

Commercialization and Food Security, Can They Go Together for The Sudanese Agrarian Economy

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1. Introduction

The agricultural sector has particular significance in the Sudanese economy. It contributes a greater share in the gross domestic product, as well as the major source of foreign currencies, besides absorbing more than 75 per cent of the labor force. The agricultural growth rate increases by 8.5 per cent, on average, during the last decade with agricultural GDP stands at 49.8 per cent in 1999 (Bank of Sudan, 1999). Sorghum and millet are the staple-food cereals in Sudan, which are facing a hard competition on natural resources due to a Government activated policy to expand export crops as part of an overall privatization strategy launched in 1992.

Moreover, drought, desertification, and famine have, seriously affected the Sahel and Eastern African countries including Sudan. It is often argued, accordingly that the recurrent drought episodes are the major cause of the food crisis in these African countries. Conversely, it has been also argued that the agricultural policy pursued by many African governments, enhanced by the failure in the food market, is behind the food dilemma faced by their people today.

As put by Bates (1982), agricultural policies in Africa are characterized by attempts to set prices in markets in a way that is harmful to the interests of most farmers. Examining the position of cash crops producers for export in Africa, he pointed that they have been subject to pricing policies that reduce the prices they receive to levels well below world market prices. Real prices of food are even kept lower relative to cash crops at the market place.

As pointed out by Elamin (1987), despite the potential of increasing food production, Sudan has been experiencing grain shortages since the early 1980s which have become severe enough to put the country in the list of food crisis countries. He also concluded that contrary to Sudan's stated goal of food self sufficiency, the credit and other agricultural policies have not been successful in closing the widening food gap.

Therefore, while the recent food crises of Sudan are always attributed to the recurrent droughts, the agricultural policy is, indeed, a major cause of these food deficits. Further, the food-grain market does not seem to have succeeded to close the food gap emerging from the cash oriented cropping policy pursued by both the national and local governments.

Food security has interrelated components; availability of food through production, storage and imports, and ability of all people in a nation to acquire the adequate food. The ability of all people depends on the situation of their income; urban food security is to a greater deal correlated with the individual earnings of cash income. On the other hand, the increasing trend of cash crops production, mainly sesame and groundnuts, where most of the farmer increase their cash crops cultivated areas may lead to declining food production, which leads to shortages in food and increased food insecurity.

2. Empirical investigation

2.1 Study objectives

The primary objective of this study is to examine the role of commercialization of agriculture as a stimulus to increased food production and hence reduced food insecurity in The Sudan. More specifically, for policy purposes, to impute the functional relationships between commercialization index and food production for the dry land agriculture sector, econometrically.

2.2 The model statement

The two equations below represent the theoretical framework of the determinants of commercialization decision and their effect on food crops production. The farm households' cash crops commercialization function is given by:

$$CI_t = \alpha_0 + \alpha_1 X_{ti} + \alpha_2 Z_{ti} + e_{ti} \quad (1) \quad t = \text{year} (1970, \dots, 2000)$$

and the conditional production function of food is:

$$Y_t = \beta_0 + \beta_1 X_{ti} + \beta_2 C_{ti} + \beta_3 Z_{ti} + V_t \quad (2)$$

Where

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CI_t commercialization index

Y_t food product/productivity

X_t explanatory variables

Z_{ti} instrumental variables

, respectively. When using the time series data we take the aggregate production of all the households' production in the year. X_i is a vector of exogenous variables that include credit, labor force, areas cropped, and rain fall, whereas Z_{ti} is a vector of education index, labor index, credit and CPI. Note that, Z_{ti} in equation (1) is included as a vector of exogenous variables, too.

These exogenous variables are included in our model to estimate their affects on the commercialization index. This commercialization of agriculture is presumed to have an impact on the production of food crops.

CI is the cash crops commercialization index, this is an endogenous variable, in the first equation and exogenous variable in the second equation, and it is computed by the gross value of cash crops divided by the value of all crops produced in the agricultural year. To compute the CI for each year, we take the major four crops, millet and sorghum as main food crops and groundnuts and sesame as the most important cash exportable crops in the study areas. This index measures the extent to which households' crop production is oriented towards commercial agriculture (Strasberg, et. .al), e and v are residual or disturbance terms. The exogenous variables in equation (1) and (2) were driven by the hypothesis that, these variables are strongly related to both cash crops commercialization and food production decisions.

3. Results and discussion

The empirical results showing the impact of commercialisation of agriculture on food supply in the dry land of The Sudan can be shown graphically in Figure 1 a and b. The yearly growth rates on food production are graphed against actual growth rate of commercialisation index (CI) for the traditional and mechanised farming, respectively. The graphed data are adjusted, a priori of estimation, for inflation and smoothed up by converting the series into three-year moving averages. It is clear from Figure 1a that adjusted annual growths of the CI and the food supply are moving together for the traditional small rain-fed farms, indicating very high correlation between cultivation of

cash crops versus food production. By contrast, Figure 1b predicts the opposite for the mechanised large-scale rain-fed farms.

These relationships between commercialisation of agriculture and production of food at the farm level are further investigated econometrically using the IV (instrumental variables) technique, with the results presented in Tables 1, 2 and 3. The results of the Ordinary Least Squares (OLS) linear equation has shown that the commercialisation index is highly influenced by the cash cropped area, the labour force available for farming and the region dummies. Of course the commercialisation is found to be negatively correlated with the food cropped area (Table 1), as expected.

When food production is estimated using only the CI index as an exogenous variable, and education, labour, credit, consumer price index, and area under cash crops as instrumental variables, the CI has shown positive impact on food supply for The Sudan dry land sector and traditional farming. But a negative impact for the mechanised farming (Table 2). The Cobb-Douglas production elasticities of food with respect to commercialisation of agriculture is 1.01, 0.47, and -0.42 for Sudan, traditional and mechanised dry land farming, respectively. Two facts could be reflected by these findings. First, large mechanised farms are in essence commercial farms owned and managed by profit maximisation producers who treat all crops, cash and food, as profit making enterprises. Therefore, the question of whether commercialisation affect food production in the mechanised farming becomes less relevant, as every crop is considered a profit led activity. Consequently, the market prices rather than the utility function of the farmers dictate the choice of cropping pattern in the mechanised farms.

By contrast, the traditional small farmers are utility rather than profit maximizers, and the choice of the cropping pattern to them is based on satisfaction of home consumption first and second provision of cash surplus. Therefore, the effects of commercialisation on food production matter for the utility maximizer farm households in the traditional rain fed farming.

The second fact that could be used to explain the positive impact of commercialisation on food production in dry land agriculture, constituted of majority traditional smallholders, is that revenues from cash cropping is generally used to finance food production. Traditional small farmers who produce more cash crops for the market are those who are more able to use purchased inputs to produce food grain, perhaps, vertically.

Table 3 presents the results of the same C-D production function with the two areas cultivated by cash and food crops added as explanatory variables, to fine tune the function to realism of the regions covered in the analysis. For this production function better estimates are found with the commercialisation index having a profound positive effects, even in the mechanised dry land farming. The elasticity of food supply with respect to commercialisation index is 0.8, 0.5, and 0.6 for The Sudan, traditional, and mechanised dry land farming, respectively.

Table 1: Empirical results of commercialization production function

Variables	OLS linear equation parameters		R ²	DW
	Coefficient	t-Statistic		
Endogenous variable				
Commercialization index			.56	1.64
Exogenous variables				
Constant	- 266.35	- 2.543***		
Area cultivated by food crops	- .013	- 6.219***		
Area cultivated by cash crop	.035	8.382***		
Labor index	7.45	2.872***		
Annual rainfall	-.010	-.788		
North Kordofan	43.13	3.074***		
South Kordofan	42.38	2.812***		
Damazine	127.85	4.42***		
Gedarif	148.33	3.535***		
South Darfur	3.81	.681		

Table 2. Empirical results of the 2SLS food production function (with only Commercialization Index as explanatory variable)

Variables	Production Function Coefficients		
	Dry land Agriculture	Traditional Rain fed	Mechanized Rain fed
Endogenous variable			
Total food production			
Exogenous variables			
Commercialization index	1.01	0.47	- 0.42
Constant	1.80	3.07	7.55
<i>Instrumental variables</i>			
Education index			
Labor index			
Credit			
Consumer price index			
Area of cash crops			

NB: Coefficients are significant at < .05 probability. Level, at least.

Table 3: Empirical results of the 2SLS food production function (with more than one explanatory variables)

Variables	Production function Coefficients		
	Dry land Agriculture	Traditional Rain fed	Mechanized Rain fed
Endogenous variable			
Total food production			
Exogenous variables			
Commercialization index	0.821	0.522	0.570
Area of cash crops	0.264	0.102	0.267
Area of food crops	-.342	0.1282	-.498
Constant	-3.017	-4.409	-.905
<i>Instrumental variables</i>			
Education index			
Labor index			
Credit			
Consumer price index			
R-square	0.43	0.86	0.76

NB: Coefficients are significant at < .05 probability. Level, at least.

4. Implications and Conclusion

Liberalization, privatization and globalization are deriving the socioeconomic and commercialization conditions in every nation, today. The residual effects of trade liberalization as a policy instrument of globalization are varied among individual economies, however, increasing food related poverty is evidenced across developing countries (Elbadawi, 2002). Therefore, it is high time to investigate the effects of commercialization on serious issues such as food production and poverty.

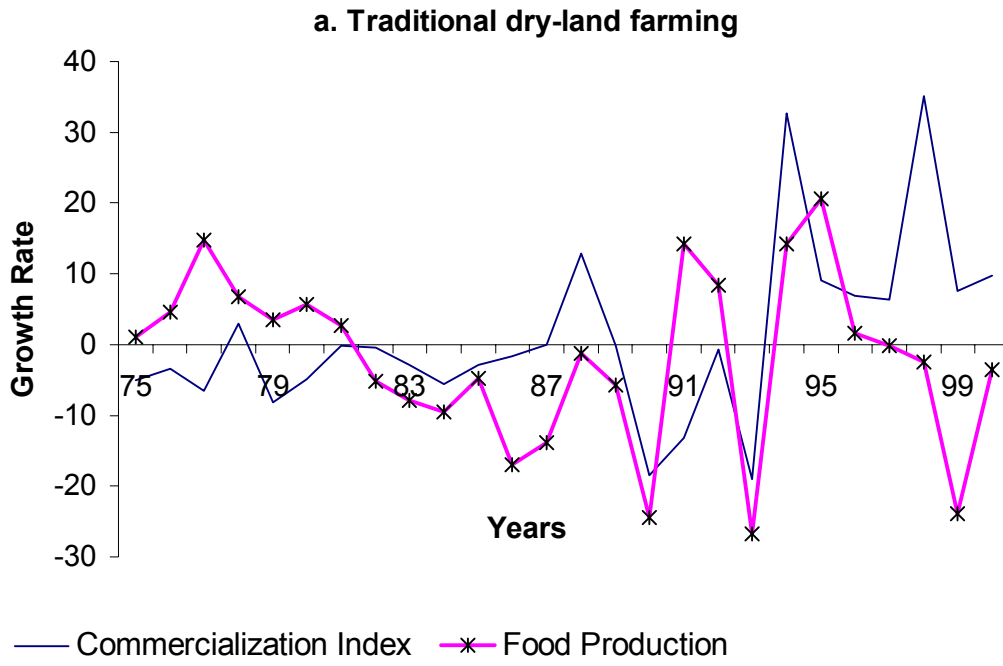
If commercialized agriculture, empirically, proved to have positive impact on the food market, then this fact could be transmitted to redesign the agriculture industry not only in Sudan, but also for North African countries, in which governments are more or less are currently obsessed by commercialization.

Our results so far have showed high positive effects of commercialization of agriculture on production of food crops, in particular in the traditional small-holder dry land farming. However, this does not guarantee that people being food secured nor going out of poverty if agricultural markets and infrastructure are still inefficient.

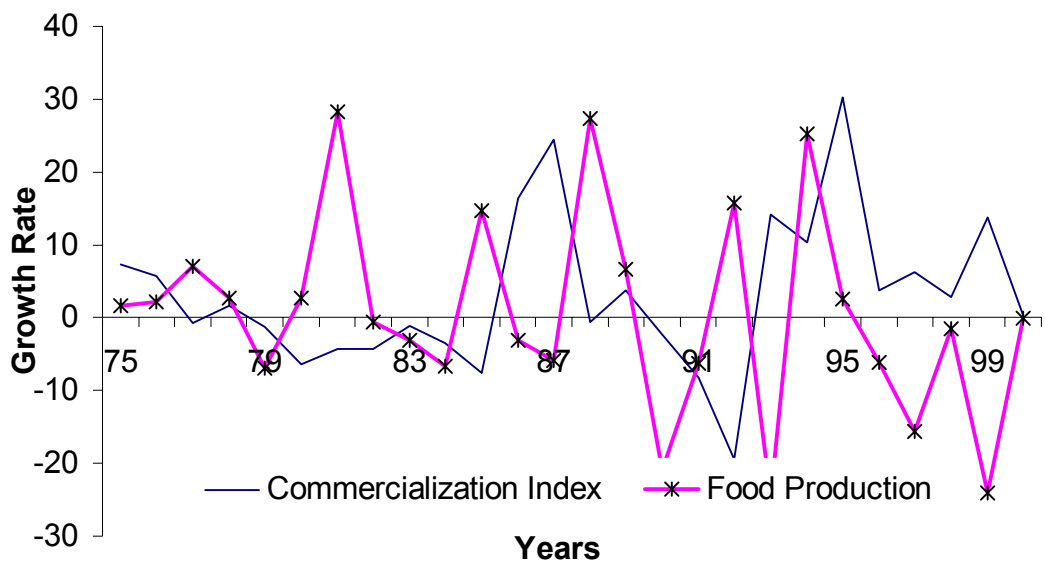
Commercialization of agriculture in the terms found in this study can be argued to reconcile the ever conflicting multiple objective facing the developing countries when they try to achieve food security, higher foreign exchange earnings from export and devaluation of the exchange rate, simultaneously.

For the case of The Sudan, we believe that the stated food security objective can go very well with the Government activated policy of progressive modernization towards export oriented commercial agriculture.

Figure 1. Relationship between food production and commercialization index in dry-land farming.



b. Mechanized dry-land farming



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