AN APPROACH TO SOCIAL ACCOUNTING FOR WELFARE PLANNING*

G.P.Tyler
and
Alan R. Roe

NUMBER 108

WARWICK ECONOMIC RESEARCH PAPERS

DEPARTMENT OF ECONOMICS

UNIVERSITY OF WARWICK
COVENTRY

AN APPROACH TO SOCIAL ACCOUNTING FOR WELFARE PLANNING*

G.P.Tyler

and

Alan R. Roe

NUMBER 108

April, 1977.

(A paper presented to the 15th World Conference of the Society for International Development, Amsterdam, November/December, 1976)

The research underlying this paper is financed by a grant from the Social Science Research Council.

Introduction - Statistics and Planning

The aim of this paper is to demonstrate that the collection and presentation of national data in the form of a Social Accounting Matrix (SAM) helps to provide a clearer insight into the relationships between production and "social" factors - such as income distribution, employment, and regional inbalances, and so provide the basis for national planning for a wider range of objectives than simply GNP; a basis, that is, for 'welfare planning'. The paper limits itself to these questions of data presentation and evaluation as tools of planning, and does not consider the logistics of plan formation, or plan implementation or the actual determination of plan objectives.

The collection of economic data and the development of economic theories and models go hand in hand. Thus with the development of Keynesian theories of national income and employment determination, and of economic growth, came the compilation of statistics of national income, consumption, savings, investment, employment etc. on a yearly basis, from which were derived parameters such as consumption and savings propensities, capital-output ratios and labour demand functions which provided the basis for national demand management, and economic growth strategies.

The later development of industrial input-output statistics followed the realisation that national production aggregates could hide crucial bottlenecks at the level of the individual sector. National planning was thus disaggregated to the level of individual industries, predicting future demands on sectoral outputs and locating key capacity constraints.

Having disaggregated the structure of production, the most recent step has been to integrate into the data scheme the objectives of production. With the realisation of the shortcomings of GNP as an index of national welfare attention has focussed on how specific target groups are affected by production and growth - the poor, the unemployed, the uneducated, those in depressed regions. The counterpart to reorientating the aims of national planning towards the separate components of social welfare (which were formerly subsumed within GNP targets) is the development of social accounts which specifically incorporate income distribution and employment generating linkages within the national accounts framework. Two recent investigations (1) into the aims and methods of disaggregated analysis and planning to achieve multiple social goals have both stressed the need for a more adequate statistical base which will allow the application of the new ideas that are being generated. The Standard system of National Accounts (SNA) of the United Nations Statistical Office, as originally developed in the 1950's contained the degree of flexibility capable of incorporating income distribution - expenditure linkages, but in practice this potential has not been exploited. Not until recently has the UN Statistical Office issued detailed guidelines on the integration of distribution and consumption statistics into the SNA (2). A considerable research effort is now being undertaken (along these lines) by organisations such as the ILO and World Bank with studies of the Phillipines and Malaysia (3).

---

(1) H.B.Chenery et al: (1974).
C.R.Blitzer et al: (1975).

(2) e.g. see U.N. Statistical Office, July 1974.

(3) See for example: Paukert, Skolka and Maton (1974) and Rodgers, Hopkins and Wery (1976).

Without an integrated, consistent statistical base, studies of income distribution in the past have tended to look at various aspects in isolation, such as the effect of autonomous income redistribution on the pattern of consumption; and autonomous shifts in industrial structure on incomes. With a full data base, and relevant theoretical insights, the mutual interdependence of production - employment - income distribution and consumption should be more adequately analysed and its consequences taken account of.

A Social Accounting Matrix for Sri Lanka

The illustrations contained in this paper rely on an integrated S.A.M. for Sri Lanka for 1970, the compilation of which is described in detail in Pyatt and Roe (1977). Since this exercise relied entirely on data which were already available, many assumptions had to be made to force these data into a consistent framework: assumptions about relative data accuracy, differences in classifications, treatment of sample data and so on. It can be argued that the net outcome is a set of data which, because it is internally consistent, is, in some sense, more accurate than the original, unadjusted, inconsistent data. For one important area - however - the distribution of factor incomes to households on a satisfactorily disaggregated basis - sufficient direct information was not available. This aspect has been developed by the current authors subsequently, and is perhaps the 'weakest link in the chain'. Of course, were the SAM format widely accepted, and data compiled specifically to meet its requirements, then many of the problems encountered would not exist.

Table 1 presents the system of the accounts in its most aggregative form. The economy is divided into eight sectors : production activities; factors of production; households; firms; government; combined capital account; dealings with the rest of the world; and employment. The matrix format reveals the transfer of resources between the seven income/expenditure accounts, and also the creation of employment. By specifically mapping all inter-sector transfers we are able to follow the circular flow of income through the economy; from production activities, to factors of production, to households, which in turn purchase the output of production activities. By consistently mapping all receipts and expenditures for each sector it is ensured that row totals (receipts) equal column sums (expenditures) and this condition provides a useful check on raw data.

To illustrate by reference to one sector, Table 1 (see row 5) shows that total government revenue was 2346 Rm, made up of 856 Rm of taxes on production, 567 Rm of taxes on household income and expenditure, 376 Rm of taxes on firms and receipts from public sector corporations, 104 Rm of indirect taxes on government expenditure, 313 Rm of taxes on investment expenditure and 130 Rm of taxes on exports. Of the total 2346 Rm received, 302 Rm was spent on domestic goods, 1275 Rm was spent on factors of production (labour), 248 Rm was transferred to households, 294 Rm was transferred to firms, 104 Rm was paid out as indirect taxes on government expenditure, 42 Rm was saved, and 79 Rm was spent on imports and overseas transfers (see column 5).

With this framework, and the necessary input of data, the scope of the SAM can be widened to include the movement of people through various

TABLE 1 - SRI LANKA - FULLY AGGREGATED SOCIAL ACCOUNTS MATRIX [b] - 1970

Receipts \ Expenditures [a]		(1) Production Activities	(2) Factors of Production	(3) Institutions Current Account: Households	(4) Institutions Current Account: Firms	(5) Institutions Current Account: Government	(6) Combined Capital Account	(7) Rest of World	Total
(1) Production Activities		4358		7603		302	1962	2113	16336
(2) Factors of Production		10098		100		1275		-113	11360
(3) Institutions Current Account	Households		9788		644	248		18	10698
(4) Institutions Current Account	Firms		1573			294			1869
(5) Institutions Current Account	Government	856		567	376	104	313	130	2346
(6) Combined Capital Account				1337	833	42		425	2640
(7) Rest of World		1024		1091	16	79	364		2573
TOTALS		16336	11360	10698	1869	2346	2640	2573	
(8) Employment		3109500		65000		26520			3439700

(a) values in millions of Rupees
(b) contains some small rounding errors.

states of education, employment, retirement, and monitoring contact with welfare services, and ownership of assets, and the SAM can focus on particular issues by greatly disaggregating particular sectors. Thus factors of production can be split up into forms of labour, capital and rent, and labour can be disaggregated by skill, by educational status, by class. Households can be distinguished by size, by chief occupation, by source of income, by size of income and by regional location. Production activities can be broken down into separate industries, by method of production and on a formal/informal basis.

With the data that was available for Sri Lanka it was possible to disaggregate Table 1 into a SAM with 48 production activities (agricultural, industrial and service sectors) 6 factors of production (currently being extended to over 27), 21 household groups (distinguished by income size and location).

For ease of presentation a semi-disaggregated version of the SAM is presented in Table 2, containing 12 activities, six households (private and public owned corporations ("other institutions"), government, capital account, rest of the world, and 3 categories of employment. The receipts and payments of factors of production have been directly routed from source to ultimate destination, and also profits earned by private firms and transferred to households have been directly incorporated into household accounts (4).

---

(4) This "throughrouting" eases presentation, but for modelling and and analysis it is preferable to keep distinct each aspect of the circular flow of income in order to keep 'open' as many analytical options as possible. (Note also that the Value Added row of Table 2 excludes all transfer elements in income, and is not the sum of institutions).

TABLE 2 SEMI-DISAGGREGATED SOCIAL ACCOUNTS MATRIX - 1970

	RECEIPTS \ EXPENDITURES	ACTIVITIES ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	SUB TOTAL	HOUSE-HOLD INCOMES URBAN LOW	URBAN HIGH	RURAL LOW	RURAL HIGH	ESTATE LOW	ESTATE HIGH	OTHER INSTITUTIONS		SUB TOTAL	GOVERNMENT	CAPITAL ACCOUNT	REST of WORLD	TOTAL
	① TEA												2	2	7	7	42	13	6	1			76	2	-55	839	864
A	③ RUBBER								8					8	-	-	-	-	-	-			-	-	25	341	374
C	⑤ COCONUT						247						6	253	28	25	153	54	27	2			289	4	29	2	577
T	⑭ PADDY				70		1012			2				1084	-	-	-	-	-	-			-	-	49	-	1133
I	⑮ OTHER AGRICULTURE	11	1			95	31	2	62	2	5		39	248	146	205	673	312	125	15			1475	16	-	106	1846
V	⑯ AGRIC. PROCESSING					11	34		187	1			40	273	136	140	787	278	127	12			1480	26	90	152	2019
I	⑰ MINING								2	3	74		1	80	1	1	5	2	1	-			9	-	-	19	108
T	⑱ TRADITIONAL INDUS	15				19	19		96	29	101	48	5	332	73	137	348	220	69	9			856	7	58	92	1346
I	⑲ MODERN INDUS.	82	24	9	35	50	24	9	36	329	136	128	31	894	34	101	190	146	26	6			501	59	17	72	1542
E	⑬ CONSTRUCTION							1			160	10	47	218	-	-	-	-	-	-			-	92	1595	-	1905
S	⑪ TRADE & TRANSPORT	55	11	9	8	23	116	6	113	138	221	138	62	900	129	275	661	417	124	17			1623	89	154	210	2975
	⑫ SERVICES	6	2	6	9	1	4			1	6	17	14	66	119	310	465	338	52	10			1294	7	-	280	1647
SUB-TOTAL		169	38	24	122	199	1487	18	504	505	703	341	247	4358	673	1200	3323	1779	555	72			7603	302	1962	2113	16336
I	HOUSE- URBAN LOW	2	2	18	12	81	19	2	60	49	95	251	121	710	12	26							38	143		-4	887
N	HIGH	16	12	54	-27	194	49	11	56	186	183	638	281	1653										491		-23	2118
C	HOLDS RURAL LOW	67	152	242	743	824	108	40	224	152	357	593	339	3841			34	22					56	300		-2	4191
O	HIGH	14	26	85	331	284	24	18	99	87	156	682	310	2116										600		-8	2711
M	ESTATE LOW	436	100	41	-	18	12	-	2	1	11	17	38	675					5	1			6	8		-	689
E	HIGH	44	12	6	-	11	-	-	-	2	1	6	7	87										9		6	100
S	OTHER INSTITUTIONS	10	16	84	-81	165	40	14	-4	184	247	243	98	1015										369		-63	1225
TOTAL	VALUE-ADDED	587	320	529	977	1575	252	85	436	661	1051	2429	1196	10098	12	26	34	22	5	1			100	1275		[-95]	11471
	GOVERNMENT	33	4	14	5	19	80	2	262	153	78	130	76	856	-1	369	-44	239	-9	12	376		943	104	314	130	2346
	CAPITAL ACCOUNT														105	414	351	456	8	3	833		2170	43	-	425	2640
	REST of WORLD	75	12	10	29	53	199	3	143	223	73	75	128	1024	98	109	527	215	130	12	16		1107	79	364	-	2573
TOTAL		864	374	577	1133	1846	2019	109	1346	1542	1905	2975	1647	16336	887	2118	4191	2711	689	100	1225		11921	2346	2640	2573	
EMPLOYMENT	URBAN	3	1	2	16	29	12	2	54	30	24	156	78	407	8	17							25	91			522
	RURAL	98	119	44	703	256	61	19	211	47	90	301	144	2093			22	14					36	172			2301
	ESTATE	506	71	7	-	3	6	-	2	1	1	8	7	611					3	1			4	3			617
TOTAL EMPLOYMENT		607	191	52	719	288	79	21	266	78	126	464	229	3110	8	17	22	14	3	1			65	265			3440

Notes: Values in millions of Rupees : Figures rounded to nearest whole number
: Employment in Thousands

Thus the SAM reveals the sources of incomes received by different categories of households, and the sources of employment, and then traces incomes through to expenditure, with production, distribution, and consumption all treated on a consistent basis. The arbitrary distinction between 'low' and 'high' income households is based (approximately) on household income being less or more than 6800 R per annum (5). The distribution and average income of households is given in Table 3.

TABLE 3 - HOUSEHOLD CLASSIFICATION

Households	Low Income		High Income	
	Number	Average Income (1)	Number	Average Income (1)
Urban	212230	4179	136800	15402
Rural	1255900	3339	255580	10607
Estate	237975	2895	13680	7310
(1) Rupees p.a.				

To illustrate the SAM we can again follow through the receipts and expenditures of one sector. Thus coconut cultivation (in col.3) has a gross output of 577 Rm. It requires 24 Rm of intermediate inputs from other domestic sectors, and imports of 10 Rm. It employs 51700 workers, and after paying 4 Rm in production taxes, has 529 Rm of value added to distribution to employees, and retains profits, which ultimately is distributed to households and other institutions. The 577 Rm of output is sold (in row 3) to the agricultural processing sector (247 Rm) and

---

(5) Work is being undertaken on a more useful finer degree of income disaggregation.

service sector (6 Rm), 289 Rm is consumed by households, 4 Rm by the government sector, leaving 29 Rm for additions to stocks and investment, and 2 Rm for export. The SAM shows clearly that, with the exception of the estate sector, the Sri Lankan economy is highly interdependent. 'Rich' and 'Poor' households earn their incomes from a wide range of activities and they spend their income chiefly on domestic products; industries get the bulk of their intermediate inputs from other domestic sectors, rather than imports (about 80% overall in 1970, and this proportion has risen substantially since then).

The role of the government is brought out strongly as a major source of "high" income employment, (providing over 20% of high rural and urban incomes, but only 16% of low urban incomes, and just 7% of low rural incomes) but at the same time a net subsidiser of low income households through indirect taxes (in the form of free and subsidised food rations).

Applications of the SAM

The disaggregated, but integrated data of the full SAM is the basis for a wide range of analytic and planning models of the economy, incorporating a multi-sectoral input/output, output/income, income/expenditure structure with multiple objectives - employment, income distribution and regional balance targets, as well as national income targets.

Of itself, the data is not a model, just as national income data is mt of itself Keynesian macro-economics. With the collection of SAM

data over a number of years, it should be possible to develop models incorporating parameters for price responsiveness in production and consumption, supply of labour, capital-output ratios and the like, and so have the basis for non-linear, dynamic, modelling of economic policies and the constraints on policies.

With fixed point data for one year we are limited in the range of analysis that can be undertaken, but nevertheless it is possible to develop a simple, linear model of the economy, which can be used in the expectation that it will provide some useful insights into the directions of relationships and rough orders of magnitude, and so illustrate the scope of more complex models.

The standard, linear modelling approach is to partition the SAM into exogenous and endogenous variables. In our case, we assume output is dependent on demand, inputs and incomes from activities are dependent on output, and household expenditure is dependent on household income, while the spending of retained corporate income, of government, and the level of investment and demand for exports are exogenous. We further assume that all dependent relationships are linear, i.e. that production requires inputs and pays incomes in fixed proportions to gross output, and that household expenditure is in fixed proportion to household income. In such a model, given the fixed coefficient structure, production, income, consumption, taxes, savings and imports are all determined by the level of exogenous demands - basically government expenditure, investment and exports.

In matrix terms, define

g - a vector of gross sectoral output levels

y - a vector of total income levels

A - a coefficients matrix of activity inputs per unit of output

V - a coefficients matrix of incomes paid to each institution per unit of output

C - a coefficients matrix of expenditure by different households on activity outputs per unit of income

E - a coefficients matrix of expenditure by households on services of other households per unit of income (domestic servants)

F_1 & F_2 vectors of exogenous demands for output, and payments of income (e.g. exports and government employment)

Then, since from our SAM of Table 2, we have the identities that:

Gross Output	=	inter-industry demand	+	household consumption	+	independent demand
Total Incomes	=	incomes from activities	+	incomes from households	+	independent sources of incomes

we can express these as :

$$g = Ag + Cy + F_1 \qquad (1)$$

$$y = Vg + Ey + F_2 \qquad (2)$$

which is the linear structure derived from the SAM. (1) and (2) can be combined to give :

$$\begin{bmatrix} g \\ y \end{bmatrix} = \begin{bmatrix} A & C \\ V & E \end{bmatrix} \begin{bmatrix} g \\ y \end{bmatrix} + \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} \qquad (3)$$

which in turn can be rearranged to give :

$$\begin{bmatrix} g \\ y \end{bmatrix} = \left[I - \begin{pmatrix} A & C \\ V & E \end{pmatrix} \right]^{-1} \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} \qquad (4)$$

The interpretation of the equation (4) is that the levels of exogenous demands, (for tea exports for example) do not only lead to direct production and income (tea output and wages for tea workers) but also cause an indirect demand for intermediate inputs into production (chiefly the products of 'modern industry' in the case of tea) and further cause an induced demand for extra production, resulting from the expenditure out of the incomes that are being generated (estate workers spending the bulk of their income on food). Each round of demands generates in turn a new round of demands in a steady declining sequence. The matrix $\left[I - \begin{pmatrix} A & C \\ V & E \end{pmatrix} \right]^{-1}$ is in fact an activity and income disaggregated multiplier, giving the comprehensive, or total, effect on the economy of one unit of exogenous demand or income. When multiplied by the current levels of exogenous demands and incomes $\begin{bmatrix} F_1 \\ F_2 \end{bmatrix}$ it gives the current gross levels of the endogenous variables in the economy. Looking at the current

level of each final demand in turn, we can see what part of the economy is being sustained by it. By further assuming that imports, taxes, savings and employment are linearly related to levels of gross outputs and incomes, effects on these variables can also be calculated. Taking the example of tea exports, with our fixed coefficients assumption we know from Table 2 that for every unit of tea output, .196 units of intermediate inputs are required from other domestic activities, thus the export of 839 Rm of tea, requires the input of 164 Rm of domestic intermediate inputs, and similarly we can calculate that 570 Rm of income is generated and 32 Rm of production taxes are paid. But the 164 Rm of inputs will in turn require inputs for their production, and at each stage a part of incomes earned will be spent on domestic products; when account is taken of these indirect and induced repercussions on dependent variables in the economy, the comprehensive income generated from the export of tea is 1723 Rm - over three times the size of the direct effect alone.

Looking at the process in reverse, a fall in tea exports of 1 million Rupees, does not simply lead to a loss of 680,000 Rupees of value added in the tea industry, but because the purchase of inputs is reduced, and estate household expenditure is cut, other incomes in the economy fall. In all 1,990,000 Rupees of income is lost.

Similarly, when the government pays to low income urban households a total of 142.8 Rm, the total effect is much larger and more widespread. Allowing for the repercussions from the spending out of this income, a total of R160.1m is generated for the low income urban group, and an

additional 177 Rm is generated for other households, the total household income generated being over 135% higher, than the direct government payment.

In Table 4 below we give the main exogenous demands, and the % of 1970 total value added, and the percentage of 'poor' and 'rich' urban household income, which is dependent on each of the exogenous elements. Thus 85% of a total 1970 value added of 11471 Rm is dependent on 4926 Rm of key exogenous demands. While on average, 54.3% of value added is sustained by construction and government payments to urban and rural households, these elements support 70.6% of 'poor' urban household incomes, and 62% of 'rich' urban household incomes. Of total 1970 value added, the investment in construction, and export of tea, together, supported over 40%.

Leakages and Target Groups

One use of our simple model is immediately obvious, - to assess the 'leakages' to other groups of government measures aimed at helping specific target groups. Government may for example redistribute income directly, or by encouraging activities which are known to provide income and employment opportunities primarily for a target group. In formulating such policies, a clear recognition of likely 'leakages' is obviously important.

In Table 5 we consider the leakage from direct income redistribution towards any of the six household groups we identified in Table 3. Taking the case of redistribution towards low income urban households, a transfer of one unit of income will generate an additional 1.367 units,

TABLE 4 Effect on Incomes of 1970 Levels of Exogenous Demands

Source	Level of Exogenous Demand in 1970 (Rm)	% of Total 1970 Value Added Sustained	% of Total 1970 'poor' urban household income sustained	% of total 1970 'rich' urban household income sustained
Exports: Tea	839	15.0	10.1	9.9
Other Services	256	3.3	4.0	3.8
Rubber	341	6.7	4.2	4.2
Wholesale Trade	172	2.7	2.5	3.6
Other Agric.	106	1.9	1.4	1.4
Dess.Coconut & Copra	83	1.5	1.2	1.2
Investment: Construction	1595	25.8	36.3	23.3
Government: low urban (Wages & high urban	142.8	2.7	18.1	1.6
	491.2	8.6	5.6	27.6
Transfers) low rural	299.7	6.0	3.9	3.5
high rural	600.3	11.2	6.7	6.0
TOTAL	4926.0	85.4	94.0	86.1

of which .127 is returned to the target group, but 1.24 will go to other household groups, .593 to 'high' income groups. Overall, the ratio of leakage to other households, to effect on the target group is 1.1 to 1.

Of course, the size of the leakage target ratio depends a good deal on the relative size of the target group. However, even in the case of a transfer to the largest income group we have identified - low income rural households with 40% of total household income in 1970 - the leakage to other households is nearly half the total income retained by the target group.

In Table 6 we examine the policy of expanding activities which favour a target group, in this case assumed to be low income, rural households. The six activities presented represent those which directly pay the largest share of gross output to the target group; from 76% in the case of the "logging and firewood" activity down to 42% in the case of coconut cultivation. Even in direct terms, there are, of course, payments to other households, but because we have selected activities which favour the target group these are relatively small - from 15% in the case of "coconut fibre and yarn" to 35% for "coconut cultivation" itself. When, however, we take into account the comprehensive effects of a unit expansion of these activities, firstly, they are no longer necessarily the 'best' sectors for generating income opportunities for the target group, and secondly, there is a much more substantial leakage into other household groups. The "logging and firewood" activity remains the 'best' sector in comprehensive income generation terms, from an

initial unit expansion of the activity, with 1.386 units of income received by low income, rural households. Nevertheless, .948 units of income is received by other households, and in particular .728 (.328 + .393 + .007) by 'high' income households - over half as much as the incomes received by the target group.

While not a new discovery, the SAM based model does demonstrate the broad impact that some specific government policies may have, and emphasises that concentrating government assistance on the poor and depressed regions does not ensure that all the benefits are felt by the poor or can be contained within the region. These diluting 'leakages' from the transfer of incomes and provision of employment opportunities may provide some part of a raison d'être for the more direct government actions to promote the welfare of target groups - such as increased access to government welfare services (education, training, health, public utilities), redistribution of assets (land) and development of appropriate technologies within activities.

Redistributive Impact

By considering the total impact of an initial unit increase on the exogenous demand for each of the 48 activities in turn, we can develop a full comparison of the effects on different income groups, on employment, or on other identified social objectives. In Table 7 we list the percentage comprehensive changes in incomes and employment that would

TABLE 5 - COMPREHENSIVE LEAKAGE FROM DIRECT INCOME REDISTRIBUTION

Receipient of Direct Unit of Income \ Comprehensive Effect		URBAN		RURAL		ESTATE		LEAKAGE/ TARGET RATIO
		Low	High	Low	High	Low	High	
URBAN	LOW	1·127 ~~1.27~~	.239	.614	.347	.033	.007	1.10
	HIGH	.101	1.188	.427	.255	.024	.005	0.68
RURAL	LOW	.116	.246	1.665	.369	.035	.007	0.46
	HIGH	.099	.211	.517	1.295	.027	.006	0.66
ESTATE	LOW	.117	.249	.673	.375	1.042	.007	1.36
	HIGH	.107	.230	.567	.3267	.040	1.007	1.26

TABLE 6 - LEAKAGE FROM SECTORS FAVOURING LOW INCOME RURAL HOUSEHOLDS

HOUSEHOLD EFFECT / SECTOR INITIALLY EXPANDED	DIRECT EFFECT						SECTOR RANK BY LOW RURAL		COMPREHENSIVE EFFECT						SECTOR RANK BY LOW RURAL
	URBAN		RURAL		ESTATE				URBAN		RURAL		ESTATE		
	LOW	HIGH	LLOW	HIGH	LOW	HIGH			LOW	HIGH	LOW	HIGH	LOW	HIGH	
Logging etc.	.072	.088	.761	.042	-	-	1		.187	.328	1.386	.393	.033	.007	1
Paddy	.010	-.024	.656	.292	-	-	2		.127	.227	1.342	.674	.034	.006	2
Coconut fibre etc.	.032	.022	.612	.002	.090	-	3		.149	.279	1.291	.370	.134	.008	3
Other Agric.	.019	.093	.450	.154	.012	.001	4		.113	.289	.983	.448	.039	.007	7
Livestock	.033	.094	.437	.116	.012	.032	5		.129	.300	.962	.409	.043	.038	9
Coconut	.031	.094	.419	.147	.071	.010	6		.110	.263	.907	.395	.298	.039	10

TABLE 7. SECTORAL REDISTRIBUTIVE EFFECTS - PERCENTAGE CHANGES IN INCOMES AND EMPLOYMENT AFTER UNIT INCREASE IN EXOGENOUS DEMAND.

	INCOMES														EMPLOYMENT							
	URBAN				RURAL				ESTATE				VALUE ADDED									
ACTIVITY	Low	Rank	High	Rank	Low	Rank	High	Rank	Low	Rank	High	Rank		Rank	Urban	Rank	Rural	Rank	Estate	Rank	Total	Rank
Tea	.012	37	.012	37	.015	25	.012	29	.078	1	.056	1	.018	17	.013	28	.018	13	.098	1	.032	2
Rubber	.012	35	.012	35	.023	8	.015	23	.043	2	.039	2	.020	7	.012	29	.028	5	.033	2	.026	6
Coconut	.014	28	.014	31	.022	10	.016	20	.014	4	.015	5	.018	12	.011	37	.015	20	.004	5	.012	24
Paddy	.014	24	.011	41	.032	2	.025	1	.005	17	.006	19	.021	3	.016	21	.044	1	.003	12	.033	1
Livestock	.015	22	.014	27	.023	9	.015	21	.006	9	.038	3	.018	14	.011	35	.013	28	.002	17	.011	28
Fish	.029	2	.021	2	.019	16	.020	6	.004	25	.007	16	.019	8	.028	4	.017	16	.002	22	.016	14
Logging Etc.	.021	9	.015	19	.033	1	.014	24	.005	19	.007	18	.021	2	.013	25	.017	17	.003	14	.014	20
Other Agriculture	.013	33	.014	30	.023	7	.017	15	.006	11	.007	17	.018	11	.011	34	.020	10	.002	15	.016	16
Mining Etc.	.013	30	.014	25	.021	13	.016	16	.004	30	.006	22	.017	19	.014	24	.019	12	.002	27	.015	17
Rice Milling	.015	23	.011	39	.031	4	.024	2	.005	16	.006	20	.021	4	.016	22	.042	2	.003	13	.031	3
Flour Milling	.011	39	.011	38	.010	37	.008	40	.005	18	.003	45	.010	40	.009	40	.009	38	.002	32	.008	40
Dairy Products	.007	47	.007	47	.009	42	.006	46	.003	34	.010	11	.008	45	.007	48	.007	46	.001	44	.006	48
Bread	.008	44	.008	45	.008	45	.006	47	.003	32	.002	47	.007	47	.009	42	.007	43	.001	41	.006	43
Other Bakery	.013	32	.013	33	.013	31	.010	37	.006	10	.004	35	.012	36	.013	27	.012	30	.002	24	.010	31
Carb. Beverage	.012	34	.015	21	.013	32	.012	32	.003	41	.004	36	.013	33	.011	38	.010	37	.001	38	.008	37
D.C. and Copra	.014	27	.014	26	.021	14	.016	19	.013	5	.014	6	.018	15	.012	32	.015	23	.004	7	.012	25
Other Proc. Food	.007	46	.007	48	.008	46	.006	48	.003	31	.004	40	.008	46	.008	43	.007	45	.001	37	.006	44
Distilling Etc.	.014	29	.017	12	.013	30	.013	28	.003	36	.006	24	.015	29	.011	36	.010	36	.001	35	.009	35
Tobacco Products	.009	43	.007	46	.010	39	.008	39	.002	45	.003	44	.009	43	.007	46	.010	35	.001	46	.008	38
Textiles	.012	38	.009	43	.012	34	.010	35	.003	37	.003	43	.010	41	.020	9	.019	11	.002	30	.016	13
Wood Products	.031	1	.016	17	.030	5	.021	5	.005	15	.006	21	.022	1	.037	1	.034	4	.003	11	.029	5
Paper Etc.	.014	26	.016	15	.011	36	.013	27	.003	40	.004	39	.013	34	.017	16	.011	33	.001	39	.010	32
Leather and Products	.021	10	.017	14	.012	33	.017	13	.004	29	.011	8	.015	31	.017	15	.012	32	.002	28	.011	30
Rubber Products	.015	18	.020	4	.015	26	.010	36	.009	8	.010	13	.015	28	.020	8	.015	22	.006	4	.014	19
Chemicals Etc.	.010	40	.016	18	.009	40	.011	34	.003	31	.005	34	.011	37	.012	31	.009	39	.001	42	.005	39
Oils and Fats	.015	21	.015	20	.020	15	.016	18	.012	6	.013	7	.018	18	.012	30	.014	24	.003	8	.012	26
Coconut Fibre Etc.	.017	15	.013	32	.031	3	.014	25	.019	3	.008	14	.021	5	.016	19	.036	3	.014	3	.029	4
Petroleum Products	.010	42	.014	28	.007	47	.010	38	.002	47	.004	38	.013	32	.009	41	.007	48	.001	47	.006	47
Structural Clay	.017	13	.019	10	.024	6	.020	9	.004	23	.006	23	.020	6	.019	12	.025	6	.002	21	.020	7
Ceramics Etc.	.012	36	.012	34	.018	18	.015	22	.003	33	.005	33	.015	30	.017	17	.023	7	.002	31	.018	10
Cement and Products	.007	45	.008	44	.009	43	.008	41	.002	48	.003	41	.011	38	.007	47	.008	41	.001	48	.007	41
Basic Metals	.007	48	.009	42	.007	43	.007	45	.002	42	.002	48	.007	48	.008	44	.008	42	.001	40	.007	42
Light Engineering	.010	41	.012	36	.010	38	.008	42	.002	43	.004	37	.011	39	.008	45	.007	44	.001	45	.006	46
Transport Equipment	.013	31	.011	40	.009	41	.007	43	.002	44	.003	42	.009	44	.017	18	.009	40	.001	36	.008	36
Machinery Etc.	.014	25	.014	29	.008	44	.007	44	.002	46	.003	46	.010	42	.011	33	.007	47	.001	43	.006	45
Manufactured n.e.s.	.023	4	.015	24	.021	12	.012	31	.004	27	.005	31	.016	24	.027	5	.018	14	.002	18	.017	12
Construction	.017	14	.015	23	.016	23	.014	26	.004	24	.005	30	.016	26	.014	23	.013	27	.002	29	.011	27
Electricity	.015	19	.015	16	.013	28	.011	33	.003	38	.010	10	.015	27	.016	20	.012	29	.002	33	.011	29
Road Passenger Trans.	.022	7	.020	5	.017	22	.018	11	.005	20	.006	25	.017	23	.020	11	.015	21	.002	19	.013	21
Rail Transport	.022	6	.019	8	.017	21	.018	10	.004	22	.006	29	.017	21	.024	6	.016	19	.002	20	.015	18
Wholesale Trade	.015	20	.021	3	.012	35	.017	14	.003	35	.006	26	.016	25	.013	26	.010	34	.002	34	.009	34
Retail Trade	.024	3	.019	9	.019	17	.021	4	.005	13	.011	9	.019	9	.030	3	.021	9	.003	10	.019	8
Other Transport	.021	8	.019	6	.016	24	.017	12	.005	21	.006	27	.017	22	.018	13	.014	26	.002	23	.012	23
Communications	.019	11	.019	7	.017	20	.022	3	.004	26	.006	28	.018	13	.022	7	.018	15	.002	16	.016	15
Hotels Etc.	.018	12	.017	11	.021	11	.016	17	.006	12	.007	15	.018	16	.020	10	.022	8	.004	6	.018	9
Professional	.016	16	.024	1	.015	27	.020	8	.004	28	.023	4	.017	20	.018	14	.014	25	.002	25	.013	22
Dwellings	.022	5	.017	13	.018	19	.020	7	.010	7	.010	12	.019	10	.011	39	.012	31	.002	26	.010	33
Services n.e.s.	.016	17	.015	22	.013	29	.012	30	.005	14	.005	32	.013	35	.031	2	.017	18	.003	9	.017	11
URBAN Low INCOMES	.127		.011		.015		.013		.005		.007		.013		.014		.014		.003		.012	
URBAN High INCOMES	.011		.056		.010		.009		.003		.005		.010		.011		.009		.002		.008	
RURAL Low INCOMES	.013		.012		.040		.014		.005		.007		.014		.013		.016		.003		.013	
RURAL High INCOMES	.011		.010		.012		.048		.004		.006		.011		.011		.012		.002		.010	
ESTATE Low INCOMES	.013		.012		.016		.014		.151		.007		.014		.013		.016		.004		.014	
ESTATE High INCOMES	.012		.011		.014		.012		.006		1.007		.012		.012		.013		.003		.011	

follow from the unit expansion of each sector output or income, to meet some independent demand, and we rank the 48 sectors by their size of effect on the different possible objectives. The results are not surprising, but do take into account the interdependence in the economy, of production, distribution and consumption. Thus it is the service sector and small scale domestic resource based industries which appear to have the greatest potential for generating income and employment opportunities for low income urban households (wood products; fishing; retail trade; manufacturing n.e.s.; other services) while some agricultural and again, domestic resource based, industry benefits rural low income households (logging and firewood; paddy; coconut fibre and yarn; rice milling; wood products).

Table 7 can also be used to assess the net redistributive impact of each activity. As we have given the impact on each income and employment group in terms of percentage changes over 1970 levels, it is the difference in the % income group increase as between household categories that describes a redistributive bias away from the 1970 income distribution. Thus tea, and rubber productions distributes income markedly in favour of estate households. Were there no redistributive impact, all identified household income groups would show an equal percentage income response to the initial unit expansion of output.

In Table 8 are listed those activities which significantly redistribute income opportunities towards low income households - urban, or rural, or both - from 'high' income households. By and large, the results confirm the expectation that redistribution towards the poor would arise from expanding agricultural and what might be termed 'traditional'

industry - leather products, wood products, coconut fibre and yarn, and so on - assuming, of course, that the structure of production, distribution and consumption remains stable in the pattern we have inferred from the 1970 SAM.

Table 7 also sheds some light on the potential conflicts between income and employment creation, in sectorial choice. The rankings of activities by comprehensive value added and comprehensive employment are similar but do contain significant variations. This suggests that encouraging activities which provide many job opportunities does not necessarily imply that total income expansion is maximised. Thus while "logging and firewood" is the "best" sector for generating income for 'poor' rural households, it ranks only 17th in terms of rural employment creation.

Further analysis conducted in this field has included the application of Tinbergen's "semi Input-Output" model (6) designed to isolate those sectors of the economy in which it would be optimal to specialise for the purpose of international trade. One feature of the model is that it gives the "comprehensive" effect of investing in any given activity in terms of the investment that will be stimulated in other sectors, as well as the indirect effects through the demand for inter-industry inputs, and the induced effects through income expansion. This allows us to assess each activity producing goods that can be exported in terms of the comprehensive investment that will be stimulated and comprehensive income that will be generated, giving an overall cost/ benefit ratio.

---

(6) For an exposition see J.Tinbergen (1966)

TABLE 8 - ACTIVITIES WITH A SIGNIFICANT REDISTRIBUTIVE BIAS TOWARDS URBAN AND RURAL LOW INCOME HOUSEHOLDS

URBAN LOW INCOMES	RURAL LOW INCOMES	URBAN & RURAL LOW INCOMES
Fish	Rubber	Paddy
Textiles	Coconut	Logging & Firewood
Leather & Pdcts.	Livestock	Rice Milling
Retail Trade	Other Agriculture	Wood Products
Dwellings	Mining & Quarrying	Coconut Fibre & Yarn
	Dairy Products	Manufactures n.e.s.
	Other Bakery Pdcts.	
	Dess.Coconut & Copra	
	Rubber Pdcts.	
	Oils & Fats	
	Structural Clay Pdcts.	

While the model has rather specialised terms of reference it does shed some light on the problems of investment to generate employment and income opportunities, and the potential trade-offs between these (and other) objectives.

In terms of 'standard' neo-classical economic theory, with two factors of production, labour and capital, in order to generate extra value-added with a given level of investment, under equilibrium conditions, an extra labour input is necessary. Were this proposition true throughout all sectors of the economy, then there could be no "trade-off" between levels of income and employment. Since in fact real economies at a given point in time are not in equilibrium, because factor markets are not perfect, because efficiency in the use of factors varies between sectors, because there are economies of scale, and the like, it is found that

trade-offs do occur.

Thus in our results we find that sectors which in comprehensive terms will utilise more labour for a given volume of investment, do not necessarily generate more income, and thus switching to a more labour intensive activity can imply a loss of income.

For Sri Lanka, 36 out of the total of 48 activities were considered to be producing exportable goods. The graph illustrates the effects of expanding any of the thirty-six 'tradeable' activities by mapping the levels of employment and value added (income) generated per unit of the investment that would, in comprehensive terms, be required. The graphs shows that were 'paddy' production to be expanded, .46 units of labour would be needed, per 1000 Rs of investment while 960 Rupees of income would be produced (7). In the case of "other agriculture" only .26 units of labour per 1000 Rs of investment are required, but they would produce 1300 Rupees of income. The wide scatter of points, each representing the comprehensive effects derived from the initial expansion of one activity for export shows extra employment and extra income do not always move together. The line drawn through the points represents the average relationship between income and employment, as estimated by O.L.S. but this revealed that only 43% of differences in the income created by investment in sectors could be explained by the use of extra labour.

---

(7) Note that we are taking account, not only of direct investment, employment and income in the sector initially expanded, but also of all the indirect linkages-effects with the rest of the economy, given the assumptions of the semi-input output method.

There are many possible explanations for the frequency of apparent income-employment trade-offs, and of course our analysis is limited to the allocation of investment between activities with fixed technologies. However the results do reinforce the need to examine very carefully problems of investment allocation and choice of technique when faced with practical planning decisions, and not to accept too readily theoretical generalisations.

Labour Market Disaggregation

Planning economic development strategies on the basis of income, employment and income distribution considerations in the abstract, without some analysis of disaggregated labour market considerations, can lead to serious shortcomings. It is well established than an overall 'labour surplus' may disguise shortages of certain skills, which can constrain economic expansion. A further important consideration is that the pattern of jobs being created under a 'basic needs' or employment orientated strategy, for example, may be totally unrelated to the demands and expectations of those seeking employment.

The precise disaggregation of employment data depends on the purposes to which the labour market analysis is orientated, and of course, on the reliability of the data. In the full SAM for Sri Lanka, seven major occupational divisions were identified, for each of the urban, rural and estate sectors. From these it is possible to form some limited idea of the labour market implications of alternative sectoral expansion policies, and therefore modifications to policies can be formulated in order to make the best use of those skills in short supply.

Particularly important in the case of Sri Lanka, as stressed by the I.L.O. Mission of 1971 {8} is the need to relate the expansion of job opportunities to the expectations of the unemployed (and vice versa). In fact, those sectors identified in Table 7 as generating the most 'employment' and 'incomes' for poor households, by and large, fail to meet these objectives, since they offer the sort of low wage, low status, manual jobs {9} which the unemployed do not actually want, and often will not accept.

Splitting employment in "white-collar" and "manual" categories, the I.L.O.Mission calculated from a 1968 Labour Force Survey, that 35% of the 220000 persons aged 15-24 who had never been employed, were not wishing to take manual employment. This high proportion is to be contrasted with the 1970 SAM data which reveals that only 10% of current employment was "white-collar" (Professional, Administrative and Clerical occupations). Turning to the sectors identified in Table 7 as generating most employment opportunities from a unit exogenous expansion of output, only:

3.6% of jobs stimulated via paddy expansion are white-collar
3.6% via tea
3.8% via rice milling
16.6% via coconut fibre and yarn
5.4% via wood products
3.8% via rubber

Thus our analysis confirms the I.L.O. Missions view that job expectations were totally out of line with potential job opportunities. This does not however imply that these expectations can be ignored in formulating an economic development strategy.

{8} See I.L.O. (1971)

{9} Note that by 'jobs' we mean work opportunities in general, which will include self-employment and casual employment.

The willingness of many families to endure the considerable expense of supporting young unemployed school leavers while they search for a "white-collar" job rather than forcing them to take up the casual manual job opportunities that often are available suggests that many people will forego certain income for the chance of a white-collar job. Similarly, moves to reduce the number of compulsory years of schooling, and to introduce more vocational training into school curricula in the early 1970's in order to equip school leavers with the skills and outlook more appropriate to likely job opportunities led to a large outcry from many parents, and a blossoming of private educational facilities. {10} In a plural democracy such as Sri Lanka, such strong preferences for high status jobs may be reflected in a national political imperative to follow an economic strategy which generates a limited number of "white-collar" opportunities, in the modern industrial and service sectors, even at the expense of a potentially much greater volume of income and employment opportunities, of low status, in the 'traditional' sectors of the economy.

Table 9 gives the sectors which generate the most "white-collar" jobs via an exogenous unit expansion of demand - and contrasts their importance on this score with their rankings by overall employment and income criteria.

{10} See D.D. de Saram (1973)

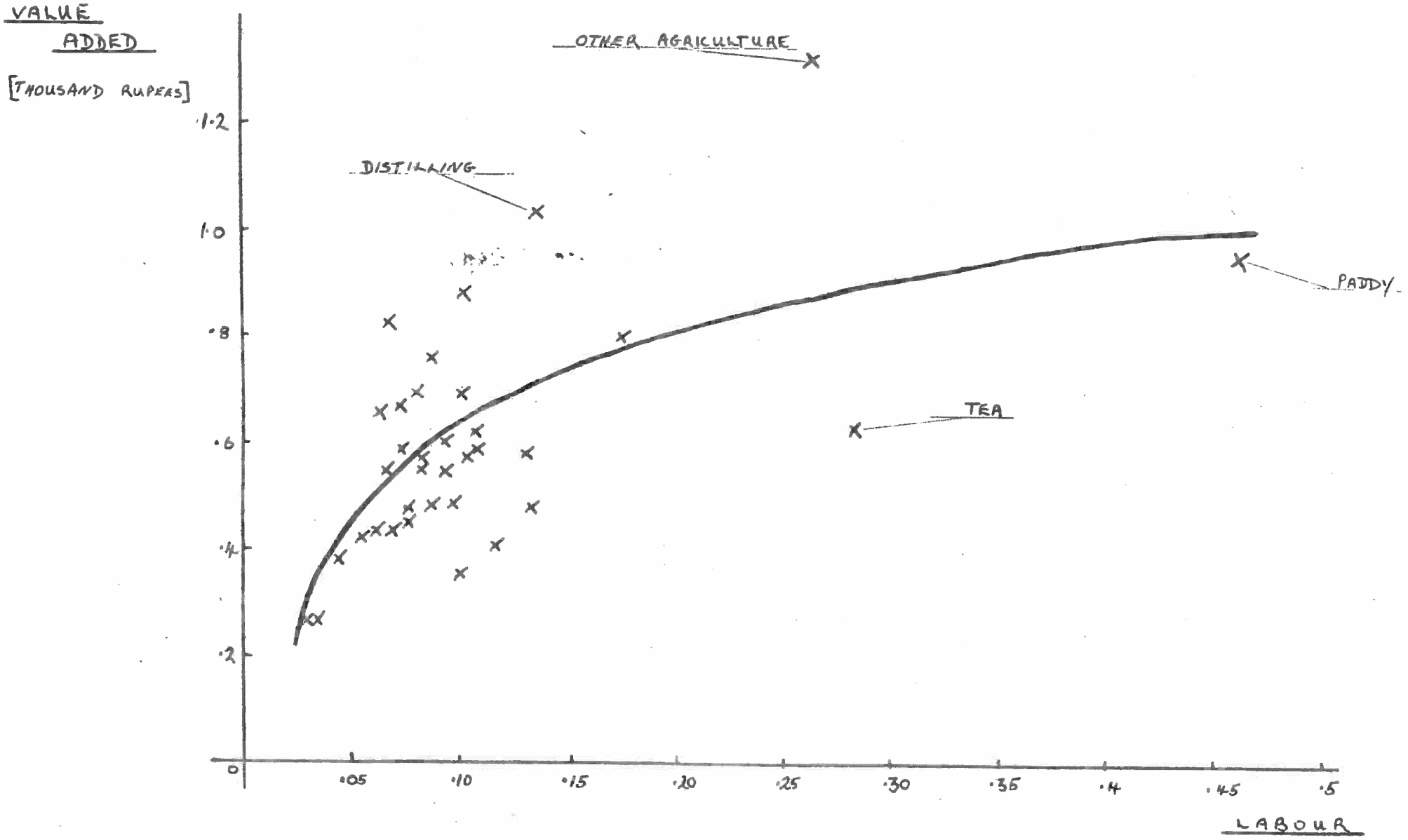
TABLE 9 - Activities Generating Substantial "White-Collar" Employment

Activity	Rank by White-Collar Employment	Rank by Total Employment	Rank by Total Value Added
Communications	1	15	13
Professional Services	2	22	20
Other Services	3	11	35
Rail Transport	4	18	21
Rubber Products	5	19	28
Retail Trade	6	8	9
Wood Products	7	5	1
Manufacturers n.e.s.	8	12	24

Conclusion

In so short a space, the account of the potential uses of even the simplest linear model, based on one year's SAM data, is inevitably limited. Analysis can be readily extended to take account of constraints on capacity (generating a requirement for investment), on available imports, on shortages of skilled labour and shortages of investment funds for example. Implications of tax and import substitution policies can also be assessed. Hopefully in this paper we have demonstrated some preliminary steps in this work, and shown the importance of specifically incorporating income distribution and expenditure linkages into economic analysis. This in turn implies the need for the orientation of data collection and compilation towards integrated social accounting which will allow the adequate assessment of, and operational national planning for, welfare orientated objectives such as income and employment opportunities for target groups.

"COMPREHENSIVE" LABOUR INPUT & VALUE ADDED PER UNIT OF CAPITAL



List of Works Cited

Blitzer, C.R., Peter B.Clark and Lance Taylor — Economy Wide Models and Development Planning, Oxford University Press, 1975.

Chenery, H.B., and others — Redistribution with Growth, Oxford University Press, 1974.

I.L.O. — Matching Employment Opportunities and Expectations. A Programme of Action for Ceylon. I.L.O. Geneva 1971.

Paukert, F., Skilka, G., and Maton, J. — "Redistribution of Income, Patterns of Consumption and Employment : A Case Study for the Philippines", World Employment Programme Research Papers, I.L.O., Geneva, 1974.

Pyatt, F.G., Roe, A., and others — Social Accounting for Development Planning with Special Reference to Sri Lanka, Cambridge University Press, forthcoming.

Rodgers, G.B., Hopkins, M., and Wery, R. — "Economic-Demographic Modelling for Development Planning : Bachue-Philippines", Population and Employment Working Papers, I.L.O., Geneva, 1976.

D.D.de Saram — "Education : An Era of Reforms", Arian Survey, December 1973.

Tinbergen, J. — "Some Refinements of the Semi-Input-Output Method", in Pakistan Development Review,

United National Statistical Office — "Statistics of the Distribution of Income, Consumption and Accumulation : Draft Guidelines for Developing Countries". E/CN.3/462, July 1974, mimeo.