Global Scientific JOURNALS

GSJ: Volume 12, Issue 3, March 2024, Online: ISSN 2320-9186
www.globalscientificjournal.com

ANALYSIS OF PERFORMANCE OF AGRICULTURE SECTOR AND ITS CONTRIBUTION TO ECONOMIC GROWTH AND POVERTY REDUCTION IN TANZANIA

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KeyWords: Agricultural, Economic Growth, Poverty Reduction.

ABSTRACT

This paper explores performance of agricultural sector and its contribution to economic growth and poverty reduction. The empirical analysis draws on representative surveys of farm households in Mbeya and Iringa, two cash crop growing regions in Tanzania. The paper find that poorer households do not only possess fewer assets, but are also much less productive. The paper find that agricultural productivity directly affects household consumption and hence overall poverty and welfare. Stochastic production frontier analysis indicates that many farmers are farming well below best practice in the region. Analysis of allocative efficiency suggests that family labour is substantially over utilized, a sign of considerable excess labour supply. Use of intermediate inputs, on the other hand, is well below what is commensurate with the estimated value of their marginal productivities. An important reason for low input use is lack of credit to purchase inputs, but difficult access to the inputs themselves, being connected to the economy, and food security and self-insurance considerations are also important impediments. Easy access to credit is positively associated with being a member of a savings association or being in a contractual arrangement with a cooperative or firm. The findings support a continuing emphasis on increasing agricultural productivity in designing poverty reduction policies. Better agronomic practices and increased input use will be crucial in this strategy. Financial constraints might be relieved through fostering institutional arrangements facilitating contract enforcement and institutions that facilitate saving by the households themselves. They may also be relieved by the provision of more adequate consumption safety nets.

INTRODUCTION

Agricultural and food policies have a crucial role in reducing rural as well as aggregate poverty in Africa, given that the bulk of the poor are in rural areas, and are employed in agriculture. Crucial among these policies are those that help increase incomes of the rural poor. The purpose of this study is to explore some of the determinants of agricultural development in rural Africa, by exploring the factors which have the largest poverty reducing effect with a particular emphasis on the role of agricultural productivity, technology, and factor market constraints, and to provide a robust empirical basis for the design of agricultural and rural development strategies effective in reducing poverty in the context of rural Tanzania.

Tanzania is among the world's poorest countries with a per capita income of about US$280. From a macroeconomic perspective, agriculture plays a dominant role in the economy, accounting for nearly 45 percent of GDP, in 2003 and employing around 70 percent of labour force. Agriculture accounts for three quarters of merchandise exports and represents a source of livelihood to about 80 percent of the population. Agricultural income is the main source of income for the poor, especially in rural areas. But households that

rely heavily on such income tend to be extremely poor. The poor are more likely to grow and sell crops than the non-poor, but the majority of production is not sold but consumed by the households.

Smallholder farmers characterize Tanzanian agriculture. The average size of land cultivated varies from less than 1 ha to 3 ha of land. The large majority of the crop area is cultivated by hand, while for the remaining area farmers use ploughs and tractors. The main food crops are maize, rice, wheat, sorghum/millet, cassava and beans and they represent nearly 85 percent of the area cultivated. Bananas are grown mainly in the Kagera and Mbeya area, and like cassava have a low value-to-bulk ratio and are generally retained for home consumption. Export crops represent 12 percent of the value of crop production. From 1993 to present, there has been a continuous reduction of state participation and control over marketing and input supply (e.g. the elimination of the subsidy on fertilizer).

There are several factors affecting the agriculture sector. First of all agriculture is rain-fed and therefore unfavorable weather results in poor agricultural performance. In addition, low labour and land productivity due to application of poor technology, and dependence on unreliable and irregular weather conditions are further concerns. Both crops and livestock are adversely affected by periodical droughts. Earlier studies (Government of the United Republic of Tanzania, World Bank and IFPRI, 2000) found that Tanzania, despite low levels of technology, has comparative advantage in all its export crops, and in several of the main food crops. It also found that there are significant linkages between increased production of exportable and overall rural incomes and growth. Hence, the issue of how to increase agricultural production and incomes is crucial to both growth and poverty alleviation.

Poverty levels are high in Tanzania, and poverty reduction during the past decade occurred mainly in urban areas, while rural areas have seen relatively little change. Poverty levels are highest in rural areas, where 39.9 percent of households fall below the basic needs poverty line according to the 2000/01 National Household Budget Survey (National Bureau of Statistics, 2002), making up about 81 percent of the poor in Tanzania. The poverty profile further suggests that changes in agricultural production and farm gate prices have the potential to significantly impact poverty in Tanzania.

LITERATURE SURVEY

According to a recent study on growth accounting in Tanzania by Ndulu and O'Connell (2003), during the most recent period covered by the growth accounting exercise, namely 1995-2000, growth per worker recovered to 1.3 percent, from negative levels during 1990-94. This recent growth performance is almost entirely driven by improved total factor productivity, while the contribution of human capital formation is small and that of physical capital formation is negative. These numbers highlight the importance of total factor productivity, in improving growth, while raising the issue which is also relevant to this study, namely why there has not yet been a stronger aggregate investment response to economic reforms and which factors explain the improvements in total factor productivity.

There is considerable international evidence from low-income agriculture-dependent countries that broad based rural growth starts with increased labour productivity in small-farm agriculture, and deepens as rural demand for rural non-farm goods and agricultural inputs is stimulated, and as labour and financial resources are mobilized and move between sectors (for a survey see Sarris, 2001).

Increased integration of poor households and sub regions into the larger economy is an essential part of this process, and national and local governments have an important role in ensuring a facilitating incentives environment, and supporting provision of essential public goods such as adaptive research, extension, physical infrastructure, laws necessary for the emergence of market institutions, and law and order.

A recent analysis by Levin and Mbamba (2004) concluded that expansion of agricultural production in Tanzania has the strongest employment and income effects, but the bulk of income increases would go to non-poor both in rural and urban areas. Nevertheless, agricultural production growth seems to have the largest impact on poverty reduction. When simulations of total factor productivity (TFP) growth in different agricultural subsectors was undertaken, it was found that the best prospects were from TFP increases in exportable crops, as these could lead to larger exportable surpluses. On the contrary TFP increases in food crops led to lower income growth, as the bulk of food crop production is nontradable, and hence a production expansion, in the face of slower domestic demand growth, would lead to domestic price declines for these products. This would negatively affect the rural poor.

Growth in agriculture and farm incomes can come about in three ways: through increases in the real prices producers receive for their products, increases in physical and human capital of farmers, and increased productivity and efficiency of resource use by individual farmers. Improvements in producer prices can come about either because of an increase in domestic and international prices for the products they produce, or by a reduction in the marketing margin between the producer and the final consumer. These aspects of market organization and prospects will not concern this study. Instead the study will focus of the last two of the above three aspects of growth, and try to identify factors that can help increase capital investments, as well as productivity and efficiency.

With limited access to credit, most rural households will have to save to invest in profitable income generating opportunities. Lack of rural growth, and hence of poverty reduction, may then be caused by two factors: the absence of profitable investment opportunities, or by lack of savings (or inability to save). Preliminary evidence in Tanzania suggests that it is mostly a lack of savings that hinders the rural poor from investing. Dercon (1998) notes for instance how poor households with little wealth have to rely on the most unprofitable, low investment activities (such as brick or charcoal making) whereas wealthier households have the means to invest in more profitable activities such as keeping cattle. Kessy (2004) notes that poor rural households in Kagera rely on casual labour while households with access to resources can invest in trading shops, fishing boats and even pharmacies. It is worthwhile to further explore what prevents the poor from saving their way out of poverty and becoming part of the growth process. Carter and Zimmerman (2000) consider frequent exposure to risk an important element. Lack of appropriate savings mechanisms may be another. Kessy (2004) notes for instance how various poor people vented their frustration because their small savings – goats in these cases - were stolen. The paper will try to explore some of these factors.

METHODOLOGY

The analysis in the paper is based on a representative survey of 957 households in 45 villages carried out in the Mbeya region, in November 2003, and on a representative survey of 892 households in 36 villages done in the Iringa region. About 75 percent of the population lives in rural areas. Coffee is the main cash crop in the region, and about 70 percent of the coffee area is held by smallholders, the remaining being cultivated by private and public plantations as well as large scale farmers. The basic needs headcount poverty rate for Mbeya was 31 percent in 2010/11, according to the 2010/11 Tanzanian Household Budget Survey, as compared with 36 percent for mainland Tanzania as a whole.

Iringa is the southernmost region of Tanzania, and is much larger than Mbeya, comprising 4.9 times the land area of the latter. Its population, however, is lower than Mbeya at 1.12 million, implying that the region is sparsely populated. About 90 percent of the population lives in rural areas and agriculture constitutes 77 percent of the regional product. There are three main exportable crops in the region, namely coffee, tobacco and cashew nuts, each grown in a distinct geographical part of the region. The basic needs headcount poverty rate for Iringa in 2010/11 was 41 percent, and this is considerably higher than the country average of 36 percent.

ANALYSIS

In this section the paper explore the issue of total factor productivity of crop and aggregate agricultural production of households. Total factor productivity (TFP) refers to that part of total production that is not accounted for by the normal basic primary production factors, such as labour and capital.

To analyze farm production the paper fit a standard Cobb-Douglas production function, using instrumental variables for the endogenously determined right hand variables. the paper introduce a variety of potential productivity determining variables in the right hand side in order to explore the determinants of TFP. The estimations use the following general form

$$\ln Q = +\alpha\, \beta \sum i \log Xi + \sum \gamma j Z\, uj + \qquad (1)$$

Where Q is a measure of the value of production of the farm, X i is a set of factors of production such as land, labour and inputs, βi are the estimated coefficients of each factor (the elasticities, if the log specification is chosen), Z j is a vector of TFP determinants such as household characteristics, and u is an i.i.d. error term.

The dependent variable is equal to the gross value of total farm output, where the paper have used for each household the unique median producer price of Mbeya and Iringa respectively, the same for all producers. In this fashion the paper account only for differences in quantities of production and avoid differences in value of production arising from seasonal variations in prices realized, and also value all production utilized for home production at the same prices.

The setting, explanatory variables such as inputs of land and labour, as well as intermediate inputs, may be considered as endogenous variables and jointly determined with Q and thus are dependent on the stochastic disturbance. To avoid biases in the estimates the paper used instrumental variables to estimate the endogenous ones.

For the production function analysis, the paper uses several sets of explanatory variables. First the paper utilize the standard factors of production, namely land, labour, capital, and intermediate inputs (purchased and own produced). The paper also use a dummy variable which is equal to 1 if the household hires labour for crop production. This variable is intended to capture whether the household is facing supervision constraints in hired labour. If this is the case the sign of this variable should be negative.

Secondly the paper utilize household and farm characteristics such as age and education of the head, land quality variables such as soil quality, proportion of the land cultivated that is irrigated, etc. Third the paper checks for current and past shock variables that may have affected current farm production. Such variables include the household assessment of whether rainfall in the plot was below normal, and whether the household has experienced different types of shocks in the past few years.

To check for endogeneity of intermediate inputs, land and labour, the paper used, as a set of instruments, lagged values of these factors, such as the size of land cultivated three years ago, number of months spent by household members and hired labourers working on the farm the previous year, and a dummy indicating whether fertilizers were used the previous year; two dummies for specific cash crop production, and, finally, variables related to credit access, as credit constraints have been long hypothesized to affect production and size (Feder, 1995; Eswaran and Kotwal, 1986). The basic assumption used in all studies is that assets, including land, affect positively the availability of credit and through this the availability of inputs and hired labour, and hence they should affect positively land and agricultural productivity. The capital factor, being a fixed factor, has not been instrumented and is not considered endogenous.

An issue arises regarding the use of lagged factors as instruments. While these variables are expected to be related to the use of the current factors, and be exogenous to current production, it may be that they incorporate individual household heterogeneity that is the same from year to year. If they do, however, then this household heterogeneity would be captured in the instrumenting regressions, and should not be a problem for the main regression. The same holds for the dummies for coffee and banana production, as the mere production for these crops may entail some specific factor input unrelated to other product outputs.

RESULTS & DISCUSSION

Tables 1 and 2 indicate the IV estimation of the agricultural production functions for Mbeya and Iringa under two assumptions concerning village level effects. The first column includes simple dummies for each village. In the second column the paper include instead of village dummies a range of variables destined to describe the infrastructure and other variables available at village level. Given that not all variables were available from the village level questionnaires, there is a significant reduction in the degrees of freedom. The tests for endogeneity in Mbeya suggest that the OLS model is rejected by the Durbin-Wu-Hausman test as well as by the Wu-

Hausman test, and hence the IV procedure is valid. For Iringa, the same tests in both cases do not reject the OLS model.

For Mbeya, all factors of production are significant with the expected signs. The dummy for whether the household hires labour is negative and significant. This dummy is supposed to test whether there are supervision constraints by the farm household, and the results appear to suggest that such constraints may exist, despite the fact that the amount of hired labour is quite small. Note that the F test for the hypothesis that the sum of the coefficients on the land, inputs, labour and capital variables is equal to 1 is strongly rejected, and the sum of these coefficients is larger than 1, suggesting increasing economies of scale.

In Mbeya, age and education do not appear to be significant. Production appears to be affected by only one of the various land quality or improvement variables. Production, however, appears to be affected negatively by bad rainfall, as expected. The inclusion of major shocks such as major illness and death in the household in the five years before the survey do not seem to have affected agricultural production. The results on the negative influence of bad weather are compatible with the significant and positive impact of the irrigation variable, which measures the share of land irrigated and which is substantial in Mbeya. The unbundling of the village effects indicates that there are no variables that affect agricultural production.

In the first stage (not shown) the value of intermediate inputs is a function of hired labour, and the amount of capital. Also both age (negative) and education (positive) significantly affect intermediate inputs. The dummies for lagged use of improved seeds, chemicals and chemical fertilizer, all appear to strongly influence the amount of inputs used. The input of household labour seems to be influenced positively by hired labour, suggesting that there may be supervision constraints, as well as illness and drought, which affect family labour input negatively, and the lack of rain, which seems to affect positively family labour input. It thus appears that the lack of rain leads to efforts by households to use labour and inputs to make up for the shortfall in production. The first stage regressions explain more than half the variation of the variables.

The results for Iringa in Table 2 (which are almost identical to the OLS results) indicate significance with the expected signs for all basic factors of production, land, labour, purchased inputs, and capital. Note also that, as in Mbeya, the hypothesis of increasing returns to scale (sum of the coefficients of the four main variables (land, inputs, labour, and capital) equal to 1) is rejected in the fixed effects model, but not rejected in the village variables model, suggesting some ambiguity with respect to economies of scale.

Education of head here is a significant positive determinant of agricultural production. Land improvement variables appear to be not significant, as in Mbeya, but soil quality here appears to affect negatively crop production. This is somewhat surprising and it may have something to do with overuse of good quality land. The current rainfall variables do not seem to affect current crop production, and this is compatible with the general impression in the region that rainfall is much more reliable compared to Mbeya. Non-rainfall shocks do not seem to affect farm production. However, the dummy for a drought shock since 1998 seems to positively affect farm production, which seems counterintuitive.

The results confirm the expected role of standard production primary inputs. Concerning TFP, they partially point towards the role of education and irrigation in TFP improvement, the negative role of weather shocks, the role of education and formal credit in purchased inputs, and the importance (positive or negative) of specific types of cash or food crop growing in affecting the total value of output. This latter effect may reflect historical reasons or institutional reasons pertaining to producers of specific crops.

TABLE 1: Mbeya: Estimation of the total agricultural production function

	Dependent variable Log gross value of total agricultural production	
	(1) IV regression with dummies for villages	**(2) IV regression with village variables**
Log acres of land cultivated [1]	0.649***	0.621***
	(4.08)	(3.70)
Log value of total inputs used [1]	0.420***	0.449***
	(3.72)	(4.11)
Log Total (hired family) labour (number of days) [1]	0.334**	0.266**
	(2.51)	(2.06)
Dummy for hired labour	-0.278*	-0.311*
	(1.87)	(1.91)
Log value of agricultural. capital	0.047**	0.063***
	(2.14)	(2.80)
Log age of the head	0.162	0.148
	(1.10)	(0.92)
Log mean years of education of the head	0.015	0.032
	(0.23)	(0.43)
Share of land improved with rock bund	0.354	0.299
	(1.38)	(1.21)
Share of land improved with soil bund	0.281**	0.244*
	(1.99)	(1.71)

Share of land improved with mulching	0.224	0.239
	(1.56)	(1.61)
Share of land improved with terraces	-0.061	0.015
	(0.35)	(0.08)
Share of land improved with grass lines	-0.066	0.109
	(0.44)	(0.59)
Share of land with soil of medium good quality	0.058	-0.007
	(0.32)	(0.03)
Share of land with gentle or steep slope	0.457*	0.508*
	(1.78)	(1.90)
Dummy: 1=death since 1998 affected living conditions	0.042	0.025
	(0.46)	(0.26)
Dummy: 1=illness since 1998 affected living conditions	0.075	0.042
	(0.81)	(0.42)
Dummy Average rain on parcel is below normal	-0.394***	-0.393***
	(4.69)	(4.47)
Dummy Average rain on parcel is much below normal	-0.483***	-0.409***
	(4.36)	(3.45)
Dummy: 1=drought since 1998 affected living conditions	-0.115	-0.119
	(1.21)	(1.24)
Proportion of land irrigated	0.233*	0.263**
	(1.88)	(2.25)
Dummy senior secondary school available in the village		-0.077
		(0.45)
Dummy hospital available in the village		-0.099
		(0.25)
Dummy bore hole for water available in the village		0.001
		(0.01)
Dummy community well water available in the village		0.101
		(0.56)
Dummy market available in the village		-0.112
		(0.92)
Dummy all weather road (tarmac) available in the village		0.100
		(0.44)
Dummy electricity available in the village		0.093
		(0.67)
Dummy public telephone available in the village		0.089
		(0.82)
Dummy availability of bus services to nearby village		-0.084
		(0.79)
Dummy agricultural extension agent available in the village		-0.049
		(0.53)
Dummy veterinary service available		-0.024
		(0.23)
Dummy agricultural input supply shop available		0.180
		(1.49)
Constant	0.575	0.640
	(0.60)	(0.62)
Observations	925	798
R-squared	0.39	0.33

Dependent variable Log gross value of total agricultural production		
	(1)	**(2)**
	IV regression with dummies for villages	**IV regression with village variables**

Test for Return to scale			
Test H0= land + inputs + total labour + ag. Capital = 1			
	F-value	10.14	1782.36
	P value	0.0015	0.0000
Test for exogeneity of regressors H0=Regressors are exogenous Wu-Hausman			
	F Test	2.53307	1.74897
	P-Value	0.05578	0.15555
Durbin-Wu-Hausman			
	Chi-sq test Chi-sq (3)	8.13010	5.45723
	P-Value	0.04340	0.14122

Robust t statistics in parentheses
* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent
In column 1: Dummies forward estimated but not reported
[1] Variables instrumented
Source. Computed by authors

TABLE 2: Iringa: Estimation of the total agricultural production function

	IV with dummies for villages	**IV with village variables**
Log acres of land cultivated [1]	0.523***	0.310***
	(5.91)	(4.14)
Log total inputs used [1]	0.169***	0.286***
	(3.13)	(6.23)
log total labour on farm [1]	0.443***	0.479***
	(4.22)	(4.43)
Dummy hired labour	0.017	-0.089
	(0.20)	(1.06)
Log value of capital	0.064***	0.066***
	(4.28)	(4.71)
Log age of the head	-0.007	0.098
	(0.07)	(0.98)
Dummy for corrections on age of the head [2]	-0.127	-0.195
	(0.53)	(0.79)
Log average years of education of head	0.102**	0.096*
	(2.15)	(1.96)
Share of land improved with rock bund	0.665*	0.627**
	(1.88)	(2.45)
Share of land improved with soil bund	0.092	0.152*
	(1.03)	(1.81)
Share of land improved with mulching	0.148	0.256
	(0.82)	(1.41)
Share of land improved with terraces	-0.059	-0.036
	(1.02)	(0.60)
Share of land improved with grass lines	-0.251	-0.173
	(1.32)	(0.90)
Share of land with soil of medium good quality	-0.161***	-0.155***
	(3.01)	(2.84)

Share of land with gentle or steep slope	0.005	0.091
	(0.08)	(1.49)
Dummy: 1=death shock since 1998	0.097	0.122*
	(1.41)	(1.76)
Dummy: 1=illness shock since 1998	-0.029	-0.009
	(0.45)	(0.13)
Dummy average rain on parcel is below normal	0.035	0.006
	(0.50)	(0.09)
Dummy average rain on parcel is much below normal	0.046	-0.029
	(0.57)	(0.37)
Dummy: 1=drought shock since 1998	0.199**	0.177*
	(2.10)	(1.87)
Proportion of land irrigated	0.294	0.367**
	(1.62)	(1.97)
Dummy for Junior secondary school available in the village		0.189**
		(1.99)
Dummy for Hospital available in the village		0.396**
		(2.48)
Dummy for Village well available in the village		-0.320***
		(4.31)
Dummy for Public water tap available in the village		0.169**
		(2.10)
Dummy for Market available in the village		0.211***
		(3.12)
Dummy for All weather road (tarmac) available in the village		-0.071
		(0.36)
Dummy for Bus service to nearby town available in the village		0.182
		(1.63)
Dummy for Village bank or other formal credit society or association available i		0.139
		(1.24)
Dummy for Agricultural Extension agent available in the village		0.257**
		(2.56)
Dummy for Veterinary service available in the village		-0.166*
		(1.80)
Dummy for Primary society available in the village		-0.309***
		(4.59)
	IV with dummies for villages	**IV with village variables**
Constant	1.111	0.348
	(1.48)	(0.47)
Observations	881	881
R-squared	0.58	0.52
Test for Return to scale		
Test H0= land + inputs + total labour + ag. Capital = 1		
F-value	4.77	2.42
P value	0.0292	0.1201
Test for exogeneity of regressors H0=Regressors are exogenous Wu-Hausman		
F Test	0.90184	1.86753

	P-Value	0.43976	0.13350
Durbin-Wu-Hausman			
	Chi-sq test Chi-sq (3)	2.89350	5.80256
	P-Value	0.40834	0.12162

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

Robust t statistics in parentheses

Column 1- Dummies for villages estimated but not reported [1] Variables instrumented.

Source. Computed by authors

CONCLUSION

The results in this paper present an interesting picture of smallholders in Tanzania and hint at several areas that could be important for policy development and poverty reduction. First, it appears that farm households in Mbeya are differentiated. In other words there appear to be substantial differences in average incomes between poor or non-poor. However, there do not appear to be substantial differences between poor and non-poor in a variety of other attributes.

A second result is that overall asset ownership among rural households in Tanzania is quite low. This holds not only in terms of human capital, but also in terms of physical capital, as well as access to a variety of infrastructure variables. Education levels are very low, and so is access to basic rural infrastructural services such as electricity and tap water.

A third major conclusion is that the main differentiating factor among rural households in both Mbeya and Iringa is agricultural productivity. These results suggest that a pro-poor rural development strategy in Mbeya may need to be anchored around improvements in agricultural productivity.

The analysis of allocative efficiency concluded that family labour is substantially over utilized, suggesting considerable excess labour on farm households. On the other hand, farm households appear to utilize substantially smaller amounts of intermediate inputs than would be commensurate with their estimated marginal productivities. Further investigation shows that the demand for inputs is especially higher among younger households with educated female household members. Households who are better connected with the wider economy through bus services and closer to input supply points are also much more likely to use modern inputs, and this emerges as a major constraint in Iringa. Finally, households with easy access to credit spent on average between 17 to 23 percent more on inputs, at least in Iringa. Access to credit seems in turn largely determined by 1) the contractual arrangements under which farming takes place (e.g. tobacco versus coffee farmers) and 2) being a member of a savings and credit organization, underscoring the need to better understand how the development of better saving mechanisms could help boost the use of modern inputs.

We also found that the use of intermediate inputs appears to be negatively related to the household's vulnerability, implying that consumption smoothing and using own resources to deal with unpredictable risks, are significant determinants of low input use and hence farm productivity. This indicates that interventions on the consumption safety net side could have important production and income increasing effects.

The empirical results highlighted in this paper lead to the following policy conclusions. First, it appears that there remains a lot of scope for improving agricultural productivity among farmers. If this is to be done by improvements in technology, the results indicate that such improvements should be land -saving in the land-scarce region in Mbeya and labour-saving in the relatively more land abundant region of Iringa. However, while improvements in technology will indeed increase agricultural productivity and reduce poverty, the paper found that considerable progress in agricultural productivity and poverty reduction can be had by working within the confines of existing technologies. Two areas of policy intervention emerge as important. The first involves policies and institutions that facilitate easier access by farmers to seasonal credit for intermediate inputs. Such policies may include wider use of credit cooperatives, promotion of other membership type of organizations like cooperatives that can facilitate access to credit by farmers, and promotion of contractual types of arrangements that can be combined with easier access to productive inputs.

The second area of policy intervention involves more efficient rural consumption safety nets. While these may be advocated on humanitarian and emergency relief grounds the paper found evidence that such policies, by helping households release their own resources that may be locked in their reserves for risk coping activities, can help households find own resources for productive activities.

It also appears that in Tanzania there is considerable room for improvements in allocative efficiency by better access to off-farm activities, so that farmers do not utilize labour so inefficiently. An alternative may be easier access to credit for expansion of land cultivation in areas with land expansion potential like Iringa, so as to utilize more efficiently the excess family labour.

We also found that major gains to agricultural productivity are to be expected from better village connectivity, especially in relatively isolated regions like Iringa. This of course has the clear implication that rural infrastructure is another key area for productivity improvements and poverty reduction.

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