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The Impact of Rice Production and Technological efficiency on Economic growth. A case study of Some Selected Countries.

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ABSTRACT

This study examines the patterns and impacts of rice production and technological efficiency on economic growth in some selected countries. Data used for the study covered the period 1990-2015 and were all obtained from Word Bank Development Index online. Descriptive and panel data techniques were employed in the analysis. The Panel regression results reveals that the F-statistics value for the fixed effect model exceeds (65.20) that of the Pooled OLS (58.1) at 1% level of significance, necessitating the adoption of the fixed effect model, with an adjusted R^2 value of 0.86. The empirical findings reveal that the countries exhibit differential rates of technology, necessitating some of the countries having technological efficiency values higher than the mean value of the entire sampled countries. The results further show that rice production index and technological efficiency are positive and significant to stimulating economic growth in the sampled countries. Hence, domestic production of rice induces positive spill-overs on income, employment and poverty reduction. We recommend rice production enhancement policies as well is increased technological know-how should be encouraged in order to enhance economic growth in these countries

Key Words: Rice production, Index, Technological efficiency, Economic growth, Panel data.

Introduction

Rice is an important crop and one of the major staples in Nigeria. It has the ability of providing a nation's population with the nationally required food security minimum of 2,400 calories per person per day (FAO, 2000). Rice is cultivated in virtually all the agro-ecological zones in Nigeria and covers both the upland and the swamps, depending on the variety (Kwara State Agricultural Development Project, 2007). The upland production area for rice is grown strictly under rain-fed conditions and rice ecosystem constitutes about 25 to 33 per cent of the national rice output (Julian, 1993; Wudiri, 1990: Ezedinwa, 2005). The average Nigerian consumes 24.8 kg of rice per year, representing 9 per cent of annual calorie intake (IRRI, 2001). The increasing rice consumption rate of Nigerians has made the demand for rice increased in a greater dimension than its domestic production (FAO, 2001). During the 1960s, Nigeria had the lowest per capita annual consumption of rice in the West African sub-region which later increased significantly. In the 1980's, per capital consumption increased to an annual average of 18 kg and reached 22 kg in 1995 and by 2007 it was 27 kg. (National Bureau of Statistics Report, 2007; FAO, 2012).

In order to address the rice supply deficit situation in Nigeria, Government policies since 1974 were aimed at encouraging and boosting local rice production. Severally, Nigeria governments intervened in the rice sector in order to improve production and encourage local rice production (FAO, 2004; Longtau, 2003b; Okpe, 2010). This was expected to widen the home market for the nation's local rice. The Government also established the Federal Rice Research Station (FRRS), National Cereal Research Institute (NCRI), National Seed Service (NSS), and Operation Feed the Nation (OFN) during 1970 to 1976. The Bank of Industries (BOI) in Nigeria has collaborated with the Federal Ministry of Agriculture and Rural Development (MARD) to increase rice reservation fund to help boost rice production in Nigeria (Bamidele *et al,* 2010). In the same vain, the Federal Ministry of Agricultural and Rural Development (MARD) is aiming to increase paddy rice production to around 13.27 million metric tons by 2018. This initiative is dependent in the viability of adequate implementation. All these programmes were aimed at addressing the widening demand supply gap for rice and stimulating surplus rice harvest for export.

Most rice farmers in Nigeria are smallholders (90 percent of total), applying a low-input strategy to agriculture, with minimum input requirements and low output (USAID 2010, IFAD 2009). Nigeria rice productivity is among the lowest within neighbouring countries, with average yields of 1.51tonne/ha. Rice is grown in approximately on 3.7 million hectares of land in Nigeria, covering 10.6 percent of the35 million hectares of land under cultivation, out of a total arable land area of 70 million hectares. (Bayou, 2009).

The demerit of Nigeria's dependence on imported rice is high, more so, the share of the imported rice in the Nigerian food market is far above that of the domestically produced rice. Rice imports have affected the domestic production and marketing of Nigeria's local rice. This is due to the decreased demand for local rice by Nigerians as opposed to the imported ones (NRCI, 2006). The local Nigerian variety has a lower demand due to the high cost of producing the crop and cost of production is usually not subsidized by the government. The low competitiveness could also be as a result of poor processing resulting in a final product with a high percentage of broken grains and debris (FAO, 2004 and Cynthia, 2012).

The foregoing therefore raises pertinent questions regarding the place of local Nigerian rice in the nutrition of the nation's households. It also raises questions as to the nature and pattern of local rice production in the country. The current study therefore examines the pattern of rice production and its technological efficiency on the economic growth of selected countries. The study is of paramount importance as it examined a contemporary issues in Nigeria, Mali, China, India and Thailand economy because of the increasing demand for rice as a staple food. Such study outcomes could therefore serve as a policy option that could be adopted by stake-holders in the domestic rice industry to raise nation's rice production and in turn reduce Nigeria's import dependency on rice.

Research Methodology

This section specifies a growth model order to examine influence of the explanatory variables on economic growth in the selected countries and then explains the estimation techniques.

Model Specification (Growth Equation)

Aghion and Howitt (1992) adopted a growth model augmented with technological efficiency. One important assumption in this specification is that technology efficiency is considered to affect growth through the channel of the total factor productivity. The general production (output) function takes the form of The AK model of economic growth regarded as the simplest endogenous growth model. Present below is the model.

Y = AK -- (1)

Where A = positive constant reflecting an economy's level of technology (usually proxied by total factor productivity) and K = the economy's stock of capital (broad sense to include human capital)

The basic conclusion in the AK model is that growth rate of an economy is dependent on the productivity of its technology. Hence, the level of technology available in an economy depends on total factor productivity (TFP) and openness of the economy to trade (being the sum of exports+ import/ GDP percent).

Since the residual component, A is a measure of technological progress (endogenized), technological efficiency is incorporated not as exogenous growth-generating factors but as a process that explained the growth process itself.

Modifying equation (i) to include other critical growth-determinants in the context of this study generates the augmented model, leading to the following specification for the determinants of economic growth in the selected countries:

GRGDP = f (PROD, DCONS, EXP, IMP, TFP) -- (2)

Equation (1) shows that potentially, real GDP (RGDP) is determined by PROD, DCONS, EXP, IMP, TECH,
Where:
GRGDP = real GDP rate or rate of growth of real GDP (a measure of economic growth in the countries)
PROD = Production of milled rice
DCONS = Domestic consumption of milled rice
EXP = Export of milled rice
IMP = imports of milled rice
TFP = Total factor productivity (a measure of technological efficiency)
The empirical specification of the model to be estimated is therefore:

$GRGDP_{2i,t}$ =, $\alpha_0 + \alpha_1 PROD_{i,t} + \alpha_2 DCONS_{i,t} + \alpha_3 EXP_{i,t} + \alpha_4 IMP_{i,t} + \alpha_5 TFP_{i,t}$ +----------------(3)

Where *i* represent country and *t* represents the period (1990-2015).

Method of Estimation

Two broad techniques are employed in the empirical analysis of this study. They are the statistical and econometric techniques; the panel data regression technique is used to analyze available data in order to examine the influence of explanatory variables on the dependent variable (economic growth).

Data Source

The data used for the study covers the period 1990-2015 and were all obtained from World Bank Development Index online. The study covers five sampled countries; Nigeria, Mali (being among the major consumers of rice in Sub-Saharan Africa), China, India and Thailand also the largest producers of milled rice in Asia and world over.

The model specified in (3) is based on the panel regression analysis procedure that is adopted in this study. The main advantage of the panel data analysis is that it comprehensively takes the individual characteristics of the different countries used in the study. It is generally observed that country-level specific context is a strong factor in the determination of economic growth and hence, this differentiation may bring endogeneity bias into the estimation. The panel data analysis helps to correct this inherent estimation problem. The basic class of models that can be estimated using panel techniques may be written as:

-- (1)

The leading case involves a linear conditional mean specification, so that we have:

-- (2)

Where Y_{it} is the dependent variable and $X_{it}$is a -vector of regressors, and are the error terms for i = 1, 2… M cross-sectional units observed for dated periods t = 1, 2… T. The α parameter represents the overall constant in the model, while the and represent cross-section or period specific effects (random or fixed).

A central assumption in random effects estimation is the assumption that the random effects are uncorrelated with the explanatory variables. One common method for testing this assumption is to employ a Hausman test to compare the fixed and random effects estimates of coefficients in order to determine the best model for the estimation of the growth equation.

Comparative Analysis of Milled Rice Production in Selected Countries

In-order to have a robust comparison of milled rice production in Nigeria in terms of its performance relating to other countries particularly Thailand, China and Indian known to have the requisite human and capital technology, a comparative analysis below is done using FAO statistics, 2015 as indicated in the Appendix page.

Beginning from 1960 to 1962, the growth rate of milled rice production in Nigeria was 7.42% compare with a consumption growth rate of a marginal 0.3%. In comparison with that of Thailand for the same period was 11.19% production growth with a corresponding domestic's consumption growth rate of 11.07%. Given such comparison, it can be infer that the domestic consumption of milled rice in Nigeria exceeded that of Thailand.

The milled rice production growth rate for Indian in the same year was – 6.86% while the domestic consumption growth rate was – 6.49%, that of china for the same period stood at a production growth rate of 17.42% with a domestic consumption growth rate of 2.11%. This invariably showed that production growth rate in China far exceeded the domestic consumption growth rate of the country with about 15.31% growth rate left for export.

By 1970, the production growth rate of milled rice product in Nigeria was 10.51% and that of China was 15.07% and Thailand 1.19%. There corresponding consumption growth rate for the years were Nigeria (10.47%), Thailand (-3.69%), Indian (0. 49%) and China (9.79%). The statistics clearly indicated that both China and Thailand had an excess of 5.91% and 4.78% respectively. This implies that there is a latent milled rice technological production deficit in Nigeria. In the same year (1970), Mali had a production growth rate of 15.19% with a domestic consumption of – 8.51%. This is an indication that the country had about 23.7% rice for export.

By 1990, while the milled rice production growth rate in Nigeria was – 24.32%, the domestic consumption stood about 77.87% leaving a deficit of about 102.19% to be met by imports. In comparison, China in the same year had an export surplus of about 18.5% for exports and Thailand had a surplus of about 1.96%. These results further buttressed that the demand deficit gap in Nigeria could have resulted from milled rice production technological gap.

In year 2000, the production growth rate of Nigeria stood at 0.66% and the domestic consumption rate of 5.69%, a further elaboration of the perceived consumption deficit gap in Nigeria which had necessitated huge import. In that same year, China had a surplus milled rice production to be exported in tune of 1.17%, Indian had a surplus milled rice production of 2.85%, Thailand had a surplus milled rice production of 1.17% and Mali had a deficit of about 5.87%. The results showed that Sub-Sahara Africa countries lacked behind in terms of milled rice production where greater use of technological efficiency is required compared to the Asia Countries (China, Thailand and Indian) which have been Nigerian's import destination.

In 2010, Nigeria performed relatively better given a production growth rate of milled rice to be tuned of 26. 14% and a corresponding domestic consumption growth rate of 10.34%. This fact could be explain from the aggressive agricultural reform and green revolutionary measures adopted by the then Nigerian President (Good Luck Jonathan) in which agriculture was given a prime attention. For Thailand, the milled rice production growth rate in the same year was 0.01% and that of domestic consumption growth rate was 0.98%. The corresponding values for China and Indian in the same year were 0.31% and 0.51% for milled rice production growth rate and 18.30% and 6.38% for domestic consumption growth rate respectively. These shows that milled rice production export marginally fell in China and Thailand. While that of Indian rose leaving a surplus for export to be tuned of 9.92%.This massive agricultural turn around in Indian was attributed to the Indian agricultural reform strategy which was implemented to drastically reduce food import bill.

In 2015, the Nigerian milled rice production growth rate was -4.44%. This abysmal performance saw import growth rate rising to be about 6.12%. In China, milled rice production growth rate for the same year stood at 0.84% but inter export growth rate of 5.63%. The corresponding export growth rate for milled rice for Thailand in the same year was 11.96%

It becomes invariably clear from the result that there is a huge deficit in milled rice production in Nigeria unlike the Asia Counterpart with export surplus arising from improved and efficient technology in milled rice production. This is a critical policy challenge deserving policy imperatives in Nigeria.

Empirical Analysis and Discussion of Results

Descriptive Statistics

Table1 presents the descriptive statistics of the sample data on the variables used for the analysis. The descriptive statistics show that the mean value of real output growth in the sampled countries is 7.28% while its median value is 4.02%. This impressive average growth rate is made possible partly due to impressive growth rate of output recorded in the countries over the sampled period, respectively. The maximum value of growth rate is 11.20 percent while the minimum value is 1.92 percent. This wide disparity is a clear indication of the differential rates of growth in the sampled countries over the period. The average value of milled rice production over the period in the selected countries is 45.25 percent, with a median value of 35.11. The corresponding maximum and minimum values are 60.15 percent and 12.32 percent, respectively. The mean value of domestic consumption of rice for the sampled countries over the period is 18.35 percent, with a median value of 19.84 percent-an indication that domestic consumption of rice in some of the selected countries far exceeded the minimum average. Apparently, these variables exhibit differential patterns in the respective countries. The maximum and minimum values of domestic rice consumption are 29.21 percent and 6.98 percent. The skewness and kurtosis values of 1.5 and 2.62 percent also buttress the non-normality of rice consumption. The average value of exports is 42.1 percent, with a median value of 36.5 percent and the corresponding maximum and minimum values are 50.27 percent and 21.1 percent. Import has an average value of 33.3 percent and 41.3 percent and its maximum and minimum values are 47.14 percent and 28.23 percent. Total factor productivity (a measure of technology) has a mean value of 10.52 percent and 15.02 percent- an indication buttressing the earlier assertion that the countries exhibit differential rates of technology, necessitating some of the countries having technological efficiency values higher than the mean value of the entire sampled countries. The maximum and minimum values are 20.20 percent and 4.5 percent, respectively. The skewness value for real GDP growth rate is quite positively high, and it indicates that some countries reported lower growth rate values than the average across the countries. The J-B value is also high and passes that significance test and clearly indicates that the growth rate across the countries is not normally distributed. The implication of this is that there is heterogeneity among the countries with respect to the variables. Endogeneity problem is therefore expected in the models if the OLS technique is employed. This is a clear justification for the adoption of the panel data analysis technique for the estimation of the relationships.

In the case of the explanatory variables, each of them has similar characteristics, namely, high variability, positive skewness and leptokurtic values. Apparently, individual country characteristics play important roles with respect to the variables used in the analysis.

	Mean	*Median*	*Max.*	*Min.*	*Std. Dev.*	*Skew*	*Kurt.*	*J-B*
RGDPPC	7.28	4.02	11.20	1.92	1.29	2.30	3.60	24.30
PROD	45.25	35.11	60.15	12.32	4.50	2.33	2.50	3.21
DCONS	18.35	19.84	29.21	6.98	3.50	1.5	2.62	3.12
EXP	42.1	36.5	50.27	21.1	4.45	1.75	1.70	2.52
IMP	33.3	41.3	47.14	28.23	3.68	2.77	4.1	2.95
TFP	10.52	15.02	20.20	4.5	4.25	2.69	1.69	2.3

Table.1. Descriptive Statistics

Econometric Analysis: Panel Regression

In this section, an attempt is made to examine empirically the influence of rice production and technological efficiency on the economic growth of some selected countries. The analysis is based on the panel data approach. We specifically analyzed our growth equation with the pooled OLS and the fixed effect approaches. A choice is made between these two approaches using the standard F-statistics. We also estimated the model with the random effect approach, however, using the Hausman test, the fixed effect is chosen as the best model. The result is presented below:

Table 2: Panel Regression Results

Dependant Variable: GDP Growth

Variables	Pooled OLS Fixed Effect	
	(1)	(2)
Constant	0.5284* (1.60)	0.211* (1.72)
PROD	0.922* (1.89)	1.152** (2.28)
DCONS	0.073* (1.75)	0.025* (1.93)
EXPORT	0.026 (1.47)	0.244** (2.42)

IMPORTS	-0.091 (-1.39)	-0.082 (-1.50)
TFP	-0.09* (-2.01)	0.127** (1.66)
Adjusted R^2	0.72***	0.86***
Durbin-Watson	1.66	1.70
F-statistics[9]	58.11***	65.20***

Note: *, **, * indicate** 1%, 5% & 10% level of significance; [9] Standard F-test to choose between Pooled OLS & Fixed Effect Models; T-ratios are in parenthesis; Pooled OLS (Model (1); Fixed Effect (Model 2).

Using the standard F-statistics test approach to choose between the Pooled OLS and the Fixed Effect models, table 2 revealed that the F-statistics value of 65.20 for the fixed effect model exceeds that of the Pooled OLS of 58.1 and is significant at 1% level. This depicts that the fixed effect model is the best and most reliable model for the estimation of the growth equation.

An examination of the empirical results reveals that the adjusted R^2 value is 0.86. Given this impressive goodness of fit statistic, it is clear that over 86 percent of the systematic variations in economic growth (proxied by RGDPG) is explained by the combined explanatory variables. This is an attestation to the good predictive ability of the model. The F-value of 65.20 is highly significant at the 1 percent level; a further attestation to the reliability and explanatory power of the model. Thus, the existence of a significant linear relationship between the dependent variable (RGDPG) and the combine explanatory variables is validated. The D.W. statistic of 1.70 is also quite impressive indicating that there is no autocorrelation in the empirical estimates, making the model reliably good for policy decisions.

In examining the contribution as well as the relative impact of the individual variables, we consider their respective signs as well as their statistical significance. A cursory observation reveals that the coefficient of production is positively signed in line with theory and passes the significance test at the 5 percent level. This is clear indication that rice production stimulates economic growth in the selected countries. This is particular true given the fact that domestic production induces positive spill-overs in terms of income, employment and poverty reduction. The coefficient of export is positive and statistically significant at the 5 percent level. This is a clear attestation to the fact that increased exports will stimulate economic growth in the sampled countries in line with the dynamic trade theory which posits that increased export has the capacity to propel rapid economic transformation through the channel of greater competition investment, technology and innovation (Adamu, Igodaro and Iyoha, 2012). Thus, given increased international trade, the ability of exports to contribute more to economic growth is enhanced. The coefficient of domestic consumption is positive, and passes the significance test at only at the 10 percent level. This implies that increased domestic consumption of rice has the capacity to generate higher growth in the selected countries, via the aggregate demand channel but must however be complemented with other critical growth-driving factors. Imports of rice has a negative coefficient in line with apriori sign .It is however not significant at the 5 percent level.

Thus, increased importation of rice has a destabilizing effect on the growth of the selected countries. The intuition for this result is that import is a leakage out of the national income of the sampled countries and increased import may therefore hamper their growth. The coefficient of total factor productivity (a measure of technological efficiency) is appropriately positive in line with theoretical expectation and passes the significance test at the 5 percent level. Since the study is cross-sectional time series in nature, such a significance level of a coefficient is commendable. Its significance implies that technological efficiency is growth-enhancing, particularly as it has the capacity to generate greater productivity and economies of scale, which automatically leads to high growth path in the selected countries. This significance of this coefficient may however have been made possible through the influence of technological efficiency in China, India, and Thailand, with some commendable level of rice production technology.

Overall, the empirical results show rice production, export, consumption and technological efficiency are significant growth drivers in the selected countries. These empirical findings have important policy implications for the sampled countries.

CONCLUSION AND RECOMMENDATIONS

The paper sets to empirically examine the relationship between rice production and economic growth in five selected countries; Nigeria, Mali, China, India and Thailand over the period 1990-2015. The argument here is that rice production and technological efficiency affects economic growth of the sampled countries, particularly through the aggregate demand channel. Employing descriptive statistics and panel regression techniques, the empirical analysis reveals that rice production, domestic consumption, exports and technological efficiency have positive and significant influence on economic growth in the selected countries. Based on these findings, it is suggested that aggressive agricultural rice production-enhancing policies be put in place, coupled with sound growth-enhancing macroeconomic policies that will rapidly drive economic growth in these countries to higher levels.

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Appendix

Table 1: Nigeria Milled Rice Production by Year

Year	Production (000 MT)	Growth Rate	Domestic Consumption (000 MT)	Growth Rate	Import (000 MT)	Growth Rate	Export (000 MT)	Growth Rate
1960	239	NA	240	NA	1	NA	-	NA
1970	284	10.51%	285	10.47%	1	0.00%	-	NA
1980	523	40.59 %	850	0.59 %	394	62.81 %	5	NA
1990	1500	-24.32 %	2757	77.87 %	224	36.59 %	0	NA
1995	1752	20.33 %	2000	-6.37 %	300	0.00 %	0	NA
2000	1979	0.66 %	3029	5.69 %	1250	31.58 %	0	NA
2005	2140	7.00 %	3800	1.33 %	1650	20.53 %	0	NA
2010	2818	26.14 %	4800	10.34 %	2400	37.14 %	0	NA
2011	2877	2.09 %	5600	16.67 %	3200	33.33 %	0	NA
2012	2370	-17.62 %	5300	-5.36 %	2800	-12.50 %	0	NA
2013	2772	16.96 %	5800	9.43 %	2800	0.00 %	0	NA
2014	2835	2.27 %	5800	0.00 %	3500	25.00 %	0	NA
2015	2709	-4.44 %	5850	0.86 %	2500	-28.57 %	0	NA

Source: United States Department of Agriculture

Table 2: Thailand Milled Rice Production by Year

Year	Production (000 MT)	Growth Rate	Domestic Consumption (000 MT)	Growth Rate	Import (000 MT)	Growth Rate	Export (000 MT)	Growth Rate
1980	11463	10.22 %	7955	-2.14 %	0	NA	3049	13.73 %
1985	13374	1.80 %	8624	1.52 %	0	NA	4334	8.54 %
1990	11347	-16.55 %	8400	-1.95 %	0	NA	3988	1.27 %
1995	14388	1.87 %	8443	2.34 %	0	NA	5281	-11.14 %
2000	17057	3.38 %	9250	2.21 %	0	NA	7521	14.84 %
2005	18200	4.84 %	9544	0.68 %	2	NA	7376	1.40 %
2010	20262	0.01 %	10300	0.98 %	200	-33.33 %	10647	17.69 %
2011	20460	0.98 %	10400	0.97 %	600	200.00 %	6945	-34.77 %
2012	20200	-1.27 %	10600	1.92 %	600	0.00 %	6722	-3.21 %
2013	20460	1.29 %	10875	2.59 %	300	-50.00 %	10969	63.18 %
2014	18750	-8.36 %	11500	5.75 %	300	0.00 %	9200	-16.13 %
2015	16400	-12.53 %	11500	0.00 %	300	0.00 %	10300	11.96 %

Source: United States Department of Agriculture

Table 3: India Milled Rice Production by Year

Year	Production (000 MT)	Growth Rate	Domestic Consumption (000 MT)	Growth Rate	Import (000 MT)	Growth Rate	Export (000 MT)	Growth Rate

1960	34639	NA	35473	NA	401	NA	67	NA
1970	42225	4.44%	41512	0.49%	307	49.03%	20	-25.93%
1980	53631	26.70 %	53301	16.10 %	70	1,300.00 %	900	111.76 %
1985	63825	9.41 %	62080	9.51 %	5	-50.00 %	250	56.25 %
1990	74291	0.98 %	73091	2.77 %	0	-100.00 %	700	40.00 %
1995	76980	-5.90 %	76280	-1.78 %	0	NA	3700	-10.84 %
2000	84980	-5.24 %	75960	-8.09 %	0	-100.00 %	1685	20.36 %
2005	91790	10.42 %	85088	5.23 %	6	NA	4688	2.60 %
2010	95980	7.73 %	90206	5.49 %	0	NA	2774	33.24 %
2011	105310	9.72 %	93334	3.47 %	0	NA	10376	274.04 %
2012	105240	-0.07 %	94031	0.75 %	0	NA	10869	4.75 %
2013	106646	1.34 %	99180	5.48 %	0	NA	10149	-6.62 %
2014	104800	-1.73 %	98000	-1.19 %	0	NA	11871	16.97 %
2015	100000	-4.58 %	98000	0.00 %	0	NA	8500	-28.40 %

Source: United States Department of Agriculture

Table 4: Mali Milled Rice Production by Year

Year	Production (000 MT)	Growth Rate	Domestic Consumption (000 MT)	Growth Rate	Import (000 MT)	Growth Rate	Export (000 MT)	Growth Rate
1960	122	NA	114	NA	-	NA	8	NA
1970	91	1519%	86	-8.51%	15	0.00%	-	NA
1980	109	0.00 %	131	-22.94 %	26	-50.94 %	0	NA
1985	94	30.56 %	168	-22.58 %	56	-51.30 %	0	NA
1990	182	1.11 %	206	10.16 %	21	NA	0	NA
1995	300	-3.23 %	355	12.70 %	55	323.08 %	0	NA
2000	492	2.50 %	531	8.37 %	39	290.00 %	0	NA
2005	624	31.37 %	749	23.80 %	125	-3.85 %	0	NA
2010	1500	18.30 %	1400	6.38 %	80	-33.33 %	0	NA
2011	1130	-24.67 %	1400	0.00 %	150	87.50 %	0	NA
2012	1250	10.62 %	1450	3.57 %	140	-6.67 %	0	NA
2013	1438	15.04 %	1520	4.83 %	150	7.14 %	0	NA
2014	1409	-2.02 %	1600	5.26 %	180	20.00 %	0	NA
2015	1593	13.06 %	1680	5.00 %	130	-27.78 %	0	NA

Source: United States Department of Agriculture

Table 5: China Milled Rice Production by Year

Year	Production (000 MT)	Growth Rate	Domestic Consumption (000 MT)	Growth Rate	Import (000 MT)	Growth Rate	Export (000 MT)	Growth Rate
1960	41811	NA	46383	NA	-	NA	428	NA
1970	76993	15.70%	72209	9.79%	8	60.00%	1292	0.94%
1980	97934	-2.67 %	98587	2.13 %	162	800.00 %	509	-54.39 %
1985	117999	-5.43 %	111894	1.30 %	352	75.12 %	957	-6.08 %
1990	132532	5.11 %	123911	2.56 %	68	19.30 %	689	111.35 %
1995	129650	5.28 %	131237	0.86 %	852	-57.36 %	265	728.13 %
2000	131536	-5.33 %	134300	0.07 %	270	-2.88 %	1847	-37.41 %
2005	126414	0.84 %	128000	-1.77 %	654	7.39 %	1216	85.37 %
2010	137000	0.31 %	135000	0.51 %	540	39.18 %	500	-23.08 %
2011	140700	2.70 %	139600	3.41 %	1790	231.48 %	441	-11.80 %
2012	143000	1.63 %	144000	3.15 %	3144	75.64 %	341	-22.68 %
2013	142530	-0.33 %	146300	1.60 %	4015	27.70 %	260	-23.75 %
2014	144560	1.42 %	147600	0.89 %	4315	7.47 %	426	63.85 %
2015	145770	0.84 %	150000	1.63 %	4700	8.92 %	450	5.63 %

Source: United States Department of Agriculture