THE EFFECT OF SUBSIDY REMOVAL ON THE PROFITABILITY AND THE COMPETITIVENESS OF RICE PRODUCTION IN SOUTHERN TOGO

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ABSTRACT

The objective of this study is to assess the effect of the removal of the fertilizer subsidy on the profitability and competitiveness of rice production in Togo. To this end, the data were collected through a survey carried out among rice producers in southern Togo. The results show that despite the subsidy removal, the rain-fed and irrigated rice production systems remained financially profitable. However the subsidy removal policy has significantly reduced the profitability and the competitiveness of rice production. Indeed, following the subsidy removal, it becomes more expensive to produce the rice locally than to import it. The implication of the result is that due to the decline of the profitability and the competitiveness of the rice production subsequent to the removal of price subsidy, the government should experiment better methods of subsidy, for example, voucher systems, to encourage poorer and more marginal rice producers to use fertilizer.

Keywords: Subsidy removal; profitability; competitiveness; rice production

1. INTRODUCTION

Between 1980 and 2000, several Sub-Saharan African countries have embarked on economic reforms that include dismantling of price and wage controls, as well as deregulation and privatization of other heavily state-controlled sectors. Such market liberalization measures are consistent with economic theory, which postulates that the proper functioning of markets and marketing channels is essential for the optimal allocation of resources (Abdulai, 2000).

In this context, many African countries have moved from a subsidy-push policy to a price-pull policy resulting on liberalization and privatization of the supply and the distribution of agri-inputs (Fontaine and Sindzingre, 1991).

However, given the Food Millennium Challenges for Africa and the need to increase fertilizers' consumption to 50 kg of nutrients per ha in 2015, the African Summit in Abuja held in 2006 on fertilizers had promoted public subsidy on fertilizers, which is now seen as an important instrument to boost the agriculture and the economy of Sub-Saharan Africa countries. In "Abuja's Declaration on Fertilizer for an African Green Revolution," the resolution no. 5 in substance said: "Improving access to fertilizers by providing subsidies to fertilizer sector especially to poor farmers». In a more general perspective of boosting the fertilizer market, resolution no. 2 says: "The Declaration of Abuja invites countries and Regional Economic Communities to take appropriate measures to reduce the purchasing cost of fertilizers at regional and national levels through the harmonization of policies and regulations to enable the free movement of fertilizer with free customs and free duties among the regions and capacity building for quality control (Honfoga, 2013).

Following the ratification of Abuja agreement, the share of fertilizer subsidy has increased in public expenditures in Togo. Indeed, an analysis of the composition of the public expenditures reveals a significant part of input subsidies with a predominant part of fertilizer subsidies. Between 2002 and 2011, these subsidies have been multiplied by 10, increasing from 0.3 to 3 billion. It is estimated that over the period 2005-2010, the sales prices of fertilizers to farmers had corresponded to an average subsidy of about 35 to 40% of the real cost of import and distribution except in 2009 when it reached 50% due to the sharp increase in fertilizer prices on the international markets (MAEH, 2012).

Nonetheless, some economists have criticized the inefficiency of such subsidy policy for several reasons: the increasing of public expenditures, the diverting of the subsidized fertilizers from the target group of small farmers to the non-target group of the rich farmers and from the country to the neighboring countries (Yovo, 2015).

In that context, the Togolese government has decided in 2016 to remove the subsidy on fertilizers' price. This removal has increased the fertilizers bag's price from 11,000, the subsidized price, to at least FCFA17, 000, the bag's price in private shops, which nearly corresponds to the market price in the neighboring countries.

Yovo (2010) has already shown that the increase of rice price during the food crisis between 2007 and 2010 has improved the profitability and the competitiveness of rice production in southern Togo. The present paper attempts to appreciate the effect of removal subsidy on the profitability and competitiveness of rice production in the same area. In others words, is the production of rice in the context of subsidy removal still profitable and competitive? The choice of rice is due to the fact that it is the grain for which fertilizers are used more intensively than others in Togolese context.

The remainder of the article is organized as follows. Section 2 describes the Policy Analysis Matrix (PAM) used to assess the profitability and the competitiveness of rice production and the data collection procedure. Section 3 presents and analyzes the results and finally the section 4 draws a conclusion and provides a policy implication aiming to improve rice productivity in Togo.

2. METHODOLOGY

In this methodology, we first describe data and the sample then we present the policy analysis matrix used to assess the profitability and competitiveness of the production of rice in Togo.

2.1 Data and Sample

The data used in this paper are collected from a survey carried out in southern Togo. The data include one output and seven inputs. Output is measured in kilograms of rice production. The only fixed input is cultivated land, measured in hectares. Variable inputs are: labour (working days), in addition to capital, fertilizers, seeds, herbicides and fungicides, all of which are measured in francs CFA, the local money.

The survey covered 360 rice producers selected randomly in three villages in southern Togo: Mission Tove, Kovie and Assome. The choice of these villages is due to the fact that they are areas rich in wetlands where the government is developing rice production. The main farming systems met in the area are the dry farming system and the irrigated farming system.

2.2 Policy Analysis Matrix approach

The PAM approach, set up by Monkey and Person (1989), is essentially a double-accounting technique that summarizes budgetary information for farm and post farm activities. While simple to use, it is theoretically rigorous and derived from social cost-benefit analysis and international trade theory in economics. The basic steps in using the PAM method are identifying the commodity system, assembling representative budgets for each activity in the system, calculating social values, aggregating the budgetary data into a matrix, analyzing the matrix and simulating policy changes. The method is based upon a familiar identity: Profit = Revenue – Costs. Costs are divided into tradable inputs which are traded on international markets (fertilizers, pesticides) and domestic factors (labour, land), which are not traded internationally. Thus, the profit identity can be reformulated as follows:

Revenue – Cost of tradable inputs – Costs of domestic factors = Profit

PAM is measured in two types of prices: private and social, which are defined clearly in the context of PAM use. Private values, are prices at which goods and services were actually

exchanged and those used in the budgets the price of crop, the cost of seed, fertilizers, farm yard manures, pesticides and the going wage rate. These are also called market or financial prices. Social values are the prices, which would prevail in the absence of any policy distortions (such as taxes or subsidies) or market failures (such as monopolies). They would reflect the value in the view of the society rather than the value in the private individuals' view. They are the values used in economic analysis when the objective is to maximize national income. These are sometimes called shadow prices, efficiency values, or opportunity costs. The determination of social values is one of the main tasks of economists, since these values offer the best indication of optimizing income and social welfare. As the country is rice importer, the social price of rice is Cost Insurance and Freight (CIF) price at out port plus the domestic transport cost, port charges, handling cost etc. In case of domestic factors, which are not traded on international markets, the social costs have been calculated using opportunity cost approach. Thus for land, the cost of renting the land was taken as the opportunity cost of the land, because farmers in the area found more profitable and less risky to rent the land at FCFA 50,000 per hectare than sell or exploit it to produce rice. With regard to labor, the wages of agricultural laborers during periods of intense activity (85,000 FCFA / hectare) were taken as the opportunity cost of labor. As for capital, the opportunity cost used is that of the financial market. The structure of the PAM is provided by table1.

Table 1: Policy Analysis Matrix

Description	Revenue	Cost of tradable inputs	Cost of domestic factors	Profits
Private prices	A	B	C	D
Social prices	E	F	G	H
Policy transfers	I	J	K	L

D= Private profit = A- B- C	J= Tradable Inputs transfers = B – F
H= Social profit= E-F- G	K= Domestic factors transfers = C - G
I= Output transfers= A – E	L= Net transfers = D – H

Source: Monkey and Pearson (1989)

From this table1, several useful indicators appear. The indicators of profitability are represented by D and H.

Private profit (D) is the measure of net returns for the production activity and a high value would suggest a system that is profitable from a financial point of view. In other words, the system generates financial profits for the producers. A negative value would be a strong indication that

the system is unsustainable, since there are no incentives for individual farmers to participate and they would leave the industry.

In contrast, social profit (D) would represent the foreign exchange saved by reducing imports of a unit of the rice. A positive value would indicate that production is adding to national income, while a negative value would suggest that the country as a whole would be better off in terms of national growth by not producing the rice. As such, it is an indication of international comparative advantage.

Cell (L) is the difference between D and H, and it describes the value of the resources going in to the rice production system from the economy as a whole (if positive) or coming out (if negative) from the rice production system to the economy as a whole.

The private profit and social profit can be computed as the following ratios:

Cost Financial Profit: $CFP = CBF = (C + B)/A$;

Cost Economic Profit: $CEP = CBE = (F + G) / E$.

The indices used to compute the competitiveness are expressed as follows:

Domestic Resource Cost: $DRC = G / (E - F)$

The indices used to compute the transfers are expressed as follows:

Nominal Protection Coefficient : $NPC = A / E$

Effective Protection Coefficient: $EPC = (A - B)/ (E - F$

Subsidy Ratio to producers: $SRP = L / A$

3. RESULTS AND DISCUSSION

Before presenting and analyzing the PAM, we describe rice production systems in the study zone.

3.1. Analysis of rice production systems

Two main production systems are met in the area. These are the dry farming and the irrigated farming system. The characteristics of the two systems are summarized in table 2.

Table 2: Characteristics of the rice farming systems in southern Togo

	Frequency of fertilizers use	Mean Farm size (ha)	Mean yield (tons/ha)	Varieties used	Percentage of rice farmers
Dry rice farming	0 to 1 time per cycle	0,35	1,5	Traditional, Nerica, IR841	35%
Irrigated rice farming	0 to 3 times per cycle	1,2	2,5	IR841, TGR, Nerica	65%

Source: The survey

Dry rice farming

It corresponds to a traditional production characterized by small farms size with less than one hectare. This type of rice farming uses a lot of family labor but very little capital. In this system, the rice is usually grown in association with maize, yam, okra, etc. Yields are low, on average 1.5 tons / hectare because of the poorly monitored technique: insufficient treatment, low fertilizer use, intensive use of traditional varieties. Production is mainly for self-consumption; however, some farmers release lean surplus that are sold on the local market (market of Kovie). Most parcels are acquired either by purchase, gift or inheritance.

Irrigated rice farming

It corresponds to an improved traditional semi intensive farming. It is characterized by a water supply of rice perimeters. The irrigation network consists in suppling water through a main canal which is subdivided into two primary channels which in turn are also subdivided in secondary channels. Farms are much larger, on average 1.2 hectares. The technical itinerary is better followed than in rain-fed rice cultivation: use of the tiller for plowing, more intensive use of fertilizers and short-cycle improved varieties including Nerica and IR 841; which yield on average 2.5 tons / hectare. The harvest is destined primarily for sale on the local market or at the rice mill. Farmers access the land most often through the rental of rice fields. For this system, two or three productions are possible in year.

The technical itinerary followed by the two types of rice farming system is the same and takes place as following:

 - Soil preparation: it includes the following operations: clearing, gathering and burning weeds, stumping, plowing, and leveling;

- The sowing: the rice is sown directly or transplanted. The online sowing is not practiced by than 45% of the farmers despite its incontestable advantages.

- Soil conservation includes weeding, manure, phytosanitary treatments.

- The harvest is done after about 120 days when the majority of the grains is hard and take a yellow colour. Harvesting is done manually using the sickles or knives either by cutting the straws to a few centimeters from the ground, either by taking only the panicles.

- Threshing is usually done in the field, immediately after harvest or after drying. It consists of beating on the ground on a hard object (tree trunk, barrel, stone, etc) or rarely using a pedal tiller for panicles harvested. Traditional threshing has the disadvantage of generate a lot of waste (pebbles, grains of sand, plant debris) in the harvest.

- Drying and winnowing: paddy rice lasts 20 to 30 days in the dryer but with a sunny weather, it is necessary only 5 to 10 days. The dried grains are then vanned using the basins (under the effect of the wind) or rarely using the winnowing machines.

- Shelling is done using the hullers and consists in separating the grain from its envelopes. This step also includes the polishing. The hullers used produce a high rate of broken rice and a byproduct that is a mixture of balls, sounds and debris, depreciating

the quality of the white rice obtained. The percentage of rice husked is 65%.

- Packaging: husked rice destined for sale is packaged in bags of 5 kg, 50 kg or 100 kg or directly sold in bulk.

3.2. Profitability of rice farming in dry and irrigated land

As mention early, rice can be produced in dry land (rain-fed upland or rain-fed lowland) or irrigated land. The PAM results are presented in the Table 3 according to the two farming systems. It appears from the analysis of these that before subsidy removal, financial profit is positive (D> 0) and the financial cost-benefit ratio is 0.35 and 0, 42 for the two production systems respectively. This results shows that rice farmers yield a profit for FCFA 161824 FCFA/ha. This financial profit which is substantial is due to the subsidy policy implemented by the government in favor of producers. This subsidy policy deals with both inputs and product. Concerning inputs, it can be noted that before the subsidy removal, the fertilizers were subsidized at least for about 50%. For example, between 2011 and 2015, the price per kilogram of NPK fertilizer and urea was on average of FCFA 155 on the local market while neighboring countries, the average price of the kilogram was FCFA 240. Apart from the effective input subsidy, there is also an indirect subsidy on the product that took place through the taxation of

imports. This taxation, if it penalizes the consumer because it lowers its purchasing power, protects the producer of the lower price of rice on the market. So there is a transfer of effect on the product. This effect is measured by the indicators namely Effective Protection Coefficient (EPC) greater than 1 and the Subsidy Ratio to Producers (SRP) greater than 0 for the both production systems. Without this subsidy, profitability is likely to be negative. Indeed, the negative sign of social profit (economic profit) H for the systems confirms this hypothesis. The negative sign of profit means that the government intervention policies through the subsidies grant have helped to make the both rice production systems profitable. We can therefore conclude that these two systems were not viable without subsidies. The negative sign of social profit means that the both systems of production are not profitable in the community point of view. Income transfers are generated by the community to support the two systems of production.

With the subsidy removal, financial profits D for the both system is still positive despite the increase of fertilizers' prices. Even though the prices of fertilizers have increased for 54%, the both systems are still financially profitable. However, the private profit has decreased for 24%. The negative sign of social profit means that the both systems of production are still not profitable in the community point of view. Income transfers are generated by the community to support the two systems of production. Thus, contrarily to what is expected, there is a loss of economic efficiency due to the removal of the subsidy.

Table 3 shows that the loss of economic efficiency is more important in lowland rain-fed rice than in irrigated rice farming. This is due to the high cost of fertilizers used intensively in irrigated farming system.

3.3. Competitiveness of rice farming in dry and irrigated land

Table 3 shows that the domestic resources costs (DRC) following the removal of subsidy are greater than unity indicating that the both systems of rice production in the locality were not competitive. In fact for the two systems the DRC grew from 1.02 to 1.43 for the dry rice farming and from 1.42 to 2.02 for the irrigated farming system. These results mean that with the removal of the subsidy, it become more expensive to produce the rice locally than to import. This result can be explained by the fact that, following the removal of the fertilizer subsidy, farmers have removed or reduced the quantity of fertilizer used in favor of the domestic resources which are not less expensive. This substitution effect of the resources has negatively affected the economic efficiency of the rice growers. Besides, we noticed that the loss of competitiveness following the removal of fertilizer subsidy is greater in irrigated system than in dry farming system for the reason aforementioned.

Table 3: Policy analysis matrix for rice farming (Unit in FCFA/ton)

PAM for dry rice farming system under subsidy			
Description	Revenue	Cost of tradable inputs	Cost of domestic factors	Profits
Private prices	A250000	B 20610	C 67566	D 161824
Social prices	E190290	F 56820	G 135900	H -1610
Policy transfers	I 59710	J -36210	K -68334	L 164254
Indicators	CFP=0.35 ; CEP=1.01 ; DRC=1.02 ; NPC=1. 31 ; EPC=1.72 ; ESC=0.66			

PAM for irrigated rice farming system under subsidy			
Description	Revenue	Cost of tradable inputs	Cost of domestic factors	Profits
Private prices	A350000	B 46515	C 102320	D 101165
Social prices	E275000	F 67300	G 175112	H -52122
Policy transfers	I 75000	J 20785	K -72792	L 153287
Indicators	CFP=0.42 ; CEP=0.88 ; DRC=1.42 ; NPC=1.27 ; EPC=1.65 ; ESC=0.61			

PAM for dry rice farming system under removal subsidy			
Description	Revenue	Cost of tradable inputs	Cost of domestic factors	Profits
Private prices	A250000	B 41200	C 67566	D 141234
Social prices	E190290	F 95230	G 135900	H -18870
Policy transfers	I 59710	J -54030	K -68334	L 160104
Indicators	CFP=0.50 ; CEP=1.21 ; DRC=1.43 ; NPC=1.27 ; EPC=1.65 ; ESC=0.61			

PAM for irrigated rice farming system under removal subsidy			
Description	Revenue	Cost of tradable inputs	Cost of domestic factors	Profits
Private prices	A350000	B 69750	C 102320	D 77930
Social prices	E275000	F 103642	G 175112	H -88464
Policy transfers	I 75000	J -33892	K -72792	L 166394
Indicators	CFP=0.56 ; CEP=1.01 ; DRC=2.02 ; NPC=1.27 ; EPC=1.72 ; ESC=0.66			

Source: author's calculation using the survey data

CONCLUSION

In the context of advanced liberalization, the Togolese government has decided in 2016 to remove the subsidy on fertilizers' price. This removal has increased the fertilizers bag's price from FCFA 11,000, the subsidized price, to FCFA17, 000, the bag's price in private shops, which nearly corresponds to the market price in the neighboring countries.

The objective of this study is to assess the effect of the removal of the fertilizer subsidy policy on the profitability and competitiveness of rice production in Togo. To this end, the data were collected through a survey carried out among rice producers in southern Togo. The results show that despite the subsidy removal, the rain-fed or irrigated rice production systems remained financially profitable. However the subsidy removal policy has significantly reduced the profitability and the competitiveness of rice production in Togo. Indeed, it becomes more expensive to produce the rice locally than to import it. The implication of the result is that, due to the decline of the profitability and the competitiveness of the rice production subsequent to the removal of price subsidy, the government should experiment better methods of subsidy, for example, voucher systems, to encourage poorer and more marginal rice producers to use fertilizer.

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