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Prospects for Equitable Growth in Rural Sub-Saharan Africa

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and
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The prospects for equitable growth in African agriculture are good as long as governments monitor land rights, upgrade rural infrastructure, foster farm-nonfarm linkages, and focus agricultural research on crops and technologies important to smallholders.

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Improving agricultural technology in Africa has been difficult because of the continent's fragile soils, its patchwork of climates, its poor potential for widespread irrigation, and its weak institutions and infrastructure. So, when advances do occur, they are likely to be limited to specific zones, worsening the regional inequalities in and between countries.

What, then, are the prospects for equitable agricultural growth in regions that benefit from new technological advances? They are good for several reasons. The distribution of land is no worse in Africa today, and the distribution of income is better, than in Asia before the green revolution. Moreover, there are few landless people in Africa. In addition, the technical packages in the field and the pipeline are scale-neutral, giving no edge to large farms over small ones. For example, improved seeds are suitable for small-scale applications, as are changes in cultivation that conserve moisture. And Africa's social institutions support people with a safety net and, through extended families, redistribute income gains — while nonfarm activities often provide an important source of income for the poor.

Equitable growth, though possible, is not assured, however. Several research and policy initiatives will be needed to capitalize on the potential.

- Research must continue to focus on technologies appropriate for small farms and on crops, especially food crops, important to the poor.

- Policymakers must no longer withhold assistance from two categories of nonfarm activity that are particularly important for equitable rural growth — service enterprises and nonfarm activities of women.

- Rural infrastructure has to be upgraded to permit the widespread dissemination of technical advances and to enable the nonfarm sector to benefit from the increased demand emanating from rising agricultural consumption and production.

- Governments will need to monitor land tenure and tenancy to ensure that landlords and large farms do not monopolize the fruits of technological advance.

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PROSPECTS FOR EQUITABLE GROWTH IN RURAL SUB-SAHARAN AFRICA

by

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I. Introduction

A growing food crisis confronts Sub-Saharan Africa, as rapidly growing population, low productivity in agriculture and an absence of any widespread technological advance in agriculture conspire to reduce food production per capita. The situation is reminiscent of Asia in the mid-1960's, when concerns over food availability motivated major investments in agriculture. In Asian, the investments led to Green Revolution technologies - improved wheat and rice seeds which, in combination with irrigation and fertilizers, generated unprecedented rates of growth in foodgrain production. Despite this success, many early analysts worried that the new technology might worsen the relative distribution of rural incomes; some even argued that it could lower absolute incomes of the poor (Griffin, 1974; Cleaver, 1972; Frankel, 1971; Grabowski, 1979; Harriss, 1977; Hewitt de Alcantara, 1976). But recent work shows these fears were not generally realized. While the new technologies did lead to widening regional disparities, they proved scale neutral in the irrigated regions where they were effective (Ruttan, 1977; Pinstrup-Andersen and Hazell, 1985; Blyn, 1983; Lipton, 1985; Hazell and Ramasamy, 1988; Shand, 1987; Hayami, 1981 and 1982; and Kalirajan and Shand, 1983).

A Green Revolution will be much more difficult to achieve in Africa because of the continent's fragile soils, its patchwork of highly varied,

micro-climates, the lack of widespread irrigation potential, and the typically much weaker institutional and physical infrastructure. Advances are likely to be effective only in limited geographic zones - as with hybrid maize in parts of East Africa - and will therefore exacerbate regional inequities both within and among countries. But what impact will the new technologies have on income inequality within the regions that benefit? And what policy interventions will be most critical in advancing equitable growth?

This paper aims to answer these questions, examining the prospects for equitable, agriculturally led growth in Sub-Saharan African. In making such an assessment, we move rapidly into the unenviable [illegible] of economic forecasting; because in the few instances where new agricultural technology has been introduced in Africa, rigorous before-and-after measurement of rural income profiles has not been attempted. But the rich body of Asian evidence has led to considerable progress in identifying the key factors affecting the equity of new agricultural technologies. This paper combines these insights with cross-section studies of the structure of rural African economies to make inferences about the potential for equitable rural growth.

The paper begins with a review of the current extent of inequality in rural Africa. It then examines, in succession, three major consequences of improved agricultural productivity that affect the level and distribution of rural income: a) changes in food prices; b) direct income affects that arise within the agricultural sector; and c) indirect income effects that arise in the rural nonfarm economy as a consequence of agriculture's growth

linkages. In concluding, it highlights policies that will bear closest scrutiny by those concerned with promoting equitable growth in rural Africa.

II. Inequality in Rural Africa

Absolute incomes in rural Africa remain heartbreakingly low, with rural-urban income differentials ranging between 1:2 and 1:9 (ILO, 1982; Ghai and Radwan, 1983). Yet the rural areas enjoy a reputation for equitable distribution of the low incomes available (Ghai and Radwan, 1983). Displaying available Gini coefficients of rural income distribution, Table 1 tempers this "poor-but-equal" perception slightly. Although the bulk of the rural income Gini's lie in the moderate range of .3 to .4, Botswana and Zambia's .5 reflects a decidedly skewed rural income structure. Overall, the rural incomes do remain more equitably distributed than those in urban Africa; but some worry that both absolute poverty and inequity may be worsening over time in rural areas (Ghai and Radwan, 1983; Gahi and Smith, 1987).

The distribution of rural African income compares favorably with that of pre-Green-Revolution Asia. Because of India's highly unfavorable income distribution, Asia maintains a weighted average rural income Gini of .43 compared to a .34 aggregate for rural Africa (Table 1). This suggests that Africa will distribute new agricultural technology into a rural economy with substantially greater income equality than was present in Asia prior to the advent of the improved agricultural technologies in the mid-1960's.

Likewise, land appears to be at least as equitably distributed in Africa as in pre-Green-Revolution Asia. Although Africa's high Gini coefficients of land distribution belie the popular image of egalitarian, communal land allocation, the figures from West, East and Central Africa lie generally below those prevailing in Asia and far below those of Latin America (Table 2). As a region, only Southern Africa - with its history of white settlers and large estates - retains a land distribution more skewed than that of Asia. Complicating these comparisons, the frequent exclusion of large estates from African agricultural censuses may bias the African Gini coefficients downward, while the common exclusion of landless households operates in a contrary direction (see Table 2, note a). Amidst the uncertainty, estimates of landlessness isolate the clearest difference between land availability in Africa and Asia, placing landlessness at 6.5% in Africa compared to about 15% in Asia and Latin America (Sinha, 1984).

In sum, as Africa works to develop more productive agricultural technology, it begins from a base at least as equitable as did Asia in the early Green Revolution era. Rural income distribution, probably land distribution, and almost certainly the extent of landlessness remain more favorable in Africa today than in Asia during the mid-1960's.

III. Price and Consumption Effects of New Agricultural Technology

Introduction of new agricultural technology, apart from its income effects, will increase African food production, potentially benefitting consumers in two ways. First, it may lead to lower food prices. These benefit the poor in particular because of their higher percentage

expenditure on basic foods. In Asia and Latin America, this price effect proved enormously beneficial to both rural and urban poor (Scobie and Posoda, 1978; Pinstrup-Andersen, 1979; Akino and Hayami, 1975; Ruttan, 1977). But the price effect may prove weaker in Africa given its greater share of imports in total food consumption (Paulino, 1986) and the potential that, at least for some commodities, increased production may simply substitute for imports without affecting price.

Second, if the improved technology leads to increased production on small farms, it also increases the physical supplies of food available to a large segment of the rural poor, the food-deficit farm households. This in-kind income entitlement is especially important in Africa given the continent's imperfect distribution system - its poor rural infrastructure, consequently high transport and marketing margins (60% higher than in Asia), and wide seasonal swings between harvest and dry season food prices (Delgado, 1984; Ahmed and Rustagi, 1984; Sherman, Shapiro and Gilbert, 1987; Berg, 1977).

IV. The Direct Effects

Whether new agricultural technology will lead to an equitable distribution of resulting increases in farm income will depend on four key factors.[1]

1. Type of technology.

The scale neutrality of Asian Green Revolution technologies contributed substantially to their successful, widespread adoption. Any farmer, regardless of farm size, could profitably adopt the improved wheat and rice

packages so long has he or she had access to required inputs - seed, fertilizer, pesticides and irrigated land. So incremental farm income increased in equal proportion for farms of all size, with little effect on relative farm incomes (Ruttan, 1977; Pinstrup-Andersen, 1982; Blyn, 1983; Hazell and Ramasamy, 1988).

In contrast, many African countries - especially in East and Southern Africa - have encouraged large, mechanized, commercial farming technology which, because of high investment requirements and scale economies, is not easily accessible to the continent's great mass of small farms. Through subsidized credit, a large-farmer bias in research and extension, and in some cases establishment of government-run cooperative farms (as in Ghana and Tanzania), policies have favored large-scale mechanized farming which is inherently lumpy and indivisible. Because of obviously deleterious effects on rural equity as well as a series of spectacular failures among large-scale mechanization schemes, this strategy has fallen in disfavor (dewilde, 1967; Eicher and Baker, 1982; World Bank, 1981).

Recent assessments by Collinson (1987), Matlon (1987) and ter Kuile (1987) project substantial differences in coming rounds of technological change in African agriculture. While the absence of on-the-shelf technical breakthroughs makes forecasting uncertain, three themes emerge consistently from their reviews of agricultural research in Sub-Saharan Africa. First, peak season labor bottlenecks which constrain output in many regions will require some combination of faster maturing crop varieties, use of herbicides or animal-drawn, mechanical weeders. Second, increasing land pressure will necessitate higher yielding seed varieties, breeding for pest

resistance, or the application of fertilizers and pesticides. Finally, maintenance of soil fertility will demand increasing attention, likely requiring mulching, attention to crop rotation, or physical investments in bunds or ridging to diminish runoff and improve water infiltration. Inherently scale neutral, the anticipated herbicides, improved seed varieties, fertilizers, and pesticides need not worsen inequality. Only animal traction might aggravate rural income disparities; but since most observers agree that improved collateral inputs will be required to make widespread expansion of animal traction attractive, it remains unclear how important it will be to the next round of improved agricultural technology in Africa (Sargent et al, 1981; Matlon, 1987; Delgado and McIntyre, 1982; Jaeger, 1986; Pingali, Bigot and Binswanger, 1987).

2. Availability of inputs.

If they are to successfully adopt new technologies, farmers - especialy small farmers - must have adequate access to both knowledge and inputs. Scale-neutrality in itself is not enough. Because large farmers frequently have privileged access to credit and extension (Ascroft, 1973; Matlon, 1979), they commonly adopt new technologies first. But small farms adopt too if given a chance; where there have been lags in Asia, they have rarely exceeded 3 to 5 years (Hayami, 1981; Herdt and Capule, 1983; Byerlee and Harrington, 1983; Ruttan, 1977; Hazell and Ramasamy, 1988; and Prahladachar, 1983). Gerhart (1975) has identified similar lagged small farmer adoption patterns in the diffusion of hybrid maize in Western Kenya.

Africa's infrastructure - its roads, credit institutions, extension services, and input supply networks - remains much weaker than that found

in Asia. African road and railroad densities, for example, stand at about 1/2 and 1/5, respectively, of the levels found in Asia[2]; and over 20% of Asian farmers have access to agricultural credit, while in Africa less than 5% do (Squire, 1981). A product of low incomes and low population density, Africa's weaker physical and institutional infrastructure could well discriminate against small farm adoption of new agricultural technologies. So increased attention to input availability will have to accompany technological change if agricultural income growth is to be distributed equitably.

3. Land Ownership and Access

Regions in Asia where Green Revolution technology generated the most equitable growth were those dominated by small, owner-occupied farms such as the Muda River Region of Malaysia and North Arcot District in India (Bell, Hazell and Slade, 1982; Hazell and Ramasamy, 1988). An equitable distribution of land promotes equitable income distribution when technological change is focused on increasing yields as opposed to extensification. The absence of large landlords both avoids rent transfers from poor to rich and reduces the risk that landlords will evict tenants as farming becomes more profitable.

Because of Africa's low incidence of landlessness, tenancy and land rental arrangements feature less prominently there than elsewhere. While data remain thin, those available indicate that African farmers rent about 2% of total landholdings (8% of total farmland) compared to roughly 21% of landholdings (12% of farmland) in Asia.[3]

In spite of low tenancy, a potential problem exists in that African land rights are not always well defined. While customary rights usually bequeath secure, long-term use rights, situations have arisen where technological change, by increasing land value, has motivated politically powerful individuals to use the legal system to override customary rights and sieze land. Just such a dispossession occurred after the introduction of high yielding rice in Ghana (Goody, 1980). Feder and Noronha (1987) argue that more formal recognition of land rights will emerge as an increasingly important issue in Africa. The absence of formal land rights, they believe, will limit the value of land as collateral and restrain long-term investments in land improvements and conservation necessary for more intensive agriculture. To investigate these issues, the World Bank and the University of Wisconsin's Land Tenure Center are conducting ongoing field research.

In the future, as land pressures increase, the question of tenancy rights will also require attention in Africa. The lack of legally recognized lease rights can lead to eviction once new technology makes farming more profitable, as happened in the Chilalo Region of Ethopia (Cohen, 1975).

4. Social and Political Institutions

Macro policies obviously affect the distribution of gains from agricultural growth. And African governments have a well-publicized history of anti-rural pricing and tax policies (World Bank, 1981; Eicher, 1982; Sharpley, 1981). They have siphoned incomes from rural to urban areas and contributed to tremendous rural-urban income disparities (ILO,

1982; Ghai and Radwan, 1983). If the benefits of improved agricultural technology are to accrue to rural Africans, change in pricing and tax policy will have to continue, as the donor community so regularly urges.

Within rural areas, distribution of incremental income depends on local political and social institutions. While social differences do exist in rural Africa, and rural elites do use their positions to gain preferred access to extension services and farm inputs (Ascroft, 1973; Matlon et al., 1979), nothing approaching the rigid Asian caste system exists. Morevoer, Africa's extended family system operates to redistribute income gains within rural areas and between countryside and town. Thus gifts in Northern Nigeria and remittances in Kenya and Botswana contribute to higher incomes for the rural poor (Matlon, 1979; and Table 3). Of course, social institutions continue to evolve, and many observers have documented the gradual demise of the extended family forms of agricultural management (Norman, Simmons and Hays, 1982). So the redistributive function they have historically performed may diminish in the future.

V. Indirect Impact of Technological Change in Agriculture

A. Current Equity Implications of Nonfarm Earnings

Rural nonfarm earnings currently account for 25-30% of total income and 30-50% of cash income in rural Sub-Saharan Africa (Anderson and Leiserson, 1980; Chuta and Liedholm, 1979; Haggblade, Hazell and Brown, 1987). Moreover, each dollar increase in African agricultural income generates about $0.50 in additional rural earnings, much of it in the nonfarm economy (Hazell, 1984; Rogers, 1986; Haggblade, Hazell and Brown, 1987). Thus the

indirect effects of agricultural growth will account for about one-third of rural income increases, with commensurate importance for rural equity.

Currently, nonfarm earnings affect rural equity in several ways. First, they generally attain greater importance for small landholders than for large. Evidence from Northern Nigeria, Sierra Leone, and Malawi indicates that off-farm earnings generate over 50% of income for the smallest landholders while accounting for under 25% for the largest (Kilby and Liedholm, 1986; Matlon et.al, 1979; Matlon, 1979).[4] Noting that middle-sized farm families frequently earn a lower percentage of total income from nonfarm activities than do the large and small, Kilby and Liedholm (1986) have flagged this J-shaped relationship between African rural nonfarm earnings and land holding. Further evidence from rural Kenya supports their conclusion (Kenya, 1978).

In the aggregate, distribution of nonfarm income across income deciles shows mixed effects on rural equity. Studies from rural Nigeria[5], Lesotho, Tanzania and farm families in Uganda indicate that nonfarm earnings aggravate inequality, accounting for a larger share of income among high-income households than among the poor (Matlon, 1979; Van der Weil, cited in ILO 1982; Collier, Radwan and Wangwe, 1986; and ILO, 1985a). Other studies, from rural Botswana (1976), Nigeria (Norman, Simmons and Hays, 1982) and among farm households in Gambia (ILO, 1985b), show nonfarm earnings more important among low-income households than among the wealthy. These conflicting results may stem, in part, from the very success of nonfarm earnings in elevating some of the would-be-poor to higher income groups or, alternatively, from failure to accurately measure what are

frequently equity enhancing female nonfarm earnings (Norman, Simmons and Hays, 1982; Matlon, 1979; and Table 4).

While the equity impact of nonfarm earnings remains uncertain across income groups in Africa, differences by activity emerge very clearly. As Table 3 indicates, poor households in rural Africa depend more heavily than do the rich on wage labor, gathering, and low-return manufacturing and service activites such as brewing, food preparation and sale. In contrast, wealthy households earn more from commerce, transport and other high-return nonfarm activities such as milling and metal fabrication which require access to quantities of fixed and working capital sufficient to limit access by the rural poor (see also Matlon et al., 1979; Wilcock and Chuta, 1982).

Women's nonfarm earnings play a key role in equity enhancement. As the Nigerian evidence in Table 4 indicates, women's nonfarm income assumes greater importance among poor households than among the wealthy. This result, corroborated by studies in both Botswana (1976) and Zambia (Marter and Honeybone, 1976), likely results from women's disproportionate representation in low-investment, low-return activities as such as basket making, weaving, gathering and food preparation.

B. Future Indirect Effects on Equity

Of the approximately $0.50 generated by each dollar increase in African agricultural income, consumption linkages account for $0.40, while production linkages generate only $0.10, or 20% of the total (Haggblade, Hazell and Brown, 1987). While new generations of agricultural technology will undoubtedly raise the relative importance of African production

linkages, Haggblade, Hazell and Brown (1987) hypothesize that Africa's more limited potential for irrigated agriculture, lower population density and less well developed rural infrastructure will result in less prominent production linkages in Africa, even in the long run. So in rural Africa, consumption linkages will likely continue to dominate the indirect effects of agricultural growth.

1. Consumption linkages. Consumption linkages emanating from agricultural income growth will undoubtedly increase the absolute incomes of the poor. Nonfarm activities important to the rural poor include female-dominated food processing (such as cooked snacks, processed roots, and beverages in Northern Nigeria, palm oil extraction in Sierra Leone, and brewing in East and Southern Africa), as well as service and manufacturing activities with low investment requirements (Haggblade, Hazell and Brown, 1987). For each of these activities, detailed rural consumption studies from Sierra Leone and Gusau, Northern Nigeria estimate positive marginal budget shares (King and Byerlee, 1977 and 1978; Hazell and Roell, 1983). So, in spite of Hymer and Resnick's (1969) contrary expectation, the rural products are not inferior. On the contrary - as Liedholm and Chuta (1976), Anderson and Leiserson (1980) and Kilby and Liedholm (1986) have stressed - income elasticities for these goods and services are not only positive, they frequently exceed 1.

Agricultural income growth likewise stimulates demand for high quality foods - fruits, vegetables and meat. Because these are likely to be produced in rural areas, usually by small farmers or pastoralists, we expect they too will contribute to rural equity.[6] Unlike Asia, the African

data suggest little increase in the rural consumption links generated by the larger of the small farms (Hazell and Roell, 1983).

While consumption expenditure boosts absolute incomes of the poor in regions similar to rural Sierra Leone and rural Nigeria, where smallholders dominate agriculture, a much less felecitious outcome would undoubtedly emerge if income increments accrued to large estates rather than small holder Although unfortunately no consumption data allow us to document this differential, as Cohen (1975) suggests, the concentration of agricultural income increments in the hands of large estate holders would very likely divert consumption away from rural areas and away from the low-priced goods important to the rural poor.

On the relative distribution of rural income, small farmers' nonfood consumption will likely have a modest, but probably positive, effect. Based on the consumption profiles from Gusau and Sierra Leone, the only sufficiently detailed data available for making such a judgement, the equity enhancing portion of incremental nonfood expenditure lies between 30 and 40%. This estimate includes incremental spending on prepared foods and beverages, social, religious and ceremonial services, as well as labor-intensive goods and services such as shoe repair and manufacture, laundering and other domestic services. The relatively affluent - the traders, transporters and purveyors of durables and services that require substantial start-up capital (milling and welding, for example) - receive the remaining 60 to 70% of gross nonfood expenditure. But given the high import content of traded items, imports, durables and transport, the value added by the second group drops considerably below this level. Under a

range of plausible value added percentages'[7] the equity enhancing portion of incremental consumption expenditure accounts for about 50% of resulting rural nonfarm income, while the remaining 50% accrues to the better-off rural dwellers. Because equal absolute income increments represent a larger percentage increase for the poor, the net effect will be to slightly improve relative rural income distribution. This conclusion, of course, holds only for small farmer expenditures. For large estate owners, we expect a negative absolute and relative income share accruing to the rural poor.

2. Production Linkages. Production linkages have two contrary effects on rural equity. To the extent they increase the demand for wage labor - for weeding, planting and harvesting or for field leveling, ridging and preparation - production links favor the rural poor and middle income groups (Table 3). But the increased use of fertilizer, pesticides, animal traction equipment, sprayers and other purchased inputs will likely favor the traders, transporters and rural manufacturing and services requiring capital investments sufficient to preclude access by the poor.

Limited evidence from large-scale, mechanized foodcrop production in Kenya depicts purchased input costs about an order of magnitude higher than wage payments (Kenya, 1972). Hence, at least in rainfed agriculture, large scale mechanization of food production appears to promise increased inequity from both indirect consumption and production linkages.

On the contrary, smallholder production of tree crops and irrigated animal traction food crops generally supports more wage labor than they do income for input suppliers (Ruthenberg, 1980, Tables 7.7, 7.10, 8.5-8.10).

Unfortunately, much of Sub-Saharan Africa is unsuitably configured for widespread irrigation (Delgado, 1984; Mellor, Delgado and Blackie, 1987)

For the rainfed hand-hoe and animal traction systems that will likely remain the backbone of African agriculture, predictions become more difficult. Hand-hoe foodcrop production currently supports more wage employment than it does income to suppliers of purchased inputs (Ruthenberg, 1980, Tables 4.7, 4.8, 6.8). But both stand at very low levels, and their relative importance in the future will depend on whether input demand grows faster than labor markets. With rainfed animal traction, wage payments currently lie below even the meager level of purchased input use (Ruthenberg, 1980, Table 6.4), but again because both stand at very low levels, predicting future requirements is difficult. Even Asian data offer little help, because their improved seed, fertilizer, and pesticide packages remain largely limited to irrigated farming. So in the area that currently enjoys the greatest research attention, rainfed foodcrop production, inference based on existing evidence does not allow a clear judgement as to the equity impact of the production linkages of future technology.

3. The Net Impact. Because consumption linkages currently dominate African growth multipliers and are likely to continue to do so, we expect that indirect growth linkages will result in a modest improvement in both absolute and relative income share of the rural poor. But this conclusion stands only if income growth accrues to small farmers and not to owners of large estates. Mechanized, large-scale crop production appears likely to

support ancillary activities that will substantially skew rural nonfarm income.

VI. Implications for Agricultural Research and Policy

To improve both rural living standards and equity, Africa will require technological change in agriculture. For without new technology, prospects for increasing agricultural incomes remain dim. Price policy reforms, however desirable, cannot induce aggregate supply responses in the face of absolute technical and resource constraints facing African agriculture (Eicher, 1987; Krishna, 1982; Shapiro, 1984). And in the absence of technical advance, population growth will lead to increasing land pressure and declining land productivity through decreased fallow and the bringing of marginal lands under cultivation. Both reduce labor productivity and hence agricultural wages important to the rural poor. Moreover, landlessness will emerge as a social and economic problem, further skewing the distribution of assets and rural income.

New agricultural technology will undoubtedly exacerbate regional income disparities; because Africa's patchwork of highly variable micro-climates will lead to location-specific technical improvements. Pockets of prosperity will emerge, while other regions lag behind. Given the severe resource shortages facing most African governments and the magnitude of the absolute poverty problem they face, it seems most sensible to allow regional disparities to dissipate through migration rather than through government targeting of scarce supplementary resources to the laggard regions.

Within the zones where new technologies prove viable, African policy makers enjoy several advantages that will favor equitable distribution of agriculturally led income growth. A small landless population, relatively

even distribution of rural incomes, a research focus on scale-neutral new technologies, a reasonably egalitarian social system, and labor-intensive rural consumption linkages all contribute to equitable income growth. But land pressure is intensifying, extended families are breaking down, and physical and institutional infrastructure remains thin. So equitable growth, although possible, is not assured.

Several research and policy interventions will be required to capitalize on Africa's potential for equitable rural growth. On the research side, activity must continue to focus on technologies appropriate for small farms. The favoring of scale-neutral technology - improved plant varieties, herbicides, fertilizers or pesticides - will enable all scales of farm operators to benefit from new technology, while a complementary focus on low-input technologies will help guarantee widespread adoption in the face of spartan infrastructure and keen cash constraints that would otherwise limit access by the poor. Research must also focus on crops that benefit the poor; foodgrains appear particularly important both because of their potential food price benefits and because the rural poor depend on them so heavily (Matlon et al., 1979; Eicher, 1982). As many have pointed out, such a scale-neutral, small farm, foodgrain-focused research strategy will promote an equitable distribution of the direct income benefits generated by new agricultural technology (Matlon et al., 1979; Eicher and Baker, 1982; Mellor, Delgado and Blackie, 1987). Examining the indirect income linkages - which will account for at least one-third of total agriculturally induced income increments - reinforces that conclusion. Growth in small farm agriculture will lead to greater consumption and

production linkages with the rural poor than will increments accruing to owners of large estates.

Policy attention will need to focus on parallel equity concerns in the farm and nonfarm rural economy. First, policy makers will need to maintain adequate agricultural price incentives, for many countries through modification of government marketing, food pricing and taxation policies. Equally important, removal of historic policy biases against small, rural nonfarm enterprises will be essential in guaranteeing full benefit from rural income multipliers in the nonfarm rural economy (Anderson and Leiserson, 1980; Haggblade, Liedholm and Mead, 1986; Marsden, 1982).

Second, input provision and output marketing networks must operate effectively to ensure widespread adoption and benefit from new agricultural technologies. While pump-priming government stocking and supply of new inputs may be necessary until new technologies are proven, the private rural distribution network can play an important role thereafter. Transport, trade and commerce are among the most rapidly growing segments of the African rural nonfarm economy (Haggblade, Hazell and Brown, 1987). Their historic exclusion from direct assistance and credit programs merits reconsideration in order to diminish the second-generation marketing problems that typically follow in the wake of new production technologies (Falcon, 1970).

Third, rural infrastructure will require upgrading to facilitate both dissemination of new technologies and the ability of the nonfarm economy to respond fully to increases in consumer demand and production linkages

emanating from increased agricultural output. Extension services, credit institutions and roads probably deserve most careful attention.

Fourth, on the farm side of the rural economy, land tenure and tenancy rights will undoubtedly emerge as a major issue in the coming decades. Monitoring and intervention will be essential to avoid equity exacerbating dispossession of significant numbers of rural dwellers.

Finally, in the nonfarm economy, the role of women will strongly affect rural equity. Women dominate many of the nonfarm enterprises important for the rural poor - food preparation and processing, gathering, and domestic services. Moreover, they participate in both those activities that suffer the most dislocation and those that grow most rapidly as the rural nonfarm economy develops (Haggblade, Hazell and Brown, 1987). Policy makers must recognize both the vulnerability and the potentially important income and equity-enhancing role of female-run enterprises. Attention to activities targeted, extension staff recruitment, credit policies and in some cases modification of legal statutes limiting female economic participation will all help female-dominated activities prosper, thus contributing to equitable growth in rural Africa.

NOTES

*This article expresses the views of the authors and not necessarily those of the World Bank.

[1]This section draws on Gotch (1972).

[2]Densities are computed as kilometers of total roads and railroads per square kilometer using data from the International Road Transport Union's World Transport Data and the International Road Federation's World Road Statistics.

[3]The African data on percentage of holdings average figures from Cameroon (5.2%), Swaziland (0%), and Zaire (0%), while those from Asia include India (23%), Indonesia (3.2%), Korea (9.5%), Pakistan (32%), and the Philippines (22%) as reported by FAO (1981, Table 5.2) and FAO (1984 and 1986). The African area data include area-weighted averages from Cameroon (7.5%), Central African Republic (.1%), Sierra Leone (6.3%), Swaziland (7.2%), and Togo (21%) based on FAO (1981, Table 5.7) and FAO (1985). The Asian area figure averages data from Bangladesh (16.8%), India (9.7%), Indonesia (2.1%), Korea (17.2%), Pakistan (35.7%), Philippines (31.5%) and Sri Lanka (22.4%) based on FAO (1981, Table 5.7) and FAO (1983, 1984, 1985 and 1986).

[4]Strictly speaking these data represent "off-farm" income, that is all "nonfarm" earnings plus wages earned by family members working on farms other than their own. While the published data from these two countries do not permit a strict breakout of "nonfarm" earnings by farm size, they do indicate that non-agricultural wages generate over three-fourths of total wage income. Consequently, no distribution of agricultural wages could alter the conclusion that nonfarm earnings account for a greater share of smallholder income than they do for the large farmers.

[5]The exclusion of female nonfarm earnings from household totals may alter this conclusion. Both Matlon (1979) and Norman, Simmons and Hays (1982) indicate that women's nonfarm earnings, while extremely difficult to measure, most likely provided a larger supplement to low-income households than to the wealthy.

[6]The classification of livestock earnings as equity enhancing will strike some as contentious. While evidence is not abundant, data from Sierra Leone and Northern Nigeria promote the equity enhancing view, Sierra Leone with consistently declining livestock shares as income rises and Nigeria with a J-shaped distribution of livestock earnings (Matlon et al., 1979). Only Botswana's rural income distribution depicts a clear and consistently positive relationship between rural income and livestock earnings (Botswana, 1976).

[7]We use the following ratios of value added to gross output: rural snack and prepared foods (95%), ceremonies (95%), transport (30%), locally produced durables (80%), and imports (25 - 50%). Using these ratios to translate gross expenditure to rural income produces estimates of the share of incremental rural income accruing to low income groups ranging between 44% and 52% in Gusau and 53% to 59% in Sierra Leone. For enterprise budgets supporting the above value added to gross output ratios, see Spencer, Byerlee and Franzel (1979), Haggblade, Hazell and Brown (1987), Haggblade, (1982).

TABLE 1

GINI COEFFICIENTS OF RURAL AND URBAN INCOME DISTRIBUTION

Country, year	Gini Coefficient Rural	Urban
Africa		
Botswana, 1974/75[a]	.52	-
Burkina, 1978	.25	-
Ivory Coast, 1985	.32-.38[b]	.36-.41[b]
Kenya, 1976	.39	.62
Lesotho, 1974	.35[c]	.50
Nigeria, 1974	.35[c]	.60[d]
Senegal, 1970	.30[c]	.40[d]
Sierra Leone, 1975	.32[c]	.60
Sudan, 1968	.34	.41
Tanzania, 1969[a]	.30	.33
Uganda, 1970	.27	.40
Zambia, 1974/75[a]	.47	.48
Population-weighted average	.34	.52
(Simple, unweighted average)	(.35)	(.43)
Asia		
Bangladesh, 1966/67[a]	.33	.40
India, 1967/68[a]	.48	.47
Indonesia, 1969/70[a,b]	.35	.34
Korea, Rep. of, 1966[a]	.31	.32
Malaysia, 1970	.46	.50
Pakistan, 1966/67[a]	.33	.39
Philippines, 1965[a]	.43	.53
Sri Lanka, 1969/70[a]	.35	.41
Taiwan, 1972[a,e]	.29	.27
Thailand, 1962/63[a]	.44	.47
Population-weighted average	.43	.44
(Simple, unweighted average)	(.38)	(.41)

[a] Per household not per capita.
[b] Expenditure not income.
[c] Matlon et al. (1979) compute ginis of .28 for three villages in Northern Nigeria and .39 for rural Sierra Leone exclusive of primarily trading households.
[d] Earnings from salaries only.
[e] Agricultural, non-agricultural rather than rural, urban.

Sources: Botswana (1976): Botswana; ILO (1982): Burkina, Kenya, Lesotho, Nigeria, Senegal, Sierra Leone, and Sudan; Gleurve (1987): Ivory Coast; van Ginneken (1976): Indonesia, Pakistan, and Tanzania; Zambia (1980): Zambia; Jain (1975): Bangladesh, India, Korea, Malaysia, Philippines, Sri Lanka, Taiwan, and Thailand.

TABLE 2

GINI COEFFICIENTS OF LAND DISTRIBUTION AMONG FARM OPERATORS[a]

Country, year	Gini Coefficient (latest available)
West Africa	
[b]Ghana, 1970	.55
[b]Ivory Coast, 1974/75	.42
Liberia, 1971	.73
Niger, 1980	.32
Nigeria, 1963/64[e,f]	.40 - .56
[b]Senegal, 1960	.40
[b]Sierra Leone, 1970/71	.43
[b]Togo, 1982/3	.47
(weighted average)[d]	(.42 - .49)
Central Africa	
[b]Cameroon, 1972/73	.42
[b]Central Af. Rep., 1973/74	.35
[b]Chad, 1972/73	.34
[b]Congo, 1972/73	.27
[b]Gabon, 1974/75	.41
Zaire, 1970	.57
(weighted average)	(.50)
East Africa	
Ethopia, 1976/77	.44
Kenya, 1974	.68
(Kenya, 1960)[e]	(.82)
[b](Kenya, 1960)	(.50)
Somalia, 1968[e]	.55
Tanzania, 1971/72	.44
Uganda, 1960	.49
(weighted average)	(.52)
Southern Africa	
[b]Botswana, 1968/69	.47
[b]Lesotho, 1970	.36
[b]Malawi, 1968/69	.34
[b]Mozambique, 1970	.71
[b](Mozambique, 1970)[e]	(.41)
[c](Mozambique, 1970)	(.81)
Zambia, 1970/71	.76
(weighted average)	(.65)

Country, year	Gini Coefficient 1960's	Gini Coefficient 1970-80's
Asia		
India, 1960-1976/77	.58	.62
Indonesia, 1963-1973	.55	.56
Korea, Rep. of, 1961-1980	.20	.30[g]
Pakistan, 1960-1979/80	.63	.54
Philippines, 1960-1980	.51	.53
Sri Lanka, 1962-1981/82	.67	.64
Thailand, 1963-1977	.46	.45
(weighted average)	(.57)	(.59)
Latin America		
Brazil, 1960-1980	.83	.85
Colombia, 1960-1970/71	.87	.86
Costa Rica, 1963-1973	.78	.81
Mexico, 1960-1970	.95[h]	.93
Panama, 1960-1980	.74	.85
Peru, 1960-1972	.94	.91
Uruguay, 1961-1979/80	.82	.80
Venezuela, 1961-1971	.93	.91
(weighted average)	(.87)	(.88)

TABLE 2 (continued)

[a]Because landholdings rather than households serve as basic sampling units, landless households are excluded from these calculations. Hence, the gini coefficients should be interpreted as describing the distribution of land among farm operators with access to it, either as tenants or owners. As a measure of land distribution among all rural households, the ginis are biased downwards in Asia and Latin America because of the higher incidence of landlessness there compared to Africa.

[b]Small or traditional holdings only.

[c]Modern or estate holdings only.

[d]Weighted by area of landholdings.

[e]From Ghai and Radwan (1983), p.11.

[f]Based on sample surveys, the Gini coefficients range from .40 in the West to .43 in the North and .56 in the East.

[g]Using same size categories as in 1961 to avoid aggregation bias.

[h]Treating ejido land as equally distributed among all ejidatarios reduces this figure to .75.

Sources: Calculated from data compiled by the FAO's 1960, 1970 and 1980 World Census of Agriculture. Except for the African figures cited by Ghai and Radwan, all 1960's Ginis have been calculated by Berry and Cline (1979, Table 3.3) from FAO (1966, Tables 1.5, 2.4 and 2.10). All remaining figures have been calculated from data published by FAO (1981, Tables 2.3 and 3.3, 1983, 1984, 1985, and 1986) using the following formula, the same as that used by Berry and Cline (1979): Gini = $1 - 2[\Sigma_i n_i * c_{i-1}] - \Sigma_i n_i * a_i$, where n_i is the fraction of number of landholdings in size category i, a_i is the fraction of total area in size category i, and c_i is the cumulative fraction of total area through size category i.

TABLE 3

DISTRIBUTION OF RURAL INCOME BY ACTIVITY AND INCOME LEVEL
(percent)

	Sources of Rural Income							
	Agriculture	Uncertain Sectoral Origin		Rural Nonfarm				
Income Strata	Own Holdings	Wage Labor	Remittances	Hunting Gathering and Fishing	Manufacturing	Trading	Other	Total
Botswana, 1974/75								
.5 - 10%	11	15	21	18	5	0	30	100
15 - 50	16	36	14	8	8	2	16	100
60 - 95	36	36	4	2	1	2	19	100
97 - 99.7	64	9	0	2	0	22	3	100
Kenya, 1974/75								
7 - 40%[a]	42	25	21	———	12	———		100
47 - 66	55	19	15	———	11	———		100
67 - 88	61	20	10	———	9	———		100
89 - 100	64	21	4	———	11	———		100
Northern Nigeria, 1974/75								
0 - 20%	78	[b](6) 13	—	0	6	4	0	100
21 - 40	78	(4) 13	—	2	4	3	0	100
41 - 60	79	(5) 12	—	1	4	5	0	100
61 - 80	71	(1) 8	—	0	5	14	0	100
81 - 100	63	(1) 8	—	1	10	18	0	100
Sierra Leone, 1974/75								
0 - 33%	81	11	—	2	5	2[c]	0	100
[illegible] - 66	81	6	—	8	4	1	0	100
[illegible] - 100	80	3	—	9	7	1	0	100

— = not available.

[a] Excludes the 6% of rural households earning negative income.
[b] Portion of income from agricultural wages.
[c] Trading income substantially underestimated because of survey exclusion of primarily trading households.

Sources: Botswana (1976); Kenya (1978); Matlon et al. (1979) and Matlon (1979).

TABLE 4

ESTIMATED EFFECT OF WOMEN'S OFF-FARM EARNINGS ON RURAL INCOME DISTRIBUTION, HANWA VILLAGE, ZARIA REGION, NORTHERN NIGERIA, 1970/71
(percent of total income)

	Household Income Level		
	Low	Middle	High
A. Household Income, Excluding Women's Off-Farm Earnings			
Own Farm	89	84	68
Male Off-Farm	11	16	32
Total	100	100	100
B. Household Income, Including Estimated Women's Off-Farm Earnings			
Own Farm	42	49	56
Off-Farm			
Male	(5)	(9)	(26)
Female	(52)	(42)	(19)
Total off-farm	57	51	44
Total	100	100	100

SOURCE: Norman, Simmons and Hays (1982).

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