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Economic impacts of fertilizer subsidy in katsina state, Nigeria

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Abstract
Low investment in Agriculture in Katsina State necessitates government intervention to boost productivity, create employment, achieve food sufficiency, economic growth and sustainable development. Provision of fertilizer to farmers at subsidized rate is kpey among series of agricultural supports enjoyed particularly by farmers in rural areas. The practice gulped huge amount of financial resources year after year. To investigate the magnitude of impact of the policy on the state economy, this paper investigated the economic impacts of fertilizer subsidy Katsina State for a period between 2007 to 2015. A sample of 150 farmers was collected from Malumfashi, Mani and Dutsinma Local Governments. Crops harvest and prices were compared for periods before and after subsidies using descriptive statistics. The results show significant increase in harvest of both cereal and tuber crops and slight increase in prices of both crops in post subsidy period. The paper recommends provision of adequate fertilizer to farmers at subsidized rate to boost agriculture and achieve food sufficiency in the State.

Keywords: economic impacts, agriculture yields, economic impact

Introduction

Agriculture yields series of economic benefits to mankind ranging from job creation, food supply, income, capital, foreign exchange, raw materials and market for industries among others. Though it is being practiced differently in different parts of the world due to economic and geographical variations such as soil type, rainfall, technology, capital, market, whether and climate among others. To cultivate land for agricultural purpose, use of chemicals is intensified to boost harvest and other immense benefits associated with farming. Due to global economic fluctuations and uncertainties, several governments directly or indirectly pursue programmes towards achieving food sustainability and economic development. Notable is the yearly provision of agricultural tools, chemicals, improved seeds, research grants, extension services and chemicals to vulnerable farmers at subsidized rates. These programmes had been in existence for several decades especially in Sub-Saharan Africa.

Despite the very large population, conducive geography suitable for farming and vast arable land in Africa, farming activities have been relegated to the background due to extreme poverty and modern farming skills and practices. Outdated tools are consistently being used for centuries. Low harvests are recorded year after year, with dismal benefits in the end. These turned virtually most African nations to dumping grounds for agricultural surplus largely from Latin America and Asia in recent years.

Nigeria being the most populous African nation suffers more from contemporary problems of Agriculture due to series of challenges ranging from insecurity, poverty, unemployment, and high cost of farming and farming implements among others. The identified challenges are more devastating in the northern part of the country. Even though Northern Nigeria has the largest share of the country's arable land, most farmers in the region cannot optimally utilize the land resources.

Katsina state is one of the 19 states in the northern region, located in the Savannah region. The State is adequately blessed with level rainfall that lasts for up to five to six months yearly, with land area of 24,192 square kilometers out of which about 1.60 million hectares are devoted to agriculture. The rainy season covers periods between May and September while the dry season covers about six to seven months in a year, usually between October and April, with average temperature between 21oc to 35oC. (KSIH 2016).

The native people of Katsina are predominantly Hausa/Fulani speaking people, living peacefully together with other Nigerian tribes and foreigners. The total number of people living in Katsina was estimated to 5,801,584 as at 2006 census NPC, (2007), and the population approaches 10, ooo, ooo in 2023. Farming remains major economic activity, though informal trading and other micro entrepreneurship also play a crucial role in economic life of the people (Kabuga and Musa, 2015) [7]

KAIH, (2016) view is consistent with the findings of Kabuga and Musa (2015) [7] that about 95% of the state population is engaged in subsistence farming and animal rearing. Both food and cash crops are sufficiently produced in the state for consumption and sale in major weekly markets in the state. During the dry season, people of Katsina competitively engage in irrigation farming along river basins. Animals reared are majorly cattle, sheep and goats, while major cash crops produced in the state are millet, guinea corn, groundnut, cotton, maize, beans, rice and wheat. Katsina State is moreover, the largest producer of cotton in Nigeria, livestock production is also a major preoccupation of the people agriculture provides raw material for a variety of industries such as oil and flour milling, textiles and dairy (KSIH 2016).

However, Poverty in Katsina State is alarming with 84.33% of 5.8 million people living in poverty, out of which 54.33% live in chronic poverty. Only 17.67% live above the poverty line (Kabuga and Musa, 2015) [7]. This justifies the compelling need for the state government to intervene financially and technically in Agriculture with a view to

achieve food sufficiency among rural poor. World Bank, (2000) reported that in most developing countries the likelihood of being poor and severity of poverty are greater in rural areas than in urban areas. Hence perhaps the State government's commitment to subsidize fertilizer for rural farmers. Did those huge amounts of money spent over the years enhance agricultural sector performance in the state? What happens to extreme poverty especially in the rural areas? To what extent prices of Agricultural produce stabilize? Did the state achieve food sufficiency within the years selected for the study? These are the fundamental questions this paper is aimed to answer.

Subsidy

Oxford Advanced Learners Dictionary (2001) [12] defined subsidy as money paid by a government or an organization to reduce the cost of service or that of producing goods so that their prices can be kept low. In addition, Bakare (2012) [2] points out that to subsidize is to sell a product below the cost of production. In other words, Majekodunmi (2013) [8] defined subsidy as any measure that keeps prices consumers pay for good or product below market levels for consumers or for producers above market price. It is the government decision onand air transport.

Theoretical Framework

A dynamic model of subsidy provides that when multiple periods of time are considered, the government must pay any production subsidy in all periods of time, including each unit of production produced in periods before any investment has taken place, even though these units of production are inframarginal. A drawback of production subsidies that a dynamic model would capture is that the government would need to pay the production subsidy for every unit of production in all periods of time, including production that takes place before any investment is made, even though subsidy payments to these inframarginal units of production are wasted from the point of view of encouraging investment in firm capacity. In addition, when there is uncertainty in the payoffs to investing, firms may be more likely to invest if they receive an investment subsidy upfront rather than a production subsidy that is paid in smaller increments over time.

Our dynamic theory model reveals the following tradeoff between production and investment subsidies. Although any investment induced by a positive production subsidy is marginal investment (which we define as investment that would not have occurred otherwise), the government must pay the production subsidy for each unit of production in both periods, including inframarginal units of production. In contrast, an investment subsidy must exceed a positive lower bound in order to induce marginal investment, but it is possible under certain conditions that very little or even none of the investment would be inframarginal. Our theory model also reveals a similar tradeoff between production and entry subsidies. Our theory results show that whether it costs more to the government to induce marginal investment via a production subsidy or an investment subsidy depends on the parameters, even if there is also a mandate, and is therefore an empirical question.

In line with the postulations of dynamic model of subsidy that when multiple periods of time are considered, the government pays any production subsidy for each unit of production in all periods of time, including each unit of production before investment takes place, fertilizer subsidy is usually provided yearly, usually before the beginning of farming activities.

Literature Review

In many studies, different results on the impact of fertilizer subsidy on farm efficiency, productivity, prices of farm produce, poverty and farmers welfare have been found in different countries. While some evidences indicate positive impacts, others found contrary results. For example, Fan *et al*. (2007) [5], Dorward *et al*. (2004) [4] and Smith and Urey (2002) [16] explored that, although farm production increased in the initial phase of fertilizer subsidy policy in India, such impacts were difficult to observe afterwards.

In another study, Sharma and Thaker (2009) [15] concluded that fertilizer subsidy, after introduction in 2005, has reduced input costs and subsequently, has positively influenced efficiency of paddy production in Sri Lanka.

Darko and Ricker Gilbert (2013) [3] employed stochastic frontier analysis to investigate efficiency among farmers and how it is affected by input subsidy programmes. They revealed that fertilizer subsidy improves efficiency among maize farmers in Malawi.

Sek (2015) [14] provides empirical evidence that the fertilizer subsidy program has indeed significantly contributed to improve farmers' efficiency in Senegal. His results tend to validate the argument that lower fertilizer prices, as a result of subsidy, provide incentives for farmers to use more of the inputs, which subsequently translates into increased output.

According to Meeta *et al*. (2004) [9] the purposes of subsidies are to amend market failures, to protect domestic production from global competition, to reduce import dependence, to make basic goods and services affordable to all, to encourage employment, to ensure the balanced regional development. Since more than 70% of African people live in rural areas and most of them are engaged in agricultural industry, it is essential that sustainable increases in agricultural productivity and rural incomes are the basis for economic growth Oumou (2006) [11]. Input subsidy programs for agricultural development strategies, especially fertilizer promotion programmes have emerged across several Africa countries such as Nigeria, Ethiopia, Kenya, Zambia, Malawi, Tanzania, and Ghana (Jacob 2013) [6].

Methodology

This paper intends to investigate the economic impacts of fertilizer subsidy in Katsina State. Secondary data on market prices, output and farmers' welfare were collected from the federal ministry of agriculture, Katsina State Investment Hand Book and farmers respectively. The data collected was summarized and analyzed using descriptive statistics such as Minimum, Maximum, Mean, percentage and charts for periods before subsidy and after subsidy in determining the economic impacts of the subsidy in Katsina state.

Table 1: Descriptive Statistics of Price Indices of Farms Produce (N/TON) in Katsina State

Period	Type of Crop		Crop Price/TON	D f	f	Mean Price/TON	Total Price/TON	Percentage
Pre-Subsidy Price Indices of Crops	Cereal	Maize	55, 000.00	-2,000	4	69, 000	276.000	30.50%
		Sorghum	50, 000.00	0.000				
		Millet	51, 000.00	-1,000				
		Rice	120, 000.00	0.000				
	Tuber	Sweet Potatoes	80, 000.00	-3,000	2	85, 000	175,000	19.36%
		Irish Potatoes	90,000.00	-1,000				
Post Subsidy Price Indices of Crops	Cereal	Maize	57, 000	2,000	4	69, 750	279,000	30.86%
		Sorghum	50, 000	0.00				
		Millet	52, 000	1,000				
		Rice	120, 000	0.00				
	Tuber	Sweet Potatoes	83, 000	3,000	2	87, 000	174,000	19.25%
		Irish Potatoes	91, 000	1,000				

Source: Author

Table 1 presents Price indices of four cereal crops and two tuber crops Produce before and after supply of subsidized fertilizer to farmers in Katsina State. A ton of maize was sold N55, 000 before subsidy of fertilizer and N57, 000 after fertilizer subsidy, indicating a positive difference of N2, 000. Price of Sorghum remained N50, 000 for the two periods, while that of millet increases from N51, 000 to N52, 000. There was no difference between prices of a ton of rice before and after supply of subsidized fertilizer. Price of a ton of Sweet potatoes changed from N80, 000 to N83, 000 while a ton of Irish Potatoes increased from N90. 000 before fertilizer subsidy to N91, 000 after subsidy, with a positive difference of N1, 000.

Table 2: Descriptive Statistics of Cereal Crops Production (TON/Ha) in Katsina State

Period/Outputs	Minimum/ Maximum		D f	f	Mean	Percentage
Quantity of Cereal Crops per Hectare before Fertilizer Subsidy	Minimum	1.50	-0.50	4	2.00	45.20%
	Maximum	2.50	-0.35			
Quantity of Cereal Crops per Hectare after Fertilizer Subsidy	Minimum	2.00	0.50	4	2.43	54.80%
	Maximum	2.85	0.35			

Source: Author

Table 2 shows descriptive results of quantity of cereal crops produced before and after fertilizer subsidy. From the results, minimum of 1.5 and maximum of 2.50 tonnes was harvested per hectare before fertilizer subsidy while minimum of 2.00 and maximum of 2.85 tonnes was harvested after fertilizer subsidy. The mean harvest before the subsidy was 2.0 tonnes while 2.43 tonnes was the mean harvest after the subsidy. The percentage harvest before the subsidy was 45.20% while 54.80% was the harvest after the subsidy. The results indicate insignificant positive impact of fertilizer subsidy on the quantity of cereal crops.

Table 3: Descriptive Statistics of Tuber Crops Production (TON/Ha) in Katsina State

Period	Minimum/ Maximum		D f	N	Mean	Percentage
Tuber Crops Production before Fertilizer Subsidy	Min	20.00	-5.00	2	22.50	46.40%
	Max	25.00	-2.00			
Tuber Crops Production after Fertilizer Subsidy	Min	25.00	5.00	2	26.00	53.60%
	Max	27.00	2.00			

Source: Author

Table 3 presents quantity of tuber crops produced before and after fertilizer subsidy. From the result a minimum of 20 and maximum of 25 tonnes were produced with average of 22.5 tonnes before supply of subsidized fertilizer to farmers while minimum of 25 and maximum of 27 tonnes with mean harvest of 26.00 tonnes were produced after supply of subsidized fertilizer. 46.40% of the total quantity of tuber crops was produced before the subsidy while 53.60% was produced after the supply of subsidized fertilizer to farmers in the state. These results indicate that fertilizer subsidy has positive impact on production of tuber crops in Katsina State.

Table 4: Descriptive Statistics of Variation in Seasonal Income of Cereal Crop farmers in Katsina State

	Minimum/Maximum Seasonal income		D f	N	Mean	Percentage
Seasonal Income of Cereal Crop Farmers Before Subsidy	Min	210, 000	-75, 000	2	247, 500	23.63%
	Max	650, 000	-300, 000			
Seasonal income of Cereal Crop Farmers After Subsidy	Min	285, 000	75, 000	2	800, 000	76.37%
	Max	950, 000	300, 000			

Source: Author

Discussion of Results

This paper studied the economic impact of fertilizer Subsidy in Katsina State. Prices per tons of cereal and tuber and quantity produced per hectare of both cereal and tuber crops and farmers' seasonal income from agriculture have been compared between pre-subsidy period and post subsidy periods. This findings are consistent with those of Wickremasinghe *et al*. (2009) and Sek (2015) [14] who found positive impacts of fertilizer subsidy on productivity. Moreover, the paper observed insignificant increase in the prices of all crops captured in the study. This is not unconnected with persistent increase in number of farmers in the state and bumper harvest of crops in the state. It is obvious to record relative stability in prices of farm produce whenever there is increase in supply. On the other hand, the paper found increase in quantity harvested per hectare of both cereal and tuber crops.

Conclusion

This paper investigates the economic impact of fertilizer Subsidy in Katsina State. A sample of 150 farmers was collected from Malumfashi, Mani and Dutsinma Local Governments. Each of the local government selected represents one of the three senatorial zones in the state. Crops harvest, per tones and seasonal incomes of rural farmers were compared between periods before and after subsidies using descriptive statistics. The results show significant increase in harvest of both cereal and tuber crops and slight increase in prices of both crops in post subsidy period. A significant increase in farmers seasonal income was observed as a result of supply of fertilizer to farmers at subsidized prices. The paper recommends continuous supply and distribution of a large quantity of fertilizer to rural farmers at subsidized rate to boost agriculture and achieve food sufficiency in the State.

Recommendations

Based on the findings, the following recommendations are put forward

1. Government of Katina State should sustain fertilizer subsidy gesture since it positively increases cereal and tuber crops harvest. Supply and distribution of subsidized fertilizer will facilitate food sufficiency in the state, increase farmers income and create a chain jobs to people involved in agricultural marketing, trading, processing and restaurants.
2. Government should increase supply of economic infrastructural facilities that have direct bearing on agriculture such as rural feeder roads, irrigation channels, water supply to rural areas and machineries. This will promote investment in Agriculture in the State. and other basic infrastructural facilities will encourage people to settle in rural areas and embrace agricultural practices
3. Government should create environment for market forces to determine prices of farm produce at all times to enable sufficient income generation to farmers. This will pave way for agricultural expansion and achievement of rapid economic growth and development in the state.
4. Provision of modern storage facilities especially for tuber crops will help in reducing the level of losses being made from frequent perishing of the crops. This will go a long way in increasing returns to farmers.
5. Investors should be mobilized and encourage to establish food and cash crops processing firms for easy marketing of farm produce. This will attract more rural people to venture into agriculture.
6. Creation of special fertilizer subsidy funds will help in funds mobilization for subsidy. This initiative will increase the quantity of subsidized fertilizer to be distributed to farmers in the state.
7. Finally, there is need for establishment of fertilizer subsidy task force that will monitor fertilizer subsidy scheme and recommend measures for improvement.

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