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The Employment Effects of an Income Redistribution in Developing Countries

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Summary. — During the 1970s a host of macroeconomic studies led to the conclusion that a redistribution of income in favor of the poor would produce only a very minor increase in employment. This paper contends that the existing research systematically tends to underestimate the true employment effect of an income redistribution, partly because it is conducted at too high a level of aggregation and partly because it neglects a variety of important macroeconomic relationships. We find that these underestimates can be corrected on the basis of a disaggregated Social Accounting Matrix (SAM) for Indonesia.

1. INTRODUCTION

The 1970 International Labor Office (ILO) Mission Report to Colombia first proposed the notion that since the poor tend to consume a more labor-intensive basket of commodities than the rich, a redistribution of income in their favour will tend to increase employment. This proposal gave rise to a host of attempts in the 1970s, to demonstrate its empirical validity in a number of developing countries. The results, however, provided only a very limited degree of support to the ILO hypothesis. Indeed, by 1978 "the clear conclusion of the general equilibrium macroeconomic models" was that "income redistribution would have only a tiny effect on employment."[1]

Our goal here is to challenge this well-established conclusion, which, we believe, is based on a methodology that is inadequate in several important respects. To redress these methodological deficiencies, we advocate a framework that employs a highly disaggregated social accounting matrix (SAM) and on the basis of the empirical results that are derived therefrom, we suggest that the received view of the relationship between income redistribution and employment may contain a systematic understatement of the true effect.

2. A CRITIQUE OF THE RECEIVED METHODOLOGY

The methodology that was commonly used to estimate the employment effects of an income redistribution during the 1970s, has been lucidly summarized by Morawetz in the following terms.

Models designed to examine the impact of income redistribution on aggregate employment generally begin by assuming a specific pattern of income redistribution, based on targets for the lowest group, on social objectives, or on taxation possibilities. The impact of the redistribution on savings and total investment is calculated from aggregate consumption functions for each group, plus assumptions as to external capital flows. The total consumption of each income group is then broken down into its component parts, using Engel curves or some other kind of demand function, and the new levels of total consumption for each commodity

are fed into an input-output system in order to determine direct and indirect changes in production, imports, employment, and income distribution. Finally, on the basis of these changes, the more complete models iterate back through the system. Production, imports, and employment can now be compared to projections of their magnitudes assuming that there was no initial income redistribution. (Morawetz, 1974, p. 504).

Though one can point to a number of weaknesses in this approach (as does Morawetz himself), we focus on two areas in particular, which, in combination, are shown to give rise to the need for an alternative approach. The first area is concerned with the level of aggregation at which the research during the 1970s was typically conducted.

(a) *Why the level of aggregation matters*

Aggregation takes many different forms in economics: industries, sectors, households and firms, for example, are commonly added together for various purposes, such as the construction of an aggregated production or consumption function. It is intuitively clear that aggregation is not likely to matter much if the units being added are alike in relevant respects — if, for instance, "the firms that are being added are very much alike — in their output (they may all produce one inch pins, for example), their inputs and their techniques of production."[2] But when instead the units to be added together are highly heterogeneous there is a correspondingly greater degree of scope for some form of aggregation bias.

In the context of the highly dualistic structures of production and consumption that are characteristic of most developing countries, it is easy enough to argue that heterogeneity rather than homogeneity will be the more prevalent. Moreover, it is just as easy on these grounds to be critical of the methodology employed in the 1970s, which relied on models that were not only highly aggregated in terms of the factors of production, but also in terms of output which typically was classified according to two-digits of the SITC (thus effectively assuming that products within the broad categories, such as clothing and transport, were highly similar).[3] What is more difficult to contend, however, is that the heterogeneity which this methodology overlooks, gives rise to an aggregation bias of a systematic kind (as opposed, for example, to errors in offsetting directions). This proposition requires some systematic pattern of association between the (heterogeneous) variables that would not be

apparent at an aggregative level of analysis.[4]

Our view that some such association does indeed exist, has as its point of departure the recognition that developing countries are characterized by the coexistence of forms of production and consumption which originate in very different historical periods.[5] For one thing, much of the production structure of these economies contains modes of production which belong to the period of "precapitalist economic formations." In this period, as Marx (1946, p. 377) put it, "the greater part of the products are produced for the satisfaction of the immediate needs of the community not as commodities," in contrast to the later capitalist mode of production which turns "the commodities formerly produced as immediate use-values into exchange values" (Marx, 1964, p. 116). At a later stage there may be simple as opposed to expanded commodity production. In such a situation the scale of operation is small and the technology used is mostly indigenous. The origin of the historical relationship between products, technologies and incomes can thus be said to reside in communities where the mode of production exists essentially to provide for the subsistence needs of the community. That these earlier modes of production continue to survive in developing countries largely reflects the fact that (especially in Africa and parts of Asia) vast numbers still live at subsistence levels of income and thus demand the type of commodity which is appropriate to the earlier historical period. For the most part, following Lancaster's theory of demand that views commodities in terms of the characteristics they embody,[6] this means commodities containing a high proportion of essential characteristics, that are produced by self-employed and other small-scale producers, in and for impoverished groups of households typically in rural areas.

The organized or formal sector of the developing economy on the other hand, operates mostly on the basis of imported processes of production developed in and for the incomes and product requirements of advanced economies. These requirements are generally such that product designs come to acquire an increasingly high proportion of "high-income" (including labor- and time-saving) characteristics; partly as a consequence, the techniques required to produce them become increasingly capital-intensive and large scale. One important dimension of product quality, for instance, is based on the need for "close tolerances" and this is often very difficult to achieve without relatively sophisticated capital equipment.[7] What evolves consequently is a generally close relationship over time between products (defined as above in terms of embodied

characteristics) and the nature of production processes with both being related to changes in the level of income per head.

Broadly speaking, therefore, the relationships between products, processes and incomes that can currently be observed in a developing country — that is, cross-sectionally — are in fact the reflection of what has occurred historically, ranging all the way from precapitalistic economic formations to the most modern products and processes, that, frequently, are associated with the activities of multinationals from the advanced countries. More specifically, what is suggested by this historical approach is a more or less systematic association between product characteristics, the factor intensity of technologies and household incomes that would not be discernible in the macro models of the 1970s and which would cause these models to understate the extent to which an income redistribution in favor of the poor is likely to promote employment.

Underlying this historically based tendency, as we see it, is the important notion of a technological system. What this notion seeks essentially to convey is the idea that "There are technological linkages between different parts of the system which mean that *much of technology comes as a package*".[8] This package includes not only the relationships between products, techniques and incomes that were suggested above, but also between these and other variables such as infrastructural requirements, the nature and quality of inputs, the legal and administrative system, culture and so on.

In highly traditional communities, for example, the technology system has a strong geographical component; that is to say, production and consumption activities tend to be closely related in a particular (and often isolated) rural locality, which relies relatively heavily on unskilled labor and self-employment as a mode of production and which exhibits relatively few links to external technological systems (or, put more technically, which has minimal leakages out of the system, as occurs, for example, through imported inputs of various kinds). Such a system, moreover, is likely to use (local) labor and other inputs relatively intensively: that is, with a high ratio of inputs per unit of output (reflecting, among other things, the lack of modern, productive technologies and advanced technological capabilities).

In the modern sector of the typical developing country, in contrast, the technological system tends to approximate closely what is found in the developed world: in particular, techniques that

produce high-income products, require high levels

of investible resources per employee, high levels of education and skills, be of a large scale and require sophisticated management techniques, be associated with high levels of labour productivity, and be linked, through inputs and outputs, with the rest of the advanced technology system.[9]

If this system is to be used efficiently in the developing country setting, it needs, as Stewart (1977) has emphasized, to be reproduced and this in turn often gives rise to a heavy dependence on imported inputs of labor and other resources.

In contrasting traditional and advanced technological systems in this way, it is not our intention to suggest that these (and other intermediate) systems never interact or that they can always be so clearly distinguished from one another. What we wish to emphasize is rather that much of technology comes as a package and that the relationships between the components of this package need to be understood from a historical perspective.

In fact, there is already quite a lot of evidence to support (some aspects of) this way of looking at technological issues in developing countries. A number of micro case studies, for example, reveal the relationship between consumption patterns of different income groups and the factor intensity of production that one would expect on historical grounds, namely, for the "poor" to purchase relatively "low-income" and labor-intensive products and for the "rich" to acquire "high-income" and capital-intensive commodities.[10] Indeed, in some of these studies something like a continuum seemed to exist — with rising incomes consumers could be viewed as passing through the product and process characteristics of the earliest precapitalist formations to those of successively later periods.[11] In other, less "pure" cases, the same relationships, though less clear, were nevertheless discernible.

Such studies as these however cast only limited doubt on the received view of the employment effect of an income redistribution in favor of the poor.[12] The reason is that whereas this view is based on macro or economy-wide models, the studies we have just cited deal only with the direct (or partial equilibrium) effects of alternative technological choices. Moreover, especially since the direct effects are likely in general to comprise a relatively small proportion of the total (that is, direct and indirect) effect, they cannot readily be used as a proxy for the latter. What is needed instead therefore, if the received view is to be challenged, is a framework which incorporates both direct and indirect employment effects and it is to the choice of this framework that we now turn.

(b) *Input-output versus a social accounting matrix (SAM) approach*

As already noted, the economy-wide models of the 1970s were based on an input-output framework for estimating the employment effect of an income redistribution. While there is little doubt that this framework provides some indication of the total effect, by no means can it be said to capture all the relevant economic relationships.[13]

In particular, whereas the input-output methodology shows how a change in final demand affects output in all other supplying sectors, it does not take into account

the further consequences of increased sectoral outputs on the employment of labour and other factors of production which generates a stream of income received by these factors. In turn, this value added ends up — assuming no supply constraints (i.e. excess capacity) — as income to the various socioeconomic households and other institutions in the economy allowing the latter to spend more on consumption of the various commodities produced by the production activities thereby generating additional production. By excluding the link between increased output, the factorial and household income distribution and increased consumption the I/O approach short circuits the circular flow in the economy and thereby accounts for only a part of the indirect production in any of the production activities.[14]

Fortunately, an alternative framework, known as a social accounting matrix (SAM), is available which redresses these deficiencies of the input-output approach.[15] How this is achieved can be briefly illustrated with the aid of Table 1, which shows a simplified schematic social accounting matrix. As with any SAM, it consists of as many rows as columns. Expenditures are recorded by the latter and receipts by the former. With these conventions a SAM can be used as an economy-wide accounting framework. As such a SAM is a consistent set of accounts since row totals (receipts) must equal column totals (expenditures). At the same time a second use of a SAM is in economic modeling. The descriptive, accounting framework can be transformed to a basis for modeling by selecting some accounts as endogenous so that these can be determined within the model by the exogenous accounts or variables. Table 1 assumes that three accounts are endogenously determined, namely, factors, institutions (households and companies) and production activities, while all other accounts are assumed to be exogenous (that is, governments, capital and the rest of the world).

Thus, for example, T_{13} is the matrix which allocates the value added generated by the various production activities into income accruing to the various factors of production and T_{33} shows the intermediate input requirements (i.e., the input-output transactions), while T_{32} reflects the expenditure pattern of the various institutions including the different household groups for the commodities (production activities) which they consume.[16]

As such, therefore, the input-output (or backward) linkages comprise only part of a much wider set of macroeconomic relationships in the SAM.

Under conditions of excess capacity that permit prices to remain constant, the framework shown in Table 1 can be employed to estimate the effects of exogenous changes (such as in

Table 1. *Simplified schematic social accounting matrix*

			Expenditures			
			Endogenous accounts			Exog.
			Factors 1	Households 2	Production activities 3	Sum of other accounts 4	Totals 5
Factors	1		0	0	T_{13}	x_1	y_1
Households	2		T_{21}	T_{22}	0	x_2	y_2
Production activities	3		0	T_{32}	T_{33}	x_3	y_3
Sum of other accounts	4		l_1	l_2	l_3	t	y_x
Totals	5		y_1	y_2	y_3	y_x	

Source: Defourny and Thorbecke (1984).

government expenditure or exports) on the entire system. The logic underlying any such exercise is that exogenous changes (x in Table 1) determine via the SAM matrix, the incomes of factors (the vector y_1); of households and companies (y_2); and of production activities (y_3). Conversion of the transaction matrix produces the corresponding matrix of average expenditure propensities. These are obtainable simply by division of a particular element in any of the endogenous accounts by the total expenditure for the column account in which the element appears.

More formally, if A_n is the square matrix of average expenditure propensities for the endogenous accounts in Table 1, endogenous incomes y_n (i.e. factor incomes y_1; institutional incomes y_2; and production activities incomes y_3 in that table) are equal to $A_n y_n + x$. Therefore,

$$y_n = (I - A_n)^{-1} x. \qquad (1)$$
$$= MaX$$

Thus, endogenous incomes can be derived by multiplying injection x by a multiplier matrix M_a, which is referred to as an accounting multiplier matrix. One limitation of this matrix, as derived in equation (1) is its implication of unitary expenditure elasticities (that is, that the average expenditure propensities in A_n are assumed to apply to any injection). It is more realistic to specify a matrix of marginal expenditure propensities (C_n below), which corresponds to the observed income and expenditure elasticities of the various agents, assuming that prices remain fixed. Formally, expressing the changes in incomes dy_n resulting from changes in injections dx, one derives

$$dy_n = C_n dy_n + dx$$
$$= (I - C_n)^{-1} dx = McdX \qquad (2)$$

McdX is referred to as a fixed price multiplier matrix and the significant role that it plays in our empirical analysis will become apparent below. At this point, however, it bears emphasizing that — as the term "fixed price multipliers" indicates — the initial redistribution leaves prices unaffected under the condition of excess capacity in productive activities. A more general approach which allows prices to be flexible is to be found in the literature on computable general equilibrium (CGE) models. Such models, however, have also been criticized for arbitrary choices of functional forms and parameter values. The approach taken in this paper is intended to be a first approximation, contrasting the general equilibrium (or

disequilibrium) approach with the partial (equilibrium) methodology we criticize.

(c) *SAM-TECH Indonesia as a disaggregated framework for estimating the employment effect of an income redistribution*

So far, in criticizing the received methodology, we have emphasized that estimation of the employment effect of an income redistribution needs to be conducted on a disaggregated basis and that it should incorporate a wider variety of macroeconomic relationships than are contained in an input-output approach. Both these requirements are met in a modified SAM framework for Indonesia that Khan and Thorbecke (1988, 1989) refer to as SAM-TECH.

What is novel about SAM-TECH is its attempt to disaggregate technologies and products in six sectors which exhibit technological dualism-sectors, that is, in which production takes place both in traditional, highly labor-intensive units as well as in more modern, capital-intensive enterprises. The distinction between the traditional and modern methods of production in each of these sectors (hand-pounded vs. milled rice; farm vs. plant processed tea; dried and salted vs. canned fish; brown vs. refined sugar; canning and preserving of fruits and vegetables in small vs. medium and large firms; and clove vs. white cigarettes), meant that in total 12 new production activities were grafted on to the 1975 SAM for Indonesia, which was constructed by the Central Bureau of Statistics. (Together these dualistic activities accounted for some 50% of manufacturing sector output in 1975).[17]

Apart from the specific (and substantial) attempt at disaggregation that this represents, it is important to emphasize that the 1975 SAM for Indonesia is itself very detailed. In particular, it contains 78 columns and rows, which include sixteen different labour groups (that are classified by sector of employment, paid vs. unpaid and rural vs. urban) and 10 socioeconomic household groups. In short, therefore, SAM-TECH provides an unusually comprehensive framework for assessing the employment effect of an income redistribution and for analyzing the role that disaggregation plays in this relationship. We examine next how various redistributive schemes were simulated within this framework and we report on the results that were obtained.

3. THE SIMULATIONS: METHODOLOGY AND RESULTS

The procedure that was adopted can be descri-

bed in terms of the following five stages.

First, from population census and household budget survey data, we were able to obtain figures for the total number of households and total household income.[18] This enabled us to derive the income of each of the ten household groups classified in SAM-TECH.

Second we devised three different redistribution schemes to transfer income from richer to poorer households, both rural and urban. The first scheme transfers 100,000 rupees from farm size 2 (representing farms owning 0.51–1.00 Ha) to farm size 1 (representing farmers owning up to 0.5 Ha). The second scheme transfers 100,000 rupees from "rural higher" households to "rural lower" households. The last scheme transfers 100,000 rupees from "urban middle" and "urban higher" to "urban lower" households.[19]

Third, using estimated consumption functions, we calculated the changes in expenditure of the affected households. Ideally, we would have wished to include all six of the dualistic sectors from SAM-TECH in these estimations, but the consumer expenditure survey data were compatible with the production-side classifications in only one of these sectors, namely, sugar. For this sector, separate consumption functions were estimated for brown sugar (the traditional unrefined product), white sugar (the modern refined product), and total sugar. The three functions estimated on the basis of weighted OLS (with weights given by the number of households in each group) are as follows.

Brown sugar b =
$-43419 + 3569.69 \times \log(y)$ $\bar{R}^2 = 0.87$
   (6029.55)   (460.96)

White sugar s =
$-110470 + 9337.21 \times \log(y)$ $\bar{R}^2 = 0.96$
   (8589.02)   (656.63)

Total sugar t =
$-153889 + 12907 \times \log(y)$ $\bar{R}^2 = 0.97$
   (10202.02)   (779.94)

These estimated nonlinear consumption functions allow us to integrate econometric modeling with fixed price multiplier modeling based on the SAM. The partial equilibrium expenditure effects of an income redistribution are captured initially through the above functions. Later the fixed price multipliers are used to capture the general equilibrium impact on employment.

Thus, application of these functions to the household groups affected by the three redistributive schemes, yields the changes in expenditure shown in Table 2. In each case the change in

expenditure on total sugar is made up (in roughly the same proportions) of expenditure changes on the two different types of sugar (and it is worth noting at this point that the respective shares of brown and white sugar in 1975 were of the order of 25 and 75%).[20]

Fourth, the changes in expenditure of the affected households that are shown in Table 2 were multiplied by the fixed price multipliers (FPM) derived from the Indonesian SAM, for the 16 labor factors that appear there (See Tables 3, 4 and 5).

Fifth, the resulting figures were divided by the average wages/salaries of the respective labor factors (also derived from the SAM) to estimate the effects on employment. These estimates are shown in Tables 3, 4 and 5 for the three different redistributive schemes.

In each of these tables, income redistribution in favor of the poor does have a favorable (direct plus indirect) effect on employment, at both aggregated and disaggregated levels of analysis. In each case, however, the overall effect is more pronounced at the latter level; when, that is to say, the combination of employment increases in the brown and white sugar subsectors, exceeds, by a factor of about three, the estimate for total sugar.

In interpreting these results, which confirm our main hypothesis that aggregation tends to understate the employment effects of an income redistribution, it is essential to recognize that the overall understatement shown in Tables 3, 4 and 5 does not occur uniformly across all 16 labor factors. On the contrary, there is a substantial degree of variation across these factors. On the one hand, as is evident from Table 3 for example,

Table 2. *Change in expenditure (using the semi-log function)*

	Sugar (Rp.)	Brown sugar (Rp.)	White sugar (Rp.)
Transfer of Rp. 100,000 from FS 2 to FS 1	6461.438	1787.04	4674.347
Transfer of Rp. 100,000 from RH to RL	5114.33	1414.47	3699.821
Transfer of Rp. 100,000 from UM to UL	309.808	85.67	224.1007

Table 3. *Changes in employment — Redistribution scheme 1*

Labor Categories	Aggregated SAM Sugar	Disaggregated SAM	
		Brown sugar	White sugar
Ag. paid rural	1.033	3.131	4.865
Ag. paid urban	1.098	0.090	0.142
Ag. unpaid rural	1.227	5.471	9.322
Ag. unpaid urban	1.227	0.179	0.313
Prod. paid rural	0.839	1.669	3.589
Prod. paid urban	1.292	0.461	1.700
Prod. unpaid rural	0.904	1.925	3.021
Prod. unpaid urban	1.292	0.189	0.525
clerical paid rural	0.839	0.720	1.465
clerical paid urban	1.227	0.005	1.386
clerical unpaid rural	0.904	1.891	3.609
clerical unpaid urban	1.292	0.698	1.389
prof. paid rural	0.904	0.230	0.468
prof. paid urban	1.227	0.183	0.428
prof. unpaid rural	0.904	0.123	0.277
prof. unpaid urban	1.292	0.089	0.200
Total	17.501	17.053	32.709

Table 4. *Changes in employment — Redistribution scheme 2*

Labor Categories	Aggregated SAM Sugar	Disaggregated SAM	
		Brown sugar	White sugar
Ag. paid rural	0.818	2.478	8.725
Ag. paid urban	0.869	0.071	0.112
Ag. unpaid rural	0.971	4.330	7.378
Ag. unpaid urban	0.971	0.142	0.248
Prod. paid rural	0.664	1.321	2.841
Prod. paid urban	1.022	0.365	1.345
Prod. unpaid rural	0.716	1.523	2.391
Prod. unpaid urban	1.022	0.150	0.416
clerical paid rural	0.664	0.570	1.160
clerical paid urban	0.971	0.434	1.097
clerical unpaid rural	0.716	1.497	2.856
clerical unpaid urban	1.022	0.552	1.100
prof. paid rural	0.716	0.182	0.370
prof. paid urban	0.971	0.144	0.339
prof. unpaid rural	0.716	0.098	2.417
prof. unpaid urban	1.022	0.070	0.158
Total	13.851	13.927	32.953

in seven of the labor categories (agricultural paid urban, agricultural unpaid urban, production unpaid urban and the last four professional categories), the aggregated estimate (for total sugar) exceeds the sum of the two disaggregated estimates (so that there is over rather than understatement). On the other hand, much of the overall understatement is concentrated in four labor categories: agricultural paid rural, agricultural unpaid rural, production paid rural and production unpaid rural. These, unlike most of the seven cases of overstatement that have just been mentioned, are labor categories drawn from the rural (rather than the urban) areas and they contain a relatively high proportion of unskilled (and low-income) workers.[21]

Underlying these contrasting patterns are in part the relevant fixed price multipliers shown in

Table 5. *Changes in employment — Redistribution scheme 3*

Labor Categories	Aggregated SAM Sugar	Disaggregated SAM	
		Brown sugar	White sugar
Ag. paid rural	0.049	0.150	0.233
Ag. paid urban	0.052	0.004	0.006
Ag. unpaid rural	0.058	0.262	0.446
Ag. unpaid urban	0.058	0.008	0.015
Prod. paid rural	0.040	0.080	0.172
Prod. paid urban	0.061	0.022	0.081
Prod. unpaid rural	0.043	0.092	0.144
Prod. unpaid urban	0.061	0.009	0.025
clerical paid rural	0.040	0.034	0.070
clerical paid urban	0.058	0.026	0.066
clerical unpaid rural	0.043	0.090	0.173
clerical unpaid urban	0.061	0.033	0.066
prof. paid rural	0.043	0.011	0.022
prof. paid urban	0.058	0.008	0.020
prof. unpaid rural	0.043	0.005	0.013
prof. unpaid urban	0.061	0.004	0.009
Total	0.829	0.838	1.561

Table 6. *Disaggregated fixed price multipliers*

Labor Categories	Aggregated Sugar	Disaggregated	
		Brown sugar	White sugar
Ag. paid rural	0.012	0.133	0.079
Ag. paid urban	0.016	0.005	0.003
Ag. unpaid rural	0.013	0.218	0.142
Ag. unpaid urban	0.016	0.009	0.006
Prod. paid rural	0.016	0.118	0.097
Prod. paid urban	0.038	0.049	0.069
Prod. unpaid rural	0.014	0.110	0.066
Prod. unpaid urban	0.032	0.017	0.018
clerical paid rural	0.014	0.045	0.035
clerical paid urban	0.038	0.061	0.059
clerical unpaid rural	0.011	0.085	0.062
clerical unpaid urban	0.024	0.046	0.035
prof. paid rural	0.049	0.045	0.035
prof. paid urban	0.106	0.057	0.051
prof. unpaid rural	0.014	0.007	0.006
prof. unpaid urban	0.084	0.021	0.018

Table 6 (as well, of course, as the particular patterns of consumption that are induced by the income redistribution).

These provide, in the first place, part of the reason why understatement of the employment increase at the aggregate level is concentrated in the four rural labor categories noted above in relation to Table 3. In fact, the fixed price multipliers for brown sugar are highest in precisely these categories and much the same is also true for white sugar. Evidently, it is in these labor categories that the aggregate SAM most sharply underestimates the total linkages. Correspondingly, when these groups are the beneficiaries of an income redistribution (as in our first two simulations), the employment effect will tend to be large in comparison to cases where (as in our third simulation) it is urban households who are favorably affected.

The disaggregated multipliers in Table 6 also lend some degree of support to our view that historically determined relationships among pro-

ducts, technologies and incomes in distinct "systems," give rise to aggregation bias of the sort found here. The table reveals uniformly higher fixed price multipliers for brown than for white sugar. In addition, the former are especially high among the rural labor groups whose consumption patterns, we suggested earlier, would be relatively intensive in labor and other local inputs and which would exhibit relatively few outside leakages.

One can in fact get a rather better sense of the differential linkages that underlie these dissagregated fixed price multipliers, by means of a relatively new technique known as "structural path analysis," which, in effect, decomposes the multipliers into a series of constituent influences. Khan and Thorbecke show that when this technique is applied to SAM-TECH it is capable of capturing "the entire network of paths through which the impact of a change in demand for the output in any production activity is transmitted throughout the Indonesian economy". (Khan and Thorbecke, 1989, p. 147). Sugar is one of the sectors they use to illustrate how these paths actually operate and more specifically, how the effects of a change in the output of brown and white sugar ultimately get translated into higher incomes for the household group headed by small farmers. What Khan and Thorbecke conclude from this exercise is that although both types of sugar

> "affect the economic system through the same set of paths", the major difference between them consisted of the "considerably smaller backward linkages to sugar cane . . . of the modern technological alternative (refined sugar) compared to the traditional one (brown sugar) which is made out of palm sugar" (1989, p. 155).

4. CONCLUSIONS

During the 1970s a host of studies attempted to examine the employment effects of an income redistribution in favor of the poor in developing countries. These studies, however, provided little or no support for the proposition that since the poor tend to consume a more labor-intensive basket of commodities than the rich, a redistribution in their favor will tend to increase employment.

We have argued that the methodology underlying these results is flawed in two (related) ways; the first being the use of a level of aggregation that disguises a historically based pattern of associations between product characteristics, technologies and incomes. Neglect of these relationships — which tend to manifest themselves in terms of distinct "technological systems" — imparts a tendency for the aggregative approach to underestimate the true employment effects of an income redistribution. In addition, based as they generally are on an input-output approach, the models used during the 1970s neglect a variety of relevant macroeconomic relationships. In particular, the input-output approach excludes the link between increased output, the factorial and household income distribution and increased consumption.

To redress these methodological deficiencies, we advocate an alternative analytical framework based on a disaggregated SAM for Indonesia. This framework is highly disaggregated not only in terms of products and technologies for six dualistic manufacturing sectors, but also in terms of labor factors and households. On the basis of this framework a number of income redistributions from rich to poor was simulated, using consumption functions estimated for one dualistic sector, sugar, at both aggregative and disaggregative levels of analysis. Though employment was found to increase at both levels, the effect is far more pronounced in the disaggregative case. Analysis of the sources of this discrepancy suggest that they were partly the result of a tendency for aggregation to most heavily understate linkage effects among relatively unskilled rural labor categories. To at least some extent this tendency seems to be explicable with reference to our theoretical framework which emphasizes the historical origins of the highly dualistic patterns of production and consumption in the manufacturing sector of most developing countries.

NOTES

1. White (1978), p. 46. Morawetz (1974) comes to the same conclusion.

2. Walters (1968), p. 308.

3. Morawetz (1974).

4. Some writers on this topic have explicitly questioned whether any such association exists. Cline (1975), for example, argues that there are no theoretical reasons to expect systematic factor combination differences between basic and luxury goods at a more disaggregated level. Recently, Cooper (1990) has expressed a similar degree of scepticism.

5. This argument is based on James (1976).

6. Lancaster (1966).

7. Forsyth, McBain and Solomon (1982).

8. Stewart (1977), p. 6, emphasis added. The following discussion of a "technology system" is based largely on this reference.

9. Stewart (1981), p. 94.

10. See van Ginneken and Baron (1984); James and Stewart (1981); Stewart (1977), Chapters 9 and 10 and James (1980).

11. James (1976).

12. For the sugar-processing industry in India, James (1980) shows that a 50% understatement of the employment effect of an income redistribution can be attributed to aggregation bias i.e. the bias that results from failing to decompose the demand for sweeteners into its constituent parts.

13. This section very closely follows the text in Khan and Thorbecke (1988, 1989).

14. Khan and Thorbecke (1988), p. 2.

15. Already in the 1970s, several "first generation" models had directly addressed the link between income distribution and employment within a general equilib-

rium framework. (Thorbecke and Sengupta, 1972 and Pyatt *et al.*, 1972). Both models were prepared under the auspices of the World Employment Programme of the ILO and they were both influential in the opening up of the SAM and CGE approaches. These two models are discussed in Pyatt and Round (1985).

16. Khan and Thorbecke (1989), p. 137.

17. Khan and Thorbecke (1988).

18. Our consumption data are taken from the Indonesian 1980 Household Budget Survey (called SUSE-NAS), while the numbers of households are those reported in Keuning (1988).

19. In principle each of these redistributive schemes could be brought about by some combination of taxes from and subsidies to, the groups which the SAM indentified. In practice, however, any such measures are likely to encounter not only administrative but also political problems with regard to the question of political will, which will influence the feasibility of redistribution even in the relatively mild changes that we have simulated. For a detailed discussion of these issues see Frank and Webb (1977).

20. Khan and Thorbecke (1988).

21. Khan and Thorbecke (1988).

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