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DETERMINANTS OF IMPORT DEMAND OF RICE IN UGANDA

Hyuha T.S.[1], Ekere William[2] and Bantebya Kyomuhendo Grace[3]
[1]*Department of Agribusiness and Natural Resources Economics, College of Agricultural and Environmental Sciences, Makerere University, P.O. Box 7062 Kampala.*
[2]*Department of Agribusiness and Natural Resources Economics, College of Agricultural and Environmental Sciences, Makerere University.*
[3] *Department of Women and Gender Studies. College of Humanities and social science, Makerere University.*

Abstract
Rice has been singled out as one of the crops that play an important role as both food and a cash crop in Uganda. Its importance has become more critical due to increasing demand. The increased demand has created a gap in domestic supply which has to be covered through imports. This study analyses determinants of import demand for rice in Uganda using econometric methods. Population, domestic rice production, own price and own consumption were found to be significant and therefore influencing rice imports in Uganda. Thus there is a need to increase supply through supporting farmers to increase domestic rice production to stabilize prices, If the country is to be self sufficient in rice as a way of saving foreign exchange, it would have to control its high population growth rate or increase domestic production through adopting high yield increasing technologies.
Key words- Uganda, rice, import demand

I. INTRODUCTION

Rice, particularly, the New Rice for Africa (NERICA) developed at West Africa Rice Development Association (WARDA) center was a technology designed to address food security in Africa due to its high yield potential close to 2.5 tons per hectare in low input and 5.0 tonnes per hectare under high production system [1]. Due to this expected potential and being grown in many agro ecological zones, Uganda Government targeted the crop as one of the crops that can assist her to achieve her overarching objective of poverty eradication and wealth creation by 2020[2].

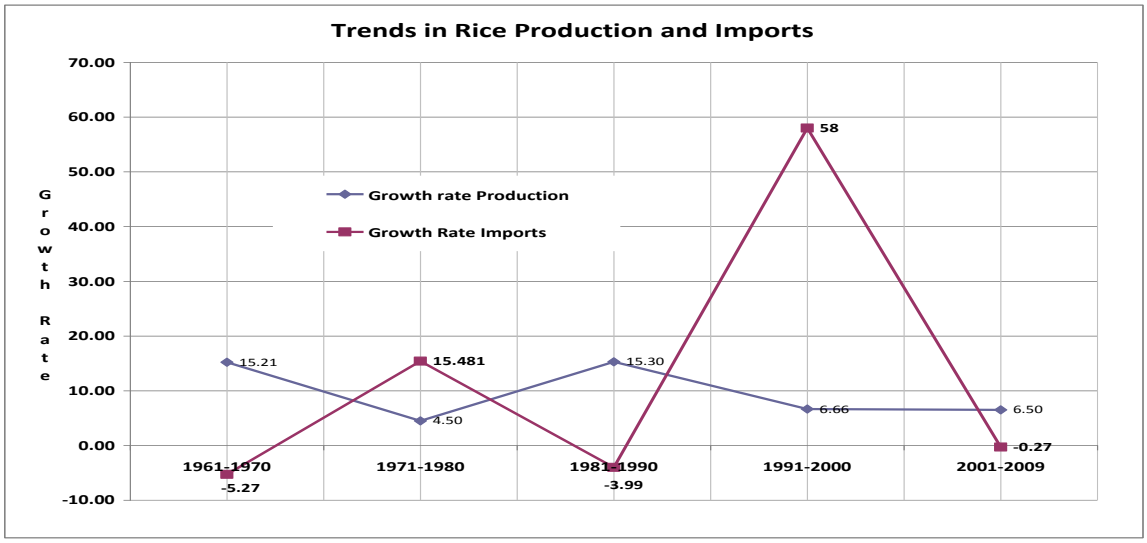
It plays an important role as both a food and a cash crop in the country [3]; [4], [5]. The crop continues to be one of the most important crop among the cereal crops(sorghum, maize, millet) grown in the country , occupying a total of 95, 277 thousand hectares of land with an estimated output of 258,193 thousand tons[6].It is also the second most important grain commodity after maize grown for commercial purposes and it is estimated that 59% of the area is under lowland rice, 36 % is upland rice and rain fed while only 5% is irrigated [7]. Since the crop is that important, especially in urban areas especially among the youth, and government institutions in the country a strategy plan was drawn up in 2009 to redirect the farmer's efforts to benefit consumers as well as the nation at large. Prior to the formulation of this strategy, a number of studies carried out in the country established that the crop competed well within the farming system [8] [5]; had higher yields than those in Asia Kijima et al.,[9]; was profitable [10]) and was facing increasing demand due to changes in tastes, especially in urban areas [11]. However, increases in domestic production is currently faced by many constraints among which are post harvesting practices leading to physical losses and poor milling facilities [12] and many more constraints highlighted in [7].

To fill this demand, it has become mandatory to increase supply and that would have to come from either domestic production or imports. Domestically, NERICA yields at farmer fields is found to be 56 percent of that at the station (2.2 tones per hectare as opposed to 5 tonnes per hectare envisaged by WARDA [9] The production estimates provided by UBOS [6] were even lower;

estimated at 1.36 per hectare. Yet, [10] results showed that rice farmers growing irrigated rice were not reaching their potential mainly due to limited access to extension services and credit. For farmers growing the NERICA variety of rice, the main factors affecting their yields were water availability and limited experience in rice growing [9]. Assuming that these problems are addressed could rice farmers increase production to meet the existing demand?

Part of the solution lies in establishing factors currently influencing import demand of the crop. Figure1 depicts the trend of rice production and imports in Uganda spanning over the period of 40years (1961-2009). As the figure shows, between 1961 and 1970, Uganda experienced a decline in production. As a result, the imports increased by 15% over the period. In the following decade (1971-1980), production increased leading to a decline in imports. However, in the next decade (1981-1990), production of the commodity declined, meanwhile imports short up by 58%. This trend can be explained by the liberation war of National Resistance Movement Government which was there in 1980-1986 and thereafter. During this period, farmers may have been too scared to be in the gardens, especially in Eastern Uganda, a major producing region, which was destabilized by rebel activities even after the end of the war. A period of 2001-2009 experienced a steep decline in imports, a sign of increased domestic supply. This period coincided with the promotion of NERICA rice in the country.

Nevertheless, given this trend described Figure 1 and taking into consideration population growth rate, the [11] projects total production to more than double by 2018 under its National Strategy and therefore translating into decreased rice imports (table 1). Is this optimism realistic?



Source: FAO STAT various, USDA

Figure1: Trends in Rice Production and Imports in Uganda (1961-2009).

Table 1: Rice production, consumption and imports in Uganda (tonnes)

Year	Production Milled rice (t)	Population (Million)	Consumption (t)	Total consumption (t)	Rice Imports (t)
2008	163,150	28	8	224,000	60,850
2013	345,150	32.8	10.2	334,560	10,590
2018	509,600	38.4	13	499,200	10,400

Source: MAAIF, 2010.

II. EMPIRICAL EVIDENCE FROM PREVIOUS STUDIES AND THEORETICAL FRAME WORK

There are about three different theories which could have potentially guided the study on import demand and these are: theory of comparative advantage, a perfect substitute model and an

imperfect substitute model. These theories (models) have been used in various studies as a study by [12] on trade liberalized disaggregated import demand of Uganda review shows. The author's extensive literature review shows wide coverage ranging from using aggregated to disaggregate data for many countries and from developing to developed countries. No attempt will therefore be made in this paper to summarize those studies.

The theory of comparative advantage states that countries should specialize in producing goods where they have a lower opportunity cost which can lead to increased welfare. This implies that countries should concentrate on producing those crops which they have comparative in order to be able to gain from trade. Comparative Advantage whether driven by technology or factor endowments is at the core of neoclassical theory. The theory is attractive for two reasons: allows the author to consider the sources of comparative advantage whether emanating from a new technology or endowments and hence becoming an attractive framework. It allows generation of results because factor endowment in practice coexist with technology and institutional differences. Second, it allows dimensionality. [12], on the other hand believes that the theory of Comparative advantage and that of perfect substitution are unrealistic and have attracted less empirical work. He questions the assumptions of the theory. The assumptions that goods are perfect substitutes suggest that the country can either be an importer or exporter, but not both. However, in many developing countries such as Uganda, they are doing both; for example, Uganda exports coffee and imports rice. Thus he advocates for use of imperfect substitution theory for the country since it can have the commodity in question on the markets from imports and domestic production. This study adopts the imperfect substitution model for that matter.

The empirical studies on import of rice in Uganda are limited. Majority of the studies on the commodity that are available were concerned with production management and profitability. These are [3], [10] [9], [11]. All these studies agree that due to the major constraints the crop is facing, Uganda will remain a net rice importer in the near future. A related study[12], but not specifically estimating rice import demand function, estimates disaggregated demand functions for consumer, intermediate and capital goods for Uganda during the post linearization period(1994-2012) using a log linear form. The results show that the consumer, intermediate, capital goods and aggregate import volumes are co-integrated with Uganda's relative import prices. Income, real effective exchange rate, trade openness and foreign exchange rate reserves were found to be significant. He adds real effective exchange rate, trade openness to the usual import demand function. This study will also add exchange rate to import demand to account for ability for the country to import depending the strength of its currency. The results also show that import coefficient on consumer goods were found to be significant in both the short run and long run. Borrowing, from other related studies [13] estimated determinants of wheat in South Africa using double logarithmic linear function to estimate determinants of wheat in South Africa. The results showed that income measured by the real GDP per capita, the price of sugar cane (compliment to wheat) and level of wheat production were significant in explaining the variation observed in the quantity imported during the period under study. In our study, the price of maize will be taken as the compliment to rice.

The main objective of this paper is to analyze parameters influencing rice import demand. It is through knowing them that relevant policies can be adopted. The rest of the paper is covered as follows: the next section covers methods and nature of the data used, followed by the exposition of empirical model used; the section of the results follows,

III. METHOD AND DATA ANALYSIS

3.1 Nature and data sources

Data used in this study was sourced from Uganda Bureau of Statistics (UBOS), Bank of Uganda, Uganda Revenue Authority, Ministry of Trade and Food and Agriculture organization (FAO). The study used time series data for a period of 1961 to 2013. The data set consisted of the following variables; quantity of rice imports IMP defined as the quantity of rice imported in various

years, RICEPRO quantity of rice produced in tons, RIPRIC is real price of rice imported into the country, MAIPRO is quantity of maize produced in tons, POPN defined as midyear population of country, GDP defined as GDP per capita to represent real disposable income. Normally per capita GDP and per capita National income (NI/per Cap) can be used to depict per capita income of consumers . the foreign exchange rate was used to capture availability of foreign exchange(ERR) to facilitate import of rice and the time trend variable was used to represent changes in tastes and preferences of the consumers,.

3.2 Data Analysis

A time series linear regression analysis was run with a dependent variable being quantity of imported rice in the country. Since they were time series data, they were transformed in logs and appropriate tests made to assess for autocorrelation.

3.3 The model

The Uganda Import demand model followed the theoretical demand function which states that Import demand is a function of own price, apparent consumption(Domestic production-exports= import(in our case there are no exports), real price of imported rice in the country, population and Gross Domestic Product and maize production(close substitute to rice). The theoretical model is in equation no 1 and variables are as defined in table 1.

Qm_D = f (IMP, RIPRIC, POPN, GDP per capita, ERR, Consu, MAIPRO, time trend)---------- 1

Table 1. Variable definitions for imported rice in Uganda (2061-2013)

Variable Name	Variable Definition	Expected Signs
IMP	Import demand for rice (MT)	-
RIPRIC	Real price of rice imported in the country	-
RICEPRO	Production of rice	-
POPN	Population	+
GDP per capita	GDP per capita to represent real disposable income	+
ERR	Real Foreign Exchange	+
IMP_{t-1}	Lagged import demand for rice (MT)	+
Cons	Apparent consumption of rice	+
MAIPRO i	Quantity of maize produced in tons	-
T	Time trend(Preferences and Tastes)	+/-

The double logarithmic model is commonly used in regression analysis [14] and [15]. For example [13] and [16] used it to estimate import demand for wheat in South Africa, and Turkey respectively. The main argument made by [16] that the estimated slope of coefficient X measures elasticity of y with respect to Xi, that is % change in y for a given (small) % change in Xi as given in [17] and [15].Therefore, in this study, we adopted the same log linear form in estimating Import demand Function of rice in Uganda. See Equation 2

The empirical model estimated was of the double log:

$$Ln(IMP) = \beta_0 + \beta_1 lnricepro + \beta_2 lnripric + \beta_3 lnMaipro + \beta_4 lnPopn + \beta_5 lnGDP + \beta_5 lnERR + \beta_7 time + \beta_8 time + \varepsilon \text{----------} 2$$

The variables are as defined in table 1

IV. RESULTS AND DISCUSSIONS

The regression results are presented on table 3. From the results, the adjusted R^2 is 0.95 which implies that variables included in the model explain 95% of variation in import demand for rice. The D-W statistic of 1.8 which is close to two implying that there is no problem of autocorrelation. The regression estimates on, Quantity of rice produced, the population, Gross

Domestic product per capita, apparent consumption of rice were found significant and influenced rice imports .

Table 3: Estimated coefficients for rice import demand to Uganda

Variable	Coefficients	t-statistic	P >t
Constant	-30.802	-1.81	0.080
Lnpric	-0.178	-0.71	0.480
LnRicePro	-1.873	-4.27	0.000
LnPopn	3.254	2.65	0.013
Lnmaiz	0.114	0.36	0.724
GDP per Capita	0.001	2.69	0.011
Lnt	0.242	0.53	0.602
lnCons	2.330	6.67	0.000
Lnforex	-0.544	-1.36	0.184
$Lnimp_{t-1}$	0.196	1.49	0.147

R^2 = 0.96
Adjusted R^2 = 0.95
DW = 1.8
F(9 31) = 91.66
Prob > F = 0.0000

The variable quantity of domestically produced rice was negative and significant at 1% .These results show that a 1 % increase in quantity of rice produced domestically will lead to a close to 2% reduction in rice imports. This means that as domestic production increases, imports decreases leading to a saving in foreign exchange. [19] registered the same price behavior for Nigeria. The authors argued that a 1 % increase in quantity produced would lead to an increase of 1.99% of domestic production.

In terms of population the coefficient was positive and significant at 5%. This implies that, a 1% increase in population would lead to approximately 3.25%(rate closer to population growth rate) increase in rice imports. It is apparent therefore that domestic rice production will have to be increased to meet the needs of the increasing population given that Uganda is experiencing one of the highest (3.5%) growth rate in Africa, if savings in foreign exchange have to be realized.

The local rice consumption variable was positive and significant at 5%. This implies that a 1% increase of domestic consumption of rice will lead to a 2.33% increase in rice imports. This result confirms the prediction made by MAAIF that Uganda will remain a net importer of rice up to 2018 due to the fact the subsector is not expanding fast enough to catch up with high rate of urbanization.

The GDP per capita was positive and significant at 5% level. This implies that a 1 unit increase in Gross Domestic per capita income will have a very marginal 0.001 unit impact on demand for imported rice. This is contrary to the results posted by [13] and [16] for import demand of wheat in South Africa and Turkey, respectively which were significant. The authors argue that higher import demand is income elastic and was explained by rapid urbanization due to increased income culminating in people wanting ready to eat-food. In the in the case of rice in Uganda, due to the busy work schedule and changing tastes by the youth this is plausible since urban people may prefer fast cooking foods compared to the traditional ones such as bananas and millet bread which

are labour , time due to their busy schedules. Moreover, cooking a food such as bananas which is staple in many urban centres is fuel demanding which is currently constrained by sky rocketing fuel prices. are due to excessive cutting down of trees-charcoal being the main source of fuel in most urban households.

The availability of Foreign exchange at good rates should theoretically empower any country to import goods of their choice. In this case, there is a negative correlation between rice imports and availability of forex exchange. A 1% increase of leads to a decrease of 1.36 % of rice imports. However, results on the quantity of maize (substitute) produced and time trend are not significant and both of them do not carry the same negative expected sign.

V. CONCLUSIONS AND POLICY IMPLICATIONS

This study analyzed factors influencing import demand for rice in Uganda during the period 1961-2013 using econometric methods. The estimated results revealed that rice production, population, GDP per capita and own consumption had significant influence on import of rice in the country.

The implications of the results are instructive. That in order for the country to be self sufficient in rice, the Government of Uganda has to deal first of all with high population growth rate. Currently, Uganda has one of the highest population growth rate of 3.2% per annum. Although it has been urged in some government circles that high population growth rate is healthy for the economy because of many reasons such as markets for goods produced, it is always not so. This argument may be flawed on a number of grounds. The population can be good for the economy if and when it has high purchasing power. But in an economy where poverty has been increasing, this argument falls flat on its face. Thus, the Government needs to increase its efforts in implementing policies to curb high population growth rates through provisioning family planning services and increasing efforts on educating the people on the ills excessive fertility rates. Policies on Primary and Universal education are a step in the right direction because these have been known to have a positive impact on population growth rate in many countries. Also promoting a policy such as encouraging the proper use of condoms has a double benefit; it is not only good for population control but also may lead to reduction of HIVAIDS and STDS. Reduced high population growth rate will have the desired effects of saving scarce foreign exchange for other pressing needs.

Furthermore, the results show that rice imports are negatively affected by import prices. This implies that as the imported prices increase, less quantity is imported. In view of the fact that the Uganda shillings has been depreciating against major currencies lately, that implies domestic prices are sky rocketing for all imported commodities including rice. Thus, this may be good for the local rice farmers, if they could produce enough to substitute the imports. As East African, import tariffs on imported rice have not yet borne fruits, as the imported rice is still cheaper and of superior quality in some cases. The Uganda government needs to increase support to the sector if the stated goal of rice self-sufficiency is to be realized.

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