we explicitly assumed that exports would not be affected by income redistribution. This of course is not quite accurate since to the extent that exports of any item are determined as a residual, domestic production less domestic consumption, income redistribution would indirectly affect exports. Estimation of such effects would require analysis of individual sectors in much greater detail than engaged in here, and in any case, since it is much more common for

exports to be determined by international demand considerations rather than domestic supply conditions, the effects of redistribution on exports would probably be small relative to the effects on imports as measured in the present study.

In terms of a sector i which produces commodities some of which are exportable and some of which are also imported, if the export volume is determined as a residual, then exports will tend to move in the opposite direction as total imports. For a given level of sector i output (X_i), a redistribution-induced increase in domestic consumption (C_i) would decrease the volume of exports ($E_i = X_i - C_i$). However, the increase in domestic demand would also lead to increased "competing" imports, as well as a secondary increase in domestic production, which in turn would tend to increase imports of productive inputs. For a redistribution-induced decrease in domestic consumption all these effects would be reversed.

The estimates presented in Table VI.8 below represent the total induced changes in the trade balance in the absence of export effects. A positive value indicates an increase in the total value of imports and hence a worsening of the trade balance (TBAL). The magnitudes of the induced changes in the trade balance are much larger for nonfarm redistribution schemes than those for the farm sector schemes simply because nonfarm families are twice as numerous as are farm families in Taiwan as shown in Table VI.2 above. However, after allowing for this, significant inter-sector differences in the magnitudes of the changes remain, as can be clearly seen from the table.

In order to provide a basis for comparison the induced changes as a percent of the actual Taiwan trade deficit of NT$970 million in 1966 are

given in parentheses in the table.[20] Again, the most significant point to note is the extremely small magnitudes of the effects relative to the size of income redistribution considered.

Table VI.8 : ESTIMATED POTENTIAL CHANGES IN TAIWAN'S TRADE BALANCE INDUCED BY INCOME REDISTRIBUTION, NT$ MILLION

	actual 1966 trade deficit NT$ mill.	"large" income redistribution				"small" redistn.	
		$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
		abslte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM		NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
d(TBAL)	970	23.3	25.2	29.1	18.4	7.8	6.8
(%)	-	(2.4)	(2.6)	(3.0)	(1.9)	(0.8)	(0.7)
FARM		F-A	F-B	F-C	F-D	F-E	F-F
d(TBAL)	970	1.9	4.9	7.8	-5.8	2.9	-1.0
(%)	-	(0.2)	(0.5)	(0.8)	(-0.6)	(0.3)	(-0.1)

Lastly, our computations do reveal one perhaps unfortunate effect; for nonfarm sector income redistribution schemes, measures which were successful in eliminating the "savings problem" from income redistribution might not be sufficient to eliminate all of the induced worsening of the trade balance. Hence, the design of income redistribution policies for nonfarm Taiwan perhaps ought to include measures to prevent a rise in imports of consumption goods. This could easily be accomplished through adjustment of exchange rates and/or tariff policies.

4. ON LABOR : SKILLED AND UNSKILLED

a. SETTING AND SUMMARY OF FINDINGS

A recent UN ECAFE paper brings together available evidence with regard to employment trends and prospects in the developing countries of Asia and concludes that employment problems in the region will be extremely severe in the future.[21] For example, one study cited estimated that to absorb increases in the labor force in the future the typical Asian country's GNP would have to grow at an annual rate of 10 percent; and this would not even begin to absorb the existing backlog of unemployment and under-employment that exists now into productive jobs. The general conclusion of the ECAFE paper is that providing employment must become a primary objective of economic policy in the future; new measures must be devised and existing biases against the use of labor-intensive techniques of production must be eliminated.

With regard to the employment effects, our procedure of considering the induced effects of changes in the size distribution of income independently of the policies used to achieve such changes is perhaps less valid than for the other factors considered; this, because the provision of employment opportunities in large scale is probably the most effective means for achieving a reduction of the incidence of poverty in Asia. Furthermore, a more complete interaction model is required before we can really come to grips with the relation between income distribution and employment. The partial model we employ in the present study makes no allowance for the induced employment effects reacting back on the distribution of income, and so on. Hence, our results with respect to the absorption of unskilled labor, and this

after all is what the employment problem is all about, should be interpretted with perhaps a slightly larger than average grain of salt.

Two main sources of labor force data exist for Taiwan: Household Registration Statistics and the Labor Force Survey carried out periodically by the Provincial Department of Social Affairs. However, with respect to unemployment the former are of little use due to an apparent excess of persons indicating "jobless" status. For example, for 1966 computations of the unemployment rate as a percent of the economically active population of 3,870,000 vary from 0.3 to 20.3 percent depending upon what part of the category "jobless" one chooses to include. Using the somewhat more reliable Labor Force Survey data with unemployment defined as persons above 12 minus persons employed, persons unwilling or temporarily unable to work, and disabled, aged, or sentenced to life imprisonment, the unemployment rate is 3.0 percent. Still other estimates yield higher rates. For 1964 according to N.H. Jacoby's estimate the rate was 14.6 percent, while according to estimates presented by M.H. Hsing the unemployment rate for 1966 was 11.4 percent.[22]

In the absence of reliable estimates it is difficult to say how serious the problem of unemployment is at present in Taiwan. However, the general feeling among researchers and policy officials as indicated in the current five-year and long term economic plans is that if the process of rapid industrialization can be sustained or accelerated the problem of labor absorption by the modern sector in Taiwan will not prove serious.[23]

Application of the Ranis-Fei "minimum critical effort" criterion to the Taiwan case seems to bear this out. The basic criterion for

development is seen by these authors to be that the rate of growth of the nonagricultural labor force exceeds the rate of population increase. A recent study using adjusted Labor Force Survey data found that for Taiwan this criterion has been met continually since 1957.[24] In recent years the difference between the two rates has been steadily increasing as family planning has been implemented and the rate of population growth has slowed on the one hand, and as the pace of industrialization and the rate of labor absorption have increased on the other.

As regards the problem of labor absorption by the nonfarm modern sector, Taiwan, due to its rapid rate of industrialization may be atypical among the developing nations of Asia. In many settings worsening of the problem of mass unemployment may occur precisely because the means to promote rapid industrialization are unavailable.

The companion problem of under-employment in the modern sector of Taiwan may be a greater cause for concern in the sense of inefficient resource allocation. That, is unskilled agricultural labor has been in past years drawn out of the agricultural sector to the extent that agricultural labor shortages have developed. At the same time it is clear that not all of this migratory labor, in addition to natural increases in economically active urban population, has been effectively absorbed into modern sector jobs. There are no firm estimates but casual observation is enough to convince one that a sizeable portion of this labor is entering "inessential" service occupations.

The other, perhaps more serious from the growth point of view, aspect of the labor problem is that the supply of trained labor is insufficient to meet the needs of a rapidly expanding industrial sector.

In Taiwan the key to both sides of the labor problem is at present felt to be in the expansion of vocational education facilities in order to transform one surplus form of labor into the scarce form, skilled labor.[25]

For our present purpose we simply regard labor absorption and the shortage of "skill" as two separate problems. Below we analyze the potential effects of the postulated redistribution schemes on each. In general we find that although the rate of unskilled labor absorption might be decreased and the "skill" shortage eased slightly, the magnitudes of the effects in terms of the economy as a whole are likely to be insignificant.

b. UNSKILLED LABOR ABSORPTION

Our procedure is to construct a measure of unskilled labor usage in terms of the value of output for each nonagricultural sector.[26] Then the redistribution schemes considered can, as for the other factors considered above, be directly translated into changes in an index of unskilled labor absorption by the modern sector of the economy. Ideally the measure of unskilled labor usage for each industrial sector should be a ratio of one flow to another, for example, the number of hours per value unit of output. Since for Taiwan such a measure was not available we were forced to use a somewhat unsatisfactory measure, the number of unskilled laborers employed at the end of 1966 per NT$100,000 of output.[27] Unskilled laborers include unskilled production workers and other, primarily casual laborers. Arranging these coefficients as a row vector $\underset{\sim}{a}_L$ and substituting into the computational equation (23) above yields for each redistribution scheme a value of

$d\bar{A}_L^k$, k = F/NF. The interpretation of these values, due to the definition of $\underline{a}_L$, is somewhat difficult but they should still adequately serve to indicate the direction of change. For this reason we compute the percentage changes in the unskilled labor absorption index, $(\%d\bar{A}_L^k)$ as shown in Table VI.9 below.

Table VI.9 : ESTIMATED POTENTIAL PERCENTAGE CHANGES IN AVERAGE FAMILY UNSKILLED AND SKILLED LABORER REQUIREMENT INDICES INDUCED BY INCOME REDISTRIBUTION

	"large" income redistribution				"small" redistn.	
	$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
	abslte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM	NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
UNSKILLED $(\%d\bar{A}_L^{NF})$	-0.6	-0.7	-0.7	-0.9	-0.3	-0.3
SKILLED $(\%d\bar{A}_S^{NF})$	-0.4	-0.4	-0.4	-0.7	-0.1	-0.2
FARM	F-A	F-B	F-C	F-D	F-E	F-F
UNSKILLED $(\%d\bar{A}_L^{F})$	-0.2	-0.1	0.1	-0.7	+0.0	-0.2
SKILLED $(\%d\bar{A}_S^{F})$	-0.1	+0.0	0.1	-0.6	0.1	-0.1

$$\%d\bar{A}_r^k = (d\bar{A}_r^k/\bar{A}_r^k) \times 100 \qquad r = \text{unskilled(L), skilled(S)} \; ; \; k = F/NF$$

$$d\bar{A}_r^k = \underline{a}_r(I-A)^{-1}(I-m)d\bar{\underline{C}}^k - *(d\bar{A}_r^k) \qquad (23)$$

$$\bar{A}_r^k = \underline{a}_r(I-A)^{-1}(I-m)\bar{\underline{C}}^k - *(\bar{A}_r^k)$$

All the induced percentage changes $(\%d\bar{A}_L^k)$ are small, less than 1 percent. For the nonfarm sector schemes all the changes are negative while for the farm sector schemes the changes are all either negative or not significantly different from zero. Note that eliminating the

"savings problem" increases the magnitude of the decline in the modern sector's ability to absorb unskilled labor. For example, for NF-C the change is -0.7 percent but eliminating the rise in private expenditure increases this to -0.9 percent. Again, the interpretation of the latter change is that in response to a "large" redistribution in the nonfarm size distribution of income after which private demand is not allowed to rise, the nonagricultural unskilled labor force required to support the average nonfarm family's pattern of demand potentially declines by 0.9 percent. Although what this would mean in terms of the economy as a whole is not precisely clear, in a labor surplus context any change in this direction would be regarded as undesirable. However, again we note that in reality these would be secondary effects.

A further point worth mention is that a reduction of poverty in agricultural areas through subsidy, increasing farm product prices, or whatever may dissuade the marginal migrant to the urban centers and thus slightly relieve the problem of excess urban unskilled labor.

Another aspect of efficient resource use is labor productivity. The extremely low productivity of low wage unskilled labor may often be related to physical condition and health. Raising low incomes results in a significant increase in both nutritional intake and expenditures on medical care and health. For example, our computations show that for redistribution scheme NF-D average family expenditures on medical care and health would increase by 3.5 percent while total expenditure on food would increase by 1.0 percent, even though total expenditure by definition of NF-D would not change. Recall that these net effects are the result of small decreases in expenditure on the

part of the upper two-thirds of families and a larger per family increase on the part of the low income families. For farm families, medical and health expenditures were found statistically to be insensitive to changes in family disposable income level, and for redistribution scheme F-D the average farm family expenditure on food would increase by only 0.1 percent, as compared to 1.0 percent for NF-D.

On the basis of these estimates we tentatively conclude that the potential effects of significant income redistribution in both farm and nonfarm sectors on the capacity of the nonagricultural sector to absorb unskilled laborers include only a small negative component acting through the pattern of private demand which may, for nonfarm redistribution, be to some extent offset by an increase in unskilled labor productivity.

c. THE "SKILL" PROBLEM

Most development economists regard the lack of the nebulous resource "skill" both in production and administration as a serious constraint on economic development in many developing countries. However, due to the difficulties of defining let alone measuring this resource, little can be said in any particular context about the severity of this deficiency in relation to other possible constraints on economic growth. In the present context we have little to add to the solution of this problem. Our procedure is simply to construct for each industrial sector a measure of skilled labor requirements in relation to output. The measure we use is the complement of the unskilled labor index used above and hence suffers from the same deficiences. Skilled laborers include all technical and managerial staff, and skilled production

workers as recorded in the Taiwan 1966 census of commerce and industry. The estimated percentage changes in average family skilled laborer requirements are given above in Table VI.9. The computation is identical to that used for unskilled labor.

from the table we see that the mix of average family expenditure shifts toward commodities which also require relatively little skilled labor in their production. Eliminating the "savings problem" has the effect of further reducing skilled labor requirements. However, for each redistribution scheme the estimated percentage change in average family skilled labor requirements is smaller than the change in unskilled labor requirements, so the effects on the skilled labor requirements of the economy as a whole are not likely to be significant.

Income redistribution may also have effects on the supply of skilled labor in the long run through its effect on expenditures on education. For farm families the average family change in such expenditures is an increase of 1 percent or less for each redistribution scheme considered. This again is the net result of a large increase in expenditure by the average sub-"poverty" level family and a smaller average family decrease on the part of the upper income groups. This shift in the distribution of expenditures on education may in itself tend to reduce inequality of opportunity.

For the nonfarm sector a strikingly different picture emerges. For each nonfarm redistribution scheme average family expenditure on education and research declines significantly; for NF-D and NF-F, 6.4 and 1.9 percent, respectively. In spite of the fact that it is still true that the low income groups' expenditures do increase simply because education is not an inferior good, these results are somewhat disturb-

ing since they do suggest that private investment in human resources might decrease as a result of large scale income redistribution.[28]

5. ON VALUE ADDED AND LABOR REMUNERATION

In this section the potential effects of income redistribution on two additional factors are considered; value added and labor remuneration. Table VI.10 presents the results of the computations.

Table VI.10 : ESTIMATED POTENTIAL CHANGES IN AVERAGE FAMILY VALUE ADDED AND LABOR REMUNERATION INDICES INDUCED BY INCOME REDISTRIBUTION, NT$

	initial average family value $\bar{A}_r^k$	"large" income redistribution				"small" redistn.	
		$d\bar{Y}^k = 0$				$d\bar{Y}^k = 0$	
		absolte. equal burden	prop. equal burden	prog. burden	total savings constant	prog. burden	total savings constant
NONFARM		NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
$d\bar{A}_V^{NF}$	18,509	46	59	74	35	24	11
$d\bar{A}_W^{NF}$	7,106	-0	1	4	-10	-0	-3
FARM		F-A	F-B	F-C	F-D	F-E	F-F
$d\bar{A}_V^{F}$	17,675	-0	25	49	-42	17	-10
$d\bar{A}_W^{F}$	6,657	-2	8	17	-17	6	-4

$$\bar{A}_r^k = \underline{a}_r \bar{\underline{X}}^k - *(\bar{A}_r^k) \qquad r = \text{value added(V), labor remun.(W)}$$

$$d\bar{A}_r^k = \underline{a}_r d\bar{\underline{X}}^k - *(d\bar{A}_r^k) \qquad k = F/NF \qquad (23)$$

$\bar{A}_V^k$ is the initial value of value added supported by the expenditures of the average farm/nonfarm family, both directly and indirectly, and

$\bar{A}_W^k$ is the corresponding value of total labor remuneration. The induced changes are, as for the other growth factors, indicated by the symbol $d\bar{A}_r^k$, k = F/NF, and r = value added(V), labor remuneration(W). In the computation formulas $\underset{\sim}{a}_V$ is computed directly from the 1966 input-output table as the vector of the ratios of total value added to the value of total output for each industrial sector and $\underset{\sim}{a}_W$ is the vector of ratios of total labor remuneration to the value of total output for each sector computed from the same source.

First considering the potential effects of redistribution on value added, we note that the pure mix effects differ in sign between farm and nonfarm sectors. For the nonfarm redistribution schemes NF-D and NF-F the average family value added increases, whereas for the farm sector schemes F-D and F-F the effect is to reduce the average family value added. For labor remuneration the farm and nonfarm sector potential responses to income redistribution in general have the same signs although the farm sector changes are slightly larger in magnitude.

The significance of these two factors is generally felt to be greatest in terms of aggregate analysis. The aggregate ratio of value added to total value of output gives an indication of the extent to which the economy is self-sufficient in production, and the share of wages in national income seems frequently to occupy a central position in theoretical analyses of the economic growth process. In terms of such aggregate parameters, the potential effects of income redistribution shown in the table above are insignificant. For example, since estimated total nonfarm sector value added, $\bar{A}_V^{NF}$ multiplied by the estimated number of nonfarm families, amounts to only 24 percent of total economy value added for 1966 as given in the input-output table,

even the estimated potential change for NF-C amounts to a less than 0.1 percent change in total economy value added. For the farm sector, the potential decrease in average family value added of NT$42 for redistribution scheme F-D amounts to less than 0.03 percent of total economy value added. The potential effects of income redistribution on aggregate economy labor remuneration are even smaller; for NF-D and F-D the decreases are 0.1 and 0.3 percent of the initial average family value, respectively, but both are less than 0.03 percent of the aggregate economy total labor remuneration for 1966 when "multiplied up."

VII. KOREA : ESTIMATED POTENTIAL EFFECTS OF INCOME REDISTRIBUTION

The purpose of this study, recall, is to compare the growth prospects of developing countries under existing income distribution with the prospects that would prevail if income were distributed more equitably. Hence our procedure is to estimate the potential effects of a large redistribution of income on the resource needs and availabilities of the economy as a whole. For the Korean case, due to the limited coverage of the available survey data[1], the above purpose cannot be directly accomplished.

The sample size for the 1963 Korean survey of urban wage and salary earner families is 955 and the estimated sampling fraction is 1/650 so the estimated total number of urban wage and salary earner families is 620,750. In comparison with an estimated total number of households of 4,654,300 at the end of 1963[2] our postulated income redistributions for the Korean case amount to increasing the level of living of some 4.8 percent of all families, and moreover not the poorest 4.8 percent who probably reside in rural areas, at the expense of less than 9 percent of all families. Such a redistribution of income does not conform to what we consider eliminating the poverty problem, and in any case would presumably have only very small effects on the economy as a whole.

In our analysis of the Korean case we shall treat the group of urban wage and salary earner families together with the economic structure required to satisfy their pattern of expenditure as a "sub-economy" within the Korean economy. Specifically, in most of what follows we compare the redistribution-induced changes in various economic growth factor indices with the respective pre-redistribution

values for the average urban wage and salary earner family. Only in this way can we get a measure of the magnitude of the effects of a large change in the size distribution of income. Of course, we cannot argue that income redistribution within other or between socio-economic groups of the populace would have effects of identical magnitude relative to the size of the redistribution. However, to the extent that income-induced differences in behavior patterns in other settings resemble those within the Korean urban wage and salary earner group, the specific inferences drawn from this case may have more general applicability.

1. ON THE PATTERN OF PRIVATE URBAN WAGE AND SALARY EARNER FAMILY EXPENDITURES

As for the Taiwan case, for the Korean case separate regression equations were fit to the sample data for each individual expenditure item and each general expenditure category such as food, housing, and so on. The final equations were also chosen only on the basis of statistical fit criteria with the rather surprising result that for every item the resultant equation had the constant elasticity form and contained only the single explanatory variable family disposable income. As well as implying that such socio-economic characteristics as race, location of residence, and consumption habits have no systematic influence on the pattern of expenditure, this also implies that family size has no influence. Due to the limited coverage of the Korean surveys, assuming that the sample is fairly homogeneous with respect to socio-economic characteristics seems plausible. However, the apparent lack of influence of family size on expenditures in total, on food, cereals, clothing and many other items, can probably

be traced to the unsatisfactoriness of the only index of family size available, the total number of family members. For the Taiwan nonfarm sector, recall, using a measure corrected for differences in age-sex composition, we found family size to have an independent influence on expenditures on a large majority of the expenditure items.

Due to the exclusion of family size from the regression equations, for the Korean case one would expect that the absolute values of the induced changes in the income group e average family pattern of expenditure, as estimated according to equations (8) in section IV.3 above, would embody an upward bias. That is, part of the estimated change in expenditure would be due to the fact that average family size was not statistically held constant. The effect of this bias on the estimated potential changes in the average urban wage and salary earner family pattern of expenditure induced by income redistribution, as estimated by equations (10) in section IV.3 above, cannot in general be determined as it depends not only on the distribution of the bias over the income groups, but also on the estimated values of the parameters of each individual regression equation. The fact that such a bias does exist for certain expenditure items should be kept in mind.

The constant elasticity function directly yields an estimate of the income elasticity of expenditure. These estimates for all items are given in the appendix table giving the regression equations for the Korean case as the estimate $\hat{b}$ for each item. Aside from the usefulness of these elasticity estimates in predicting demand patterns over time, they directly give information about the probable structure of household demand after income redistribution. The average family expenditure on any item, the income elasticity of which exceeds unity,

will decrease in response to any income redistribution which reduces inequality but preserves the initial pre-redistribution average family disposable income level. This is because, using the notation given in section IV.1 above, the fraction of family disposable income which is spent on item i, $C_{ie}/Y_e = A\,Y_e^{b-1}$ where A is some constant and b is the income elasticity, increases along with the level of disposable income Y_e as long as $b > 1$. Alternatively, if $b < 1$ income redistribution of the same type will result in an increase in expenditure on that item.

Using the fitted equations for the general expenditure categories we estimate the potential changes in the average urban wage and salary earner family expenditure pattern induced by income redistribution as shown in Table VII.1 below. The potential changes are expressed as a percent of the pre-redistribution expenditure levels.

Table VII.1 : KOREA : ESTIMATED POTENTIAL PERCENTAGE CHANGES IN AVERAGE URBAN WAGE AND SALARY EARNER FAMILY PATTERN OF EXPENDITURES INDUCED BY INCOME REDISTRIBUTION

expenditure categories	income redistribution schemes			
	$d\bar{Y}^k = 0$			
	abslte. equal burden	prop. equal burden	prog. burden	total savings constant
	A	B	C	D
1. FOOD	0.9	1.0	1.2	0.6
2. HOUSING	-1.5	-2.4	-3.0	-4.3
3. FUEL & LIGHT	0.9	1.1	1.3	0.7
4. CLOTHING	-1.3	-1.4	-1.5	-7.8
5. MISCELLANEOUS	-0.8	-1.0	-1.2	-7.6

Each entry is computed as $(d\bar{C}_i^k / \bar{C}_i^k) \times 100$ where

$$d\bar{C}_i^k = \sum_e \hat{l}_e^k \, d\hat{C}_{ie}^k \qquad k = \text{urban w \& s earners} \quad (10)$$

$$\bar{C}_i^k = \sum_e \hat{l}_e^k \, \hat{C}_{ie}^k \qquad i = 1,\ldots,5; e = 1,\ldots,8 \quad (9)$$

Average family expenditures on FOOD and FUEL & LIGHT increase and expenditures on HOUSING, CLOTHING and MISCELLANEOUS which includes personal services, education, recreation, and transportation and communication, decrease. At the risk of offending the reader we again note that this does not imply that the last three items are inferior goods. The negative changes simply mean that the decrease in expenditure on the part of income groups whose incomes fall as a result of redistribution exceeds the increase in expenditures on the part of the recipients of the hypothetical income transfers so that the expenditure of the average urban wage and salary earner family decreases. We also note from (D) in the table that when average family total expenditure is held constant the percentage decreases are quite significant, the largest being the 7.8 percent decline in expenditure on CLOTHING.

2. ON SAVINGS

For the Korean case our results with respect to the potential effects of redistribution on domestic savings may have greater significance for the prospects of implementing policies to promote social equity than in the Taiwan case due to the greater degree of dependence on foreign savings to finance capital formation. Table VII.2 presents our estimates of the potential effects of income redistribution on average family savings.

Table VII.2 : KOREA : ESTIMATED POTENTIAL CHANGES IN AVERAGE URBAN WAGE AND SALARY EARNER FAMILY ANNUAL SAVINGS INDUCED BY INCOME REDISTRIBUTION, WON PER ANNUM

	initial average savings $\bar{S}^k$	income redistribution schemes			
		$d\bar{Y}^k = 0$			
		abslte. equal burden	prop. equal burden	prog. burden	total savings constant
		A	B	C	D
$d\bar{S}^k$	-5,748	-432	-524	-636	-804
(%)	-	(-7.5)	(-9.2)	(-11.1)	(-13.9)

$\bar{S}^k = \bar{Y}^k - \bar{E}^k$

$d\bar{S}^k = d\bar{Y}^k - d\bar{E}^k$

$\% = (d\bar{S}^k/\bar{S}^k) \times 100$

k = urban wage and salary earner families (21)

For 1963-64 the urban wage and salary earner group as a whole is, as previously noted, a net dis-saver group. For redistribution schemes A, B and C average family savings falls as expected; for the most progressive of the three amounting to 11.1 percent of the initial dis-saving level. However, initial dis-saving is only 8.3 percent of initial mean disposable income so the potential fall in average family savings is actually less than 1 percent of disposable income. Hence, even if no policy measures were taken to prevent a rise in private demand, the "savings cost," the cost in terms of the reduction in available investment funds, of income redistribution seems small.

However, that even such a small decline might not be acceptable to the Korean authorities can be inferred from the current five-year

development plan. For 1970 35.0 percent of gross investment was financed by foreign savings while for 1971 this increased to 43.9 percent due in part to increases in private consumption.[3] The crucial importance of the rate of domestic savings is reflected in the third five-year plan, 1972-76, in which in order to fulfill the target growth rate of GNP of 8.6 percent per annum gross investment is by 1976 to rise by 58.9 percent over the level of 1970, in terms of 1970 prices. The projected percentage increases in the sources of investment funds by 1976 over the respective 1970 values are given below.

Table VII.3 : KOREA : PERCENT INCREASES IN SOURCES OF INVESTMENT FUNDS PROJECTED FOR 1970-76

GROSS INVESTMENT	58.9%
DOMESTIC SAVINGS	111.7
PRIVATE SAVINGS	131.2
PUBLIC SAVINGS	83.0
FOREIGN SAVINGS	-37.7

Source : The Third Five-Year Economic Development Plan, 1972-76, Economic Planning Board, p.14

For our present purposes we simply note that through a variety of measures private savings is to be increased by over 130 percent[4] while reliance on foreign savings is to decrease by 38 percent. In such a context inevitability of a reduction in distributive inequity causing a fall in domestic savings might indeed be sufficient to relegate redistribution measures to a low position in development priorities.

Again, it is a central point of this study that even such a small decline in domestic savings is by no means inevitable. For the Korean

case income redistribution scheme D is designed to eliminate the "savings problem." As for the Taiwan case we can compute the additional implicit tax burden on the upper income groups required to provide public tax revenues sufficient to offset the fall in private household savings. As explained in section V.3 above, for the Korean case, financing the implicit income transfers to the poor groups requires an implicit tax burden on the upper income groups amounting to 5.8 percent of their initial disposable income level. Eliminating the fall in total savings as well requires an additional tax burden of only 1.4 percent of the initial disposable income level of the same groups.[5] In Table VII.2, although for redistribution scheme D average urban wage and salary earner family savings falls by 804 won per annum, this fall is matched by the increase in public savings resulting from the additional tax levy of 1.4 percent of disposable income on the upper income groups.

As for the Taiwan case it seems clear that the potential induced fall in private savings should not be regarded as an obstacle to immediately reducing the extent of poverty in urban Korea.

3. ON OTHER ECONOMIC GROWTH FACTORS

In considering the other economic growth factors in the Korean case we carried out the computations under three alternative assumptions as to the values of the $m_i = dM_i/dC_i$, $i = 1,\ldots,n$, as noted in section IV.7 above. We have Case I : $m_i = 0$ for all i so that all induced changes in demand are satisfied through changes in domestic production ; Case II : $m_i = 1$ for all i so that all induced changes in demand are satisfied through changes in net imports ; and Case III :

Table VII.4 : KOREA : ESTIMATED POTENTIAL CHANGES IN AVERAGE FAMILY ECONOMIC GROWTH FACTOR INDICES INDUCED BY REDISTRIBUTION OF URBAN WAGE AND SALARY EARNER FAMILY DISPOSABLE INCOME

economic growth factor	ave. family initial value of economic growth factor index	change in value of economic growth factor index induced by income redistribution			
Case I : $m_i = 0$		A	B	C	D
TOTAL IMPORTS $d\bar{A}_M^k$ ($d\bar{C}_M^k$=0)	6,967	-25	-34	-44	-167
UNSKILLED LABOR $d\bar{A}_L^k$	31,644	-86	-127	-174	-1272
SKILLED LABOR $d\bar{A}_S^k$	3,685	-2	-5	-8	-115
VALUE ADDED $d\bar{A}_V^k$	64,774	+58	+30	-6	-1198
LABOR REMUNERATION $d\bar{A}_W^k$	14,579	-64	-91	-119	-540
Case II : $m_i = 1$		A	B	C	D
TOTAL IMPORTS $d\bar{C}_M^k$ ($d\bar{A}_M^k$=0)	6,967	+202	+221	+230	-528
Case III : $m_i = m_i^{1963}$		A	B	C	D
TOTAL IMPORTS $d\bar{C}_M^k + d\bar{A}_M^k$	6,967	-12	-20	-29	-204
UNSKILLED LABOR $d\bar{A}_L^k$	31,644	-82	-121	-166	-1216
SKILLED LABOR $d\bar{A}_S^k$	3,685	-1	-5	-7	-110
VALUE ADDED $d\bar{A}_V^k$	64,774	+43	+16	-22	-1160
LABOR REMUNERATION $d\bar{A}_W^k$	14,579	-61	-88	-115	-521

$$d\bar{C}_M^k = \sum_i m_i \, d\bar{C}_i^k \quad ; \quad \bar{C}_M^k = \sum_i m_i \, \bar{C}_i^k \qquad i = 1,\ldots,n \qquad (22)$$

$$d\bar{A}_r^k = \underline{a}_r \, d\bar{X}^k \quad ; \quad \bar{A}_r^k = \underline{a}_r \, \bar{X}^k \qquad r = M,L,S,V,W \qquad (23)$$

$\underline{a}_M$: value of imported inputs per won output

$\underline{a}_L$: number of unskilled laborers per 10,000 won output end 1963

$\underline{a}_S$: number of skilled laborers per 10,000 won output end 1963

$\underline{a}_V$: value added per won output

$\underline{a}_W$: value of labor remuneration per won output

$m_i = m_i^{1963}$ where m_i^{1963} is the 1963 absolute ratio of net "competing" imports to final demand for sector i. The numerical results for all cases and income redistribuion schemes are presented in per annum terms in Table VII.4. For case II, since domestic production is assumed not to change we have $d\bar{A}_r^k = 0$, for r = imports of productive inputs (M), skilled labor (S), unskilled labor (L), value added (V), and labor remuneration (W). The computations are made according to equations (22) and (23) in section IV.5 above except that, as noted previously, the correction terms do not apply.

In order to gauge the magnitudes of the redistribution-induced changes we also compute percentages from Table VII.4 for Case III : $m_i = m_i^{1963}$ and redistribution schemes A, B, C and D, as shown in Table VII.5 below.

Table VII.5 : KOREA : INDUCED CHANGES IN ECONOMIC GROWTH FACTOR INDICES AS A PERCENT OF THE INITIAL AVERAGE URBAN WAGE AND SALARY EARNER FAMILY VALUE; CASE III : $m_i = m_i^{1963}$

economic growth factor	income redistribution schemes			
	$d\bar{Y}^k = 0$			
	abslte. equal burden	prop. equal burden	prog. burden	total savings constant
	A	B	C	D
TOTAL IMPORTS	-0.2	-0.3	-0.4	-2.9
SKILLED LABOR	-0.0	-0.1	-0.2	-3.0
UNSKILLED LABOR	-0.3	-0.4	-0.5	-3.8
VALUE ADDED	+0.1	+0.0	-0.3	-1.8
LABOR REMUNERATION	-0.4	-0.6	-0.8	-3.6

Source : computed from Table VII.4

a. TOTAL IMPORTS

Recent macro-economic projection studies by the United Nations Economic Commission for Asia and the Far East of countries in the region indicate that under certain plausible assumptions about parameter values and growth rates of Gross Domestic Product (GDP), the trade gap, for our purposes defined simply as the difference between total imports (M) and total exports (Z), may dominate the savings-investment gap, the difference between investment ($\dot{K}$) and domestic savings (S). For the Korean case, on the basis of an assumed 7 percent rate of growth of GDP, we see from Table VII.6 below that for 1970 and 1975 the projected savings-investment gap is closed, domestic savings exceeds projected investment in constant 1960 prices, but the projected trade gap remains above 5 percent of GDP.

Table VII.6 : KOREA : GAP PROJECTIONS AS A PERCENT OF GDP

	actual		projected	
	1960	1967	1970	1975
TRADE GAP $[(M-Z)/GDP]x100$	9.3	8.0	5.0	5.4
SAVINGS-INVESTMENT GAP $[(\dot{K}-S)/GDP]x100$	9.2	7.9	-2.4	-1.8

Source : Feasible Growth and Trade Gap Projections in the ECAFE Region, UN ECAFE, Bangkok, Thailand, 1968, chapt. V, annex II, table 1 and table on p.152.

In actuality the rate of growth during the second plan period, 1967-71, greatly exceeded the 7 percent rate used in these projections - the average annual rate of increase in GNP at constant prices is given as 11.4 percent[6] - with the result that the actual trade gap has been increasing; in 1971 it amounted to about 13.6 percent of GNP.[7] In view

of this development, the potential effects of income redistribution on total imports may be especially important. Below we consider the three cases, alternative assumptions as to the values of the m_i, individually. For Case I : $m_i = 0$ the change in total imports required by the average urban wage and salary earner family is simply the change in imports of foreign productive inputs ($d\bar{A}_M^k$) because by assumption direct "competing" imports do not change ($d\bar{C}_M^k = 0$). In Table VII.4 the Case I entry for each redistribution scheme is negative, average family total imports decrease.

For Case II : $m_i = 1$ in which all induced changes in expenditure are assumed to be accommodated through "competing" imports, the change in average family total imports is simply the sum over tradable commodities[8] of the induced changes in expenditures. For redistribution schemes C and D from Table VII.4 the respective changes are +230 won and -528 won; eliminating the "savings problem" also replaces the increase in total imports of redistribution C with a substantial decrease. Apparently under redistribution scheme D the mix of expenditure shifts in favor of nontradable goods, the supply of which is supposed to be elastic, and the demand for tradables falls.

For Case III : $m_i = m_i^{1963}$, the most realistic case, the average family change in total imports is the sum of the induced changes in both "competing" imports and imports of productive inputs for each redistribution scheme considered. That is, we compute the sum $d\bar{C}_M^k + d\bar{A}_M^k$ where the two terms are computed according to equations (22) and (23) in section IV.5 above. For Case III it is implicitly assumed that each expenditure item i is tradable to the extent given by $m_i = m_i^{1963}$. For redistribution schemes C and D the term $d\bar{C}_M^k$ has values

+13 and -44 won per annum, respectively. The corresponding $d\bar{A}_M^k$ terms are -42 and -160 won, respectively, so as shown in Table VII.4 the induced changes in average family total import requirements for redistribution schemes C and D are -29 and -204 won, respectively, or from Table VII.5, -0.4 and -2.9 percent of the initial average family value.

From the above results we tentatively conclude that there is no conflict between lessening distributional inequity and the objective of closing the trade gap. With the exception of the rather unrealistic Case II assumption for redistribution schemes A, B and C, all the estimated potential effects on urban wage and salary earner household total imports are negative, suggesting that measures successful in alleviating poverty would also have the effect of decreasing total imports and hence easing the balance of payments constraint. Eliminating the "savings problem" of redistribution greatly accentuates this effect.

b. LABOR : SKILLED AND UNSKILLED

Turning now to the effects of income redistribution on the manufacturing structure required to satisfy the urban wage and salary earner group's expenditure pattern we see from Table VII.4 that the capacity to absorb unskilled labor may be adversely affected. In view of growth theories which suggest that the modern sector must supply employment opportunities sufficient to accommodate both high birth rates and high rates of worker displacement from agriculture as a necessary condition for economic development, and the often observed increasing trend in urban unemployment rates in developing countries,

such a result could have serious consequences for the prospects of implementing income redistribution policies. From Table VII.5 we see that for redistribution scheme C the decline is just above 0.5 percent of the initial value but for D it is 3.8 percent. To the extent that the Korean manufacturing sector is dependent on domestic demand, this potential fall in the index of unskilled labor absorption must be regarded as serious. However, since during the period 1959 to 1969 exports of goods and services increased at the remarkable rate of over 40 percent per annum[9], it seems clear that the capacity of the Korean manufacturing sector to absorb unskilled labor depends on, among many other things, investment policies in the past, the availability of other factors of production, and the rate of net capital formation, rather than on urban wage and salary earner family demand for manufactured goods. Income redistribution scheme D potentially decreases the total import requirement of the private household sector which would free foreign exchange for imports of productive inputs and thus allow for a general expansion of production. Policies to eliminate the "savings problem" of redistribution might increase tax revenues which in principle could be used for such purposes as investment subsidies to private manufacturing. Public use of the increased revenues may also affect domestic employment directly through public projects as well as indirectly through government final demand.

Although the apparent tendency of income redistribution to decrease the capacity of the Korean manufacturing sector to absorb unskilled labor must be regarded as unfortunate, this result is by no means inevitable. The significance of our result is that the design of policies aimed at altering the distribution of income should include careful

consideration of the unskilled labor problem.

Again, our rather scarce comments on the shortage of "skill" as a constraint on economic growth clearly do not adequately represent its real importance both in production and government administration. In fact, a convincing argument can be made that, in the context of many developing countries, it is the most serious constraint. As in the Taiwan case this lack of emphasis in this case only reflects the lack of satisfactory quantitative measures of whatever it is that the word "skill" means in this context. Our single index of this factor, the number of skilled workers required both directly and indirectly by the average urban wage and salary earner household, does decrease for each income redistribution scheme considered. For redistribution scheme D the decline, as shown in Table VII.5, is 3.0 percent. This suggests that redistribution of income may not be inconsistent with reduced "skill" requirements in manufacturing.

c. VALUE ADDED AND LABOR REMUNERATION

In Table VII.4 the initial value of 64,774 won for the value added index represents the total annual value added "supported" by an average urban wage and salary earner household, both directly and indirectly through input-output linkages. Income redistribution scheme A potentially causes a 43 won increase in the value added supported by the average family or less than 0.1 percent of the initial value. Increasing the tax progressivity does result in a change in sign for the value added index as shown in Table VII.4, but the magnitude of the decrease of 22 won for redistribution C is not significant. From Table VII.5 we see that redistribution scheme D potentially results in

a 1.8 percent decrease in the value added index.

The interpretation of the initial value of the labor remuneration index is similar. For redistribution scheme C the fall of 115 won amounts to only 0.8 percent of the initial value; for D the fall is 3.6 percent. It is not clear how this decrease in the labor remuneration index should be interpretted. If one believes in neoclassical two-factor production theory, it might be interpretted as indicating that the demand mix of the urban wage and salary earner group becomes more capital intensive, a clearly unfortunate development in a developing, presumably capital-poor, country. Generally, all that can be said is that income redistribution may slightly decrease the share of labor in national income. Since wage income is generally less unequally distributed than property income, this may have the effect of counteracting to some extent the initial reduction in overall inequality achieved by the initial redistribution policy.

VIII. INTER-COUNTRY COMPARISON OF RESULTS

In this section we make a rough comparison of the effects of income redistribution within the Taiwan nonfarm sector and the Korean urban wage and salary earner group. The coverage of the sample surveys does not correspond exactly but, if perhaps only for the sake of completeness, such a comparison seems warranted. Certain aspects of the comparison made in Table VIII.1 below are subject to qualification due to differences in the quality of the available data and the statistical procedures used for the two cases. Where possible the effects of such differences will be pointed out.

Table VIII.1 : COMPARISON OF POTENTIAL PERCENTAGE CHANGES IN AVERAGE FAMILY EXPENDITURE PATTERN AND ECONOMIC GROWTH FACTOR INDICES INDUCED BY "LARGE" INCOME REDISTRIBUTION WITH TOTAL SAVINGS HELD CONSTANT FOR TAIWAN AND KOREA

	Taiwan (NF-D)	Korea (D)
GENERAL EXPENDITURE CATEGORIES:		
FOOD	+1.0	+0.6
HOUSING	-1.2[a]	-4.3
FUEL & LIGHT	+2.2	+0.7
CLOTHING	-1.9	-7.8
MISCELLANEOUS	-2.0[b]	-7.6
ECONOMIC GROWTH FACTOR INDICES:		
PRIVATE SAVINGS	-3.0	-13.9
CAPITAL REQUIREMENTS	-0.2	-
"COMPETING" IMPORTS	+0.6	-1.2
IMPORTS OF PRODUCTIVE INPUTS	+0.1	-4.7
UNSKILLED LABOR	-0.9	-3.8
SKILLED LABOR	-0.7	-3.0
VALUE ADDED	+0.2	-1.8
LABOR REMUNERATION	-0.1	-3.6

a/ includes TOTAL RENT & WATER CHARGES, TOTAL FURNITURE, FURNISHINGS & HOUSEHOLD EQUIPMENT in Table VI.1.

b/ includes TOTAL MISCELLANEOUS CONSUMPTION EXPENDITURES, TOTAL RECREATION & AMUSEMENT, TOTAL TRANSPORTATION & COMMUNICATION, and TOTAL PERSONAL & MEDICAL CARE in Table VI.1.

As noted previously redistribution scheme NF-D can be characterized as raising the disposable income share of the poorest 35 percent of all nonfarm families in Taiwan from 17.4 to 23.0 percent, while for Korea redistribution scheme D can be characterized as raising the share of the poorest 35 percent of all urban wage and salary earner families from 16.2 to 21.0 percent. Both schemes allocate the implicit burden progressively with implicit tax revenue sufficient to compensate for both the income transfers and the fall in private savings, so that total savings does not fall. Hence the table presents the potential "mix" effects of postulated large scale income redistribution in the two settings; the average family level of expenditures does not change.

We first note that for each case the results with respect to labor are internally consistent; the changes for both skilled and unskilled labor, and the change in total labor remuneration are negative. However, for the Taiwan case there is a minor inconsistency in that the changes for capital requirements as well as those for labor inputs are negative, and yet the change for total value added is positive. This apparently results from the fact that the data for the capital and labor inputs individually are taken from the survey of commerce and industry for 1966, whereas the data on total value added, also at producer's prices, are taken directly from the 1966 input-output table. This of course does not explain the underlying cause of the discrepancy but in any case this minor inconsistency should not detract significantly from the value of our results.

In comparing the two country cases the most important result to note is that the signs of the induced changes in the general expend-

iture categories correspond exactly; for both cases the average family's expenditures on FOOD and FUEL & LIGHT increase while expenditures on HOUSING, CLOTHING and MISCELLANEOUS decline. The magnitudes of the changes, in general extremely small in relation to the sizes of the implicit income transfers, are greater for the Korean case for the latter three categories. Part of this, however, is due to differences in the procedures used in hypothesizing income redistribution.

In the Taiwan case, recall, the average family disposable income level of each initially sub-"poverty" level group was raised up to the "poverty" level, whereas for the Korean case the average family disposable income levels for the two lowest groups of urban wage and salary earner families were each raised by 30 percent. Although in terms of cumulative income shares the correspondence is close, this difference in the assumed transfers has the effect of making the Korean case estimated changes somewhat more negative.

Subject to the same qualification private savings is much more sensitive to income redistribution in the Korean wage and salary earner context than in the Taiwan nonfarm sector.

The numerical results with respect to the other economic growth factor indices exhibit the same relation; i.e., the Korean results are all significantly more negative. In addition to the effect of the differences in the assumed transfers to the poor groups, there is also the downward bias due to the fact that for the Korean case no correction was made for the "adding up" problem. Allowing for a certain degree of negative bias in the Korean results, the induced changes in Table VIII.1 do not exhibit significant differences. For both cases the results with respect to unskilled and skilled labor and labor remuner-

ation roughly coincide; that is, allowing for a slight upward adjustment seems likely to leave the Korean results negative but somewhat smaller in magnitude. For "competing" imports and value added, for the Korean case, it is not clear whether the signs would differ from those for the Taiwan case after adjusting for the various negative biases or not. For imports of productive inputs it seems reasonable to tentatively conclude that the signs of the two country changes would still differ.

IX. CONCLUSION

Three important points emerge from the study:

1) We have shown that the hypothetical values of the economic growth indicators for two Asian countries under more equitable size distribution of income would not differ significantly from their actual values.

2) If appropriate demand management policies were implemented simultaneously, it is entirely conceivable that income redistribution would not be inconsistent with improved growth prospects due to effects through the pattern of private demand and the economic enfranchisement of the poor groups.

3) Since the problem of eliminating the redistribution-induced fall in domestic savings is in actuality small relative to the problem of implementing income redistribution itself, it makes little sense to regard the potential fall in savings as a reason for postponing income redistribution.

We do not pretend to offer a solution to even a small part of the problem of social equity in developing countries in the ECAFE region. Nor do we mean to suggest that tax policy alone is sufficient for dealing with social inequity. This study does, however, provide evidence that suggests that the notion of an inevitable conflict between equity and growth is not true in general. Attention should be given to developing new and better policies for achieving equity with growth rather than worrying about supposed conflicts between the two objectives.

A final caveat seems to be in order. Throughout this paper we have attempted to point out the various methodological and statistical problems which beset an analysis of this type. Improvement on the most serious of these points awaits improvement in the basic data. In the interim these difficulties should be kept in mind.

X. NOTES AND CITATIONS

I. 1 See Programming Techniques for Economic Development, Development Programming Techniques Series No. 1 (United Nations publication, Sales No.: 60.II.F.3), p.6.

2 See Hansen, B., "Development and Social Justice", paper submitted to the Conference of Asian Economic Planners, fourth session, December 1971 (E/CN.II/CAEP.4/L.5).

3 Papanek, G., Pakistan's Development, Social Goals and Private Incentives (Harvard University Press, 1967), p.242.

4 Marchal, J. and B. Ducros (ed.), The Distribution of National Income: Proceedings of a Conference Held by the I.E.A., 1968, p.359.

5 Lewis, W.A., The Theory of Economic Growth (Allen & Unwin, 1965), p.379.

6 The most comprehensive discussion of the problem by R. McNamara appears in his Address to the Board of Governors, Washington, D.C., September 25, 1972, although the issue is mentioned in most of his recent speeches. H. Oshima's recent work deals with identifying the sources of income inequality in Asian countries; see his "Income Inequality and Economic Growth: The Postwar Experience of Asian Countries", Malayan Economic Review, vol. XV, no. 2, October 1970. I. Adelman and C. Morris attempt to discover the underlying socio-politico-economic causes of income disparities in An Anatomy of Patterns of Income Distribution in Developing Nations, U.S.A.I.D., February 1971, and S. Morley and G. Smith and W. Cline use simulation methods to analyze the effects of income redistribution on economic growth in Latin America. See Morley, S. and G. Smith, "The Effect of Changes in the Distribution of Income on Labor, Foreign Investment and Growth in Brazil" in Stepan (ed.) Authoritarian Brazil (Yale University Press, 1973) and Cline's study Potential Effects of Income Redistribution on Economic Growth, Latin American Cases (Praeger, 1972). Other recent papers on income distribution include Weisskoff, R., "Income Distribution and Economic Growth in Puerto Rico, Argentina and Mexico", Review of Income and Wealth, series 16, no. 4, 1971, and Fishlow, A., "Brazilian Size Distribution of Income", American Economic Review, Papers and Proceedings, May 1972.

II. 1 See Solow, R., "A Contribution to the Theory of Economic Growth", Quarterly Journal of Economics, February 1956, and Harrod, R.F., "An Essay in Dynamic Theory", Economic Journal, March 1939. In the neoclassical model the equilibrium rate of economic growth is determined solely by the rates of exogenous population growth and technological progress. However, the aggregate savings ratio

does affect both the level of output and the time required for adjustment to equilibrium. See Sato, R., "Fiscal Policy in a Neoclassical Growth Model: An Analysis of the Time Required for Equilibrating Adjustment", Review of Economic Studies, February 1963.

2 See Kaldor, N., "Alternative Theories of Distribution", Review of Economic Studies, 1956.

3 See Sato, K., "Taxation and Neoclassical Growth", Public Finance, 1967.

4 See Stiglitz, J., "Distribution of Income and Wealth Among Individuals," Econometrica, July 1969.

5 See Chenery, H. and M. Bruno, "Development Alternatives in an Open Economy, the Case of Israel," Economic Journal, March 1962, and Eckaus, R. and V.T. Parikh, Planning For Growth (M.I.T. Press, 1968).

6 See Chenery, H. and A. Strout, "Foreign Assistance and Economic Development", American Economic Review, September 1966. Such models have not been without their critics. See Bruton, H., "Two Gap Approach to Aid and Development: Comment", and reply by Chenery in American Economic Review, June 1969.

III. 1 The computation of the number of male adult equivalent units (M.A.E.U.) was made in accordance with the following table:

age	0-1	2-4	5-7	8-10	11-14	15-20	21 and over male	21 and over female
no. of M.A.E.U.	0.3	0.4	0.5	0.7	0.8	0.9	1.0	0.9

2 See Oshima, H., "Income Inequality and Economic Growth: The Postwar Experience of Asian Countries", Malayan Economic Review, vol. XV, no. 2, October 1970.

3 Hsing, M.H., Industrialization and Trade Policies in Taiwan, Institute of Economics, Academia Sinica, Nankang, Taipei, Taiwan, March 1971, appendix table A.18.

4 For a description of the procedures used in constructing both sets of tables and the 1964 tables themselves see Chiu, J., "The Taiwan Economy: An Input-output Study", Industry of Free China, vol. XXX, no. 5, November 1968.

5 It is apparent that the Korean statistical authorities do feel that much of the dis-saving is due to reporting errors. In Korea Statistical Yearbook 1965 the result of the survey is reflected in the national accounts data; savings of households and private nonprofit institutions accounted for -1.3 percent of gross domestic capital formation. However, in Korea Statis-

tical Yearbook 1969 the same figure for 1963 has been adjusted to +6.9 percent.

IV. 1 A similar approach was taken by W. Cline in his study Potential Effects of Income Redistribution on Economic Growth, Latin American Cases (Praeger, 1972); for an excerpt see Development Digest, vol. IX, no. 4, October 1971.

2 An earlier more complete version of the Korea case study appears as "Effects of Income Redistribution on Economic Growth Constraints: Evidence from the Republic of Korea", Economic Bulletin for Asia and the Far East, UN ECAFE, Bangkok, Thailand, vol. XXIII, no. 1, June 1972.

3 In actuality, in the sample there were no farm families falling into the income class 'NT$200,000 and over' so for the farm sector we have only 30 income groups. However, for notational convenience we shall continue as if both sectors consisted of 31 income groups.

4 See note III.1.

5 By allowing the data themselves to determine the particular functional form used to represent household expenditures on each item we free our analysis from bias introduced by the prior choice of those forms. This is of considerable importance, since as any student of econometrics is well aware econometric results often depend crucially on the investigator's choice of functional form.

6 The reader unfamiliar with input-output models may see Chenery, H. and P. Clark, Interindustry Economics (John Wiley & Sons, 1962).

7 For a discussion of this problem see Prais, S.J. and H.S. Houthakker, The Analysis of Family Budgets (Cambridge University Press, 1955).

8 In May of 1964 a unified fluctuating exchange rate system was established in Korea with the floor set at US$1 = 255 won. This is considerably above the official rate recorded for 1963. Since the rate adjustment presumably was made to more accurately reflect the true parity between U.S. and Korean currencies, we take the mid-1964 rate as the basis for comparison.

V. 1 See "Economic Growth and Income Distribution", Economic Survey of Asia and the Far East 1971, UN ECAFE, Bangkok, Thailand, March 1972.

2 See Weisskoff, R., "Income Distribution and Economic Growth in Puerto Rico, Argentina, and Mexico", Review of Income and Wealth, series 16, no. 4, 1971.

3 See Kuznets, S., "Quantitative Aspects of the Economic Growth of Nations: VIII. Distribution of Income by Size", Economic Development and Cultural Change, vol. XI, no. 2, part II, January 1963.

4 See Haq, M., "Employment and Income Distribution in the 1970's: A New Perspective", Development Digest, vol. IX, no. 4, October 1971, for a strong statement of the case for re-ordering development priorities.

5 See Ogura, T., "Economic Impact of Postwar Land Reform in Japan", and "land Reform in the Republic of China" by the Chinese delegation to the UN FAO conference in 1966 in Rome, Italy, both in Lin, S. (ed.), Readings in Land Reform, John C. Lincoln Institute, University of Hartford, Conn., 1970.

6 For a more recent look at the distribution of income in Taiwan and the changes over the period 1964-70, see Liu, J., "Income Distribution and Economic Growth in Taiwan", Institute of Economics, Academia Sinica, Nankang, Taipei, Taiwan, (mimeo in Chinese).

7 Oshima's index of decile inequality is simply $I = [\Sigma|d|]/180$ where $|d|$ is the deviation of each decile share from 10 percent in absolute value. Since $0 \leq \Sigma|d| \leq 180$, we have $0 \leq I \leq 1$.

8 Oshima, op. cit. note III.2, Table 1, p.13.

9 Report on the Survey of Family Income and Expenditure in Taiwan 1966, Bureau of Accounting and Statistics, Taiwan Provincial Govt., June 1968, pp. LXXVII, XCII.

10 Oshima, op.cit. note III.2, appendix Table D, p.39.

11 Highlights of Land Reform in Taiwan, Joint Commission on Rural Reconstruction, Taipei, Taiwan, revised May 1966.

12 See "Land Reform in the Republic of China" in Lin (ed.), op. cit. note V.5.

13 See Weisskoff, op. cit. note V.2, for a discussion of the deficiencies.

VI. 1 A list of the grouped and individual expenditure items and the allocation of the latter to the input-output sectors are presented in the appendix to this study.

2 Previously we noted that since occupational characteristics and consumption habits could not be corrected for on the basis of the available data, our estimates are only approximations to the expenditure patterns that would exist under alternative hypoth-

esized distributions of income. Here we note further that due to possible differences in the strength of habit-persistence, "Jones" effects and other types of interdependence between utility functions between families at different income levels, our estimates are even more approximate as estimates of the potential effects of a change in the size distribution of income. However, since nothing can be done about such factors anyway, we shall not maintain this distinction; all the results of our computations to follow will hence be characterized as potential changes induced by income redistribution.

3 Although there is a considerable amount of inter-sector differences in the direction of responses, the estimated changes in terms of the individual expenditure items also support this conclusion.

4 Hsing, op. cit. note III.3, table 4.6, p.197.

5 National Income Statistics, Taiwan, Republic of China, Overall Planning Department, Commission for International Economic Cooperation and Development (CIECD), Executive Yuan, Rep. of China, December 1972, Table 12, p.13.

6 Long Range (1971-80) Economic Development Plan for the Taiwan Area, Republic of China, CIECD, Executive Yuan, Rep. of China, December 1972, Table 2, p.28.

7 Note that the variance "explained" by these equations is that of the logarithm of total expenditure, rather than total expenditure itself. Hence, our estimates of savings as the difference between disposable income and total expenditures based on these equations may not possess the degree of accuracy suggested by the high R^2 coefficients and t statistics. This was pointed out to the author by A. Fishlow.

8 For example, U.S. data for 1948-49 show this tendency as do British data for 1952; see Brady, D., "Family Saving 1888 to 1950" in Goldsmith, R., A Study of Saving in the United States (Princeton University Press, 1956), vol. II, p.151, and Lydall, H.F., British Incomes and Savings (Oxford, 1955), Table 71, p.143. It is interesting to note, however, that Japanese data do not seem to conform; for example, from 1956-60 urban wage and salary earner households in Japan saved a much higher percent of their income than did agricultural households. See Komiya, R., "The Supply of Personal Savings" in Komiya (ed.) Postwar Economic Growth in Japan (Univ. of California Press, 1966), Table 8-5, p.168.

9 This point is easily overlooked. If family size enters the expenditure equation multiplicatively, as in the log-linear form used in this study, then its omission can have serious effects on the results of income redistribution simulation

studies as can be demonstrated using the Taiwan case. Excluding family size from consideration and refitting the equations for total farm/nonfarm family expenditure yields the equations below, with t values in parentheses and R^2:

$$\text{Farm} : \text{Log}E^F = 1.6647 + \underset{(45.8)}{.8242}\text{Log}Y^F \qquad R^2 = .9868$$

$$\text{Nonfarm} : \text{Log}E^{NF} = .5563 + \underset{(100.9)}{.9381}\text{Log}Y^{NF} \qquad R^2 = .9972$$

where E^F/E^{NF} and Y^F/Y^{NF} are farm/nonfarm total expenditure and disposable income, respectively, as defined previously. Comparing these equations with those above in the text, equations (25), shows that the estimated income elasticities do not differ by much; .82 as compared to .64 and .94 as compared to .90 for farm and nonfarm equations, respectively. However, using the above equations, without the measure of family size, to compute the potential induced changes in average family annual savings for "large" redistribution schemes A, B and C yields the following:

NF-A -82	NF-B -104	NF-C -127
F-A -197	F-B -238	F-C -280

Comparison of these estimates with the corresponding entries in Table VI.3 above in the text shows that the omission of the measure of family size from the regression equations results in estimates of the induced fall in average family annual savings which are twice the magnitude they should be. Again, this is so even though the elasticities of total expenditure with respect to disposable income do not differ by much.

10 Kuo, S., The Economic Structure of Taiwan 1952-69, Graduate Institute of Economics, National Taiwan University, December 1970, Table 6-1, p.98.

11 Total government revenue in 1966 was NT$25,192 million, Taiwan Statistical Data Book 1972, CIECD, Executive Yuan, Rep. of China, p.137.

12 Computed from the Third Census of Industry and Commerce 1966, Taiwan, Rep. of China. Since the lifetimes and efficiencies of capital goods may vary greatly between industrial sectors, it is not certain that the induced effects on capital services requirements would even be in the same direction as the effects on capital stock measured here. Hence, one would also like to construct an index for capital services. This, however, did not prove possible.

13 In the Taiwan national accounts data, net domestic savings plus provisions for consumption of fixed capital equals gross domestic savings. Hence, the net savings-investment gap as

used here is identical in magnitude to the more usual gap between gross domestic savings and gross investment.

14 Kuo. S., op. cit. note VI.10, Tables 3.18 and 3.20.

15 These percentages are of the actual 1966 savings-investment gap of NT$1,991 million. For 1965 and 1967 the gaps are NT$3,947 million and NT$3,797 million, respectively, so the percentage effects in Table VI.5 may be rather high.

16 Taiwan Statistical Data Book 1972, op. cit. note VI.11.

17 Annual Report on Taiwan's Economy 1970 and 1971, CIECD, Executive Yuan, Rep. of China.

18 See Fifth Four-Year Plan for Economic Development of Taiwan, 1969-72, CIECD, Executive Yuan, Rep. of China, February 1969.

19 Hsing, op. cit. note III.3, Table A.12, p.280.

20 Computed as the difference between the value of imports and the value of exports of goods and non-factor services as given in Kuo, op. cit. note VI.10, Table 4.3, p.70.

21 See "Economic Growth and Employment", Economic Survey of Asia and the Far East 1971, UN ECAFE, Bangkok, Thailand, March 1972.

22 All unemployment rates computed from Hsing, op. cit. note III.3, Tables A.3 and A.4. Jacoby's estimate of the number of unemployed is from Jacoby, N., U.S. Aid to Taiwan, A Study of Foreign Aid, Self-Help, and Development (Praeger, 1966), p.278.

23 In fact at present it is felt by some economists in Taiwan that the economy is now moving from labor surplus to labor shortage so that the future labor problem will be one of supply and training rather than absorption of unskilled labor.

24 Kuo, op. cit. note VI.10, Table 3-14.

25 See Fifth Four-Year Plan for Economic Development of Taiwan, 1969-72 and Long Range (1971-80) Economic Development Plan for the Taiwan Area, Republic of China, op. cit. notes VI.18 and VI.6.

26 Since we are concerned with the capacity of the modern sector to absorb unskilled labor, part of which is from rural areas, we neglect the agricultural sectors in the input-output tables in the computations that follow.

27 Computed from the Third Census of Industry and Commerce 1966, Taiwan, Rep. of China.

28 This result is of course due to the nature of the regression equation used in the predictions. However, as a glance at the

equation used as shown in the appendix to this study will show, the equation is quite adequate as a representation of the expenditure behavior of the sample families as regards education.

VII. 1 See section III.2 above.

2 Computed as the average of the estimated number of households for Dec. 1, 1962 and Dec. 1, 1964. See Korea Statistical Yearbook, 1964 and 1965.

3 Economic Survey of the 1971 Korean Economy, Economic Planning Board, Govt. of the Rep. of Korea, 1972, p.19.

4 Among measures to be implemented for this purpose are measures to reduce the high rate of inflation, restructuring of tax rates on households and private corporations, upward adjustment of interest rates on long term bank deposits, development of the capital market, improvement and extension of banking services, and promotion of a public austerity program of the nature of that carried out in Taiwan for the same purpose.

5 Referring to note VI.9 we again note that the estimates of the magnitude of the "savings problem" in the Korean case may be somewhat high due to the lack of an adequate measure of family size. Hence, this estimate of 1.4 percent perhaps should be regarded as the maximum additional tax burden that would be required to eliminate the "savings problem".

6 Economic Survey of the 1971 Korean Economy, op. cit. note VII.3, p.206.

7 Computed by taking the actual 1971 trade deficit of US$1046 million as a percent of 1971 GNP of US$7715 million. See Economic Survey of the 1971 Korean Economy, ibid., pp.4,5. The GNP figure was converted at the official exchange rate US$1 = 400 won.

8 For this calculation all items are tradable except house mending, water and electricity charges, services, and transportation and communications.

9 The Third Five-Year Economic Development Plan, 1972-76, Economic Planning Board, Govt. of the Rep. of Korea, p.136.

XI. SUPPLEMENTARY TABLES

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KOREA: EXPENDITURE SURVEY ITEMS

1. TOTAL EXPENDITURE

2. FOOD

    3. CEREALS
    4. MEAT AND FISH
    5. MILK AND EGG
    6. VEGETABLES, SEAWEEDS AND FRUITS
    7. CONDIMENTS
    8. MANUFACTURED PROVISIONS
    9. CONFECTIONERIES AND BEVERAGES
    10. ALCOHOLIC BEVERAGES
    11. EATING OUT

12. HOUSING

    13. RENTS PAID
    14. HOUSE MENDING
    15. WATER CHARGE
    16. FURNITURE, FURNISHING, ETC.

17. FUEL AND LIGHT

    18. ELECTRICITY CHARGE
    19. FUEL

20. CLOTHING

    21. CLOTHES
    22. FOOTWEAR
    23. ACCESSORY

24 MISCELLANEOUS

    25. MEDICAL CARE
    26. PERSONAL CARE
    27. TRANSPORTATION AND COMMUNICATIONS
    28. EDUCATIONAL CARE
    29. RECREATION
    30. TOBACCO

KOREA: FINAL URBAN WAGE AND SALARY EARNER REGRESSION EQUATIONS

$C_i = AY^b$; $\log(C_i) = a + b \log(Y)$; $a = \log(A)$

C_i = expenditure on item i ; Y = disposable income

item	$\hat{a}$	$\hat{b}$	t stat. $H_o: b \neq 0$	R^2	t stat. $H_o: b \neq 1$
1.	1.6948	.8166	44.82	.9931	10.07
2.	2.3641	.6878	28.01	.9825	12.71
3.	3.9695	.4533	9.24	.8590	11.14
4.	-5.9700	1.3633	36.40	.9895	9.70
5.	-6.4561	1.2054	7.18	.7866	1.22
6.	-4.1861	1.1823	36.27	.9895	5.59
7.	-2.9864	.9828	16.19	.9493	.28
8.	-5.1507	1.0418	18.66	.9613	.75
9.	-7.0671	1.2550	13.66	.9302	2.77
10.	-3.1525	.7656	7.95	.8188	2.44
11.	-10.7051	1.6869	7.23	.7887	2.94
12.	-2.3563	.9089	10.14	.8801	1.02
13.	4.5440	-.1690	.16	.0018	9.27
14.	-10.9623	1.7047	6.80	.7674	2.81
15.	-9.2258	1.4593	8.19	.8272	2.58
16.	-11.4134	1.7509	8.27	.8302	3.55
17.	.3694	.6540	20.56	.9679	10.88
18.	-6.7566	1.2557	29.92	.9846	6.09
19.	-.0144	.6664	21.75	.9713	10.89
20.	-4.8296	1.2323	17.26	.9551	3.25
21.	-6.4498	1.3635	15.58	.9455	4.15
22.	-3.3860	.8896	23.98	.9762	2.98
23.	-6.1694	1.1549	12.74	.9206	1.71
24.	-3.3450	1.1975	17.25	.9551	2.85
25.	-5.0227	1.1620	10.78	.8924	1.50
26.	-1.5434	.8096	11.03	.8968	2.59
27.	-8.2940	1.5106	12.87	.9221	4.35
28.	-8.5381	1.6145	26.29	.9801	10.01
29.	-7.7032	1.3009	11.63	.9061	2.69
30.	-2.0305	.8583	22.13	.9722	3.65

KOREA: ALLOCATION OF EXPENDITURE SURVEY ITEMS TO INPUT-OUTPUT SECTORS

index	expenditure survey items	input-output sectors
a	CEREALS (3)	RICE, BARLEY & WHEAT
b	MEAT & FISH (4) MILK & EGG (5) VEG., SEAWEEDS & FRUITS (6)	OTHER AGRICULTURE FISHERY
c	CONDIMENTS (7) MANUFACTURED PROVISIONS (8)	PROCESSED FOODS
d	CONFECTIONERIES & BEVERAGES (9) ALCOHOLIC BEVERAGES (10) TOBACCO (30)	BEVERAGES & TOBACCO
e	HOUSE MENDING (14)	BUILDING & MAINTENANCE
f	WATER CHARGE (15)	WATER & SANITATION
g	FURNITURE, FURNISHING, ETC. (16)	WOOD PRODUCTS & FURNITURE
h	ELECTRICITY CHARGE (18)	ELECTRICITY
i	FUEL (19)	PETROLEUM & COAL PRODUCTS
j	CLOTHES (21) FOOTWEAR (22)	FINISHED TEXTILE PRODUCTS RUBBER PRODUCTS
k	ACCESSORY (23)	LEATHER & LEATHER PRODUCTS
l	MEDICAL CARE (25) PERSONAL CARE (26) EDUCATIONAL CARE (28) RECREATION (29)	OTHER SERVICES
m	TRANSPORTATION & COMMUNICATIONS (27)	COMMUNICATIONS TRANSPORTATION & STORAGE

KOREA: DIRECT AND TOTAL SECTOR INPUT COEFFICIENTS AND m_i^{1963}

Direct Effect Coefficients: $\underline{a}_r$; r = M,S,L,V,W

index	A_M	A_S	A_L	A_V	A_W	m_i^{1963}
a	.0001	-	-	.8327	.0603	.0965
b	.0068	-	-	.6955	.0850	.0802
c	.0284	.1871	1.5555	.2564	.0946	.0208
d	.0025	.1687	.7676	.4985	.0706	-.0018
e	.0042	-	-	.2890	.2234	.0000
f	.0431	-	-	.5157	.4118	-.1367
g	.0020	.2407	1.6670	.3128	.1770	.0360
h	.0870	-	-	.6350	.2009	-.1187
i	.0284	.2631	1.7571	.1741	.0697	.0111
j	.2064	.2162	3.0740	.2662	.1347	-.0345
k	.0396	.2193	2.0023	.2747	.1530	.0021
l	.0077	-	-	.5511	.3609	.0142
m	.0968	-	-	.6226	.2920	-.1302

Total Effect Coefficients: $\underline{a}_r(I-A)^{-1}$; r = M,S,L,V,W

index	A_M	A_S	A_L	A_V	A_W
a	.0123	-	-	.9877	.0963
b	.0237	-	-	.9763	.1484
c	.0579	.2070	1.7351	.7232	.2264
d	.0343	.2130	1.0913	.9657	.1773
e	.1568	-	-	.8434	.4047
f	.0965	-	-	.9035	.5464
g	.2169	.2489	1.7425	.7820	.3355
h	.1093	-	-	.8907	.3068
i	.0908	.2724	1.8572	.9093	.4317
j	.2735	.2303	3.2445	.7265	.2660
k	.1348	.3302	3.0684	.8652	.3526
l	.0507	-	-	.9493	.5068
m	.1351	-	-	.8647	.3803

A_M : value of imported productive inputs per won output

A_S : number of skilled laborers per 10,000 won output

A_L : number of unskilled laborers per 10,000 won output

A_V : value added per won output

A_W : labor remuneration per won output

KOREA: CHANGES IN THE AVERAGE URBAN WAGE AND SALARY EARNER FAMILY PATTERN OF EXPENDITURE INDUCED BY INCOME REDISTRIBUTION, WON PER ANNUM

index	initial ave. fam. expend	A	B	C	D
a	30,851.52	+325.20	+389.76	+445.80	+322.56
b	10,476.48	-111.84	-142.44	-175.80	-343.80
c	3,583.44	0.00	0.00	0.00	-38.76
d	3,551.28	+13.20	+13.56	+15.00	-134.88
e	660.84	-21.12	-29.28	-36.00	-49.80
f	410.88	-7.80	-9.24	-11.88	-20.88
g	639.60	-18.24	-28.44	-35.64	-49.20
h	777.60	-4.08	-5.52	-7.80	-18.60
i	3.650.64	+35.28	+41.64	+47.76	+23.88
j	3,668.88	-38.64	-49.56	-63.72	-295.44
k	571.32	-2.88	-3.12	-3.36	-12.48
l	8,450.88	-96.60	-128.76	-160.80	-583.92
m	1,652.64	-39.84	-52.44	-63.72	-172.08

TAIWAN:
EXPENDITURE SURVEY ITEMS

1.	TEXP		Total Expenditure on All Items
2.	TFD		Total Expenditure on Food
	3.	TSFD	Total Expenditure on Staple Food
		4. RICE	Rice
		5. FLR	Flour
		6. SPOT	Sweet Potato
		7. OCER	Other Cereals
	8.	SUPM	Supplementary Food and Milk
	9.	COND	Condiments
	10.	REST	Food in Restaurants
	11.	CEL	Food for Family Celebrating
	12.	FMAR	Food for Marriages, Births, Birthdays and Funerals
	13.	NBEV	Non-alcoholic Beverages
	14.	ABEV	Alcoholic Beverages
15.	TOB		Tobacco
16.	TKLO		Total Clothing and Other Personal Effects
17.	TRNT		Total Rent and Water Charges
	18.	IRNT	Imputed Rent
	19.	MEND	House Repairing and Installation
	20.	WATR	Water Charges
21.	TFL		Total Fuel and Light
	22.	ELE	Electricity Charges
	23.	COAR	Charcoal and Coal
	24.	KERO	Kerosene
	25.	GAS	Gas
	26.	WOOD	Firewood
	27.	REF	Refuse of Agriculture
28.	TFRN		Total Furniture, Furnishings and Household Equipment
	29.	FRN	Furniture and Furnishings
	30.	TXFR	Textile Furnishings
	31.	APPL	Appliances for Kitchen and Bath
32.	TOP		Total Household Operation
33.	TPRS		Total Personal and Medical Care
	34.	PRS	Personal Care
	35.	BARB	Barber and Bath Shop Service
	36.	MED	Medical and Health Expenses
37.	TTRN		Total Transport and Communication
	38.	ETRN	Purchases of Personal Transport Equipment
	39.	OPTR	Operation of Personal Transport Equipment
	40.	PTRN	Purchased Transportation
41.	TREC		Total Recreation and Amusement
	42.	REC	Recreation
	43.	NEWS	Books, Newspapers, Magazines and Stationery
44.	TMIS		Total Miscellaneous Consumption Expenditures
	45.	ED	Education and Research
	46.	MAR	Marriages, Births, Birthdays and Funerals
47.	OE		Other Expenditures

TAIWAN:
FINAL NONFARM REGRESSION EQUATIONS

( ) = t statistic
Y = nonfarm family annual disposable income
N = number of male adult equivalent units

1. $\log(TEXP) = 0.8171 + \underset{(63.20)}{0.9037}\log(Y) + \underset{(2.95)}{0.0801}\log(N)$ $R^2=.9978$
2. $\log(TFD) = 1.3463 + \underset{(34.80)}{0.7916}\log(Y)$ $R^2=.9766$
3. $\log(TSFD) = 1.7933 + \underset{(15.42)}{0.6370}\log(Y)$ $R^2=.8914$
4. $\log(RICE) = 1.6982 + \underset{(14.52)}{0.6339}\log(Y)$ $R^2=.8790$
5. $\log(FLR) = 7.4322 - \underset{(-12.07)}{26603.1166}(1/Y) - \underset{(-4.24)}{0.8612}\log(N)$ $R^2=.9386$
6. $SPOT = 148.6001 - \underset{(-2.84)}{0.0027}(Y)$ $R^2=.4100$
7. $\log(OCER) = -4.2048 + \underset{(8.38)}{0.8851}\log(Y) + \underset{(1.53)}{0.3100}\log(N)$ $R^2=.9090$
8. $\log(SUPM) = 0.3780 + \underset{(33.26)}{0.8245}\log(Y)$ $R^2=.9745$
9. $\log(COND) = -0.5517 + \underset{(9.43)}{0.6323}\log(Y)$ $R^2=.7541$
10. $REST = 118.8938 + \underset{(4.67)}{0.0348}(Y) - \underset{(-2.01)}{173.5126}(N)$ $R^2=.8783$
11. $\log(CEL) = -2.5049 + \underset{(9.58)}{0.8130}\log(Y) + \underset{(3.89)}{0.6326}\log(N)$ $R^2=.9471$
12. $\log(FMAR) = -8.7564 + \underset{(6.14)}{1.1748}\log(Y) + \underset{(3.93)}{1.4431}\log(N)$ $R^2=.9081$
13. $\log(NBEV) = 7.0406 - \underset{(-8.68)}{31516.3712}(1/Y) - \underset{(-1.91)}{0.6387}\log(N)$ $R^2=.9138$
14. $\log(ABEV) = 8.6613 - \underset{(-11.34)}{42199.9592}(1/Y) - \underset{(-3.55)}{1.2199}\log(N)$ $R^2=.9364$
15. $\log(TOB) = -1.7359 + \underset{(23.34)}{0.8294}\log(Y)$ $R^2=.9495$
16. $\log(TKLO) = -3.3563 + \underset{(35.32)}{0.9868}\log(Y) + \underset{(7.13)}{0.3824}\log(N)$ $R^2=.9946$
17. $\log(TRNT) = -1.9271 + \underset{(17.85)}{0.9702}\log(Y) + \underset{(1.60)}{0.1673}\log(N)$ $R^2=.9752$
18. $IRNT = -175.6714 + \underset{(5.88)}{0.2088}(Y) - \underset{(-1.83)}{753.4590}(N)$ $R^2=.9564$
19. $\log(MEND) = -10.7930 + \underset{(6.56)}{1.3351}\log(Y) + \underset{(3.50)}{1.3665}\log(N)$ $R^2=.9082$
20. $\log(WATR) = -3.7083 + \underset{(13.11)}{0.7900}\log(Y) + \underset{(3.52)}{0.4072}\log(N)$ $R^2=.9652$
21. $\log(TFL) = -0.3187 + \underset{(23.43)}{0.7586}\log(Y) - \underset{(-3.35)}{0.2080}\log(N)$ $R^2=.9788$
22. $\log(ELE) = -2.7888 + \underset{(46.70)}{0.8617}\log(Y)$ $R^2=.9869$

23. COAR = 93.2236 - 0.0215(Y) + 243.1320(N) R^2=.6769
(-2.81) (2.75)

24. KERO = 20.5563 + 0.0017(Y) R^2=.4776
(1.69)

25. GAS = -66.3330 + 0.0172(Y) - 76.3092(N) R^2=.9508
(5.67) (-2.17)

26. log(WOOD) = 7.0549 - 15867.1658(1/Y) - 0.8501log(N) R^2=.4336
(-3.57) (-2.08)

27. REF = 78.5505 - 0.0032(Y) +17.3049(N) R^2=.5448
(-3.25) (1.50)

28. log(TFRN) = -6.0465 + 1.1109log(Y) + 0.6697log(N) R^2=.9569
(11.36) (3.57)

29. log(FRN) = -11.3138 + 1.3720log(Y) + 1.7200log(N) R^2=.9048
(5.97) (3.90)

30. log(TXFR) = -4.4605 + 0.8928log(Y) + 0.2559log(N) R^2=.9380
(10.58) (1.58)

31. log(APPL) = -5.2052 + 0.8845log(Y) + 0.7880log(N) R^2=.8627
(5.46) (2.54)

32. log(TOP) = -6.3179 + 1.2552log(Y) - 0.2864log(N) R^2=.9612
(16.81) (2.00)

33. log(TPRS) = -1.8255 + 0.8987log(Y) - 0.2428log(N) R^2=.9410
(13.74) (-1.94)

34. log(PRS) = -3.7042 + 0.9107log(Y) R^2=.9623
(27.19)

35. log(BARB) = -2.7317 + 0.8258log(Y) R^2=.9614
(26.89)

36. log(MED) = -2.5327 + 0.9273log(Y) - 0.4729log(N) R^2=.8638
(9.66) (-2.57)

37. log(TTRN) = -4.6175 + 0.9814log(Y) + 0.6780log(N) R^2=.9202
(7.93) (2.86)

38. ETRN = -272.7597 + 0.0103(Y) R^2=.7419
(1.39)

39. log(OPTR) = -6.0125 + 0.8653log(Y) + 1.4118log(N) R^2=.9600
(8.50) (7.23)

40. log(PTRN) = -4.1083 + 0.9083log(Y) + 0.4354log(N) R^2=.9294
(9.16) (2.29)

41. TREC = 10.0283 + 0.0594(Y) - 307.3434(N) R^2=.9637
(9.45) (-4.22)

42. log(REC) = -9.8347 + 1.5041log(Y) R^2=.8655
(13.66)

43. NEWS = -24.7872 + 0.0097(Y) - 36.0643(N) R^2=.9660
(6.64) (-2.14)

44. log(TMIS) = -6.7797 + 1.1721log(Y) + 1.4741log(N) R^2=.9841
(15.24) (9.99)

45. log(ED) = -6.6139 + 1.0356log(Y) + 2.0769log(N) R^2=.9797
(10.91) (11.40)

46. log(MAR) = -10.3832 + 1.5125log(Y) R^2=.8889
(15.23)

47. OE = 375.6625 + 0.0347(Y) R^2=.9138
(17.35)

TAIWAN:
FINAL FARM REGRESSION EQUATIONS

( ) = t statistic
YA = farm family annual disposable income
NA = number of male adult equivalent units

1. $\log(TEXPA) = 2.9993 + \underset{(12.63)}{0.6371}\log(YA) + \underset{(3.88)}{0.3558}\log(NA)$ $R^2=.9915$
2. $\log(TFDA) = 4.4650 + \underset{(9.94)}{0.3876}\log(YA) + \underset{(9.36)}{0.6645}\log(NA)$ $R^2=.9938$
3. $\log(TSFDA) = 5.6570 + \underset{(2.76)}{0.1597}\log(YA) + \underset{(8.68)}{0.9149}\log(NA)$ $R^2=.9825$
4. $\log(RICEA) = 5.0782 + \underset{(3.01)}{0.2182}\log(YA) + \underset{(6.51)}{0.8591}\log(NA)$ $R^2=.9748$
5. $\log(FLRA) = -0.3700 + \underset{(7.04)}{0.4624}\log(YA)$ $R^2=.6387$
6. $SPOTA = 230.5009 + \underset{(1.82)}{0.0041}(YA)$ $R^2=.1772$
7. $\log(OCERA) = 3.9401 - \underset{(-4.34)}{12357.9201}(1/YA)$ $R^2=.4027$
8. $\log(SUPMA) = 2.9499 + \underset{(7.22)}{0.4550}\log(YA) + \underset{(4.95)}{0.5671}(NA)$ $R^2=.9845$
9. $\log(CONDA) = 0.2445 + \underset{(8.14)}{0.5325}\log(YA) + \underset{(2.42)}{0.2875}\log(NA)$ $R^2=.9796$
10. $\log(RESTA) = -5.2593 + \underset{(10.97)}{1.0769}\log(YA)$ $R^2=.8113$
11. $\log(CELA) = -2.9084 + \underset{(27.14)}{0.9119}\log(YA)$ $R^2=.9634$
12. $\log(FMARA) = -6.7137 + \underset{(12.15)}{1.2381}\log(YA)$ $R^2=.8405$
13. $\log(NBEVA) = -3.8829 + \underset{(3.28)}{0.6790}\log(YA) + \underset{(1.65)}{0.6213}\log(NA)$ $R^2=.9121$
14. $\log(ABEVA) = 3.7368 - \underset{(-2.5917)}{9335.5987}(1/YA) + \underset{(3.20)}{1.1350}\log(NA)$ $R^2=.9424$
15. $\log(TOBA) = -2.4967 + \underset{(15.52)}{0.8877}\log(YA)$ $R^2=.8958$
16. $\log(TKLOA) = -2.2276 + \underset{(32.52)}{0.9223}\log(YA)$ $R^2=.9742$
17. $\log(TRNTA) = 0.1389 + \underset{(25.11)}{0.7373}\log(YA)$ $R^2=.9575$
18. $\log(IRNTA) = 0.3176 + \underset{(22.41)}{0.7093}\log(YA)$ $R^2=.9472$
19. $\log(MENDA) = -7.8756 + \underset{(5.73)}{1.2355}\log(YA)$ $R^2=.5774$
20. $WATRA = 41.5989 - \underset{(-2.03)}{0.0010}(YA)$ $R^2=.6287$
21. $\log(TFLA) = 0.9671 + \underset{(19.46)}{0.6023}\log(YA)$ $R^2=.9311$
22. $\log(ELEA) = -2.0547 + \underset{(6.08)}{0.8105}\log(YA) - \underset{(-1.70)}{0.4113}\log(NA)$ $R^2=.8978$

23. $\log(COARA) = 5.8993 - 28224.1386(1/YA)$ $R^2 = .8367$
(-11.54)

24. $KEROA = -1.9571 + 0.0002(YA)$ $R^2 = .1018$
(0.68)

25. $GASA = -7.1894 + 0.0008(YA)$ $R^2 = .1319$
(2.01)

26. $WOODA = 320.3844 + 0.0008(YA)$ $R^2 = .3955$
(0.18)

27. $\log(REFA) = 9.2617 - 35916.3743(1/YA) - 0.9932\log(NA)$ $R^2 = .8940$
(-5.62) (-1.58)

28. $\log(TFRNA) = -8.1923 + 1.2943\log(YA)$ $R^2 = .7714$
(9.72)

29. $FRNA = -117.5009 + 0.0063(YA)$ $R^2 = .4539$
(0.97)

30. $\log(TXFRA) = 4.8791 - 22171.1180(1/YA)$ $R^2 = .7792$
(-9.94)

31. $\log(APPLA) = 4.4042 - 22251.8526(1/YA)$ $R^2 = .7859$
(-10.14)

32. $TOPA = 4.9508 + 0.0074(YA) + 19.0465(NA)$ $R^2 = .9642$
(6.24) (2.09)

33. $\log(TPRSA) = 2.6836 + 0.3197\log(YA) + 0.6581\log(NA)$ $R^2 = .8255$
(1.56) (1.77)

34. $PRSA = 12.9037 + 0.0059(YA) + 27.5519(NA)$ $R^2 = .9125$
(2.86) (1.75)

35. $\log(BARBA) = -0.0049 + 0.5462\log(YA)$ $R^2 = .8759$
(14.06)

36. $MEDA = -757.3353 - 0.0092(YA) + 327.0387(NA)$ $R^2 = .5389$
(-1.72) (3.93)

37. $TTRNA = 636.5621 + 0.1204(YA) - 592.1629(NA)$ $R^2 = .7093$
(5.47) (-3.50)

38. $\log(ETRNA) = -26.7910 + 3.4814\log(YA) - 2.9202\log(NA)$ $R^2 = .6620$
(3.85) (-1.85)

39. $OPTRA = 103.3383 + 0.0240(YA) - 114.6449(NA)$ $R^2 = .8353$
(6.63) (-4.12)

40. $PTRNA = 124.8172 + 0.0184(YA) - 70.4280(NA)$ $R^2 = .8868$
(6.36) (-3.17)

41. $\log(TRECA) = -12.5100 + 1.9975\log(YA) - 1.7214\log(NA)$ $R^2 = .8722$
(7.01) (-3.32)

42. $\log(RECA) = -11.7821 + 1.9062\log(YA) - 1.7249\log(NA)$ $R^2 = .8507$
(6.64) (-3.30)

43. $\log(NEWSA) = -15.8969 + 1.8114\log(YA)$ $R^2 = .8002$
(10.59)

44. $\log(TMISA) = -2.0188 + 0.5969\log(YA) + 1.8076\log(NA)$ $R^2 = .9204$
(1.95) (3.25)

45. $\log(EDA) = 4.4717 - 17349.7023(1/YA) + 1.5874\log(NA)$ $R^2 = .9494$
(-3.22) (2.99)

46. $\log(MARA) = 6.5214 - 19868.4288(1/YA)$ $R^2 = .4822$
(-5.11)

47. $\log(OEA) = -8.9983 + 1.4820\log(YA)$ $R^2 = .8743$
(13.95)

TAIWAN:
ALLOCATION OF EXPENDITURE SURVEY ITEMS TO INPUT-OUTPUT SECTORS

index	expenditure survey items	input-output sectors
a	RICE (4)	RICE
b	FLOUR (5)	WHEAT FLOUR
c	SWEET POTATO (6) OTHER CEREALS (7)	OTHER COMMON CROPS
d	SUPPLEMENTARY FOOD & MILK (8)	MISC. HORTICULTURAL CROPS SUGAR CANNED FOODS TEA MISC. FOODS
e	CONDIMENTS (9)	SALT MONOSODIUM GLUTAMATE
f	FOOD IN RESTAURANTS (10)	MISC. SERVICES
g	NON-ALCOHOLIC BEVERAGES (13)	NON-ALCOHOLIC BEVERAGES
h	ALCOHOLIC BEVERAGES (14)	ALCOHOLIC BEVERAGES
i	TOBACCO (15)	TOBACCO
j	TOTAL CLOTHING & OTHER PERSONAL EFFECTS (16)	MISC. FABRICS & APPAREL, ACCESSORIES
k	HOUSE REPAIRING & INSTALLATION (19)	RESIDENTIAL BUILDING
l	WATER CHARGES (20)	CITY WATER
m	ELECTRICITY CHARGES (22)	ELECTRICITY
n	CHARCOAL & COAL (23)	COAL & COAL PRODUCTS
o	KEROSENE (24) OPERATION OF PERSONAL TRANSPORT EQUIPMENT (39)	PETROLEUM PRODUCTS
p	GAS (25)	NATURAL GAS
q	FIREWOOD (26)	LUMBER

r	FURNITURE & FURNISHINGS (29)	PRODUCTS OF WOOD, BAMBOO, RATTAN
s	TEXTILE FURNISHINGS (30)	ARTIFICIAL FABRICS COTTON FABRICS WOOLEN & WORSTED FABRICS
t	APPLIANCES FOR KITCHEN & BATH (31)	HOUSEHOLD ELECTRICAL APPLIANCES
u	PERSONAL CARE (34) BARBER & BATH SHOP SERVICES (35)	MISC. SERVICES
v	MEDICAL & HEALTH EXPENSES (36)	MEDICINES
w	PURCHASES OF PERSONAL TRANSPORT EQUIPMENT (38)	MOTOR VEHICLES OTHER TRANSPORT EQUIPMENT
x	PURCHASED TRANSPORTATION (40)	WATER TRANSPORTATION LAND TRANSPORTATION AIR TRANSPORTATION
y	RECREATION (42)	MISC. SERVICES
z	BOOKS, NEWSPAPERS, MAGAZINES & STATIONERY (43)	PRINTING & PUBLISHING

TAIWAN:
TOTAL EFFECT SECTOR INPUT COEFFICIENTS AND m_i COEFFICIENTS

$$a_r(I-A)^{-1} \; ; \quad r = K,M,S,L,V,W$$

$$m_i = dM_i/dC_i \; ; \; i = a,\ldots,z$$

index	A_K	A_M	A_S	A_L	A_V	A_W	m_i
a	-	.0542	-	-	.9459	.3453	.0094
b	.8539	.7183	.2714	.2110	.2816	.1032	.1933
c	-	.0456	-	-	.9928	.3151	.2398
d	2.2239	.1015	.8134	.8954	.8986	.3969	.1049
e	2.5877	.0702	1.3164	.7530	.9297	.2666	.0234
f	.8314	.0178	2.2470	.3668	.9822	.2576	.0280
g	1.5911	.0722	1.0378	.8541	.9276	.3120	.0556
h	-	.0279	-	-	.9718	.1315	.0092
i	.9101	.0889	.1943	.1171	.9112	.1180	.0044
j	2.4573	.2967	1.1359	1.8757	.7032	.2972	.0125
k	1.8018	.1381	2.3284	2.4068	.8620	.5414	.0000
l	.9554	.0296	1.8256	1.5623	.9704	.2252	.0300
m	1.1727	.0736	1.4894	1.2953	.9263	.2165	.0194
n	1.9486	.0604	.7532	.5445	.9396	.6095	.0584
o	1.5651	.3556	.1568	.1006	.6442	.0762	.0224
p	-	.0622	-	-	.9378	.2751	.0000
q	1.8708	.1144	.5551	.4374	.8854	.2335	.0000
r	1.3671	.0954	1.5177	1.1430	.9046	.3512	.0304
s	3.1267	.5023	.7434	.8882	.4976	.1943	.0958
t	1.3217	.1960	1.1917	1.0695	.8040	.2859	.1215
u	2.0952	.0178	4.3210	1.0697	.9822	.4958	.0280
v	2.0785	.2701	1.3170	.8546	.7300	.3125	.4249
w	1.6568	.3636	1.2457	.8391	.6365	.2561	.1232
x	3.1059	.2108	1.0124	.5341	.7889	.4175	.1103
y	1.3392	.0178	1.5309	.3238	.9822	.2289	.0280
z	1.9897	.1190	1.9369	.6575	.8811	.4600	.0879

A_K : value of capital stock in place per NT$1 output at the end of 1966

A_M : value of imported productive inputs per NT$1 output

A_S : number of skilled laborers per NT$100,000 output at the end of 1966

A_L : number of unskilled laborers per NT$100,000 output at the end of 1966

A_V : value added per NT$1 output

A_W : labor remuneration per NT$1 output

TAIWAN:
DIRECT EFFECT SECTOR INPUT COEFFICIENTS

$\underset{\sim}{a}_r$: r = K,M,S,L,V,W

index	A_K	A_M	A_S	A_L	A_V	A_W
a	-	.0205	-	-	.7220	.2587
b	.5579	.6904	.0893	.1070	.0833	.0313
c	-	.0123	-	-	.7002	.2066
d	1.4129	.0207	.3913	.6293	.3368	.1707
e	1.5860	.0131	.8236	.4513	.6126	.1424
f	.6538	.0057	2.0945	.2889	.8904	.2217
g	.5636	.0233	.2919	.5407	.4626	.1128
h	-	.0038	-	-	.7715	.0542
i	.6398	.0772	.0328	.0524	.7413	.0467
j	.6598	.0458	.6052	1.3160	.2904	.1336
k	.6059	.0208	1.7534	1.9009	.3255	.3130
l	.4601	.0030	1.1236	1.0110	.5961	.1242
m	.4601	.0023	1.1236	1.0110	.5578	.0825
n	1.4227	.0138	.5057	.3633	.6843	.5260
o	1.2912	.3299	.0592	.0493	.5184	.0361
p	-	.0232	-	-	.7423	.2086
q	1.2449	.0843	.3225	.3154	.1079	.0719
r	.5969	.0121	1.1387	.9037	.3699	.2040
s	1.7551	.3209	.3662	.5176	.2007	.0819
t	.3733	.0815	.4843	.6897	.3885	.1205
u	1.8844	.0057	4.1140	.9733	.8904	.4537
v	1.0919	.1990	.5686	.4945	.3203	.1471
w	.7721	.2244	.6527	.5161	.2273	.0964
x	2.3476	.1394	.7433	.3765	.5511	.3343
y	1.1483	.0057	1.3973	.2470	.8904	.1938
z	.7815	.0213	1.0362	.1980	.3223	.2285

TAIWAN:
CHANGES IN THE AVERAGE NONFARM FAMILY PATTERN OF EXPENDITURE INDUCED BY INCOME REDISTRIBUTION, NT$ PER ANNUM

index	initial ave.fam. expend.	NF-A	NF-B	NF-C	NF-D	NF-E	NF-F
a	3,885.00	+46.61	+56.80	+67.43	+61.71	+24.34	+22.65
b	207.34	+26.68	+28.91	+31.34	+31.07	+11.69	+11.60
c	317.20	-3.39	-4.19	-5.00	-5.51	-1.58	-1.72
d	7,694.15	+53.84	+67.21	+81.06	+65.26	+28.10	+23.49
e	402.66	+4.84	+5.90	+7.00	+6.41	+2.53	+2.35
f	480.63	+10.85	+16.66	+22.44	+6.40	+20.67	+5.88
g	159.71	+15.09	+16.97	+19.01	+18.75	+6.02	+5.93
h	262.66	+43.56	+47.48	+51.80	+51.24	+15.14	+14.95
i	978.14	+5.68	+7.35	+9.07	+8.05	+3.53	+2.90
j	1,741.12	-25.04	-26.50	-28.30	-33.08	-9.91	-11.26
k	182.08	-9.74	-11.71	-13.84	-14.64	-4.10	-4.31
l	156.55	-1.05	-0.87	-0.70	-1.03	-0.30	-0.40
m	479.84	+1.73	+2.42	+3.14	+3.10	+1.42	+1.12
n	452.68	-12.03	-18.47	-24.88	-24.44	-7.10	-6.96
o	221.56	-4.55	-4.82	-5.18	-5.71	-1.68	-1.82
p	163.94	+4.30	+6.61	+8.91	+7.90	+2.54	+2.25
q	214.28	+24.57	+26.04	+27.64	+27.49	+12.67	+12.62
r	274.63	-16.27	-19.83	-23.68	-24.97	-6.83	-7.18
s	178.06	-1.03	-0.93	-0.84	-1.26	-0.33	-0.46
t	163.01	-3.42	-3.52	-3.68	-4.09	-1.27	-1.39
u	670.27	+3.65	+4.57	+5.53	+4.06	+1.90	+1.48
v	655.90	+19.14	+20.38	+21.79	+20.34	+8.41	+7.99
w	180.33	-4.12	-6.32	-8.51	-9.93	-2.43	-2.83
x	383.20	-4.79	-4.80	-4.87	-5.82	-1.77	-2.04
y	403.16	-11.07	-15.34	-19.68	-22.85	-6.02	-7.07
z	129.69	+2.39	+3.68	+4.95	+4.38	+1.41	+1.25

TAIWAN:
CHANGES IN THE AVERAGE FARM FAMILY PATTERN OF EXPENDITURE
INDUCED BY INCOME REDISTRIBUTION, NT$ PER ANNUM

index	initial ave.fam. expend.	F-A	F-B	F-C	F-D	F-E	F-F
a	6,629.97	+8.88	+15.48	+21.78	+9.30	+6.41	+2.70
b	79.81	+1.14	+1.33	+1.53	+1.24	+0.52	+0.43
c	343.39	+4.48	+5.93	+7.32	+6.76	+2.10	+2.04
d	5,544.07	+13.58	+22.13	+30.33	+7.99	+8.98	+2.34
e	506.27	+3.42	+4.42	+5.40	+3.08	+1.70	+1.00
f	371.90	-1.44	-1.80	-2.15	-6.05	-0.65	-1.80
g	69.03	-0.32	-0.29	-0.26	-0.71	-0.09	-0.22
h	211.21	+2.52	+3.21	+3.91	+3.49	+1.19	+1.06
i	801.83	+4.02	+4.89	+5.78	-0.76	+1.80	-0.15
j	1,509.38	+5.37	+6.57	+7.78	-5.15	+2.40	-1.44
k	146.04	-1.87	-2.38	-2.88	-4.71	-0.84	-1.38
l	29.89	-1.17	-1.66	-2.13	-2.28	-0.56	-0.60
m	267.12	+6.52	+7.29	+8.11	+6.32	+2.76	+2.21
n	128.38	+5.26	+6.50	+7.77	+6.99	+1.83	+1.57
o	115.39	+7.69	+10.87	+13.95	+9.56	+3.66	+2.34
p	10.57	+0.41	+0.59	+0.75	+0.68	+0.20	+0.17
q	400.73	-3.39	-4.79	-6.15	-7.68	-1.61	-2.06
r	89.36	+0.15	+0.21	+0.27	-1.59	+0.07	-0.48
s	56.41	+2.67	+3.14	+3.62	+3.36	+1.03	+0.95
t	34.99	+1.66	+1.95	+2.25	+2.09	+0.64	+0.59
u	595.84	+5.57	+6.98	+8.49	+6.06	+2.57	+1.86
v	748.50	-0.00	+0.00	+0.00	+2.78	+0.00	+0.82
w	111.87	+0.94	-5.29	-10.81	-14.93	-3.26	-4.59
x	231.59	+5.52	+7.79	+10.00	+6.55	+2.62	+1.59
y	148.36	+9.34	+8.63	+8.08	+5.46	+2.74	+1.93
z	23.26	-1.16	-1.60	-2.02	-2.50	-0.54	-0.68