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FARM SIZE, LAND USE AND PROFITABILITY OF FOOD CROPS IN INDONESIA

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A prosperous growth and an equitable distribution of food crops production remains crucial for the fulfillment of Indonesia's development objectives. By now ample data have been collected and numerous publications permit an assessment of various aspects of agricultural performance. Recently an attempt has been made to integrate several of the rich sources of information available in Indonesia's Central Bureau of Statistics and to incorporate the results into a consistent economy-wide System of Socio-economic Accounts. This framework, which can be considered an extension of the more familiar Social Accounting Matrix (SAM), contains related and reconciled estimates concerning asset distributions, factor ownership, production structure, income distributions among factors and institutions, expenditure patterns and living conditions in Indonesia in 1975 [BPS, 1982 and Downey, forthcoming].

The agricultural part deals with the linkage of land ownership and tenancy, land use (cultivated area, harvest intensity, cropping pattern), yield (quantity, value, yield rate), inputs (total costs, cost structures), and net income (before and after rent and/or share transfers). These variables have been (cross-) classified in a variety of ways, using such criteria as region, size of land owned,

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type of land, size of the (wet land, dry land or total) holding and crop, Small-holders' land and food crop production are discussed in Keuning [1981] and the cultivation of estate crops is reviewed in Kusmadi Saleh and Slamet Soetomo [1982]. The present paper concentrates on land use and the profitability of food crops in relation to farm size and region in 1975.

METHOD AND SOURCES

In order to reconcile various sources of agricultural data a sequential estimation procedure has been adopted, starting with the distribution of land owned and arriving at a computed estimate of the distribution of disposable income through successive linkage with land held, harvested areas, yields and net returns. Where data permitted, a distinction has been made between wet and dry land, and almost all calculations have been done seperately for each of the regions Sumatra, Java/Bali, Kalimantan, Sulawesi and Other Islands (unfortunately, a programming error caused the misclassification of the province of East Kalimantan under Other Islands). Nine types of food crops are considered: rice, maize, cassava, other root crops, peanuts, soybeans, other beans and nuts, vegetables and fruits.

The principal source of data for the whole System of Socio-economic Accounts was retabulations of the results of the nation-wide combined labour force and budget survey of 1976 (Sakernas/Susenas, see BPS [1976,1978 b]), which included questions about land ownership, tenancy and income from agriculture both in rural and in urban areas. We corrected for limited coverage in the provinces East Nusatenggara, Irian Jaya and the Moluccas. The resulting total land area and subdivisions by region, type of land and farm size approximate corresponding estimates of the 1973 Agricultural Census [BPS, 1976/1977]. Consequently, matching these two sources involved only minor adjustments.

The next stage concerned land transactions, which could be estimated with the help of the Sakernas file. It appears that tenancy and sharecropping are not very common in Indonesia. Non-owner operated land accounts for only 10% of total land controlled and about 25% of all farmers either let out or receive in some land. In Java/Bali these proportions are only slightly above average (13% and about 30% respectively) [1]. White [1983] also concludes that "... the great majority of Java's paddy fields (and still more of unirrigated land) both recently and in the colonial period, appear to have been "farmed" (with or without hired labour) by their owners..." (p.25).

However, in every region considered the recorded acreage let out is more than twice as large as the area received. The Agricultural Census data show the same pattern.[2] Partly this concerns peasant plots on land owned by a non-household institution (the state, the village or a company) and fields to which the tiller is not legally entitled, partly we suspect that some land rented out is suppressed. In our accounting system it is assumed that the gap is made up by private plots and communal possessions for which the cultivator does not pay a rent, and by public property, which is either leased out (tanah kas desa) or given in usufruct to the village official by way of salary (tanah bengkok). Palmer [1976] observes: "Owing to the sizeable quantity of land given to village officials for as long as they hold office... more land is cultivated in a village than is owned privately." (p.130). Refer also to Utami & Ihalauw [1973: table 3], Wiradi [1978: 16-20] and Booth & Sundrum [1981:186].

Before the distribution of disposable income from food crops can be evaluated, a clarification of total earnings

1. cf. Keuning [1981: tables 9 and 10].
2. Ibid., p.16 and table 8.

is needed. This statistic as computed from the Sakernas survey amounts to less than half the value added in food crops production according to the National Accounts [BPS, 1981]. It can be questioned whether this understatement is equally distributed among all farm size-classes. We will come back to this issue later on.

With respect to 1975, the reference year, consistency with other parts of the System of Socio-economic Accounts has been ensured by taking the operating surplus from each type of food crops in the 1975 Input-Output tables [BPS, 1980] as a benchmark. From the workfile we traced how these operating surpluses have been computed. Mostly data collected during the 1975 Agricultural Survey [BPS, 1975] have been used, with a mark-up for not covered (by-) products.

The annual Agricultural Survey reports also include estimates by crop and region of yields per hectare and gross harvested areas[3] (see also BPS [1977] for provincial data and Booth [1979] for a discussion of the Agricultural Surveys, 1970-75). Those yields and harvested areas have been adjusted as well, depending on the kind of mark-up applied in the Input-Output-tables. Details by type of land (sawah, dry land) about harvested areas, yields and returns are available for only one crop, namely paddy.

On the supposition that the total land area and its distribution underwent no major changes between 1975 and 1976, we proceeded with the disaggregation of the adjusted 1975 harvested areas, yields and returns by crop and region, based on landownership and tenancy relations measured in 1976. Use was made of statistics about gross harvested areas by crop, by region, by type of land, and by size-class of land holding collected during the Agricultural Census.[4]

3. In case of double cropping of a cultivated hectare gross harvested area equals two hectares (one hectare of each crop).
4. The Census results are reviewed in Booth & Sundrum [1976].

The quotients of these harvested areas and total land area of the same type controlled by farmers in the same size-class and region are called harvest intensities. These ratios reflect the average number of times a year a certain crop (or a variety of crops) is cultivated on the piece of land concerned. The total harvest intensity may exceed 1 (or 100%) because of two factors: a) multiple cropping, and b) most food crops can be harvested more than once a year. By assuming that the patterns of harvest intensities across farm size-classes did not change between 1973 (the year of the Census) and 1975, we were able to assign the harvested areas in 1975 (by crop, by region and by type of land) to each farm size.

The next step involved the distribution of yields and returns. For wet land rice a separate source is available [BPS, 1978 a] , which gives regional and size-specific estimates on yields, gross returns, costs and net returns per harvested hectare. However, the classification of farm sizes in this source does not agree with the commonly used taxonomy. This problem was solved by an intrapolation procedure based on weighted regressions.

Unfortunately, for the other crops no size-specific productivity and profitability estimates are published. Therefore the distribution of profits has been computed by multiplying harvested areas by crop, region and size-class with a rate indicating the net returns per harvested hectare by crop and region. It is most likely that in this way income inequality is underestimated, since for paddy sawah a significantly negative size-elasticity of yield per hectare has been found. Moreover, the plausibility of this negative relationship at the regional level is widely documented (e.g. Sen [1975] and Berry & Cline [1979]).

Subsequently, incomes from wet and dry land and from all crops have been added up. The resulting distribution turned out to be much more unequal than the comparable distribution of income which was directly derived from the respondents' answers.

Finally rents and/or shares paid and received had to be settled. It is unfortunate that our sources do not distinguish between these (and other) types of leasing arrangements.

The questionnaires of the Agricultural Census contain separate cells for the recording of land rented, share-cropped, pawned, given to civil servants and leased in another way. The former two and the latter three categories were added by hand, before processing the data in the computer, and in the final publication all subgroups have been consolidated. Retabulation revealed that 30% of non owner-operated land belongs to the latter three categories.[5]

Wijaya and Sturgess [1979], in a case study of land leasing, point out that many cash leases function as debt instruments. They calculated an implicit interest rate based on net returns from plots rented in. This indicates that also in case of a cash lease the payment for the usufruct of the land depends on (expected) profits. Accordingly, we did not differentiate between rents and shares.

Several micro-studies report on the distribution of shares between landowner and sharecropper/tenant.[6] The estimates

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5. For regional breakdowns consult Keuning [1981:17].
6. Utami & Ilalauw [1973:50-52], Palmer [1976: 128-129], Wijaya & Sturgess [1979:tables 3 and 4], Murai [1980:38], Husein Sawit & Rozany Nurmanaf [1980:table 3], Prabowo & Sajogyo [1981:70] Hayami & Kikuchi [1981:tables 8-15 and 9-11], Deuster [1981:88], Wijaya [1981:9-12], Booth & Sundrum [1981:189].

diverge, but mostly vary between 1/3 and 2/3 of gross or net returns accruing to the landowner , provided that the share-tenant is the entrepreneur(pengusaha) In our system this implies that he "... bears the direct risk of the cultivation" (Sakernas manual [BPS,1976]). Otherwise he has been classified under agricultural labourers, which may receive only 1/5 of the product [Sajogyo, quoted by Wiradi,1978:20]. The share accruing to the tenant decreases as well if an element of interest on debts is added. [e.g. Partadireja,1974, Palmer, 1976:128 and Wijaya & Sturgess, 1979] These interests are recorded elsewhere in the Indonesian System of Socio-economic Accounts [BPS,1982], as far as they could be traced.

The case studies appear to confirm the theoretical notion that the institutional form of land tenure and the shares depend on the population density in a certain location (see also Dove [1981]). As an average for the whole archipelago we experimented with 1/3 and 1/2 of gross returns for the lessor, all costs being paid by the lessee [Keuning, 1981:tables 89-91]. After reconciliation with computations on paid agricultural wages from other sources[7] the assumption of equal shares for tenant and owner was rejected. It would leave landless tenants' family workers with an average imputed labour income per hour below the agricultural wage rate, which may not be realistic.

It is often argued that the marginal labour productivity on small family-farms lies below the agricultural wage rate [e.g. Berry & Cline, 1979: p.8-10], but according to this theory of labour market dualism the average product of family labour will not lag behind the wage rate. Moreover, as we will see shortly, wage labour is to a large extent hired by small farms as well.

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7. See Downey, forthcoming.

Evidently, application of the 1/3-2/3 split to all land received conceals presumable regional differences and disregards the likelihood that for some non-owner operated land no rent is charged (plots on loan from relatives, part of the communal grounds etc.). In fact, if we fall from one extreme to the other and assume, firstly that the rent per hectare on public property[8] equals the price of land let out by households, and secondly that on all area received which is not recorded to be let out no rent is charged, the percentage of gross returns handed over to the owner on the remaining fields becomes 66 (if we keep total rent payments constant). Summarizing, the average share for those non-owner operators who pay a rent, will lie between 1/3 and 2/3 (according to our 'guesstimates').

The distribution of net disposable income from food crops results from the subtraction of net rents paid from net returns. It is obvious that net disposable incomes are distributed more unevenly than net returns.

Before the results of this estimation procedure are shown in the next two sections, we want to dwell shortly on the data limitations. Firstly, the reconciliation of various data sources involved some adjustments for mismatching scopes and definitions.

Secondly, the information is presented in aggregated form and by discussing trends which appear from grouped data it is implicitly assumed that the characteristics of the elements depend primarily upon their belonging to a specific group. This is particularly hazardous if the regional dimension of Indonesian agriculture is not recognized. For example if both small farms and farms in the region

8. Including imputed payments for <u>tanah bengkok</u>.

Java/Bali score low on the same indicator, this may not concern an intrinsic property of small farms. Quite possibly it is due to the preponderance of marginal holdings in the low scoring area Java/Bali. For this reason we will generally present region-specific tables and comment on the consistency of possible trends in all island-groupings.

Thirdly, considerable problems arise in the measurement of land, tenancy relations, past yields, incomes etc. (see e.g. White [1979]), though we trust that integration of estimates from all kinds of sources rules out the worst anomalies.

LAND USE

The acreage figures in Sakernas [BPS,1976] refer to both sawah (wet land, at least at the moment of the interview) and dry land (including tegalan and house compound-building yard and such - and excluding fish ponds). These are cultivated by households where an income is received as pengusaha pertanian (agricultural entrepreneur). Neither lower nor upper bounds have been set to the amount of land owned or controlled. Total land area and most subdividions by region, size-class and type of land approximate corresponding figures from the 1973 Agricultural Census which refer to the land for building and the yard round about plus sawah plus dry fields planted with seasonal crops plus area currently in use for shifting cultivation (ladang) plus soil on which perennial crops grow, thereby excluding fish ponds, grasslands, wood and forest, land left idle for more than one year and other lands.[9]

Typically, sawah is planted with rice (about 82% of total cropped wet land area (1975) in Indonesia, and 78% in Java/Bali, concerned paddy). Dry land is generally used

9. For details, see Keuning [1981:p.5-13 and tables 1-6].

for perennial crops and palawija (seasonal food crops, other than rice). Rice accounted for roughly 17% of dry fields cultivated with seasonal crops in Indonesia in 1975 (in Java/Bali for only 7%).

Disparities in land use by farm size have been examined for wet, dry and total land separately. In table 1 harvested areas and harvest intensities of paddy sawah are presented by size class of wet land holding and

TABLE 1: HARVESTED AREA (000 ha.) AND HARVEST INTENSITY OF RICE ON SAWAH BY SIZE-CLASS OF WET LAND HOLDING AND REGION (1975)

Region	SIZE-CLASS OF WET LAND HOLDING (ha.)						
	≤0.25	0.25-0.50	0.50-0.75	0.75-1.50	1.50-3.00	≥3.00	Total
SUMATRA							
Harv. Int.	1.40	1.35	1.31	1.25	1.16	0.89	1.27
Harv. Area	123	366	174	494	224	18	1419
JAVA/BALI							
Harv. Int.	1.66	1.66	1.61	1.58	1.56	1.45	1.61
Harv. Area	769	1190	684	1010	530	335	4518
KALIMANTAN							
Harv. Int.	0.95	0.90	0.91	0.84	0.82	0.73	0.83
Harv. Area	7	50	30	194	161	54	496
SULAWESI							
Harv. Int.	1.63	1.71	1.74	1.61	1.54	1.39	1.63
Harv. Area	45	132	84	253	94	22	630
OTHER ISL.							
Harv. Int.	1.10	1.08	0.95	0.96	0.92	0.84	0.96
Harv. Area	16	45	27	113	45	25	271
INDONESIA							
Harv. Int.	1.60	1.54	1.50	1.34	1.25	1.23	1.41
Harv. Area	960	1783	999	2064	1074	454	7334

SOURCES: Agricultural Census Reports [BPS, 1976/77] and Sakernas data file.

region.[10] The representative sawah in Indonesia yielded 1.41 harvests of paddy (and 0.31 harvests of palawija) in 1975.

The cropping intensities diverge considerably and consistently both by region and by sawah size. Rice is most frequently harvested in Sulawesi and Java/Bali. Including palawija Java/Bali ranks first (with more than two yields a year). A high linear correlation ($r=0.95$) was found between the regional average cropping intensity (of all seasonal food crops) on sawah and the regional percentage of sawah irrigated. In all islands the harvest intensity tends to decline when the size of the holding increases. The weighted linear regression of the size-class means on the corresponding harvest intensities in Indonesia resulted in:[11]

$$HI_i = \underset{(0.06)}{1.52} - \underset{(0.03)}{0.08}\, S_i; \quad i = 1, .., 6.$$

standard errors of the coefficients in parentheses, both coefficients significant at 5% level of significance

HI_i = Average harvest intensity of rice on wet land in size-class i

S_i = Mean of size-class i, referring to sawah holding (ha)

S_6 = 5 (Pareto's α method led to an unacceptable result)

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10. Since double cropping of paddy sawah is rare, gross harvested areas are about equal to net harvested areas.

11. The average harvest intensity by size-class is based on the (non-uniform) number of hectares controlled in each size-class, so a problem of heteroscedasticity arises. This has been taken into account by assigning that number as weight to each observation. It is our impression, that the relationship between size and harvest intensity could be better described with a (semi-) logarithmic functional form. This cannot be tested formally, because the geometric average harvest intensities by size-class are not available.

The negative size-elasticity of the cropping intensity is in conformity with recent findings in other countries, and it is argued that this pattern is caused by the higher effective price of labour and the lower effective price of land and capital larger farms are facing [Berry & Cline, 1979].

Lack of data prevented a direct test of the land price hypothesis, but we investigated the related argument that land quality is poorer in larger holdings or, to put it more precisely, in villages where larger farms predominate [Sen, 1975:149]. A linear correlation coefficient of -0.91 between the average proportion of sawah which is irrigated (in six size-classes of wet land holding in Indonesia) and the corresponding size-class mean was computed from the results of the Agricultural Census. However, Sakernas data yielded $r = + 0.41$ for the same relationship. Besides, the causality between availability of irrigation and intensity of cultivation can be two-way. A larger effort in maximizing the yields presumably involves more investment in land improvement and water supply.

The mechanization of Indonesia's food agriculture in the reference year was negligible. If we treat the per hectare usage of subsidized fertilizer as a proxy for the amount of cheap credit channelled to farmers, the available evidence [BPS,1978a and Booth,1979:table 18] does not support the capital price hypothesis stated above. Unfortunately, we could not look into the possibility of a general inverse relationship between interest rates paid on loans over the production cycle and size of the holding.[12]

Finally, the dual labour market hypothesis is based on the reasoning that abundantly available family labour in small farms cannot be marketed at the going wage rate, so

12. Wijaya & Sturgess [1979] point to the interrelatedness of rural land-, money- and labour markets.

that these holdings are cultivated more intensively. However, this explanation is contradicted by estimates from the Rice Intensification Programs Survey [BPS,1978a], which show that smaller farmers typically spend more on paid labour per harvested hectare of paddy. This observation is in line with other findings from a variety of sources.[13] According to White & Wiradi [op.cit.:11] it applies to both pre-harvesting and harvesting labour input.

A comparison with estimates on labour use in the Indonesian System of Socio-economic Accounts reveals that the number of unpaid person hours (family labour input) per harvested hectare (all crops) also decreases with the size of the farm. [BPS,1982 and Downey,forthcoming; see also Abey, Booth & Sundrum, op.cit.:table 6]. A partial explanation may be found in the intricacy of labour relations, whereby (family members of) small landowners seek more lucrative (temporary) employment in another activity, while at the same time landless agricultural labourers are hired [Hart & Sisler,op.cit.:825].

Several recent studies [Ahmed, 1981 and Bharadwaj, 1982] arrive at the conclusion that the empirical finding of a negative correlation between farm size and yield per hectare can be explained by disparities in both the cropping intensity and the cropping pattern. It is argued that smaller farms select higher yielding crops (which may need a higher labour input per hectare). This hypothesis has also been examined for Indonesia. Table 2 shows cropping patterns (food crops only) on all agricultural land of fourteen household groups and five regions. The first thirteen socio-economic categories refer to both rural and urban households where agricultural entrepreneurial revenues constitute the main source of income (46% of all households) and in the last group agricultural labourer households (13% of the total) and all non-agricultural

13. An extensive discussion of labour use in Indonesian agriculture is provided by Abey, Booth & Sundrum [1981]. Refer also to Hart & Sisler [1978], Booth [1979], White & Wiradi [1981], and de Koninck [1983].

TABLE 2: CROPPING PATTERN OF FOOD CROPS BY HOUSEHOLD GROUP AND REGION (1975).

PERCENTAGE OF TOTAL HARVESTED AREA (ROW %)

CODE	HOUSEHOLD GROUP	WET RICE	DRY RICE	TOTAL RICE	MAIZE	CAS-SAVA	OTHER ROOT CROPS	PEA-NUTS	SOY-BEANS	OTHER BEANS & NUTS	VEGE-TABLES	FRUITS	HARV. AREA 000 Ha
1.	FARMERS OWNING:												
100	0.000 ha.	41.3	6.1	47.4	17.0	9.5	3.2	3.0	5.3	2.8	7.8	4.0	396
101	0.001 to 0.100 ha.	63.8	2.5	66.3	10.6	6.0	1.6	2.0	3.5	1.3	5.4	3.3	445
102	0.101 to 0.200 ha.	48.3	3.1	51.4	14.9	8.9	2.1	2.9	5.1	1.6	7.9	5.2	444
103	0.201 to 0.300 ha.	45.1	3.4	48.5	15.9	9.4	2.2	3.1	5.4	1.8	8.4	5.3	710
104	0.301 to 0.400 ha.	49.1	3.2	52.3	15.0	8.7	2.0	3.0	5.0	1.7	7.8	4.5	643
105	0.401 to 0.500 ha.	43.5	5.1	48.6	16.1	9.2	2.4	3.2	5.3	1.9	8.4	4.9	972
107	0.501 to 0.750 ha.	47.1	4.1	51.2	15.7	8.9	2.1	3.1	5.1	1.8	8.0	4.1	1765
110	0.751 to 1.000 ha.	44.5	6.8	51.3	16.0	8.7	2.5	3.0	4.6	1.9	7.9	4.1	1933
115	1.001 to 1.500 ha.	44.2	7.1	51.3	15.6	9.1	2.5	3.1	4.7	2.0	8.1	3.6	2429
120	1.501 to 2.000 ha.	41.1	10.2	51.3	15.3	9.1	2.8	3.0	4.5	2.1	8.2	3.7	1602
130	2.001 to 3.000 ha.	41.6	10.7	52.3	15.0	9.0	3.0	2.9	4.2	2.3	8.0	3.3	1649
150	3.001 to 5.000 ha.	43.4	11.6	55.0	14.0	8.2	3.0	2.7	4.1	2.6	7.5	2.9	1298
151	5.001 or more ha.	44.2	12.0	56.2	13.6	7.8	3.0	2.5	4.3	3.0	7.1	2.5	758
510	Agric Labourers &	52.2	5.2	57.4	13.4	7.8	2.1	2.6	4.3	1.7	7.0	3.7	1165
N.Ag	Non-agric. households												
INDONESIA		45.3	7.2	52.5	15.1	8.7	2.5	2.9	4.6	2.0	7.8	3.9	16209
SUMATRA		55.4	18.2	73.6	3.7	4.8	2.0	1.2	2.3	0.7	7.1	4.6	2564
JAVA/BALI		43.2	2.7	45.9	17.3	10.4	2.1	3.7	5.9	1.8	9.1	3.8	10452
KALIMANTAN		65.7	22.4	88.1	1.5	3.7	1.3	0.3	1.2	0.3	2.4	1.2	749
SULAWESI		46.5	6.7	53.2	23.2	5.2	2.7	3.0	0.8	2.5	4.9	4.5	1356
OTHER ISLANDS		24.9	13.9	38.8	19.5	9.1	8.8	1.7	6.0	7.9	4.8	3.4	1088

Sources: Agricultural Census Reports [BPS,1976 /77], Agricultural Survey Report [BPS, 1975], Input-Output Table [BPS, 1980] and Sakernas data file.

households (the remaining 41%) have been merged. It goes without saying that in households of the last category own-account farming may constitute an (important) secondary source of livelihood. The agricultural operator households have been disaggregated here according to the size of land owned, but the pattern in this table hardly changes when we classify them on the basis of the size of the holding.[14]

It appears that the cropping patterns of food crops are very similar across groups of farmers. Only the share of rice on dry fields is more or less steadily increasing with the farm size. In all categories a great variety of crops seems to be planted[15], and a substantial share may be produced for the market [Mears, 1981 and Tabor & Squires, 1982]. The information contained in this table can be summarized with the help of a diversification index, calculated for each household group [e.g. Pope & Prescott, 1980]. This index indicates the degree to which the harvested area is equally spread over all crops. We found a uniformly high value for each category of tillers.

The differences in degree of diversification across the archipelago are more pronounced. Kalimantan, for instance, relies heavily on a single food crop (rice) for subsistence, as opposed to Java/Bali and the Other Islands. Thus in the latter regions we find less homogeneity (diverging specialization of farmers) and/or a generally higher degree of risk spreading (diversification by individual farmers).

On the table's extreme right are the harvested areas. A comparison with the number of households harvesting seasonal crops is of interest: 45% of all those cultivators belong to groups 100-105 and harvest 22% of all area, 23% belong

14. cf. Keuning [1981:68-70, tables 76-78, figures 11 and 12].
15. Of course this does not equally apply to the individual households, but, on the other hand, complete specialization in soybeans for example, will not often occur.

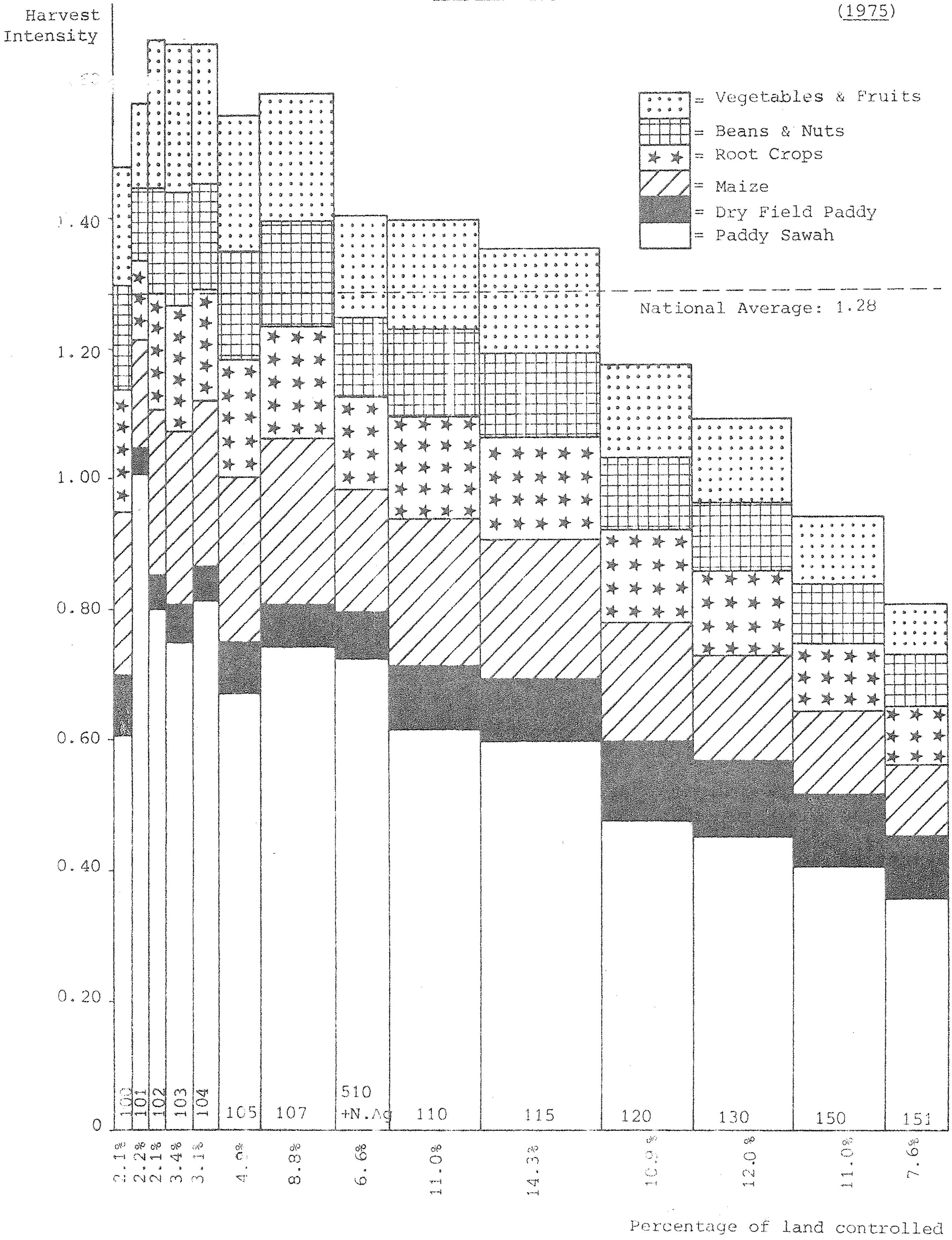
to groups 107 and 110 and harvest 23% of the total area, 23% belong to groups 115-151 and harvest 48% of all area, and finally the 9% for whom farming is not the main source of income, harvest 7% of all area.

The gross harvested areas in this table can be divided by the total acreage controlled in each class to yield the gross cropping intensities on total agricultural land. These are presented in figure 1. This diagram is horizontally subdivided by percentage of land held by each household group and vertically the harvest intensities have been plotted. Multiplication of the units at both axes reveals that the surface of each rectangle corresponds to the harvested area by crop and household group. Obviously, this method of presentation enables comparisons of both absolute figures (harvested areas) and relative figures (harvested areas in relation to the land controlled). Besides, by ranking the groups according to amount of land owned, the relation between farm size and cropping intensity is clear at a glance.[16]

The histogram shows that generally food crops are much less frequently harvested on larger land holdings . This applies to all product groups (so the cropping patterns are rather stable, as also shown in table 2). The highest total harvest intensity is realized by farmers owning between 0.1 and 0.4 hectare (groups 102-104). The very marginal peasants owning less than 0.1 hectare (group 100 and 101) do not come out on top because their dwelling occupies a relatively large part of their holding. A recalculation, using Census data to estimate the cropping intensity on kebun/tegalan (dry fields not planted with

16. Refer also to Downey, forthcoming.

FIGURE 1: Gross Harvest Intensity of Food Crops on Total Agricultural Land for each Household Group (1975)



Sources: see table 2.

perennial crops and usually separated from the house compound) plus ladang (land in use for shifting cultivation), and leaving out (if possible) both the house compound and plots covered with trees, yielded a continuously falling trend of the total harvest intensity for increasing farm size. This indicates as well that this decline is not only caused by a shift to other modes of utilization of the land, but also by a less intensive use of the land by larger farmers. This observation is confirmed by the results from the related study on non-food crops [Kusmadi Saleh & Slamet Soetomo, 1982]. Superimposing the productive area of estate crops on the food crops in figure 1 smoothes the pattern somewhat, but does not change the trend (except for the group of the largest land owners, which has a higher harvest intensity (all crops) than the three classes of households owning between 1.5 and 5 hectares). Furthermore, the tendencies discussed here are similar in each of the five locations.

The overall cropping intensity of food crops varied from 1.72 in Java/Bali, 1.36 in Sulawesi, 1.08 in the Other Islands, 0.80 in Sumatra to 0.55 in Kalimantan. This considerable range points to interregional differences in the concepts of 'land' and 'cultivation'. Dove [1981:4-6] describes how in parts of Kalimantan land is controlled by a farmer as soon as the primary forest (or grassland) is cleared. Nevertheless his whole area cannot be cultivated continuously. After cropping a part for a year, it must be left fallow "...to allow the vegetative cover time to rebuild its store of exploitable nutrients (p.2)."

The cropping pattern also influences the total number of harvests per year, for the in ground maturation period of each seasonal food crop is not identical [Tabor & Squires, 1982: table 4].[17]

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17. See also table 5 below.

RETURNS OF FOOD CROPS

In table 2 we present the proceeds of paddy sawah specified by size-class of wet land holding and region. Costs refer to current expenditures on purchased and own-produced seed, insecticides, chemical fertilizer, manure, animal rent, irrigation, hired labour and miscellaneous charges, such as indirect taxes. Depreciation and possible post harvest obligations towards the landowner and/or moneylender are not included. Like in table 1, we notice considerable differences between regions and a consistent trend by size-class. The situation in Java/Bali is somewhat exceptional, because there rather moderate average net returns per hectare do not coincide with low yields. On the contrary, a productivity of 4 tons per harvested hectare has not been realized in any other region. But the implicit price in Java/Bali (44 Rp/kg) is much lower than in Sumatra (52 Rp/kg), Kalimantan (51 Rp/kg) and Sulawesi (56 Rp/kg), and only higher than in the Other Islands (38 Rp/kg). Because of this, the region Java/Bali ranks after Sumatra with respect to gross returns per hectare.

Moreover, better yields in Java/Bali involved higher expenses, even to such an extent that net returns per hectare rank third, after Sumatra and Sulawesi. This points to a tradeoff (after a certain level) between productivity and profitability. An increase in output, brought about by the application of more (expensive) inputs, does not necessarily imply a rise in profitability, as measured by the net returns per hectare. In 1975 outlays on chemical fertilizer (procured at subsidized rates) stood at 9,259 Rp/ha in Java/Bali, more than 2.5 times higher than in any other location, while wages per hectare (averaging 30,632 Rp.) were about twice as high as anywhere else. This is not reflected in the returns.[18] On the other hand, very low costs, like in Kalimantan, coincide with the lowest returns.

18. Note that unpaid labour inputs are not yet taken into account.

TABLE 3: YIELDS, GROSS RETURNS, COSTS AND NET RETURNS PER HARVESTED HECTARE OF WET RICE BY SIZE-CLASS OF WET LAND HOLDING AND REGION (1975)

(yields in tons per hectare; gross returns, costs and net returns in Rp '000 per hectare)

Region	Size-Class of Wet Land Holding (ha.) <0.25	0.25-0.50	0.50-0.75	0.75-1.50	1.50-3.00	≥3.00	Average
SUMATRA							
Yield	4.2	3.9	3.7	3.5	3.4	3.2	3.7
Gross Returns	224	203	194	184	174	165	192
Costs	47	32	32	33	34	34	34
Net Returns	177	171	162	151	140	131	158
JAVA/BALI							
Yield	4.4	4.1	4.0	3.9	3.7	3.6	4.0
Gross Returns	198	182	175	167	159	152	176
Costs	56	55	55	54	53	50	55
Net Returns	142	127	120	113	106	102	121
KALIMANTAN							
Yield	2.9	2.6	2.4	2.3	2.1	1.9	2.2
Gross Returns	138	126	120	114	106	100	112
Costs	30	25	23	21	19	18	21
Net Returns	108	101	97	93	87	82	91
SULAWESI							
Yield	3.6	2.9	3.2	3.2	3.0	2.9	3.1
Gross Returns	199	184	177	169	161	155	174
Costs	43	26	26	26	27	28	28
Net Returns	156	158	151	143	134	127	146
OTHER ISLANDS							
Yield	4.1	3.7	3.3	3.2	3.2	3.3	3.4
Gross Returns	150	138	126	123	127	131	129
Costs	31	31	30	30	29	28	30
Net Returns	119	107	96	93	98	103	99
INDONESIA							
Yield	4.3	3.9	3.8	3.5	3.3	3.3	3.7
Gross Returns	200	184	176	164	153	145	173
Costs	53	47	47	41	40	43	45
Net Returns	147	137	129	123	113	102	128

Sources: Agricultural Survey Report [BPS, 1975] and Rice Intensification Programs Survey Report [BPS, 1978a].

By size-class a clear tendency emerges. Both yields and gross returns and costs per harvested hectare of paddy are generally lower if more sawah is controlled, and in such a way that operating surplus also declines with increasing size of the wet land holding. This finding is in line with our inference from table 1 : the smaller the sawah, the more intensive its cultivation (with rice), the better the yields and the higher the profits per cultivated hectare (of rice).

Weighted linear regressions have been fit for the influence of sawah size on yields and net returns per hectare of rice in Indonesia, using the original data for five size-classes [BPS, 1978a].[19] The size coefficients are indeed negative, and moderately significant (at 10% level with respect to the yield rate and at 15% level with respect to net returns/ha.). Here the number of harvested hectares in each class has been assigned as the weight of each observation. Again we suspect that a (semi-) logarithmic functional form will give a better fit (refer to footnote 11).

Regarding the coststructures, per hectare expenditures on purchased seeds, manure, animal rent, irrigation, wages & salaries and miscellaneous charges all tend to decline with increasing farm size. The trend is rather erratic with respect to own-produced seeds, insecticides and chemical fertilizer. These tendencies in each costelement diverge considerably by province, with one noticeable exception.

In the majority of regions wages & salaries per hectare are less in larger farms. In Java and Bali in particular even the percentage of total costs spent on hired labour is falling with increasing size of the sawah. This is not

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19. Since an intrapolation procedure has been used to reconcile the original size-class data with the commonly used taxonomy of wet land holdings, the application of the (weighted) least squares method to the figures in table 3 would be improper because of an autocorrelated disturbance term.

in line with the dual labour market hypothesis discussed above, and the more so because it indicates that hired labour in small farms is not confined to peak periods (refer also to Soejono [1976:87], Abey, Booth & Sundrum [1981:table 7] and White & Wiradi [1981:11]). Provided that a similar wage rate prevails in all farms, it implies a larger employment creation per hectare of land, per hectare of cultivated land and even per rupiah spent on inputs in the smallest farms.

Division of output by paid wages yields the lowest ratio in Java/Bali (7.4 as compared to 10.8 in Kalimantan and the Other Islands, 14.5 in Sulawesi and 17.2 in Sumatra). On the assumption that unpaid labour input per cultivated hectare is not lower and wage rates are not higher in Java/Bali, we conclude that the labour productivity is lowest in Java/Bali. This is not surprising in view of the heavy population pressure in these islands. This output/paid wages ratio does not follow a uniform pattern by size-class, although in all five regions the highest value was recorded for sawahs measuring between 0.30 and 0.50 hectare. However, the sign and the significance of the correlation between labour productivity and farm size can only be estimated after incorporation of family labour input and derivation of person hours.[20]

A specification of average yields, prices, returns and costs by crop appears in table 4. These values are reconciled with the Indonesian Input-Output table for 1975 [BPS,1980], which among others involves the addition of by- products.[21]

20. More details on (imputed) wages and paid as well as unpaid labour input in terms of person hours will be provided in Downey, forthcoming.

21. This may partly solve a dispute between Booth [1979] and Nyberg [1979] on maize yields. Reconciliation procedures revealed that the Agricultural Survey [BPS, 1975] did include neither maize harvested at an immature stage, nor by-products which together account for about 13% of total returns. Moreover matuzation periods have to be taken into account when comparing crop yields (see table 5 below).

TABLE 4: YIELDS, GROSS RETURNS, COSTS AND NET RETURNS PER HARVESTED HECTARE AND IMPLICIT PRICES OF FOOD CROPS BY REGION (1975)

(yields in tons per hectare; prices in Rp/kg; gross returns, costs and net returns in Rp '000 per hectare)

Region	Crops	Wet Rice	Dry Rice	Maize	Cassava	Other Root Crops	Peanuts	Soy-Beans	Other Beans & Nuts	Vegetables	Fruits
SUMATRA	yield	3.7	1.8	1.2	10.3	7.4	1.0	0.9	0.6	4.0	5.4
	price	52	54	50	20	25	229	113	150	62	85
	gross returns	192	96	59	207	184	222	104	85	245	463
	costs	34	17	18	10	8	32	25	18	63	56
	net returns	158	79	41	197	176	190	79	67	182	407
JAVA/BALI	yield	4.0	1.7	1.2	8.8	7.4	0.8	0.8	0.4	2.9	6.7
	price	44	51	58	16	20	219	137	137	65	85
	gross returns	176	88	72	140	150	175	107	53	188	569
	costs	55	26	19	20	41	39	24	11	48	69
	net returns	121	62	53	120	109	136	83	42	140	500
KALIMANTAN	yield	2.2	1.5	0.9	9.1	4.7	0.9	0.7	0.5	1.6	5.8
	price	51	50	85	21	27	273	209	167	60	85
	gross returns	112	73	79	193	125	241	138	88	97	492
	costs	21	9	14	8	47	56	23	18	25	60
	net returns	91	64	65	185	78	185	115	70	72	432
SULAWESI	yield	3.1	1.7	1.1	9.2	5.9	0.7	0.7	0.4	2.8	3.6
	price	56	46	55	27	27	182	142	122	57	85
	gross returns	174	77	63	245	158	135	95	54	158	306
	costs	28	23	14	22	37	25	16	11	41	37
	net returns	146	54	49	223	121	110	79	43	117	269
OTHER ISLANDS	yield	3.4	1.4	1.0	8.2	6.4	0.7	0.7	0.4	4.0	4.8
	price	38	46	68	34	38	207	109	131	58	85
	gross returns	129	63	65	281	242	141	77	49	234	407
	costs	30	12	11	12	6	25	15	10	60	49
	net returns	99	51	54	269	236	116	62	39	174	358
INDONESIA	yield	3.7	1.7	1.2	8.9	7.0	0.8	0.8	0.4	3.1	6.0
	price	46	51	58	18	25	217	133	135	64	85
	gross returns	173	85	69	162	176	173	104	53	195	513
	costs	45	18	17	19	28	37	23	11	50	62
	net returns	128	67	52	143	148	136	81	43	145	451

Sources: Agricultural Survey Report [BPS, 1975] and Input-Output table [BPS, 1980].

The implicit price estimates have to be considered with care, because mostly it has been assumed that these by-products had been included already in the weight of the harvest, but not in the returns.

A comparison of the profits of various crops shows substantial and sometimes surprising disparities. However, these proceeds still have to be corrected for differences in the length of the production cycle. Tabor & Squires [1982: table 4,note 2] give an overview of in ground maturation periods for several seasonal crops, which roughly agree with our own information from the Agricultural Division of Biro Pusat Statistik. These gestation lags have been used for a crude estimation of net returns per hectare per month (see table 5).

TABLE 5: Net Returns per Harvested Hectare of Food Crops in Indonesia, Corrected for the Difference in Maturation Periods (1975).

Crop	Maturation Period (months) rough average	Net Returns/Harv.Ha./ Month
wet rice	4	32
dry rice	4.5	15
maize	3.5	15
cassava	8	18
other root crops	4	37
peanuts	4	34
soybeans	3.5	23
other beans & nuts	3	14
vegetables	5	29
fruits	12	19 a)

a) Net Returns/Planted Hectare/Month

Sources: Agricultural Survey Report [BPS,1975], Input-Outputtable [BPS,1980], Tabor & Squires[1982], BPS staff Agriculture Division and Wageningen University Tropical Agriculture Division (oral communications).

The returns of fruits refer to the yields over the year 1975. In particular for this crop a large discrepancy exists between planted area and harvested area. The latter refers to productive trees only. In table 5, the unproductive parts of the orchard (roughly 50% of the total area) have been taken into account as well.

As might be expected the gaps between the return rates are narrowed in table 5. Nevertheless, the variation is still considerable. This is partially caused by an important factor which has not yet been considered, namely the (unpaid) family labour input per harvested hectare per month. It is known that wet rice needs an intensive care throughout its cultivation. On the other hand, a large proportion of the vegetables and fruits grow in the housegardens without much looking after. Therefore it is not unlikely that profits from the produce of the home-garden surpass those from paddy sawah on a hectare per month basis, after subtraction of the imputed value of own-account labour input involved.[22]

Table 5 gives remarkably high returns for other root crops (sweet potatoes, potatoes, other tubers) and peanuts. Yet it seems that 1975 was a somewhat atypical year in this respect. The estimates of Tabor & Squires [1982: table 4], relating to the season 1978/1979, and of the Agricultural Surveys for the years 1971 until 1975 (see Booth [1979:table 1]) show that, with the exception of 1974 and 1975, the returns per hectare per month are highest for paddy sawah, followed at a distance by other root crops and peanuts.
Returning to table 4, it is obvious that both yields and prices and costs have a separate impact on disparities in net returns per harvested hectare. Whereas cassava and other root crops produce many kilos per acre, peanuts and to a lesser extent the other types of beans fetch an

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22. A more extensive treatment of the role of the home-garden can be found in Stoler [1978] and Penny & Ginting [1980].

exceptionally good price. Wet field rice and vegetables require relatively high expenses, while input costs are low for cassava, fruits and other root crops.

The regional discrepancies in net returns per hectare are certainly not negligible, but a consistent ranking of all crops does not appear. Roughly the highest profitability is found in Sumatra, followed by Kalimantan and next Java/Bali. Again, the patterns of yields, prices and costs diverge.

Firstly, by far the best yields are obtained in Sumatra, followed by Java/Bali, and only at a distance by the other three regions. Secondly, implicit prices are the highest in Kalimantan. Finally, costs are generally very high in Java/Bali, and low in the Other Islands. This is not so much caused by price differences of individual in-puts (because it is likely that the procurement in the central region is even cheaper), but by the appli-
This is not so much caused by price differences of individual inputs (because it is likely that the procurement in the central region is even cheaper), but by the appli-
cation of more or less (expensive) inputs. This is also discussed by Booth [1979:63], who concludes "... fertilizer application (in kg per hectare) is higher in Java than elsewhere for all crops" (referring to maize, cassava, sweet potatoes, soybeans and peanuts).
As explained earlier, these regional and crop specific productivity and profitability data (excluding paddy sawah) have been multiplied with the harvested areas by region, crop and household group (given in table 2).
Thereafter the returns have been added by region and crop in order to arrive at total income from food crops on dry fields by category of farmers. For paddy sawah size specific productivity and profitability figures were available for each location (table 3), which in combination

with information on harvested areas (table 1) and on the regional distributions of wet land holdings produced estimates on income from paddy sawah by household group and region. Finally, division of the aggregated proceeds from dry fields and from paddy sawah by the number of households harvesting seasonal crops yielded an overview of net returns from food crops per harvesting household.[23]

This overview can be juxtaposed with distributions of land owned and land controlled as shown in table 6. In the first column the average areas owned approximate the size-class means. It appears that the farms of those agricultural labourers and non-agricultural households who own land (the last group) are typically medium-sized.[24]

The first nine subgroups of agricultural operators (owning less than 1.5 ha.) control more land than they own (cf. columns 1 and 2). Part of the pieces of land received in refer to <u>tanah bengkok</u>, the land owned by the state and given in usufruct to the village official.[25] It is obvious that land controlled is less unevenly distributed than land owned.

Surprisingly, the average holding of landless agricultural households (code 100) is larger than the average farm of operators owning between 0.4 and 0.5 ha. However, this statistic conceals the considerable heterogeneity in the first group (unlike the other categories where in general land owned and the holding largely or completely coincide). Evidently, a greater standard deviation in the size of the farm entails

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23. The percentage of land owning households which harvested seasonal crops exceeds 85% in all groups and 90% in twelve of the fourteen categories. The proportion is highest in the group of farmers owning between 0.3 and 0.4 ha. Thereafter it slightly declines with increasing farm size.

24. Of the households where the head's main source of income is as a labourer in agriculture (code 510) still 9% own land. Of the non-agricultural households also 9% are landowner. Both subgroups are rather heterogeneous with respect to the size of the holding.

25. Cf. footnotes 2 and 5.

TABLE 6: INCOME FROM FOOD CROPS BY HOUSEHOLD GROUP AND REGION (1975)

CODE	HOUSEHOLD GROUP	1. LAND OWNED PER LAND OWNING HOUSEHOLD (ha.)	2. AVERAGE LAND HOLDING (ha.)	3. NET RETURNS PER HARVESTING HOUSEHOLD (000 RP)	4. NET RETURNS PER HECTARE CONTROLLED (000 RP)	5. CALCULATED INCOME/ STATED INCOME
1.	Farmers owning:					
100	0.000 ha.	--	0.58	114	188	1.8
101	0.001 to 0.100 ha.	0.05	0.24	57	204	1.2
102	0.101 to 0.200 ha.	0.15	0.24	57	224	1.3
103	0.201 to 0.300 ha.	0.25	0.31	73	225	1.5
104	0.301 to 0.400 ha.	0.35	0.41	90	218	1.6
105	0.401 to 0.500 ha.	0.47	0.52	111	205	2.2
107	0.501 to 0.750 ha.	0.63	0.66	137	203	2.0
110	0.751 to 1.000 ha.	0.92	0.95	175	176	2.3
115	1.001 to 1.500 ha.	1.28	1.30	223	165	2.1
120	1.501 to 2.000 ha.	1.86	1.85	284	141	2.5
130	2.001 to 3.000 ha.	2.59	2.56	350	127	2.8
150	3.001 to 5.000 ha.	4.09	3.94	458	107	2.9
151	5.001 or more ha.	8.29	7.77	786	86	4.3
510 + N.Ag	Agricult. Labourers and Non-Agric. Households	0.64	0.66	120	174	2.1
INDONESIA		0.89	0.91	153	159	2.2
SUMATRA		1.19	1.20	163	122	2.4
JAVA/BALI		0.67	0.70	150	207	2.2
KALIMANTAN		2.02	2.02	108	51	1.6
SULAWESI		0.87	0.89	156	164	2.2
OTHER ISLANDS		1.25	1.30	182	126	2.3

SOURCES: Agricultural Census Reports [BPS, 1976/ 77], Agricultural Survey Report [BPS, 1975], Rice Intensification Programmes Survey Report [BPS, 1978a], Input-Output table [BPS, 1980], and Sakernas data file.

a loss in terms of the reliability of the estimates. Probably the category of landless farmers combines real tenants and de facto owners (who may or may not have a legal title to their land).

The third column gives the net returns per harvesting household which vary from about 57,000 Rp. for the most marginal landowners to 786,000 Rp. (almost fourteen times as much) for the farmers owning more than five hectares. Yet, net returns are less unequally distributed than the holdings.

If the distribution of land controlled and the distribution of net returns per farmer are plotted as Lorentzcurves in the same figure (with the groups ranked according to size of land owned), the latter curve is situated completely above the former. It can be proven[26], that this positioning implies that the average profitability (per hectare controlled) of farmers owning less than any (arbitrary) amount of land is higher than the profitability of their colleagues owning more than that amount of land. This characteristic was to was to be expected in view of the trends by size-class in tables 1 and 3 and figure 1.

The above theorem, though, does not state that average net returns per hectare are constantly decreasing with the expansion of the area owned. This is shown in column four.[27] Profits in relation to the size of the holding are highest for the group of farmers owning between 0.2 and 0.3 ha., and fall rapidly thereafter.[28] For an overall evaluation of the land productivity by farm size the returns from non-food crops need to be added. The estimates

26. Keuning [1981:54].
27. Column four is equal to column two divided by column three times the proportion of households harvesting seasonal crops.
28. Cf. figure 1, and realize that the cropping pattern of category 103 is slightly more favourable than that of category 102.

derived by Kusmadi Saleh and Slamet Soetomo [1982] indicate, that the tendency shown here is smoothed a little bit but certainly not ironed out if profits from estate crops are taken into account.

A comparison of the relative efficiency of groups of farmers (see e.g. Yotopoulos & Lau [1979]) can only be made after allowance for differences in family labour input and depreciation ('capital input') per hectare. According to the 1973 Agricultural Census the number of family members regularly employed per harvested hectare falls rapidly in larger holdings [Abey, Booth & Sundrum, 1981:figure 1]. In fact, the data presented here have also been linked with disaggregated information on person hours of unpaid labour input, collected during the 1976 Sakernas labour force survey [Downey, forthcoming].

Table 6 also clearly demonstrates the regional dimension of Indonesian agriculture. The major disparities in farm size (columns 1 and 2) are not reflected in the average net returns per harvesting household (column 3). This is explained by the countervailing differences in the profits per hectare controlled (column 4). Because of a very high cropping intensity and the selection of relatively high yielding varieties, the farmers in Java and Bali largely succeed to compensate for the small size of their holdings. On the other hand, in Java more than twice as many regular family workers are employed on a hectare than in the outer islands. [Abey, Booth & Sundrum, 1981:table 4].

Strout [1983] attributes the above-average productivity in Java/Bali to the favourable soil/climate conditions. However, since the best returns per harvested hectare of <u>individual</u> crops are not found in these islands (see table 4), we would be inclined to give at least as much weight to own-account labour and entrepreneurial inputs as a cause for the ranking of regions in column four of table 6.

Finally we present a comparison of these 'calculated' net returns, which were based on the land (distribution) recorded by the Sakernas survey, with analogous estimates stated by the respondents themselves. The survey questionnaire refers to the income from seasonal crops instead of food crops [BPS,1976]. Therefore profits from fruits have been subtracted from the 'calculated' net returns. Moreover, costs in the questionnaire include post-harvest obligations (both monetary and in kind) towards the landowners.

A computation of rents and shares paid (and received) by each category is not only necessary for the comparison of calculated and stated revenues, but will also allow for the derivation of the distribution of income in agriculture. It is unfortunate that rent data on a macro-level are not available. We chose a rather arbitrary rule which at least did not lead to unacceptable results elsewhere in the integrated System of Socio-economic Accounts (see the discussion at the end of the second section and footnote 8).

In the last column we have divided the 'calculated' net returns by the stated incomes.[29] Overall, the interviewees' estimates have to be multiplied with a factor 2.2 in order to arrive at a reliable measurement of total revenues. More interesting though is that the gap is certainly not equiproportional for all groups. Instead a clear tendency stands out. The larger the average income, the higher the relative understatement. It is indeed likely that a larger farmer, when asked about his income last year, has more difficulties in recalling his receipts from a probably large variety of crops.

This finding has serious implications for research on inequality grounded solely on one source, taking for granted respondents' answers. It is well-known that their income (and consumption) estimates are usually too

29. The denominator has been deflated with the growth of net returns from seasonal crops in 1976, estimated at 23.2% (cf. Keuning [1981:tables 45,83 and 87]).

low. However, in this case the sample income distribution is much less skewed as well.

Regionally, the differences in the degree of understatement are not very pronounced, with the exception of Kalimantan. There not only net returns per harvesting household are by far the lowest but also the degree of diversification is minimal (cf. table 2). Obviously, recollection of the yields is easier if less crops are tilled.

SUMMARY

The purpose of this paper has been to demonstrate that a better use can be made of available information about Indonesian agriculture. The reconciliation of various sources containing macro-level data, reckoning with the results of micro-studies, can lead to new insights and provides the policy-maker with a consistent and comprehensive data framework. Moreover, possible flaws and discrepancies in the data collection process can be traced. Each survey is a very costly exercise and its results deserve to be analyzed thoroughly.

Inevitably, the reference year will not be the same for all sources, but on the other hand the underlying structure of for instance inequality or productivity differences will not change drastically in one or two years time. As soon as the results of new large-scale enumerations (e.g. the 1983 Agricultural Census, the 1980 Population Census, the 1980 Input- Output tables) become available, they can be combined with more regular statistics in order to produce a renewed overview of the growth and distribution of the fruits of agriculture. Progressing computerization will also speed up these linking exercises.

A prerequisite for the integration of estimates from several sources is the uniformity of concepts and classifications. A few further refinements may be worth while in this respect (e.g. the concept of sawah, the classification of farm sizes). Besides, the considerable discrepancies, both in the 1973 Agricultural Census and in the 1976 Labour Force Survey, between land rented out and land received by households indicate that more attention could be given to the conditions under which land is owned and transferred (see e.g. Sajogyo [1972/73], Wiradi [1978] and Dove [1981]). Simultaneously, a few questions about person hours of (family) labour input and about the amount (and mode) of rent payments and receipts might be included into the regular large-scale (agricultural) surveys. Finally, more insight can be gained in distributional issues, if the revenues from _palawija_ are also tabulated by size of the holding.

Some of the more striking features of the situation in 1975 are:

- Land rented, sharecropped and the like account for only 10% of total land controlled (13% in Java/Bali). Of non-owner operated land approximately 70% is leased or sharecropped. The rest concerns land pawned, given to civil servants (_tanah bengkok_) or obtained in another way.
- The smaller the sawah, the more intensive its cultivation (with rice), the better the yields and the higher the profits per cultivated hectare (of rice). This tendency appears in all regions. It coincides with more family labour input on small farms. Total costs per hectare and several cost elements, like paid wages, are also declining with increasing farm size.
- Cropping patterns of food crops are rather similar for all farm sizes, but cropping intensities tend to decrease rapidly with the expansion of the holding. This tendency is smoothed somewhat, but not ironed out, if non-food crops are taken into account.

-Yields and returns per hectare differ considerably by crop, even after correcting for different in ground maturation periods.
-According to our estimates the richest households earn about fourteen times as much as the poorest from the cultivation of food crops.
-Regionally very marked differences exist in farm size, cropping intensities, labour input, land productivity and profitability of food crops. The small size of the typical farm in Java/Bali coincides with high yields and an intensive cultivation of the land. Costs per hectare are much higher in Java/Bali too.
-Total earnings as computed from the respondents' answers amount to less than half the estimate from the Input-Output-tables. More importantly, any conclusions drawn from the distribution of stated incomes will seriously underrate the degree of inequality in Indonesian agriculture.

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