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INSTITUTIONS AND ECONOMIC LINKAGES AT THE VILLAGE LEVEL IN WEST JAVA, INDONESIA

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Abstract

This study uses a Social Accounting Matrix for a village in West Java to compare the implications for growth and distribution of market-oriented changes and targeted government programs. We simulate the effects of growth in the surrounding economy, increases in prices for crops exported from the village, increased hiring for public works projects, loans for small enterprises and increases in use of high yielding varieties for rice. The simulation methodology is based on a SAM multiplier, using marginal household expenditure coefficients and a "mixed multiplier" to account for constraints on crop production. The simulations are standardized by scaling each program to an equal total injection. The results suggest that, on average, the market oriented policies produce higher levels of growth in village value added and total household income, but increase the gap between incomes of low calorie households and the other groups. Further, the results from individual simulations show that relaxing the constraints on agricultural production through improved technology outperforms a simple growth scenario in terms of village value added, while it greatly improves the relative situation of the poor.

1. Introduction

The study presented here uses a Social Accounting Matrix (SAM) framework to focus on the relationship between household nutrition and village economic linkages in West Java; households are divided according to dietary energy consumption in order to determine the sources of income for each type of household, and likely sources of income increases for each group.

The study is based on survey data collected by Katherine Ralston in a village in West Java, called here Cibageur for protection of privacy. The survey covered the time period April 1988 to March 1989 and focused on household economic activities and nutritional status at the household and individual level. The sample included 49 households (about 5% of the village population), and interviews were conducted with all working age members of the household (see Section 5 for more detail). The survey was supported as part of a Cornell Food and Nutrition Policy Program technical assistance contract with the Indonesian Ministry of Health, funded by a World Bank Loan.

1.1 The Village Setting

Cibageur is located in the district of Sukabumi, West Java province; it is about one hour away by public transport from the district capital town, and about three hours away from the national capital of Jakarta. Its geography places it on the border between the productive wet lands and high population densities that characterize the corridor running through the middle of Java, and the more sparsely populated dry highlands of the southern coast; the village contains both kinds of land, with dry hilly land dominating.

The lowland area of the village is closest to the local market center, which lies at the intersection of two paved roads. The upland area is more difficult to reach, involving a one to two hour hike up a narrow path. Thus, transportation within the village is slow, but for an economy with a very low wage rate, this is not a rigid impediment to economic transactions. In fact, a surprising range of commodities are transported in and out of the village on foot, including food, building materials, bicycles, and furniture. Motor transportation to larger population centers is then available at the crossroads. The crossroads market center serves two other villages as well; the three villages surrounding the crossroads were in fact part of a larger

village which was subdivided administratively in 1982. Thus, the administrative boundaries of Cibageur are not economic boundaries; households near the village borders trade extensively with neighboring villages.

The village received a large number of immigrants following the 1965 anti-communist purge when a tea plantation in the village was confiscated from its owner and partially opened for settlement. The remainder of the tea plantation's land was taken over by a cacao plantation, which rents out unplanted land to village residents and employs labor from the village.

Economically, the village relies mainly on agriculture, including both wet rice and dry land crops such groundnuts and cassava. Fruits, vegetables and timber are also important supplementary activities. Many households also engage in non-farm enterprises such as small retail shops or door-to-door sales, prepared foods, and production of furniture, brooms, and woven bamboo walls. A small number of households operate more capital intensive enterprises such as mechanical rice milling and minibus routes. Other employment can be found working on other farms, carrying harvested crops, construction materials and other goods in and out of the village, and working for the plantation adjacent to the village and local factories. A small fraction of village households have more formal employment in the civil service and some receive pensions from military service.

1.2 Cibageur as a Representative Village

While every village has its unique characteristics, Cibageur reflects the same patterns facing much of rural Java, and to a lesser extent, other parts of Indonesia.

Studies of the rice producing lowlands suggest a steady movement from agricultural labor into off-farm labor, including commuting or migration to the cities (Hart 1986). Hart notes the difficulty in determining from national level data whether this movement reflects the "push" of lower employment opportunities in agriculture or the "pull" of higher wages in non-agricultural jobs. Studies by Hayami and Kikuchi (1982) and by Collier et al. (1989) based on repeated surveys of several villages in lowland Java provide a village-level view of trends in labor demand.

Both studies note that not only has labor demand in rice production failed to keep up with population,

it has actually decreased due to technological changes such as the use of hand tractors for land preparation and the use of the sickle in harvesting. Labor institutions have shifted away from an open-harvest system where anybody could assist in the harvest in return for a share, to various closed-harvest arrangements, where only specifically invited workers were allowed to participate. While Hayami's study suggests a decline in the share of harvest received by harvesters during 1968-78, Collier's study shows that the real agricultural wage (in kilograms of rice per hour) increased during 1980-87. Given increases in yields, Hayami suggests that actual payments to labor may have increased during the earlier period as well. The rise in wages could be taken as evidence that increase in non-agricultural labor demand has outpaced the release of labor from agriculture. However, the existence of unemployment and underemployment suggests that the slack has not been absorbed, and that labor market imperfections maintain wages above the market clearing level.

Cibageur lies closer to the dry upland southern coast than to the lowland rice belt. While mechanization in rice production and land consolidation are not widespread, rice production is a relatively small part of village agriculture. Thus, agricultural opportunities are even more limited in this upland area than in the rice belt. By contrast, Cibageur is close enough to the urban economy to send surplus labor to the rapidly growing town of Sukabumi, and to the capital city of Jakarta. The real wage measured in 1989 is comparable to the level found in many villages by Collier for 1987. Off farm employment includes activities with higher returns such as urban employment, shop keeping and light manufacturing, as well as activities with lower returns, such as some food processing operations. The high-return activities are evidence of links to the urban economy, while participation in the low-return activities suggests that the slack labor is not completely absorbed by off-farm activities: not everyone who gets pushed out of agriculture succeeds in getting pulled into an equal or better off-farm labor opportunity.

More detailed information on the village economy is provided in the following sections; the point here is that the Cibageur, because of its intermediate proximity to urban markets, is typical of the environment of a large fraction of the population of Java. The development of links to the urban economy probably lags behind the trends in villages closer to larger cities; these conditions will spread to an increasing number of

villages as the urban-oriented economy expands. Cibageur's upland geography and its later entry into the urban-oriented economic sphere are representative of parts of Indonesia outside of Java as well, either currently, or in the near future.

1.3 Household Classifications

In this paper, households are classified according to dietary energy consumption. The three household groupings are based on average daily energy consumption per adult equivalent unit over a three month period. Total household energy consumption is estimated from the energy content of foods purchased, grown on the household's own farm or received as gifts. The number of adult equivalent units per household is calculated based on the energy requirement scale from FAO (1973). The use of adult equivalent units rather than simple household size accounts for the fact that household of different age-sex composition have different energy requirements. The lowest group averages below 80 percent of the FAO standard of 2350 Kcal per day for a reference male. The middle group averages slightly above this standard, while the highest group falls much above this standard. (See Table 1.)

Some basic comparisons between these groups can be seen in Table 2. While female headed households are only slightly more prevalent among the Low Calorie households, low calorie households are younger, have more children living at home, and are least likely to live in the lowland rice growing area of the village close to the road. Medium calorie households are somewhat older, with fewer children living at home, and are fairly equally distributed throughout the village geographically. The High calorie group are most likely to live in the lowland area and least likely to live in the isolated upland section of the village.

Households with the lowest dietary energy consumption are the poorest households, the medium energy group is the wealthiest, and the high energy group consists of middle income households. The reasons for this pattern are based on the relationship between households' income sources and energy expenditure. The high energy consumption households derive their income from heavy physical labor on their own farms. This group has a high demand for energy and is wealthy enough to meet those needs. The medium energy group includes wealthier households whose incomes are derived more from returns to physical capital, as well

as from government jobs and from pensions; they can afford to eat as much as they like, but, because they engage in less physical labor, they do not require high levels of dietary energy. The low energy consumption households may have high levels of physical labor, but they are not successful enough to meet their energy needs.

2. Village Factor and Commodity Markets

2.1 Food

The village markets are relatively diverse and well developed; yet subsistence food production encompasses a non-negligible fraction of total production. Further, not all households are equally linked to the market. Table 3 gives the marketed surplus ratio (fraction of production not consumed directly by the household), self sufficiency (total production divided by total consumption) and self supply (direct own farm consumption divided by total consumption) for rice and other crops. Households which are lowest in dietary energy consumption have the lowest marketed surpluses for rice. Thus, they benefit least from a producer price increase in rice.

While the low-calorie group has the lowest self sufficiency, representing the level of total consumption which could be met by own production, they have the highest level of self supply, which is the level of total consumption which is actually met by own production. Other households are selling and repurchasing rice to a much higher degree, perhaps to take advantage of quality differences.

On average the interaction with the market for rice is high, with a marketed surplus rate of 77 % for the whole village, and a self supply rate of only 32 %; even the poorest households are not completely withdrawn from the market.

2.2 Labor

The labor market offers some limited diversity, but few chances for income security. Land preparation tasks are generally performed by men, who receive a daily wage and a meal. The wage paid for land preparation was approximately 1000 Rupiah (about sixty cents in 1989) for a five hour day; with the value of the meal included, the wage was about 1300 Rupiah. Transplanting and weeding are performed by

women, who are paid a share of the crop after it is harvested; for the survey year, workers compensated by a share of the harvest earned the equivalent of about 200 Rupiah per hour. While the cash hourly wage is comparable to the grain equivalent of earnings from shares of the harvest (and may be higher for women in a more productive year), the women receive no meal, must wait for payment, and must share the yield risk with the operator.

Labor tying, through lending to workers in exchange for reliable availability, has been reported in other parts of West Java (Hardjono 1987). In this village, households did not report any credit arrangements with employers, although the survey was not designed to focus on this arrangement, and Hardjono noted that her respondents were reluctant to discuss this institution. It may well be that the well developed markets for credit and labor in this village do not leave room for labor tying as an institution. Credit is available from local traders, so that households are not dependent on employers for loans. Further, the small amount of rice land in this village, relative to labor availability, reduces the peak labor demand problem for employers.

Other local opportunities for wage labor include local construction, the nearby plantation, and local factories. There are also a broad range of self-employment activities: small scale food processing, such as snack preparation and palm sugar production; light manufacturing of woven bamboo walls, furniture, brooms and baskets; and marketing through small shops, door-to-door sales, and town-village trade. Implicit wage rates for these activities, average close to the agricultural wage, but are highly variable over time, depending on fluctuations in sales. During the survey year, returns to labor in small scale food processing ranged from 40 Rp per hour to 220 and monthly earnings ranged from 9000 - 40000 Rp ($5.40 - $24.00 in 1989). In light manufacturing hourly returns ranged from 113 Rp to 285 Rp, and monthly earnings from 5000 to 27000 Rp ($3.00 to $16.20). Retail sales, which require some operating capital, averaged about 300 Rp per hour, and anywhere from 6000 Rp to 80000 ($3.60 to $48.00) per month, depending on sales.

Labor is also often provided on a volunteer basis, under two arrangements. The village government organizes volunteer labor, one or two days per week, for small projects. Families also draw heavily on volunteer labor for help with agricultural tasks and construction. Members of the extended family who

volunteer their labor are usually rewarded with a meal, which often includes more "luxury foods" than a standard meal provided to paid workers.

Table 4 gives the sources of labor income for each of the three household groups. Low Capital enterprises include the retail sector (small shops and door-to-door peddling), low capital food processing (cooking snacks), and light manufacturing (brooms, furniture and woven bamboo walls). High capital enterprises include high capital food processing (rice milling) and transportation (minibus). Agricultural labor includes work on other farms. Low wage labor (1000 - 2000 Rp. per day) includes work in the plantation, work in nearby factories, and hired employment in local construction, retail, low capital food processing, light manufacturing and wood gathering. High wage labor (3000 - 5000 Rp. per day) consists of work in the transportation sector (driving the minibus) and high capital food processing. Government jobs include teaching, working in the clinic and working for the village or subdistrict government. The government category also includes pensions paid to retired soldiers.

Within own enterprise labor, non-rice crops play a much more important role for the Medium and High Calorie households than for the Low Calorie households. (Note that the non-rice category includes low return crops such as cassava with high return crops such as groundnuts.) In particular, the Medium Calorie group, which is the wealthiest, derives large incomes from high capital enterprises, which the other groups do not have the capital to participate in, and from government employment and pensions. The High Calorie households derives little income from hired labor. Because they control the largest amount of total land, farming provides the major demand for their labor. Their low-capital enterprises provide the next most significant source of labor demand. The low-capital enterprises are less important to the Medium Calorie group, and less accessible to the Low Calorie households.

Table 5 shows the role of each household group in the direct labor market, not counting the employment effects of goods purchased. The high-calorie group is by far the most important in hiring agricultural labor and construction labor, while the low-calorie group is more important in hiring in Retail and Wood.

2.3 Land

While simple land rental is rare, share-cropping is common, under several different arrangements depending on the owners responsibility for inputs. Share-cropping from family members was common, but not dominant: roughly one-third of share-cropping arrangements were conducted with the households' parents. The local plantation also share-cropped land out to households, although these arrangements carried no implicit tenure protection once the land was scheduled to be planted to cacao.

A small amount of land, one hectare out of the total of 400 hectares in the village, was available to village officials for use in lieu of salary. A small amount of communal land, about two hectares, was also available for use by households.

Landownership in the village is skewed, although landlessness is less severe than in other parts of the country. Only two percent of the sample households own over one hectare of rice land, while most households own less than a quarter hectare. Holdings of the less valuable dry land are larger, but the pattern is similar: eight percent of households owns more than one hectare while over half own less than one quarter hectare. Ten percent of the sample households own about 57 % of the rice land and 55 % of the dry land owned by village residents. Note that this does not include land owned by the plantation which accounts for a large fraction of the dry land in the village. Eighteen percent of households own no land, but only one household in the sample does not have access to land at least in the form of a share-cropping arrangement; this one family is headed by a teacher.

Differences in land ownership and land control among the three household groups are shown in Table 6 and 7. Table 6 shows that the Low Calorie Households own and control less wet rice land and dry land than the other two groups. The High Calorie households own more wet rice land but slightly less dry land than the Medium Calorie group. The distribution of households according to ownership and control in Table 7 adds further detail to this pattern. The Medium Calorie group contains the highest fraction of large landowners of both wet rice and dry land. The Low-Calorie group has the highest fraction of households which control no rice land. (The only household which controls no land is headed by a school teacher.)

2.4 Credit/Savings

The local markets for credit and asset sharing are relatively well developed. Traditional credit sources offer small to medium loans: Small scale purchase credit ($ 10 - $ 20) is available from vendors who sell goods and then collect monthly payments. Households may also borrow rice for repayment after the harvest. The nominal interest rates on these loans are as high as 100%; since each kilogram of rice borrowed must be repaid with two kilograms. However, the price of rice can decline by as much as 50% following the harvest, leaving the real interest rate much lower. Larger scale credit ($100 and up) is available through pawning of land or livestock. The implicit interest rate in these arrangements is equal to the productive value of the land or animals which is kept by the lender until the loan is repaid. A traditional futures market also serves a credit function; a farmer may sell a crop before it is harvested at a discounted price. Commercial, state-controlled, banks offer credit for agricultural inputs, as well as larger loans for investment in land, vehicles or equipment.

Savings still tend to be invested in traditional instruments such as livestock and land. Another traditional form of savings is the local "savings lottery"; members contribute savings each week, and each week one member takes the pot to use for larger purchases such as furniture. While this form of savings pays no interest, it does protect members from theft, and substitutes for self-discipline in the same way that "Christmas Accounts" once functioned in U.S. Savings may also be deposited at the subdistrict bank branch which accepts deposits of any amount, but pays interest only on certificates of deposit, with a minimum balance of $500 to $600.

The availability of small credit is an effective tool for increasing demand for durable goods such as clothing and furniture. Likewise agricultural credit plays an important role in facilitating input use. However, the inaccessibility of larger investment loans is a barrier to small enterprise formation by the poor. A government rural development program does provide loans and assistance with marketing for specific small operations such as poultry production; funds for these projects are limited and the projects are targeted to individual villages.

3. Village Institutions

3.1 Families

The family structure has important distributional implications for the village economy. While a nuclear family unit consisting of two parents and their children was the most common in the village, roughly twenty percent of the households fell into other categories, including polygamous families, female headed households and extended families living together.

Polygamy is permitted, and this village included an estimated four percent of husbands with two wives (up to four are permitted, but no one with the inclination was wealthy enough for more than two.) Under these arrangements, the wives and their children live separately, and the husband divides his time and income between his families. The division of a husband's income places an extreme burden on the first wife, and one such wife in the survey sample reported that she could remain in the marriage only because she had inherited land from her parents; otherwise she would be forced (and permitted by local interpretation of Islamic law) to divorce her husband to seek a husband who could support her.

Female headed households may result from death of the male head, although in this village it appeared to be rare for a family to remain in this state: only six percent of the sample households were headed by women, and there was no difference in this rate across household groups.

Young families often live with the bride's parents until they can afford to build their own home, they also live with the bride's parents when the bride delivers her first child even if they have their own home. Surveyed households in such an arrangement stressed as a point of pride that they maintained separate budgets and cooked food separately, although this division is undoubtedly flexible. In another multi-generational living arrangement, older parents sometimes live with their grown children; the parent (often widowed) provides baby-sitting and other household services, and sometimes allows the younger family to farm his or her land. Extended families living together made up fourteen percent of the village households, and were more frequent in the low-calorie group, representing 28 % of those households. Some of these households overlap with the female headed households: almost one-third of the extended families were headed

by widowed daughters living with their widowed mothers. Even when not living together, extended families provide a great deal of mutual assistance in the form of labor and food; gifts of food are common, and while usually not large, may play an important role in assisting poorer members of the family.

Rules for inheritance and divorce leave women in a much better position than in other parts of Asia; daughters inherit land equally with their brothers, and are granted possession of their home in a divorce. Further, families of brides receive bride price payments from the groom's family; these payments go largely toward the expense of the wedding and establishment of the new couple's household. Daughters are hence not seen as a large future expense as they are in South Asia where dowry payments are required from the bride's family.

3.2 Village Government

The official village organizations are generally part of a hierarchy designed by the central government and replicated in every village, although their charitable and labor-organizing functions are older cultural traditions. They provide a vehicle for implementing programs designed and funded by higher levels of government. While they could also serve as organizational structures for locally designed projects (within some limits), their capacity for self-finance is very limited.

Village and higher level government functions are divided as follows: The village government collects land taxes from village residents, which are used to purchase materials for small infrastructure projects. The estimated tax collections for the village during the survey year totaled to five million Rupiah, (3000 $US in 1989), for an average of 5000 Rupiah per household. Village residents contribute volunteer labor for these projects.

The provincial government, working through district and subdistrict governments, is responsible for larger infrastructure funding for roads and school buildings and for salaries for village officials and school teachers. The provincial government collected an estimated four million Rupiah in school fees and spent over 34 million Rupiah for school teacher salaries. Thus village education is heavily subsidized by higher level government, by an average of about 50000 Rp. per primary school age child. Village government salaries

are also subsidized: the salaries of village officials, totaling an estimated thirteen million Rupiah, far exceed the village tax revenues.

The village also has three administrative subvillages, each with an appointed head. These officers are responsible for maintaining lists of residents, keeping track of "black-listed" residents (former members of the Communist or Islamic fundamentalist parties), identifying poor families for targeted public works employment, and initiating requests for emergency assistance.

3.3 Religious Institutions

The local mosques play an important role in village life. Each subvillage had its own mosque, and this building serves not only as a religious gathering place, but also as a meeting place for local discussion. Residents make weekly contribution to the mosques, which are used for furnishing the building with mats and an amplifier, for building new buildings (with matching funds from higher level government), and for emergency assistance for families.

Religious leaders govern marriage and divorce, and have been drawn into cooperation on family planning. In this village prospective brides were sent by mosque officials to the health clinic for an injection, the content of which was unknown to the women, but which was in fact a contraceptive dose good for several months.

3.4 Other Institutions

There is a village chapter of the Family Welfare Organization, composed of women volunteers who assist in the health clinic's visits to the village for nutrition activities, and other activities, such as encouraging women to accumulate savings for small-enterprise capital. In this village there are also wealthy individuals who have no official status in either the village government or the mosque, but who were consulted by officials, and gave powerful motivational speeches on behalf of government policy. These individuals had stronger links to business and culture outside the village (one had children attending college in the U.S.).

4. The Village SAM Structure

The Social Accounting Matrix (SAM) provides a detailed accounting of purchases from each sector

of the economy from every other sector; it expands on the input-output matrix by adding accounts for payments to value added, households, investment accounts and exogenous accounts to show the flow of the funds through the economy in more detail. The SAM presented here divides the village economy into five accounts, labeled Activities (1), Value Added (2), Institutions (3), Investment (4), and Outside (5) (see Table 8). Each column contains purchases from the column's account from other accounts; each cell of a given column represents the payment by the column account to the row account.

In this SAM, activities which are outside the market are included in the SAM as if households purchased these activities from themselves. The volume of these activities is included in the account flows, and households are shown as purchasing these activities from themselves, so that both the imputed expenditure and the imputed income are included in the relevant accounts.

The accounts are divided into subaccounts to reflect the particular activities, factors, institutions, investment patterns and exogenous agents which interact within the economy of this village. The first nine activity subaccounts are agricultural, covering wet rice (1.1), dry rice (1.2), maize (1.3), tubers (1.4), soybeans (1.5), groundnuts (1.6), vegetables (1.7), tree crops (1.8) and livestock and fish ponds (1.9). The next seven activity subaccounts cover non-agricultural household enterprises, including construction (1.10), retail (1.11), small-scale food processing (1.12), large-scale food processing (1.13), light manufacturing (1.14), transportation (1.15), and wood products (1.16). Livestock includes chickens, ducks, goats and sheep, as well as larger animals such as cattle and water buffalo. Almost all households at least raise chickens, and most raise small ruminants as well. Only one sample household owns water buffalo. Construction includes home building as well as construction of small livestock shelters. Retail activities include door-to-door trading, marketing of goods outside the village and small village shops. Small scale food processing includes palm sugar production, as well as production of snacks and meals for sale in local shops. Large scale food processing consists of a mechanical rice milling operation. Transportation includes two minivans which are licensed to run a route to and from the nearest town (Sukabumi). Wood products include both firewood and lumber for local construction and export. The last two accounts, education (1.17) and health (1.18), are

service activities covering teachers and traditional health providers.

The Value Added account is broken down to reflect payments to land (2.1), physical capital (2.2), animal capital (2.3), hired labor (2.4), and profits(2.5). Payments to land are primarily through share-cropping. Payments to physical capital include rental of pesticide sprayers, in the case of agriculture, and rental payments for a minivan in the case of transportation. Payments to animal capital consist of rental payments for animal traction. Payments to hired labor include both wage labor and labor compensated with a share of the harvest, where the harvest share is evaluated at the farm-gate price. Profits represent returns to labor from a household's farm or other enterprise; it also includes returns to the household's own land in the case of agriculture.

Institutions include migrants (3.1), three household groups (3.2, 3.3 and 3.4), endogenous government (3.5), the mosque (3.6) and the plantation (3.7). Migrants include both migrants to other parts of Indonesia (mainly the capital, Jakarta) as well as international migrants to Saudi Arabia and Kuwait. In order to assess the impact of different household transfers on household nutrition, households are disaggregated into three groups according to their dietary energy consumption. Economically, the low dietary energy group (3.2) tends to include the poorest households, while the highest dietary energy group includes medium income households which rely on heavy physical labor for their income, but are successful enough to meet their dietary energy requirements. The methodology for this division is discussed in Section 1.3, and the economic characteristics of the household groups are discussed in Section 2. The exogenous government subaccount (3.5) covers fee-for-services activities, such as education. Since both revenues and expenditures for these services increase with household income, this subaccount is placed in the endogenous section of the SAM, as another village institution. (The remainder of government activities, such as taxation and development expenditures, are reflected in an exogenous government subaccount within account 5.) The religious institution (3.6) collects contributions from households and uses them to build new buildings and to purchase a public address system. In addition, this institution collects fees for religious education and crop prayers and hires from the education sector and from hired labor. The plantation (3.7) hires labor from the village,

rents unplanted land to village residents, and exports cacao to the rest of Indonesia.

The investment account includes investment in physical capital (4.1), animals (4.2), human capital (4.3) savings (4.4), and inventory (4.5). Physical capital includes buildings, vehicles, agricultural tools and large food processing equipment. Human capital includes all expenditures on education. Inventory refers to storage of crops by the households, as well as crops which have not yet been harvested.

Since the village trades with areas in Indonesia as well as the rest of the world, the outside account is disaggregated as well. The first outside subaccount, Local (5.1), encompasses the nearest villages, the second, Indonesia (5.2), covers the remainder of Indonesia and the final account, World (5.3), includes all other countries. In general, local imports are used to meet the gap between consumption and production in some sectors, and local exports are the channel for village surplus. Imports from the rest of Indonesia consist of imported inputs such as agricultural chemicals, and exports to the rest of Indonesia include crop surplus, and lumber. There are no direct imports from the rest of the world to the village, but several migrants from the village send remittances from other countries, such as Saudi Arabia and Kuwait.

5. The Village Survey and SAM Estimation

The data which serve as a basis for the Social Accounting Matrix were collected in a survey conducted during January - March of 1989, in conjunction with a study of economic determinants of intrahousehold food distribution. The survey sample consisted of 49 households drawn from a stratified random sample, so that each of three subvillages were proportionally represented.

The survey included a current recall component in which households were interviewed every 15 days for three months. A second component, spread over interview opportunities, was a retrospective survey in order to obtain enough information to estimate economic flows for a full year. The bi-monthly recalls covered expenditures on inputs and household goods, time allocation of all household members, earnings from employment and household enterprises, and payments for all inputs and taxes. The retrospective survey covered the nine month period preceding the start of the survey; the year represented in the SAM begins in April 1988, following the rice harvest in 1988, and includes special purchases for the Moslem holiday of Idul

Fitri. The end of the rice harvest and Idul Fitri purchases serve as useful boundary points for the village economic cycle, and are more easily remembered by households in reconstructing their economic history.

The nine-month history included information on inputs, production, and labor use for all agricultural plots, changes in livestock and crop inventory, debt, and asset ownership. For histories of earnings from wages and non-farm enterprises, households were asked to describe major changes in this income for the previous nine months, for example, which months they worked at which job, whether enterprises had been started or stopped, and whether prices of intermediates for enterprises had changed. For household expenditures, one form was used to enumerate purchases of clothing and other durables, as well as spending on construction; a separate form was used to record major changes in spending patterns for food and frequent non-food purchases such as lantern fuel and soap. Household expenditures were then totaled as by multiplying three-month expenditures on frequently purchased items by four and adding durable purchases recorded the three month current survey as well as those recorded through the nine month retrospective survey.

Because of the high level of integration with the surrounding economy, the calculation of flows in and out of the village required some assumptions. Imported inputs were assumed to come from the rest of Indonesia, since they are not produced locally. Imports of commodities required to match reported supply and reported consumption were assumed to be imported from the local area, since they are all produced locally. The survey sample covered about 5% of the total village population. Thus, the reported transactions were multiplied by 20 to estimate flows for the entire village. Estimates of plantation sales were not inflated, since this information was available for the whole plantation from the plantation manager.

6. The Estimated Village SAM and Village-Wide Linkages

The estimated SAM (reproduced in Ralston 1992) clearly illustrates the three dominant characteristics of the village economy, which influence all other economic linkages: the economy is very open, production is dominated by agriculture, and household income is dominated by returns to hired labor and family labor.

The linkages within the village economy are first of all constrained by the openness of the village

economy. While exports serve as an important source of income, the high import content of many activities reduces the total impact of exogenous changes on the economy. Overall, imports account for 39% of total final demand, with imported commodities making up 14.6% and imported intermediates making up 24.5%. Rice imports are the most important item in commodity trade, making up 50% of total commodity imports and 52% of final demand for rice. The estimated SAM values indicate the magnitude of the role of agriculture in the economy: the total of final demand for all crops and livestock is 822 million Rupiah ($ 493,000 in 1989) or 48% of final demand in all sectors. Within agriculture, wet rice alone accounts for 14% of total final demand, tubers account for 6% groundnuts for 11% and livestock for 7%. Within non-agricultural activities, the major activities are retail with 19% of total final demand, large scale food processing with 6% and transportation with 8%.

It is also clear from the SAM how important labor is in the economy: returns to family labor and hired labor make up fully 90 % of the village total value added, with returns to family labor accounting for 61% and returns to hired labor accounting for 29%.

An important implication of the large role of agriculture is that agricultural growth is likely to be limited due to land constraints. Wet rice land is already completely utilized in the village, so increases in production can only come from yield increases, which may not be associated with large increases in employment. Dry land share-cropping from the cacao plantation can be increased only temporarily while the plantation is not yet fully planted. In the sections that follow, the linkages among sectors of the village economy are explored in more detail, and their implications for sources of economic growth are discussed.

6.1 Production Linkages

As is typical of agricultural villages, the input-output matrix (columns 1.1 - 1.18, rows 1.1 - 1.18) for the village is sparse, with few linkages between activities : crops activities purchase seeds from themselves, as well as a small amount of dung from livestock, but make no other purchases from other activities. Similarly livestock purchases animals from itself and a small amount of medicine from the local retail sector. Of the non-farm activities, construction is slightly more strongly linked to other village sectors,

purchasing local lumber, woven bamboo walls from light manufacturing and nails from the retail sector. The input-output coefficients associated with these purchases total over 0.35, with purchases of lumber alone representing almost two-thirds of that total. The retail sector purchases from a greater number of other activities, including Rice, Tubers, Tree Crops, Livestock, Small-scale Food Processing, Light Manufacturing, Transportation, and Lumber. However, the total input-output coefficients for purchases from these sectors is only 0.18, even less than the total for construction. Small-scale food processing is the most highly linked sector, purchasing from Rice, Tubers, Groundnuts, Tree Crops and Livestock; the input-output coefficients associated with these purchases total to over 0.51. Of the remaining non-farm activities, purchases from other activities are virtually nil, with only light manufacturing purchasing from Lumber and Firewood.

While agriculture's linkages to other activities are weak, payments to labor are high, as shown in SAM columns 1.1 - 1.18, rows 2.4 - 2.5. Coefficients for payments to hired labor are moderate to high for Rice (0.19), Dry Rice (0.40), Maize (0.16) and Tubers (0.23), while returns to family labor are very high, as a fraction of total output, for all crops other than Rice and Dry Rice, with coefficients between 0.58 and 0.97. Payments to land are highest for Rice, as are payments to animal capital.

Import coefficients for imported commodities (row 5.2) as well as imported inputs (row 5.3) are high for many activities. In addition to the high import ratio for rice mentioned above, other high leakage sectors are transportation and rice milling, which import fuel from the rest of Indonesia.

6.2 Factor Payments and Other Household Income

Columns 2.1 - 2.5 of the SAM show the payments from each factor to household groups; migrant remittances (Column 3.1) and pension payments (Column 5.1, Row 3.3), also contribute to household income. Returns to family labor make up the bulk of these payments, accounting for 61% of total village value added. Returns to hired labor comprise another 29%, adding up to 90% of total value added. Returns to animal capital, physical capital and land make up 3.7%, 3.5%, and 1.4% respectively of total value added. However, only 20% of land payments are captured by other village households, most of the remainder is paid to the local plantation under share-cropping arrangements. Migrant remittances, while not included in village

value added, contribute to household incomes an amount equivalent to an additional 7.2% of village value added. Table 9 shows the proportions of each source out of total household income.

6.3 Household Expenditures and Investments

SAM columns 3.2 - 3.4 give the fraction of household income paid to each sector. Expenditure patterns of each household group reveal some significant differences in linkages to the village economy. The most important distinction of medium calorie households is that, during the survey year, they were the only group with positive savings. While all households invested in physical, human and animal capital and crop inventories, low and high calorie households drew down on assets while medium calorie households accumulated savings over and above investment in other instruments.

After savings and investment are accounted for, the two largest expenditure categories are retail (at 32%, 20% and 40% for low, medium and high calorie households) and rice (at 27%, 12% and 15%), although for high calorie households construction appears as a large item (15%). Other significant categories overall are small scale food processing and livestock. The high calorie group outspends other households on retail, both as an average total and as a fraction of total income. This expenditure category is weakly linked to the village economy, since over 70% of retail volume is imported. The medium calorie group spends more on rice on average, although the low calorie group spends more as a fraction of total income. This category also has a high import content (52%), and the contributions to hired and family labor (19 and 7 percent respectively) are low, but higher than retail.

Household groups' marginal propensities to consume from each sector were estimated from quadratic consumption functions; the impact of changes in income of household groups is more accurately captured by marginal coefficients rather than average coefficients. Because the marginal propensity to consume rice for the poorest households is higher than the average propensity, increases in income for the poorest households not only improve their energy consumption, but have a stronger link to the rest of the village economy through rice production. Further, returns to hired labor from rice accrue more to the poorest households, who in turn consume more rice, thus further linking this group to the village economy.

Columns 4.1 - 4.6 of the SAM show the distribution of each investment account. While the high savings rate of medium calorie households (30%) is clearly desirable, these savings have limited impact on the village economy, since they are deposited in a bank outside the village. These funds are available to some extent for loans to village residents, but profits from those loans do not stay in the village. Of investment accounts, the financial subaccount thus represents an important leakage from the village, when compared to other savings instruments and investments such as crop inventory, and livestock, which purchase from the village.

6.4. Village Exports and Other Exogenous Accounts

Columns 5.1 - 5.5 of the SAM show purchases by each exogenous account, including the government, the plantation, local exports, exports to the rest of Indonesia, and exports to the rest of the World.

Total commodity exports from the village to the local area and to the rest of Indonesia sum to 537.7 million Rupiah (about $322,000 in 1989). This amounts to 32 % of total final demand. The major export activities are groundnuts (with 29% of commodity exports), large scale food processing (with 20%), transportation (with 23 %), and tubers (with 14%). Other smaller exporting sectors include maize, soybeans, retail, lumber, and health. An additional 17 million Rupiah enters the village as remittances from migrants in the rest of Indonesia, and another 106 million Rp. is remitted from migrants to the rest of the World.

The plantation hires village labor, as does the government. The government also pays pensions to households of retired soldiers; these payments are shown going directly to the account for medium calorie households, the only group receiving such pensions. The linkages between the exogenous accounts themselves include the estimated exports of the plantation to the rest of Indonesia, as well as payments to balance exogenous accounts. The exogenous government allocates 34% of its receipts from the village to subsidize the endogenous fee-for-service government account to cover the gap between fees and services. Local imports from the rest of Indonesia balance the gap between local imports and local exports. The rest of Indonesia imports from the rest of the World. Finally, the exogenous government requires a balancing payment from the rest of Indonesia to cover the gap between taxes collected and payments to hired labor,

pensioners and the endogenous government. The export patterns point to some of the difficulties in stimulating growth in an economy structured around supplying urban centers: The scope for increases in agricultural exports is limited by land constraints. In this village, dry land for maize and tuber production will available for a few years until the plantation is fully planted to cacao, and then production increases will be limited to yield increases. Non agricultural exports such as large scale food processing and transportation are capital intensive and have high import contents. These sectors are controlled by wealthier households with expenditure patterns with higher direct and indirect leakages.

Prospects for growth are more likely to come from increased hiring by the plantation and from increased migrant remittances. The village's proximity to Jakarta gives residents access to a large market for unskilled labor in construction, although residents from other villages will be competing for the same jobs. Import substitution may also provide a source of growth. The village is currently exporting wood and importing light manufactures, losing the additional value added which could be captured by increasing production of light manufactures such as furniture to substitute for imports.

7. Simulations

7.1 Simulation Methodology

The present section looks at how market changes and government interventions impact on a local level, village economy. The technique for these simulations is to construct a vector of changes in the exogenous account (ΔX), and pre-multiply this vector by an appropriate multiplier matrix to derive a vector of changes in the total final demand for each sector (ΔY).

Three modifications are made to the standard SAM multiplier technique in order to more accurately reflect the interactions in the village economy.

7.1.1 Marginal Expenditure Coefficients

First, the average expenditure coefficients in the household column of the SAM were replaced by marginal coefficients These coefficients more accurately reflect the impacts of incremental income changes on household expenditures. Pyatt and Round (1979) refer to the coefficients obtained by dividing each cell

by the column total as the "accounting" coefficients (A), and the resulting multiplier ($(I-A)^{-1}$) as the accounting multiplier. They refer to the multiplier obtained from a coefficient matrix containing marginal coefficients for some or all of the accounts (denoted in their work as C) as the "fixed price multiplier". We assume (as do Pyatt and Round) that average coefficients are close enough to marginal coefficients for accounts other than the household accounts. The marginal coefficients for each household group were computed from quadratic regressions based on individual household data.

7.1.2 Constraints on Agricultural Production and Exogenously Determined Output Changes

Second, some production activities were assumed to be constrained by land limitations. We assumed that, with existing technologies, wet rice, soybeans, groundnuts, vegetables, tree crops, and wood were constrained at their initial values. Wet land limitations impact not only on wet rice, but also on soybeans, vegetables and groundnuts, which are grown on wet land during the dry season. Tree crops and wood were constrained because supplies cannot be increased in the period relevant to a SAM experiment. When treating agriculture as constrained, the total output of constrained accounts is exogenous, and the exports (or imports) required to rebalance the SAM are endogenous.

The main problem when a sector is constrained is to ensure that the SAM rebalances, so that the leakages from the SAM equal the injections. When the SAM contains only one exogenous account, the conventional multiplier technique results in an automatic rebalancing of this account following an injection, because the endogenous accounts are automatically rebalanced. Once the SAM contains one or more large constrained (and hence exogenous) accounts as well one or more "outside" accounts (such as Rest of the Country and Rest of the World) the multiplier technique will leave the exogenous accounts rebalanced in the aggregate, but not individually, and these imbalances are too large too ignore[1].

Two closely related approaches to rebalancing the constrained accounts individually are used by

[1] Individual exogenous accounts will be imbalanced even if there are no constraints, as long as there is more than one exogenous account. This is often the case in village SAMs which have at least both a Rest-of-Country and Rest-of-World account, well as other Government and other "outside" accounts. Changes in these accounts are unlikely to balance at the village level. However, because these accounts are relatively small, the imbalances are usually ignored. See Subramanian and Sadoulet, p. 148 for a good discussion of this.

Subramanian and Sadoulet (1990) for a village SAM from India, and Lewis and Thorbecke (1991) for a village in Kenya. The differences in these approaches may be summarized as follows: Subramanian and Sadoulet (1990) present an algebraic method for rebalancing their particular SAM, which includes both activity and commodity accounts, and which includes only two non-agricultural exogenous accounts. Lewis and Thorbecke use a more general matrix algebraic solution for a SAM which does not separate commodity and activity accounts. Their approach (taken from Miller and Blair 1985) gives an explicit expression for the multiplier relating endogenous changes in unconstrained sector output and agricultural exports, and exogenous changes in unconstrained sector exports and agricultural output. This method automatically rebalances the constrained accounts by solving for the changes in agricultural exports required to meet agricultural demand.

To obtain their solution, partition the output change vector (ΔY), the "outside" account change vector (ΔX), and the marginal coefficient matrix (C) into non-constrained (subscript n) and constrained accounts (subscript c). Based on the fact that the sum of changes in intermediate and "outside" demand must sum to total change in output for both non-constrained and constrained accounts, the formula for this solution is:

$$\begin{bmatrix} \Delta Y_n \\ \Delta X_c \end{bmatrix} = \begin{bmatrix} (I - C_{nn}) & 0 \\ -C_{nn} & -I \end{bmatrix}^{-1} \begin{bmatrix} I & C_{nc} \\ 0 & -(I - C_{cc}) \end{bmatrix}$$

$$= \begin{bmatrix} (I - C_{nn})^{-1} & (I - C_{nn})^{-1} C_{nc} \\ -C_{cn}(I - C_{nn})^{-1} & (I - C_{cc}) - C_{cn}(I - C_{nn})^{-1} C_{nc} \end{bmatrix}$$

The rebalancing problem also arises when supply changes are made exogenously to accounts that are not actually constrained by land limitations. If the simulation specifies a change in supply due to technology or price rather than demand, than this change is exogenous; changes in the outside account required to rebalance then become endogenous.

For simulations where the constrained sector output changes, we use the Lewis and Thorbecke (Miller

and Blair) methodology. In addition, we use Lewis and Thorbecke's methodology in simulations which exogenously change output in sectors which are not constrained; we treat them as constrained at their present output level and then construct the multiplier as in Equation 2.

For simulations in which output of the constrained sector does not change, we use a simpler algorithm which gives identical results. We modify the coefficient matrix so that it contains zeros in the columns of the constrained accounts, reflecting the fact that additional supply can only be met by imports. The partitioned coefficient matrix looks like:

$$\begin{bmatrix} C_{nn} & 0 \\ C_{cn} & 0 \end{bmatrix}$$

Since output in the constrained sectors does not change, our solution for changes in output in the non-constrained accounts and changes in net exports in the constrained accounts looks like:

$$\begin{bmatrix} \Delta Y_n \\ \Delta X_c \end{bmatrix} = \begin{bmatrix} (I - C_{nn})^{-1} & 0 \\ -C_{cn}(I - C_{nn})^{-1} & I \end{bmatrix} \begin{bmatrix} \Delta X_c \\ 0 \end{bmatrix}$$

The change in output for the non-constrained sectors ΔY_n is equal to $(I - C_{nn})^{-1} \Delta X_n$. The change in net exports in the constrained accounts, ΔX_c is equal to $-C_{cn}(I - C_{nn})^{-1} \Delta X_n$. These results are identical to the Lewis and Thorbecke result for the case where the constrained sector output does not change, so that $\Delta Y_c = 0$.

7.1.3 Standardization of Experiments

Third, the experiments were standardized, in order to make them comparable to each other. In principle, there are two ways in which one can standardize experiments. One can either make the budgetary cost to the government comparable, or one can make the injection into the village comparable. Since our experiments involve both market-induced change and government-intervention induced change and since market-induced changes carry no direct budgetary cost, at least in principle, we chose to standardize the experiments to the same total injection. We performed the price experiment, in which prices for rice and maize were allowed to rise to world-market levels, first and then standardized all other experiments so that

they entail the same total injection into the village. As a result, only the form of the injection varied among experiments. The total injection we applied in each of our simulation experiments is 16 million Rupiah ($96,000 in 1989), or 2.2% of village value added.

7.2 Simulation Results

The first two simulations illustrate the effects of growth in the surrounding economy and an increase in the prices of commodities exported from the village. The next three simulations focus on government programs, such as public works employment, small enterprise loans and increased use of high yielding varieties for rice. The design of the simulations and their results are discussed in more detail below.

7.2.1 Market Change Simulations

Growth in the Indonesian Economy: It is assumed that the growth of the overall economy impacts on the village by increasing its exports. To perform this simulation we increase outside demand for all nonconstrained exporting sectors by 3.4%. These include maize, tubers, retail, high food-processing, transport, health, migrant remittances, and labor hired by the nearby plantation. The results of this simulation are summarized in column 2 of Table 10. There is a 0.91% increase in village production, with the largest percentage increases in high food-processing, transport, and tubers, reflecting the increase in exports of these activities. These increases in production generate almost 1% increase in village value added, with the largest percentage increase in payment for physical capital, followed by family and hired labor. The increases in value added are distributed to households. The total increase in household incomes is 1.20%. The distribution of income gains is somewhat regressive: the low-calorie households benefit least but the high calorie (middle income) households, rather than the medium calorie (high income) households, benefit most. This is because the low calorie households have no marketable surplus of crops to export, do not participate in high-capital enterprises, and are the least likely to send migrants out of the village.

Price Increase Simulation: This simulation (Table 10, col 3) allows the prices of groundnuts and maize to rise by 8 % and 25 % respectively. In the case of maize, this price increase would bring the price up to the world price, after adjusting for transport and trade margins, based on the Indonesian National SAM

for 1985. In the case of groundnuts, the price increase would require an increase in the world price, since the price of groundnuts is already at the world market level.

The resulting change in production was modeled as a combined injection: a supply response, which was modeled as an exogenous output change in the maize and groundnuts column, and a pure price effect on the net production of each household group, modeled as injections into household incomes. The supply responses assumed a supply elasticity for maize of 0.1 and for groundnuts of 0.2. The income equivalent of the price increase was computed for each crop by multiplying the price difference by each household's net production, calculated as profits plus in-kind hired labor earnings less household consumption.

Total household incomes rise over 50% more than in the previous experiment. However, the increase in market price leads to an increase in per-household income which is distributed so that the poorest household gain least; the absolute per household income gains of the medium and high calorie households are nearly the same, at 26,000 and 25,500 Rp respectively, while the gain to low calorie households is only one quarter as great, at 4000 Rp. The increase in household income due to an increase in agricultural prices is thus distributed in a regressive manner. This is not surprising, since the poorer households produce less.

7.2.2 Government Intervention Simulations

All government programs simulated in these experiments are assumed to be targeted so as to favor the poorer households.

Public Works: This simulation (Table 10, col 5) assumes that the government initiates a targeted public works program. This is modeled as an income injection. Two thirds of the total increase in income from the public works program is assumed to accrue to the poorest, low calorie households; one third is assumed to accrue to the high calorie, medium-income households. Implicitly, we assume in this experiment that there is considerable underemployment in this village, so that the increase in labor for public works does not reduce the income from hired labor.

Household incomes in the village increase by almost two percent. Due to the targeting of public works hiring, the poorest households benefit over twice as much as the medium households and nearly ten

times as much as the richest households in per household absolute terms.

Small Enterprise Promotion: The government is assumed to lend money to poor farmers for poultry and furniture-making (Table 10, column 6). It is assumed that half the total increase in output value is in the livestock and poultry sector and half is in light manufacturing. These changes are modeled as exogenous supply shifts to these accounts. The marginal coefficients for distribution of returns to family labor and to animal capital were changed to reflect the targeted nature of the program.

This program raises village production and value added by twice as much as the public works program, but has only half the impact on household incomes; this reflects the fact that the public works program injects income directly to the households, while the enterprise projects involve considerable leakage through imported inputs. The targeted small-enterprise program is relatively even more effective in redistributing income to the poor, since the impact on the middle calorie groups and low calorie groups is almost nil.

Crop-Technology Simulation: This simulation extends the use of high-yielding rice varieties (HYV) among poor households (Table 10, column 7). Twenty eight percent of poor households already use HYV. This is modeled as exogenous changes in rice output and payments to land, animal capital and family labor. The technology vector in the SAM is amended to reflect the input use pattern of the village households that use HYV. In addition, the targeted nature of the program is reflected in new marginal shares for the distribution of profits among household groups.

There is very little income leakage to the higher-income groups, so that the entire benefit of the program accrues to the poor even after the indirect effects of the program are taken into account. The income of the low calorie households rises by almost 6%. The increase in total value added is the highest out of the three government programs, but the impact on total household income falls between the other two simulations, at 1.11%.

7.2.3 Government vs. Market Programs

To compare the programs, they were scaled so that the total injection generated by the two market-based programs is the same as the total injection generated by the three government-intervention programs.

Each combined program generates the same total injection as the individual programs. The results are reproduced in Table 10, columns 4 and 8. In the case of the growth and market simulations, the combined program gives results that are equal to the average of the two component simulations. The results of the combined government program, however, are calculated by adding the results of scaled down versions of each simulation. This is required because the SAM coefficients are adjusted in the crop technology simulation based on the number of households using high yielding varieties; thus, the results of the one-third scale simulation are not equal to one-third of the original results. The government programs have a larger production effect than the market programs but they also have a smaller impact on the total household income of the village.. The distributional effects of the two types of programs are also quite different. On the aggregate, the market-based programs are quite regressive while the government programs are quite progressive, in both relative and absolute terms. Thus, our simulations suggest that the choice of market-based vs government-induced programs also involves a tradeoff between income-growth and distribution.

8. Conclusion

The village Social Accounting Matrix provides a useful framework for analyzing the linkages among sectors of the economy. In particular, the SAM decomposes the sources of income for households of different types, and the likely mechanisms for increased incomes for each type of household, through interactions among activities, factors and households. While the village is a fairly open economy, it is by no means irrelevant as an economic unit, since the majority of labor hired for agriculture and other enterprises comes from within the village.

The SAM highlights some of the difficulties in stimulating growth in an economy structured around supplying urban centers: the scope for increases in agricultural exports is limited by land constraints. In this village, dry land for maize and tuber production will available for a few years until the plantation is fully planted to cacao, and then production increases will be limited to yield increases. Non-agricultural exports such as large scale food processing and transportation are capital intensive and have a weaker multiplier effect on village value added.

We have presented simulations of several village growth strategies, including market-oriented strategies and government investment strategies. We estimated the effects of each strategy on income of three classes of households, with household divisions based on average dietary energy consumption. We also estimated the effect of each strategy on total village production, total imports, total value added and total household income. All simulations were scaled to the same level of total injection into the economy.

Simulations of market oriented village growth, through growth of the surrounding economy and increases in prices, give the greatest benefits to the High Calorie (middle-income) households. Growth in the rest of Indonesia stimulates exports from the village; the major export sectors are controlled by Medium Calorie (high-income) and High Calorie households. Benefits from price increases for rice and maize accrue to these groups as well, because these groups are net producers of these crops, whereas the Low Calorie (low-income) households are net consumers. Government investment programs (public works employment, small enterprise credit and increases in use of high yielding rice varieties), give much higher benefits to the Low-Calorie households. This is to be expected, since these interventions are specifically targeted to the Low-Calorie group.

While total village production is higher under the targeted simulations, total value added is higher under the market simulation. Thus, there appears to be a trade-off between growth and distribution. However, comparing individual simulations suggests more mixed results; the village value added increase resulting from the crop technology simulation is higher than that for the growth simulation. This suggests that some targeted strategies, particularly those aimed at relaxing the output constraints on agriculture, can perform well both for growth and distribution.

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Table 1. Daily Energy Intake by Household Group			
	Percent of Sample (%)	Average (Kcal/day)	Range (Kcal/day)
Low Calorie Households	29	1823	1278 - 2211
Medium Calorie Households	35	2478	2282 - 2649
High Calorie Households	36	3379	2717 - 4776

Table 2. Village Demographics			
	Low Calorie Households N = 14	Med Calorie Households N = 17	High Calorie Households N = 18
Family Size	5.3	4.1	2.9
Percent of Households:			
Female Headed	6.7	5.5	5.2
Heads under 40	71	47	39
Heads over 40	29	53	61
In Lowlands	14	35	50
In Moderate Uplands	57	30	33
In Isolated Uplands	29	35	17

Table 3. Consumption as a Fraction of Own Production				
	All Households	Low Cal Group	Med Cal Group	High Cal Group
Rice				
Marketed Surplus Ratio (%)	0.77	0.33	0.85	0.8
Self Sufficiency Ratio (%)	1.39	0.65	1.65	1.58
Self Supply Ratio (%)	0.32	0.44	0.24	0.32
Non-Rice Crops				
Marketed Surplus Ratio (%)	0.94	0.91	0.97	0.92
Self Sufficiency Ratio (%)	6.62	2.52	10	6.62
Self Supply Ratio (%)	0.39	0.23	0.35	0.52
See text for explanation of indicators.				

Table 4. Sources of Labor Income by Household Group (percent)			
	Low Cal Households	Med Cal Households	High Cal Households
Family Labor (Own Enterprise)			
Rice	1.5	5.6	14.9
Non-Rice	11.8	27.7	36.5
Livestock	4	1.3	11.5
Low Capital	11.2	4.3	14.8
High Capital	0	14.9	0
Hired Labor			
Agriculture	6.1	1.5	3.1
Low Wage	25	13.8	1.5
High Wage	26.5	10.9	5.8
Government	0	20.1	11.8
Total (1000 Rp)	561.4	1129.2	717
See text for explanations of labor categories.			

Table 5. Proportion of Labor Hired by Household Group			
	Low Calorie Households	Medium Calorie Households	High Calorie Households
Agriculture	0.08	0.37	0.55
Wood	1	0	0
Retail	0.81	0.19	0
Construction	0.06	0.23	0.71

Table 6. Average Land Owned, Rented and Controlled (hectares)			
	Low Calorie Households	Medium Calorie Households	High Calorie Households
Wet Rice Land			
Owned	0.04	0.15	0.1
Rented/Share-cropped	0.02	0.03	0.2
Total Controlled	0.07	0.18	0.29
Dry Land			
Owned	0.23	0.38	0.29
Rented/Share-cropped	0.1	0.18	0.22
Total Controlled	0.33	0.56	0.51

Table 7. Distribution of Land Owned and Farmed (percent)								
	Low Calorie Households		Medium Calorie Households		High Calorie Households		All Households	
Wet Rice Land								
	Owned	Farmed	Owned	Farmed	Owned	Farmed	Owned	Farmed
> 1 Ha	0	0.0	5.9	5.9	0	5.6	2	4.1
0.25 - 1 Ha	0	7.1	0	5.9	22.2	16.7	8.2	10.2
0.1 - 0.25 Ha	21.4	21.4	29.4	41.2	16.7	27.8	22.4	30.6
0.05 - 0.1 Ha	14.3	14.3	11.8	11.8	11.1	22.2	12.2	16.3
< 0.05 Ha	14.3	28.6	29.4	23.5	16.7	11.1	20.4	20.4
Own no land	50	28.6	23.5	11.8	33.3	16.7	34.7	18.4
TOTAL	100	100	100	100	100	100	100	100
Dry Land								
	Owned	Farmed	Owned	Farmed	Owned	Farmed	Owned	Farmed
> 1 Ha	0	7.1	11.8	11.8	11.1	16.7	8.2	12.2
0.25 - 1 Ha	21.4	35.7	5.9	41.2	33.3	61.1	20.4	46.9
0.1 - 0.25 Ha	42.9	42.9	11.8	29.4	16.7	22.2	22.4	30.6
0.05 - 0.1 Ha	0	0.0	17.6	5.9	11.1	0.0	10.2	2.0
< 0.05 Ha	14.3	14.3	17.6	5.9	11.1	0.0	14.3	6.1
Own no land	21.4	0.0	35.3	5.9	16.7	0.0	24.5	2.0
TOTAL	100	100	100	100	100	100	100	100

Table 9. Household Incomes by Source (%)			
	Low Calorie Households	Medium Calorie Households	High Calorie Households
Factor Incomes			
Land	0.5	0.2	0.4
Physical Capital	0	6	0
Animal Capital	2.3	0.2	5.2
Hired Labor	60.7	24.1	12.1
Family Labor	31.8	53.2	59.6
Transfers			
Migrant Remittances	4.8	6.2	22.7
Pensions	0	10.1	0
Average (1000 Rp)	523.7	1535.6	1020.8

Table 8. Social Accounting Matrix Outline

	1. ACTIVITIES	2. FACTORS	3. INSTITUTIONS	4. CAPITAL ACCOUNTS	5. OUTSIDE	TOTAL
	1.1 ... 1.18	2.1 2.2 2.3 2.4 2.5	3.1 3.2 3.3 3.4 3.5 3.6 Migr Households Rel End Gvt	4.1 4.2 4.3 4.4 4.5 4.6 Phys Land Human Anim Finan Invent	5.1 5.2 5.3 5.4 5.5 Ex. Govt Plant Local Indonesia World	
1. Activities 1.1 Rice 1.2 Dry Rice 1.3 Maize 1.4 Tubers 1.5 Soybeans 1.6 Groundnuts 1.7 Vegetables 1.8 Tree Crops 1.9 Livestock/Fish 1.10 Construction 1.11 Retail 1.12 Low-cap Fdproc. 1.13 Hi-cap Fdproc. 1.14 Light Mfg. 1.15 Transportation 1.16 Primary resources 1.17 Education 1.18 Health	(1,1) Village Input-Output Table		(1,3) Consumption Teachers	(1,4) Phys Cap. Inv. Anim Purch. Crop Stocks	(1,5) Local Exports ROI Exports	(1,6) Total Sales
2. Factors 2.1 Land 2.2 Physical Capital 2.3 Animal Capital 2.4 Hired Labor 2.5 Family Labor	(2,1) Value-added in Village Production		(2,3) Relig. Labor		(2,5) Civil Servants Plant. Labor Local Labor	(2,6) Total Land, Labor and Capital Value Added
3. Institutions 3.1 Migrants 3.2 Low calorie Households 3.3 Medium calorie Households 3.4 High calorie Households 3.5 Religious 3.6 Government		(3,2) Payment to Households for Factors Use of Govt land	(3,3) Migr. Rem. to HH Rel.tax Govt.tax	(3,4) Land Purch Saving/ Borrow Educ Expdr.	(3,5) ROI Mig. Remittance ROW Mig. Remittance Pensions	(3,6) Total Migr. Remittance Total Household Income Total Receipts
4. Capital 4.1 Physical 4.2 Land 4.3 Human 4.4 Animal 4.5 Inventory 4.6 Financial			(4,3) HH Sav HH Human Cap. Sav			(4,6) Total saving
5. Outside 5.1 Exogenous Government 5.2 Plantation 5.3 Local 5.4 Rest of Indonesia 5.5 World	(5,1) Local Imports ROI Imports	(5,2) Use of Plant. land Payments to Outside factor owners	(5,3) HH local imports HH ROI imports		(5,5) ROI-> town World -> ROI	(5,6) Local Imports ROI Imports
6 Total	Total Payments	Tot Factor Payments	Mig Rem. HH exp Tot Rel and Gvt	Total Investment	Tot Ex Gvt Tot Plant Tot local Tot ROI Tot ROW	Row = Col

Table 10. Market and Government Simulations (% change)

Sector	Base (Million Rp)	Market			Government			
		Growth	Price Increase	Average	Public Works	Enterprise Loans	Crop Technology	Average
1.1 Rice	239	0.00	0.00	0.00	0.00	0.00	3.55	1.18
1.2 Dry Rice	49	1.55	2.22	1.89	4.90	2.00	3.16	3.47
1.3 Maize	14	1.48	2.50	1.99	0.00	0.00	0.00	0.00
1.4 Tubers	108	2.98	0.28	1.63	0.48	0.18	0.30	0.33
1.5 Soybeans	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6 Groundnuts	189	0.00	1.46	0.73	0.00	0.00	0.00	0.00
1.7 Veg etc	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8 Tree Crops	52	0.00	0.00	0.00	0.00	0.00	0.00	0.15
1.9 Livestock	121	1.2	1.65	1.43	3.26	6.59	2.06	4.47
1.10 Construction	80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.11 Retail	334	0.24	0.00	0.12	0.00	0.00	0.00	0.00
1.12 Low Food Proc.	81	1.43	2.11	1.77	3.96	1.51	2.45	2.73
1.13 High Food Proc.	110	3.38	0.00	1.69	0.00	0.00	0.00	0.00
1.14 Light Mfg.	10	0.03	0.00	0.01	0.00	74.49	0.00	24.83
1.15 Transportation	127	3.24	0.00	1.62	0.00	0.00	0.00	0.00
1.16 Wood	94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.17 Education	40	0.01	0.01	0.01	0.01	0.00	0.20	0.07
1.18 Health	1	2.53	1.08	1.80	-13.92	-8.26	-11.44	-11.69
2.1 Land	21	0.18	0.25	0.21	0.19	0.08	6.69	2.31
2.2 Physical Cap.	31	3.15	0.00	0.58	0.00	0.00	0.09	0.03
2.3 Animal Cap.	33	0.59	0.81	0.70	1.61	3.19	5.94	3.81
2.4 Hired Labor	259	0.87	0.24	0.55	0.32	0.11	0.83	0.43
2.5 Family Labor	543	0.89	0.71	0.80	0.36	0.89	1.41	0.94
3.1 Migrants	122	3.40	0.00	1.70	0.00	0.00	0.00	0.00
3.2 Low-cal. HH	146	0.99	0.78	0.89	7.62	4.11	5.90	6.12
3.3 Med-cal. HH	522	1.09	1.70	1.39	0.27	0.03	0.23	0.18
3.4 High-cal. HH	367	1.44	2.50	1.97	1.79	0.01	0.44	0.75
3.5 Religious	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.6 Endogenous Govt.	39	0.01	0.01	0.01	0.01	0.00	0.20	0.07
4.1 Phys Inv.	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.2 Land Inv.	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.3 Human Inv.	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.4 Animal Inv.	275	1.52	2.18	1.85	4.80	1.96	3.10	3.40
4.5 Inventory	825	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.6 Financial	344	13.94	21.77	17.86	3.50	0.35	2.99	2.32
Total Production (base prices)	1709	0.91	0.48	0.70	0.58	1.07	0.86	0.88
Total Production (new prices)			1.54	1.22				
Total Value Added (base prices)	889	0.94	0.54	0.74	0.38	0.70	1.50	0.90
Total Value Added (new prices)			2.40	1.76				
Total Household Income	1036	1.20	1.85	1.53	1.85	0.60	1.11	1.22