INCOME DISTRIBUTION ANALYSIS FOR RURAL CENTRAL JAVA: AN APPLICATION OF SOCIAL ACCOUNTING METHODOLOGY[1]

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Abstrak

Ketimpangan pendapatan merupakan masalah besar di negara-negara berkembang. Seringkali, kelompok-kelompok tertentu seperti wanita dan buruh tani mendapat perhatian khusus dalam analisa distribusi pendapatan. Tujuan penelitian ini adalah untuk menelusuri sumber-sumber pendapatan dari kelompok sasaran dengan menggunakan Social Accounting Matrix. Hasil analisis menunjukkan hubungan langsung dan tidak langsung antara aktivitas, komoditas dan faktor-faktor produksi dengan pendapatan serta pengaruh distribusinya diantara kelompok-kelompok sasaran.

INTRODUCTION

Agriculture has been a major component of economic growth during the past twenty years in Indonesia. More than half of the labor force of the nation is in the agricultural sector. Because most of the Indonesian population is rural, evolving from a subsistence form of agriculture, enchancing the economic quality of rural areas is a key policy concern.

Income, employment, and income distribution are major problems in rural areas. Rural policymakers are concerned about unskilled and inefficient allocation of labor, insufficient use of modern production processes, lack of capital, high interest rates on informal credit, and lack of employment opportunities for women and landless groups within agriculture and non-agricultural activities. These conditions tend to keep income levels low and skew income distributions towards farm operator households in the more productive agricultural areas with better access to capital and with higher labor inputs from male workers.

Central Java, one of the most populated provinces in Indonesia, plays and important role in driving economic growth of the nation. A survey of rural house-

91

holds in Central Java was conducted in 1988 called PATANAS (Panel Petani Nasional = National Panel of Farmers) conducted by Center for Agro Economic Research, Agency for Agriculture Research and Development, Ministry of Agriculture in Indonesia. In this survey farm operator and landless households were sampled in three different agro-ecological zones. These zones were identified as the rice producing area, the other food crop producing area, and the vegetable producing area. Sources of data for this study is mainly from this Patanas data.

The purpose of this study is to use the survey results to analyze the income distribution in rural Central Java. Based on the Patanas data, rural Central Java Social Accounting Matrix (SAM) was constructed for purposes of understanding the region's economic structure and tracing income distribution effects associated with policy changes or exogenous shocks to the rural system with emphasis on landless households and returns to women's labor. A SAM is an extension of the input-output model where the full circular flow of money and goods is described (Pyatt and Round, 1988b).

SOCIAL ACCOUNTING MATRICES

In recent years, several studies of income distribution have utilized the SAM framework (Adelman, Taylor, and Vogel; Greenfield; Gupta). Most economy-wide models generate the distribution of income by aggregate factors of production. The SAM provides a framework for the analysis of the mappings between the different types of distribution one may want to consider. The SAM represents a picture of economic conditions at a point in time.

The SAM is distinguished from income accounts and input-output analysis in that the latter are single entry accounts whereas the SAM is a double entry account. The SAM is a series of accounts where each account shows incomings (receipts) and outgoings (expenditures) and the two must balance. A SAM must be square where each row account records the details of receipts and each column account records details of expenditures. King suggests the main purpose for building a SAM is for better organization of information. The information describes the economic and social structure of a country, region, city, or other jurisdictional unit. A second purpose is to provide the quantitative basis for a plausible economic and/or planning model. A SAM can be structured to measure differences between the incomes of various socio-economic groups. The SAM can be structures such that commodity and factor markets reflect systems of production and consumption.

The accounts of a SAM generally include an *Institution Account* that supplies factors of production and demands products. The *Factor Account* receives payment from production and provides income to institutions. An *Activity Account* utilizes

inputs and produces commodities. The *Commodity Account* distributes goods and services to activities and institutions and trades with the rest-of-the-world. The *Rest-of-the-World Account* functions as a demander of commodities produced and a supplier of goods not produced domestically.

In a model focusing on income distribution, the activity account shows the functional distribution of factor inputs disaggregated by sector. The commodity account captures all commodities produced by each sector in the activity account. Factor inputs are distinguished by type of input such as labor, capital, and land in the factor account. Labor may also be disaggregated by gender and/or by family and hired to capture source of income from different institutional or household groupings. The institutional account may include aggregations of households, enterprises, and government. The behavior of these institutional groups can be modeled in terms of how they concume commodities from the commodity account and how incomes are formed from the factor account. The rest-of-the world account shows the net factor income from abroad, and the value of total imports and exports.

The SAM can further trace the distribution of income by factor and institution. The value added from activity account can be disaggregated by type of labor, capital, and natural resource. The institutions receive payment according to the factor services they supply. Wages and/or imputed prices value the labor and capital services supplied by households and other institutions. Rents or imputed rents value the land and other natural resource services supplied. In this way, total value added maps into the disposable income of each institution. Transfers between institutions give the inter-institution distribution of dispisable income.

The Rural Central Java SAM

The SAM for rural households in Central Java has four endogenous accounts: Activity Account, Commodity Account, Factor Account, and Institution Account. An Exogenous Account represents import and export activities and all other external transactions occurring with the rural households. The 114 x 114 matrix for rural Central Java is summarized in an aggregate SAM for the base year 1988 in Table 1 (see Budiyanti for the detailed SAM).

Rural households in Central Java are grouped into three areas according to major crops produced. The three areas are Rice Area, Other Food Crop Area, and Vegetable Area. Each area is identified by its major crop although each area also produces a variety of other crops.

In the aggregate SAM for rural Central Java, the Activity Account shows that the aggregate value of commodities produced in 1988 was 3 126 151 million rupiah. To produce these commodities required 90 958 million rupiah of seed and feed from the Commodity Account, 2 451 746 million rupiah of factor compensation from

Table 1. Aggregate SAM for rural Central Java, 1988 (in Million Indonesian Rupiah).

Expenditures Account	Activity account	Commodity account	Factor tion acc.	Institu- account	Exogenous receipts	Total receipts
Activity account		3 126 151				3 126 151
Commodity account	90 958			1 106 597	1 928 596	3 126 151
Factor account	2 451 746				625 481	3 077 227
Institution account			2 857 850		172 180	3 030 030
Exogenous account	583 447		219 377	1 923 432		2 726 256
Total expenditures	3 126 151	3 126 151	3 077 227	3 030 030	2 726 256	15 085 814

the factor account, and 583 447 million rupiah of material input purchases from the Exogenous Account.

In addition to the sales of feed and seed to the Activity Account, the commodity account had sales of 1 106 597 million rupiah to households in the institution account and 1 928 596 million rupiah of sales to the Exogenous Account, mainly as purchases by urban households in Central Java and as regional exports.

The factor account shows receipts of 2 451 746 million rupiahs from the activity account, and receipts of 625 481 million rupiah from the exogenous account, mainly as factor payments for rural household labor supplied to the urban sector. Expenditures by the factor account include factor payments of 2 857 850 million rupiah to rural households in the institution account and 219 377 million rupiah to urban households for labor and land rents in the exogenous account.

The Institution Account shows rural household income of 2 857 850 million rupiah as factor payments from the factor account and 172 180 million rupiah income from the exogenous account as transfers and gifts. Expenditures of the Institution Account include rural household consumption of 1 106 597 million rupiah from the Commodity Account and 1 923 432 million rupiah from the exogenous account.

Receipts of the exogenous account include 583 447 million rupiah for purchases of material inputs by the activity account, 219 377 million rupiah for factor payments from the factor account, and 1 923 432 million rupiah for purchases by households in the institution account. Expenditures of the exogenous account include 1 928 596 million rupiah for purchases by urban households and regional exports from the commodity account, 625 481 million rupiah payments to factors owned by households in rural Central Java, and 172 180 million rupiah income transfers and gifts to rural households in Central Java.

Disaggregated SAM Accounts

A further disaggregation of the SAM accounts is presented in Table 2. Cropping systems account for 78 percent of the receipts in the activity account. Exports from rural Central Java (to urban households and to other regions) account for about 62 percent of receipts in the commodity account. About 48 percent of factor payment receipts in the factor account are from capital, 34 percent from labor, and 18 percent from land. Factor payments account for 94 percent of the receipts in the institution account for about 71 percent of the receipts of the exogenous account with imported inputs and factor payment outflows accounting for the remaining 29 percent of the receipts.

Factor payments account for 78 percent of the expenditures of the activity account with purchased inputs and imported material inputs accounting for the remaining 22 percent of expenditures. Paddy accounts for about 45 percent of the expenditures of the commodity account with the other 9 commodity groups accounting for the remaining 55 percent of expenditures.

Household payments account for about 93 percent of the expenditures of the factor account with the remaining 7 percent going to factor payment outflows. Household consumption accounts for about 36.5 percent of expenditures of the institution account. Household import expenditures account for 63.5 percent or the remaining expenditures.

Export account for 71 percent of the expenditures of the exogenous account with the remaining expenditures accounted for as factor inflows (23 percent) and income inflows (6 percent).

DIRECT INCOME ANALYSIS

Income sources for rural households include returns to resources of land, labor, and capital. Income also comes from transfers among households and from other institutions. Resources may be used in the household's own activities or in activities of other households or businesses. Most resources are used within the local area but some resources are employed outside the local area.

Farm Family Income

Farm operator family income is made up of farm and off-farm income (Table 3). Farm income is 70.3 percent of the total and off-farm is 29.7 percent. Of farm income, returns to land are 18.3 percent, labor income is 19.1 percent, and capital income is 62.6 percent. Female labor is 20.9 percent of total onfarm labor income.

Table 2. Disaggregated receipts and expenditures for rural Central Java SAM, 1988 (in million Indonesian rupiah).

Receipts		Expenditures	
ACTIVITY ACCOUNT		**ACTIVITY ACCOUNT**	
Cropping Systems	2442412	Purchased Inputs	90958
Homegardens	211881	Factor Payments	2451746
Fisheries	21214	Imported Material Inputs	583447
Livestock	450643		
		Sub-Total	3126151
Sub-Total	3126151		
		COMMODITY ACCOUNT	
COMMODITY ACCOUNT		Paddy	1415307
Purchased Inputs	90958	Maize	322170
Household Consumption	1105697	Cassava	277219
Exports	1928596	Soybeans	114575
		Peanuts	103785
Sub-Total	3126151	Vegetables	169050
		Other crops	40306
FACTOR ACCOUNT		Homegardens	211881
Labor	1055431	Fisheries	21214
Land	540139	Livestock	450643
Capital	1481657		
		Sub-Total	3126151
Sub-Total	3077227		
		FACTOR ACCOUNT	
INSTITUTION ACCOUNT		Household Payments	2857850
Factor Payments	2857850	Factor Outflows	219377
Income Inflows	172180		
		Sub-Total	3077227
Sub-Total	3030030		
		INSTITUTION ACCOUNT	
EXOGENOUS ACCOUNT		Household Consumption	1106597
Imported Inputs	583447	Household Imports	1923432
Factor Payment Outflows	219377		
Consumer Imports	1923432	Sub-Total	3030030
Sub-Total	2726256	**EXOGENOUS ACCOUNT**	
		Exports	1928596
		Factor Inflows	625481
		Income Inflows	172180
		Sub-Total	2726256
Total Receipts	15085814	**Total Expenditures**	15085814

Table 3. Farm family income, income to landless, and labor income to women, by income source for rural Central Java, 1988 (in million Indonesian rupiah).

Income Source	Farm Family Income			Income to Landless			Labor Income to Women		
	Farm	Off-Farm	Total	Farm	Off-Farm	Total	Farm	Off-Farm	Total
Land									
Owned	351243	–	351243	535	–	535	–	–	–
Rented	–	122196	122196	–	–	–	–	–	–
Agricultural labor									
Family : – Male	296763	–	296763	20872	–	20872	–	–	–
– Female	70343	–	70343	2839	–	2839	73183	–	73182
Hired : – Male	–	71886	71886	–	32507	32507	–	–	–
– Female	–	20229	20229	–	33893	33893	–	54122	754122
Agricultural capital									
Animal Power	25178	–	25178	–	–	–	–	–	–
Tractor Power	405	–	405	–	–	–	–	–	–
Other	1174030	–	1174030	11839	–	11839	–	–	–
Non – Agricultural									
Family Labor: – Male	–	217660	217660	–	61832	61832	–	–	–
– Female	–	82006	82006	–	21385	21385	–	103391	103391
Other capital	–	213072	213072	–	29527	29527	–	–	–
Other									
Gifts	–	82904	82904	–	89275	89275	–	–	–
Total	1917963	809953	2727916	36085	268420	304506	73183	157513	230695

The major source of off-farm income is non-agricultural family labor income which accounts for 37.0 percent of the total. Non-agricultural capital income is 26.3 percent of off-far income and gifts contribute 10.2 percent. Labor income from other agricultural producers is 11.4 percent of off-farm income and land rents from other producers is 15.1 percent.

The overall share of labor income to total farm family income is 27.8 percent. The overall capital share of total family income is 51.8 percent and the total land share is 17.4 percent. Gifts contribute 3.0 percent.

Off-farm non-agricultural female labor income (Rp 82 006 million) is greater than on-farm female labor income (Rp 70 343 million). However, total female agricultural labor income (Rp 90 571 million) is slightly greater than off-farm non-agricultural female labor income. Of total farm family labor income, the male labor income share is 77.3 percent and the female labor income share is 22.7 percent. Female labor earns 27.4 percent of non-agricultural family labor income. This indicates that non-agricultural activities are more important to women than to men.

Income to Landless

Landless laborers earn Rp 304 506 million (Table 3) from agricultural and non-agricultural sources. The own-farm income for landless laborers is the returns from homegardens, fisheries, and livestock activities. The returns to land of Rp 535 million was from homegardens.

Landless laborers earn 33.7 percent of their income from agriculture, 37.0 percent from non-agricultural sources, and receive 29.3 percent as gifts. Labor's share of total income for the landless is 56.9 percent with the remaining income share of 43.1 percent composed of gifts, capital income, and land rent.

Landless male workers earn 53.7 percent of their income from non-agricultural sources and 46.3 percent from agriculture. However, for women, wage income from agriculture (Rp 33 893 million) is more important than non-agricultural labor income (Rp 21 385 million).

Labor Income to Women

Women play an important role in earning family income (Table 3). They work in the agricultural sector on their own family farm and on farms of other producers. However, their major source of labor income is from non-agricultural activities. Women earn 44.8 percent of their total labor income from non-agricultural sources. Returns to labor contributed on their own farms accounts for 31.7 percent of their total labor income and work on other farms contributes 23.5 percent. Each of the three sources contributes over 20 percent of total labor income earned by women. Overall, women earn about 25 percent of rural Central Java labor income. However, women earn 33.5 percent of labor income in landless households whereas women earn only 22.7 percent of labor income in farm operator households. Labor income for women is about 7.6 percent of total rural family income versus 23.1 percent for labor income to men.

Income per Household

The distribution of income within the household is shown in Table 4. The distribution is shown by factor, area, and household type. Farm operator families in the rice area has the highest household income (Rp 968 649). However, landlass households had the lowest household income (Rp 358 556) which is only 37 percent of income for farm operators. The other food crop area had the lowest farm operator household income (Rp 662 688) which is 64 percent of farm operator income in the rice area. The other food crop area had the highest landless household income (Rp 501 720) which is 81 percent of farm operator income in the same area. House-

hold income for the vegetable area is in the middle range of all producing areas for both farm operator and landless families.

Table 4. Total and per household income distribution by area, household type, and resource for rural Central Java, 1988.

Area and household type	Labor	Capital	Land	Gifts	Total Income
.... Aggregate (in million rupiah)					
Rice Area					
Farm operator	346358	631433	175651	52789	1206231
Landless labor	95526	16628	534	56674	169362
Other Food Crop Area					
Farm operator	226235	340127	144914	6093	717369
Landless labor	45088	19398	1	3725	68212
Vegetable Area					
Farm operator	186294	438736	152915	24022	801967
Landless labor	32716	4339	–	28876	66931
Total	932217	1451661	474015	172179	3030072
.... Per Household (in 00 Rp.)					
Rice Area					
Farm operator	2781.39	5070.65	1410.54	423.92	9686.49
Landless labor	2022.38	352.03	11.31	1199.85	3585.56
Other Food Crop Area					
Farm operator	1963.76	2952.36	1257.88	52.89	6226.88
Landless labor	3316.36	1426.78	0.07	273.98	5017.20
Vegetable Area					
Farm operator	1523.52	3587.99	1250.54	196.45	6558.51
Landless labor	2110.69	344.45	0.00	1862.95	4318.09
Average	2126.69	3311.71	1081.38	392.80	6912.59
.... Per Household (in percentage)					
Rice Area					
Farm operator	28.71	52.35	14.56	4.38	100.00
Landless labor	56.40	9.82	0.32	33.46	100.00
Other Food Crop Area					
Farm operator	31.54	47.41	20.20	0.85	100.00
Landless labor	56.40	9.82	0.32	33.46	100.00
Vegetable Area					
Farm operator	23.23	54.71	19.07	2.00	100.00
Landless labor	48.88	7.98	0.00	43.14	100.00
Average	30.77	47.91	15.64	5.68	100.00

Capital returns is the major source of income for farm operators in all income accounted for 23 to 32 percent of household income and land returns accounted for 15 to 20 percent.

Labor returns is the major source of income for landless households accounting for 49 to 66 percent of total income. Capital returns accounted for 8 to 28 percent and returns to land is minimal. Gifts for landless households account for 5 to 43 percent of total income. This compares to less than five percent for farm operator households in all areas.

DIRECT AND INDIRECT INCOME ANALYSIS

To exploit the interrelationships implied by the rural Central Java SAM between activities, commodities, factors, institutions, and exogenous accounts, a matrix of interdependence coefficients or fixed price SAM multipliers are constructed (Pyatt and Round, 1988a). The mathematical relationship is the following:

$$X = (I - A)^{-1}Z$$

where X is the vector of row totals for identified endogenous accounts, I is an identity matrix, A is a coefficient matrix, Z denotes the vector of row totals for exogenous flows, and $(I - A)^{-1}$ is the square matrix of interdependence coefficients. The A matrix is a matrix of expenditure coefficients where each column expenditure is assumed a fixed proportion of its respective column total (the total outlay). Fixed prices and unitary expenditure elasticities are assumed in the analysis. Consequently, in the fixed price multiplier analysis, marginal expenditure propensities are equal to average expenditure propensities.

The interdependence coefficients indicate the total change in each endogenous account as a result of a one unit change in the exogenous account. The total change includes the direct effect as well as all indirect effects. An interdependence coefficient is interpreted as the direct and indirect change in the row account for each unit change in the exogenous portion of the column account.

Commodity Account

A change in exogenous (export) commodity demand is associated with changes in all of the accounts and is measured by the interdependence coefficients contained in the columns of the commodity account. The interdependence associated with the commodity account and the aggregated factor and institution accounts is shown in Table 5. For example, a Rp 1 000 change in the exogenous demand for paddy

100

is associated with a direct and indirect change in compensation to male labor in rural Central Java of Rp 209. On a rupiah basis of a change in commodity demand, the commodities of vegetables and other crops have the highest change in total factor compensation of the crop commodities. That is, for a one rupiah change in the demand for these commodities, the associated change in total factor compensasion is Rp 124.

Table 5. Direct and indirect effects on factor and institution accounts for the marginal commodity demand of the thoushand rupiah for rural Central Java, 1988.

Account	Paddy	Maize	Cassava	Soy-beans	Peanuts	Vege-table	Crops	Home-garden	Fisheries	Live-stock
COMMODITY DEMAND										
(Rp)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
FACTOR ACCOUNT										
(Rp)										
Male Labor	209	246	211	235	235	233	228	125	572	237
Female Labor	88	90	72	91	93	85	81	43	24	53
Capital Rent	612	563	686	605	613	646	655	349	424	307
Land Rent	291	315	263	263	261	279	271	89	66	68
Total	1200	1215	1232	1193	1203	1244	1235	606	1087	664
Commodity Multiplier	1.20	1.22	1.23	1.19	1.20	1.24	1.24	0.61	1.09	0.66
Relative Male to Female										
Labor Multiplier	2.38	2.73	2.93	2.58	2.53	2.74	2.81	2.91	23.83	4.47
INSTITUTION										
ACCOUNT (Rp)										
Farm Operators	1029	1072	1089	1032	1040	1104	1094	525	919	551
Landless Laborers	40	46	37	49	58	44	40	66	141	86
Total	1069	1117	1126	1081	1098	1148	1135	591	1061	637
Commodity Multiplier	1.07	1.12	1.13	1.08	1.10	1.15	1.13	0.59	1.06	0.64
Relative Farm Operator										
to Landless Multiplier	25.72	23.30	29.43	21.06	17.93	25.09	27.35	7.95	6.52	6.41

The relative male to female labor compensation multiplier is constructed by dividing the male labor compensation by the female labor compensation for each Rp 1000 change in commodity demand. This ratio shows the relative importance of female labor compensation to male labor compensation per unit of commodity demand or per unit of aggregate factor income in producing the commodity. The lower the ratio the more important is the exogenous commodity demand in generating direct and indirect female labor compensation relative to male labor compensation. Fisheries, with a ratio of 23.83, is predominantly a male labor commodity.

Livestock is also a predominantly male labor activity per unit of commodity or unit of total factor income. Among the cropping activities, paddy has the lowest relative ratio indicating female labor compensation relative to male labor is the highest. Peanuts and soybeans also have relatively higher female labor compendations. Surprisingly, homegardens and vegetables have higher ratios than paddy, peanuts, and soybeans indicating higher male labor compensation relative to female compensation.

Similarly, a Rp 1000 change in exogenous demand for paddy is associated with a direct and indirect change in farm operator household income of Rp 1029 and landless laborer household income of Rp 40 for a total institution income change of Rp 1069. The commodity multiplier for total institution income for paddy is 1.07 indicating the direct and indirect institution income associated with a Rp 1000 change in exogenous demand for paddy. The relative farm operator to landless laborer income compensation multiplier is calculated by dividing the farm operator income compensation by the landless laborer income compensation for each Rp 1000 change in commodity demand. The lower the ratio the more important is the exogenous commodity demand in generating direct and indirect household income for landless laborer.

Livestock, fisheries, and homegardens are the most important activities generating incomes for landless groups relative to farm operators. In each of these, returns to land are less important relative to return to labor and capital. Among the cropping activities, peanuts and soybeans are more important to landless groups relative to farm operators. The relative rank of other commodities in terms of importance to landless households is maize, vegetables, paddy, other crops, and cassava.

Activity Account

Land is the basic unit of crop production in rural Centra Java. Therefore, a unit of land in each of the three agro- ecological zones, in each of the three producing seasons (Dry Season I, Dry Season II, and Rainy Season), and on each of the two cropping systems (irrigated and non-irrigated) can be evaluated for its distribution effect on female labor income and landless household income. Revenue per hectare for each of the cropping systems is shown in Table 6. For example, revenue for one hectare of the cropping system on irrigated land during dry season I in the rice area is Rp 961 100. When this value is applied to the interdependence coefficients of the corresponding acitivty account (column), the direct and indirect effects of the marginal land unit on factor returns and institution incomes are determined. For example, the direct and indirect effect on male labor compensation from the hectare of land in the cropping system identified above is equal to

Rp 160 100 and for female labor compensation it is equal to Rp 89 600. Similarly, the direct and indirect effect on farm operator household income from the unit of land is equal to Rp 941 500 and on landless household income it is equal to Rp 49 400. These total factor and institution account effects are presented by cropping system for each producing area in Table 6.

Analysis of factor returns indicates that a unit of land in the vegetable area has the highest direct and indirect female labor compensation ranging from Rp 78 500 to Rp 106 100. A unit of land in the rice area has a direct and indirect female labor compensation ranging from Rp 40 400 to Rp 100 500 and in the other food crop area the compensation ranges from Rp 19 900 to Rp 83 700. In general, a unit of irrigated land has a higher female labor compensation than non-irrigated land although for the vegetable area there is little difference in revenue per hectare or total factor payments per hectare between irrigated and non-irrigated cropping systems.[1] Cropping season appears to have little variation with respect to female labor compensation per land unit although the rainy season in the vegetable and other food crop areas has higher compensation than for the other two seasons and the dry season II has higher compensation than dry season I in the vegetable area.

Total institution income (direct and indirect) per hectare of land appears to be very similar in the rice and vegetable areas. Excluding the anomalies for non-irrigated land in the rice area for dry season II and rainy season, total income ranged from Rp 857 700 to Rp 1 292 600 per hectare in the rice area and from Rp 1 120 700 to Rp 1 285 500 per hectare in the vegetable area. Total income per hectare in the other food crop area was significantly lower and ranged from Rp 239 700 to Rp 790 600.

The level and distribution of income between farm operators and landless laborers varied significantly among the producing areas. The level of landless income per hectare is significantly lower in the other food crop area compared to the rice and vegetable areas. The ratio of farm operator income to landless income ranged from 8.1 to 37.8 in the rice area, from 42.6 to 57.1 in the other food crop area, and from 16.5 to 28.7 in the vegetable area. Not only is the amount of income per hectare to landless households less in the other food crop area but the proportion of income going to the landless is less compared to the rice and vegetable areas.

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[1] For the rice area there appears to be an animaly in revenue per hectare between irrigated and non-irrigated cropping systems for dry season II and rainy season. For these seasons, revenue per hectare for non-irrigated system is greater than for irrigated system eventhough land rents are higher for irrigated systems. The apparent inconsistency is because of the mix of crops in those seasons for that year and thce favorable prices received.

The different producing areas, however, do not have the same ratio of farm operator families to landless families. The other food crop area has a high ratio of 8.5 whereas the rice area has a much lower ratio of 2.6 indicating that landless laborer are much more important in the rice area compared to the other food crops area. The vegetable area has a ratio of 7.9. These ratios can be used to form the ratio of landless income to landless families on a per hectare basis. The higher this ratio, the more important the producing areas is in generating income to the landless on a per household basis. This ratio varies from 0.28 to 0.48 in the vegetable area, from 0.07 to 0.32 in the rice area, and from 0.14 to 0.20 in the other food crop area. The results indicate that the rice area supports a high ratio of landless families but that the vegetable area supports a higher level of total income per landless family.

Table 6. Direct and indirect effects on factor and institution accounts for the marginal land unit of one hectare by producing area, season, and irrigated and non irrigated, Central Java, 1988.

	Rice area					
	Dry season I		Dry season II		Rainy season	
	Irri-gated	Non-Ir-rigated	Irri-gated	Non-Ir-rigated	Irri-gated	Non-Ir-rigated
Unit (Hectare)	1	1	1	1	1	1
Revenue/Ha (00Rp)	9611	9467	7865	15704	11904	13679
Factor Account (00Rp)						
Male Labor	1601	1742	1850	2608	2269	2493
Female Labor	896	404	1005	529	886	523
Capital Rent	5718	8656	4591	15983	7947	13460
Land Rent	3249	1726	1825	1766	3366	1805
Total	11464	12528	9272	20385	14467	18281
Institution Account (00Rp)						
Farm Operators	9415	11606	7632	18617	12391	17302
Landless Laborers	494	379	945	761	535	458
Total	9910	11985	8577	19378	12926	17760
Ratio of Farm Operator Income to Landless Income	19.1	30.6	8.1	24.5	23.2	37.8
Ratio of Farm Operator Families to Landless Families	2.6	2.6	2.6	2.6	2.6	2.6
Ratio of Landless Income to Landless Families per ha. (00 Rp)	0.14	0.08	0.32	0.11	0.11	0.07

Table 6 *(continued)*

	Other Food Crop Area					
	Dry season I		Dry season II		Rainy season	
	Irri-gated	Non-Ir-rigated	Irri-gated	Non-Ir-rigated	Irri-gated	Non-Ir-rigated
Unit (Hectare)	1	1	1	1	1	1
Revenue/Ha (00Rp)	4074	2246	5483	3357	7950	4529
Factor Account (00Rp)						
Male Labor	1092	797	1231	555	1919	1331
Female Labor	339	240	363	199	837	404
Capital Rent	1861	840	3123	2775	4221	2758
Land Rent	1668	736	1636	713	2081	1111
Total	4961	2613	6352	4242	9058	5604
Institution Account (00Rp)						
Farm Operators	4496	2342	5575	3919	7770	4773
Landless Laborers	91	55	102	64	136	88
Total	4587	2397	5677	3983	7906	4861
Ratio of Farm Operator Income to Landless Income	49.4	42.6	54.7	61.2	57.1	54.2
Ratio of Farm Operator Families to Landless Families	8.5	8.5	8.5	8.5	8.5	8.5
Ratio of Landless Income to Landless Families per ha. (00 Rp)	0.17	0.20	0.16	0.14	0.15	0.16

Table 6 *(continued)*

	Vegetable area					
	Dry season I		Dry season II		Rainy season	
	Irri-gated	Non-Ir-rigated	Irri-gated	Non-Ir-rigated	Irri-gated	Non-Ir-rigated
Unit (Hectare)	1	1	1	· 1	1	1
Revenue/Ha (00Rp)	10309	10840	10520	9993	10432	10589
Factor Account (00Rp)						
Male Labor	2312	2409	2487	2462	2568	2607
Female Labor	785	786	924	874	1057	1061
Capital Rent	7028	7488	6907	6229	6291	6451
Land Rent	2966 ·	2997	2970	2890	' 2701	2741
Total	13092	13680	13287	12455	12620	12860
Institution Account (00Rp)						
Farm Operators	11787	12316	12150	11339	10800	11035
Landless Laborers	419	429	705	686	407	412
Total	12206	12745	12855	12025	11207	11447
Ratio of Farm Operator Income to Landless Income	28.1	28.7	17.2	16.5	26.5	26.8
Ratio of Farm Operator Families to Landless Families	7.9	7.9	7.9	7.9	7.9	7.9
Ratio of Landless Income to Landless Families per ha. (00 Rp)	0.28	0.28	0.46	0.48	0.30	0.29

Similar analyses for other resources (capital and labor) and for other activities (livestock and fisheries) show the direct and indirect effects on factor returns and incomes (see Budiyanti for results). The highest direct and indirect effects of a marginal unit of capital on labor returns to women is for the non-irrigated cropping system in dry season I for the other food crop area. The result is Rp 498 per Rp 1 000 of capital (returns). The second highest is Rp 417 per Rp 1 000 of capital (returns) for livestock in the rice area.

Household income to landless laborers per Rp 1 000 of capital (returns) ranges from Rp 42 to Rp 295 for cropping systems in the rice area, Rp 30 to Rp 113 in the other food crop area, and Rp 77 to Rp 154 in the vegetable area. For livestock systems, household income per Rp 1 000 of capital (returns) for landless laborers ranges from Rp 310 in the vegetable area to Rp 548 in the rice area.

CONCLUSIONS

The SAM is useful in analyzing the sources and distribution of income among farming systems (crops and livestock), producing regions, landless laborers, and women. The sources of income for landless households is shown as agricultural labor (male and female), agricultural capital, non-agricultural labor, non-agricultural capital, and gifts and transfers. Sources of labor income to women are shown as on-farm, off-farm agricultural, and off-farm non-agricultural. Sources of factor income (labor, capital, and land) are shown by producing area (Rice Area, Other Food Crop Area, and Vegetable Area). Finally, per household income is shown by producing area, household type (farm operator and landless), and by source (labor, capital, land, and gifts and transfers).

Interdependence coefficients show the direct and indirect effect a change in exogenous commodity demand has on female labor compensation and landless household income. In rural Central Java, commodities from fishery and livestock activities have a predominantly male labor compensation whereas cropping activities involving paddy, peanuts, and soybeans will have relatively higher female labor compensations. Similarly, livestock, fisheries, and homegardens have higher relative impacts on landless household incomes.

Analysis of factor returns indicates that the marginal unit of land in the vegetable area has the highest total effect on labor compensation to women. The rice area supports the highest proportion of landless families, but the vegetable area supports a higher level of total income per landless family.

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