Evaluation of the Privatization of Government Agricultural Schemes in the River Nile State, Sudan

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Abstract: This study was carried out to measure the effect of privatization policy on socio-economic situation of producing wheat tenants in the River Nile State through direct comparison with the private small pump schemes who used to manage their farms privately and they had attained a considerable experience in this field. Stratified sampling method was used to collect data from the selected schemes in the River Nile State during season 2007/08. Multiple regression methods was used to estimate the wheat cost function for privatized and small private pumps schemes. The results of the wheat cost function multiple regression analysis showed that the private small pumps schemes were more close to the optimal productivity, whereas, the difference between the economic productivity level and the achieved productivity was 55 % for the privatized schemes and 32 % was for the private small pumps schemes respectively, indicating that small farmers were utilizing their resources more efficiently than the privatized tenants. Hence, the study recommended more rehabilitation efforts to be taken to raise the capacity of the irrigation and drainage systems, have more access to inputs to benefit from the economies of scale and to grow more cash crops to increase farmer’s income.

INTRODUCTION

Privatization policy aimed to transfer control and management of public enterprises to the private sector as a part of economic reform program of the World Bank (WB) and the International Monetary Fund (IMF). Since its introduction by Britain’s Thatcher government in the early 1980s, privatization is one of the most important elements of the continuing global phenomenon of the increasing use of markets to allocate resources” (Megginson and Netter, 2001). Nellis and Shirley (1992) noted that privatization is not a blanket solution for the problems of poorly performing SOEs. On the other hand some writers refused the prevailing believe that the efficiency of resource distribution will be improved by the application of privatization (Arab Organization for Agricultural Development (A. O. A. D), 2000).

In Sudan, since the mid 1980’s the state – owned enterprises performance began to deteriorate performance and have become a burden on the national economy, justifying for privatization. Agriculture, beings the most important potential contributor to the economic growth (36.5 % of the GDP in 2009), received a considerable attention on privatization policy action, in order to increase economic efficiency and promote the agricultural production to obtain positive effects on crop yield, farmer income, management and asset ownership.

By 2005, 81 enterprises were privatized of which 26 % were agricultural schemes (Technical Committee for the Disposition of Public Enterprise TCDPE, 2005). Many of the privatized enterprises in the agricultural sector (9 out of 21) were disposed of by transfer their ownership to a governmental organizations or regional governments for free. TCDPE, revealed in its reports issued in 1997and 2002 – that the experience of privatization in the agriculture sector was impressed by a continuous failure.

The main criticism of the privatization program inside Sudan relates to the transfer of enterprises to state governments and acquisition of enterprises by those considered to politically connect (CEM, 2003). In September 2000, the Steering Committee of the Strategic
Comprehensive Program for Poverty Reduction in Sudan concluded that more than half of the Sudanese population live under the poverty line (Musa, 2002). However, MFNE, (2005) reported that, the total return of privatized enterprises reached about SDD 33 milliard by 2005 (the privatization proceeds represent about 3% from the total receipts of government in 2005).

According to recommendation of the 1992/93 National Salvation Program in its strategy conference 1990 the government transferred the ownership of the ten government schemes in the River Nile state under the management of the Northern Agricultural Production Corporation (NAPC) to established farmers unions. Those schemes were aging and have poor financial position; the new administration was not qualified to meet financial need of the rehabilitation and operation of production activities at these schemes. The outcome of this situation was reflected in higher water charges, law crop productivity, smaller areas under cultivation, law income to farmers, a significant reduction in the number of the employees.

The study set forth evaluation of the privatization of the Northern Agricultural Production Corporation (NAPC) Schemes (government schemes) in River Nile State through direct comparison with small pump schemes.

**METHODOLOGY**

**Survey area and data collection**

Data are usually gathered by the researcher via surveys, experiments or observation methods (Diamantopoulus and Schlegelmich, 1997). The primary data were obtained from a field survey of NAPC – schemes and private small pumps schemes in the River Nile state during the season of 2007/08

With regard to sampling, multi-stage stratified random sampling technique was adopted as it gives more precise results because as it reduced the variation within each stratum (Elzaki, 2005). The 10 NAPC- schemes were divided into two clusters, one that included the rehabilitated schemes, namely Fadlab, Kelly and Gendettu, and the other cluster included non rehabilitated (rest 7- schemes). Data was collected from the farmers selected randomly from the selected schemes in the cluster. The actual number of farmers interviewed was 150, which represents about 1% of the total (15000 farmers). Farmers and schemes administration were directly interviewed to obtain primary information about location, area, crops planted, varieties, yields cost of production, prices and inputs used. Several documents, reports and other sources of information that are related to the study were also used as supplementary information, to serve the objectives of the study.

**Analytical techniques**

There are many types of models that can and often have been used for policy analysis and forecasting, but there are three general classes of models can be constructed for this purpose (Pindyck and Rubinfeld, 1981): Time-series models, Single-equation regression models and Multi-equation simulation models.

This study applied Single- equation regression model to assess cost functions for wheat planted in the privatized enterprise and in the private small pump, schemes who used to manage their farms privately and they had attained a considerable experience in this field.

For cost function, polynomial or cubic function was used in the form:

\[ Y = a + bx + cx^2 - dx^3 \]

where

\[ Y = \text{Total costs per feddan} \quad X = \text{Yield per feddan} \]

\[ (1 \text{ feddan} = 0.42 \text{ ha}) \]

\[ a \text{ is a constant representing the total fixed cost} \]

\[ b, c, \text{ & } d \text{ are constants representing the variable coefficients and they measure the slope at zero points.} \]

The study use of the cubic form because it allowed marginal cost to decline by a constant absolute amount and implies more quantitative interpretations for the results obtained by using the second derivative of production function to determine the quantity of yield which minimize the costs.
Robust regression method is used to provide an alternative to least square regression that work with less restrictive assumptions (data with outliers), it provides much better regression coefficients estimates. Hamilton (1991) stated that, ordinary least square analysis does not perform well when outliers occur; robust regression down weights the influence of outliers. The coefficient of multiple determinations $R^2$ is used to measure the proportion of the variation in the dependent variable explained by the equation; $t$-statistics are used to assess whether the explanatory variables in the model have any significant impact upon the dependent variable.

RESULT AND DISCUSSION
Cost function for wheat in privatized farms
The objectives of this section were determining the existing situation of production and the economic size of production, which minimizes the average cost of feddan and maximizes the yield. The results of the relationship between the wheat total production costs per feddan and the quantity of production for privatized schemes were illustrated in cubic form as follows:

$$TC = 795.35 + 119.87Y + 17.93Y^2 - 0.67Y^3 \quad (1)$$

$$(3.92)^* \quad (3.70)^* \quad (-2.94)^*$$

$R$ - Square $= 80 \%$

$F$ - Statistics $= 31.76^{**}$

* Significant at 5% level.

** Significant at 1% level.

$TC = $ Total costs per feddan (SDG).

$Y = $ Yield per feddan (Sacks).

The level of output, $Y$, at which the average variable cost and marginal cost reach their minimum, can be calculated (Doll and Orazem, 1978). This characteristic of cost function has enabled the study to drive the following relationships:

The value of output ($Y$) at which marginal cost (MC) is a minimum can be calculated by equating the (MC) slope to zero, from equation (1) above, this quantity can be calculated as follows:

$$MC = \frac{dTVC}{dY} = 119.87 + 35.86Y - 2.01Y^2$$

The first derivative of the above equation equals the slope of the $MC$ curve

$$dMC = 35.86 - 4.02Y = 0$$

$$\frac{dY}{dY} = 9.0 \text{ sacks}$$

Thus, the minimum of ($MC$) occurs where output equals 9.0 sacks

The amount of output $Y$ at which the average variable cost ($AVC$) reaches its minimum can be calculated by equating the slope of $AVC$ curve to zero as illustrated in the following steps:

From equation (1)

$$AVC = \frac{TVC}{Y} = 119.87Y + 17.93Y^2 - 0.67Y^3 \quad (4)$$

$$Y = 119.87 + 17.93Y - 0.67Y^2 \quad (5)$$

$$\frac{dAVC}{dY} = 17.93 - 1.34Y = 0$$

$$\frac{dY}{dY} = 13.4 \text{ sacks} \quad (1 \text{ sack} = 95 \text{ kg})$$

The average variable cost reaches its minimum when output, $Y$, is 13.4 sacks, at this level of output, the average variable cost equals marginal cost.

The results of the above equation indicate that the amount of output at the beginning of the rational stage (13.4 sacks) is higher than the existing yield (6 sacks) by 123 %. In other words, there is a gap of 55 %, which indicated that the production is far from the rational production, which means, the privatized schemes are not utilizing their available resources economically (Table. 1).

Table 1. Comparison of economic volumes of yield per fed with the existing yield for wheat in privatized farms
Cost function for wheat in small schemes:
The relationship between wheat total production costs of feddan and the quantity of production for small schemes was illustrated in cubic form as follows:

\[ TC = 22.73 + 236.86Y - 29.19Y^2 + 1.03Y^3 \]

(7)

\[ R^2 = 92\% \]

\[ F\text{-Statistics} = 40.00** \]

* Significant at 5% level.

** Significant at 1% level.

\[ TC = \text{Total costs per feddan (SDG).} \]

\[ Y = \text{Yield per feddan (Sacks).} \]

The following relationships were derived from the above equation.

\[ MC = \frac{dTVC}{dY} = 236.86 - 58.38Y + 3.09Y^2 \]

(8)

The first derivative of the above equation equals the slope of the MC curve

\[ \frac{dMC}{dY} = -58.38 + 6.18Y = 0 \]

(9)

\[ Y = 9.4 \text{ Sacks} \]

Thus, the minimum of MC occurs where output equals 9.4 Sacks. Similarly, the amount of output Y at which the average variable cost (AVC) reaches its minimum can be calculated by equating the slope of AVC curve to zero as illustrated in the following steps:

\[ AVC = \frac{TVC}{Y} = \frac{236.86Y - 29.19Y^2 + 1.03Y^3}{Y} \]

\[ = 236.86 - 29.19Y + 1.03Y^2 \]

\[ \frac{dAVC}{dY} = -29.19 + 2.06Y = 0 \]

(12)

\[ Y = 14.2 \text{ sacks} \]

The average variable cost reaches its minimum when output, Y, is 14.2 sacks; at this level of output the average variable cost equals marginal cost.

By comparing these economic volumes of yield per feddan with the existing yield which amount to 9.60 sacks per feddan (Table 2.), it is become clear to that although the yield at the beginning of the rational stage is higher than the existing yield by 48% (32% gap), it seems that the small schemes are about to reach the economic points of production before their peers in the privatized farms. This may be attributed to the effectiveness of management and regular irrigation in addition to the high fertility of the soil.

The results indicate that the small schemes are utilizing their available resources more economically than their peers in the privatized farms.

The results of this study, are also in conformity with the findings of Saad (2007) who evaluating privatization effect on Blue Nile Agricultural Corporation and found that, the high cost per feddan and the traditional mode of production prevailing in the privatized farms in Sinnar indicates inefficient use of resources available in these farms, and subsequently deprived them from attaining economic quantities at earlier stages of production and maximize their profits.

Huwaitalla (1998) reported that, companies (the government pump schemes which have been transformed to agricultural companies since 1996, e.g Nuri and Elgueir in Merawe, Elkulud and Genatti in Al-Deba locality and Elburgage in Dongola locality) were recorded to work at a
lower performance level than the cooperatives and the individuals.

Table 2. Comparison of economic volumes of yield per fed with the existing yield for wheat in small schemes

<table>
<thead>
<tr>
<th>Yield at the minimum point of MC (sacks)</th>
<th>Yield at the beginning of the rational stage (sacks)</th>
<th>Existing yield (sacks)</th>
<th>Gap %</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.4</td>
<td>14.2</td>
<td>9.60</td>
<td>32</td>
</tr>
</tbody>
</table>

Source: Author’s survey 2007/08

It was concluded that the privatization of the government schemes in the River Nile State had not contributed positively to the improvement of crop production. Hence, the study recommended more rehabilitation efforts to be taken to raise the capacity of the irrigation and drainage systems, have more access to inputs to benefit from the economies of scale and to grow more cash crops to increase farmer’s income.

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موجز البحث: أجريت هذه الدراسة لقياس تأثير سياسة الخصخصة على الأداء الاقتصادي والاجتماعي لمزارعي القمح بولاية نهر النيل من خلال مقارنة المشاريع الخصخصة بمشاريع الطلبات الصغيرة. استخدمت العملية الفحصية العشوائية في جمع البيانات أثناء موسم 2007/2008، كما استعانت الدراسة بتحليل الإحصاء المتعدد لتقدير دالة التكاليف لم الحصول الفعلي للكمية المتاحة من أداة التكاليف لمتحصى الفدح. أظهر تحليل دالة التكاليف لمتحصى الفدح أن مشاريع الطلبات الصغيرة تقترب من تحقيق الإنتاجية المثلى، حيث أن الإنتاجية في بداية المرحلة الاقتصادية فوق الإنتاجية المحفقة فعلاً تصل إلى 55% في المشاريع الخصخصة و32% في مشاريع الطلبات الصغيرة في عادت الأمر. هذا يشير إلى كفاءة استخدام الموارد المتاحة لتصغر الزراعين ميزار المزارع بين المزارعين المشاريع الخصخصة واهمية توسيع الدراسة بضرورة تخصيص ميزانيات كافية لرفع كفاءة عمليات البرم من خلال تأهيل محطات الري والترع والقوارض وتوزيع المدخلات للاستفادة من اقتصادات الحجم بهذه المشاريع وتقييم العوامل التي تبني زراعة المحاصيل النقدية لزيادة دخولهم.

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