

Public debt influence to the agriculture sector in Tanzania

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Abstract: Recent literature evidence shows that the Tanzania Public Debt is rapidly growing and the Tanzania Government is using 40% of its domestic revenue to service the public debt at a time when substantially more funding is required for keeping the Tanzania agriculture sector, economic development activities and most important the sustainable development goals attainable. The present study is undertaken to evaluate the influence of the public debt to the agriculture sector in Tanzania. The study firstly assesses the marginal change of the annual average public debt influence to the agriculture gross domestic product and secondly the study evaluated the correlation between the public debt and the agriculture gross domestic product during the period from 1996 to 2018 in Tanzania. With that regard the study applied the Ordinary Least Square (OLS) method to analyze the average annual growth rates of the public debt and the agriculture sector gross domestic product during the period from 1996 to 2018 in Tanzania. Public debt and agriculture sector gross domestic product time series data were collected from the World Bank and the Bank Of Tanzania annual reports during the period from 1996 to 2018 for Tanzania. To assess the marginal annual average change for the public debt and the agriculture sector gross domestic product the annual average growth rate for the sub periods of 1996-2000, 2001-2005, 2006-2010, 2011-2015 and for the presidential term 1996-2005 (Third President Term), 2006-2015 (Fourth Presidential Term), and 2016-2018 (Three Years Of The Fifth Presidential Term) were evaluated. While to evaluate the influence of the public debt to the agriculture sector gross domestic product, the correlation between the public debt and the agriculture sector gross domestic product were investigated during the period from 1996 to 2018 in Tanzania. The findings of the study in actual fact catching up the attention. The study findings revealed that the public debt and the agriculture sector gross domestic product marginal annual average change is positive while the correlation between the public debt and the agriculture sector gross domestic product is negative and insignificant during the period from 1996 to 2018 in Tanzania.

Keywords: Tanzania, Public Debt, And Agriculture Sector.

Introduction

Recent evidence shows that (UNRISD, 2020, pg.1) Global debt has reached historically unprecedented levels at a time when substantially more funding is required for keeping the SDGs within reach.

The Tanzania Government using the 40% of the internal revenue to service the public debt resulting in the rise of the lending rates by the commercial banks to the private sector, the final implication is the private sector discouraged to make more investment and to support different economic activities including agriculture sector activities. The World Bank Group Report (2019,pg.3) insisted that, “This adds to the debt service bill, which already consumes nearly 40 percent of domestic revenue and puts upward pressure on commercial rates for lending to the private sector”.

The Tanzania Government experienced the scarcity of public funds to finance the agriculture sector economic activities towards transforming the entire economy of the country and simultaneously achieving the global sustainable development goals of 2030. The world Bank Report (2019,pg.55) suggests that, “Scarce public funds should be better targeted to mobilize private sector finance, including for on-farm investment by smallholders, through institutional and infrastructural development that increases the returns to their labors. Public spending on agriculture needs both to grow and to shift from providing significant private goods, such as input subsidies, to providing core public goods, such as agricultural research and more efficient irrigation, that mobilize private investment in agricultural production and distribution”.

The Tanzania economy is still dependent largely on the agriculture sector as the sector contribution surpasses other sectors' contribution to the economy. In addition to that, the Tanzania agriculture sector is the leading employer for the larger population of the country depending on the agriculture. This emphasised on the Deloitte Report (2016,pg.11) argued that, “The contribution of the agricultural sector to the economic growth and the development of Tanzanians has continued to increase. In 2015, the agricultural sector contributed 29% of the GDP, compared to 28.8% in 2014. This was the largest contribution, surpassing all other sectors. In addition, agriculture is the largest employer in the country”.

Motivation and objective of the study

The Tanzania Government using the 40% of the internal revenue to service the public debt resulting in the rise of the lending rates by the commercial banks to the private sector, the final implication is the private sector discouraged to make more investment and to support different economic activities including agriculture sector activities. The World Bank Group Report (2019,pg.3) insisted that, “This adds to the debt service bill, which already consumes nearly 40 percent of domestic revenue and puts upward pressure on commercial rates for lending to the private sector”.

Recent evidence shows that (UNRISD , 2020, pg.1) Global debt has reached historically unprecedented levels at a time when substantially more funding is required for keeping the SDGs within reach.

Despite the recent rapid growth of the Tanzania Public debt in Tanzania there is no studies have been undertaken to investigate the influence of the public debt to the Agriculture sector. The present study is undertaken to evaluate the influence of the public debt to the agriculture sector in Tanzania. The study firstly assesses the marginal change of the annual average public debt influence to the agriculture gross domestic product and secondly the study evaluated the correlation between the public debt and the agriculture gross domestic product during the period from 1996 to 2018 in Tanzania. In addition to that, the study will contribute the new knowledge about the influence of the public debt to the agriculture sector in Tanzania during the period from 1996 to 2018. Finally the study will be usefully for the policy implications and decision makers and most important to the sustainable development goals studies.

Objective of the study

The present study is undertaken to evaluate the influence of the public debt to the agriculture sector in Tanzania. The study firstly assesses the marginal change of the annual average public debt influence to the agriculture gross domestic product and secondly the study evaluated the correlation between the public debt and the agriculture gross domestic product during the period from 1996 to 2018 in Tanzania.

Literature review and hypothesis

TANZANIA PUBLIC DEBT

Literature explores that Tanzania Public debt is still under reasonable control despite the rapid growth of the domestic borrowing by the Tanzania Government to finance the 2018/19 budget. Recently Tanzania has been using 40% of the domestic revenue to service the debt bill. The World Bank Group Report (2019, pg.2&3) discusses the matter stating that, “Public debt is still sustainable, despite the recent jump in domestic borrowing. Though Tanzania is at low risk of debt distress, commercial debt as a share of total public debt has risen because domestic debt has risen by 2.3 percent of GDP to finance the 2018/19 budget”.

Charles (2018,pg.5) insisted that the Tanzania public debt is still sustainable for short and medium term for the Country. Argued that , “The most recent debt sustainability analysis (DSA) by the Government (2017) and by the IMF and World Bank (2016/17) indicated that Tanzania’s public debt remains sustainable in both the short and medium term”.

Evidence still shows that the Tanzania debt is still well manageable regarding the macroeconomic indicators including growth, inflation, interest rate, primary balance and the possibility and availability of external finance (Sharer et al, 2004, pg.30) suggested that, “Based on the macroeconomic assumptions made about growth, inflation, interest rate, primary balance, and the availability of external financing, the simulations indicate that Tanzania’s domestic debt position is manageable, if it continues to enjoy access to highly concessional external financing”.

TANZANIA PUBLIC DEBT THREAT

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THE SIGNIFICANCE OF THE TANZANIA AGRICULTURE SECTOR

The Tanzania economy is still dependent largely on the agriculture sector as the sector contribution surpasses other sectors' contribution to the economy. In addition to that, the Tanzania agriculture sector is the leading employer for the larger population of the country depending on the agriculture. This emphasised on the Deloitte Report (2016,pg.11) argued that, “The contribution of the agricultural sector to the economic growth and the development of Tanzanians has continued to increase. In 2015, the agricultural sector contributed 29% of the GDP, compared to 28.8% in 2014. This was the largest contribution, surpassing all other sectors. In addition, agriculture is the largest employer in the country”.

The Tanzania Government's role to intervene and support the agriculture sector is still very important and inevitable to enhance the better performance of the agriculture sector. Meertens (2000,pg.1) argued that, “Government involvement might be necessary to ensure a higher consumption of agricultural inputs and thus a better performance of the agricultural sector in Tanzania”.

The 90 percent of the Tanzania population is employed by the agriculture sector and mostly in rural areas however this population is stagnant to develop the agriculture sector due to several reasons including the inadequate access of news and information about their agriculture products, technology and markets. Kaishozi (2019,pg.1) explores that, “Nearly 90 percent of Tanzania's residents live in rural areas, work primarily in the agricultural sector and lack access to information, technology and markets”.

The importance of the agriculture sector to the Tanzania economy has been highlighted particularly agriculture sector as a stabilizing factor of the economy moderating the negative effects of the economic decline in Tanzania. Potts (2005,pg9) clarified that, “Agriculture has therefore not been a leading sector, rather a stabilising factor moderating the negative effects of periods of economic decline and declining in relative importance in periods of relatively faster growth”.

In addition, The significance of the Agriculture sector as the central and core engine sector towards the transformation of the Tanzania economy has well highlighted by (The World Bank Report, 2019) the reported argued that, “The government recognizes agriculture as central to realizing its objectives of social economic development, which are well-articulated in the Second Agriculture Sector Development Program (ASDP II). Among the goals of ASDP II are to transform agriculture by promoting commercialization, prioritizing high-potential commodity value chains, and mobilizing capital by giving the formal private sector a growing role in agriculture”.

In particular to the employment and job creation heading to the poverty reduction in Tanzania the evidence shows that the Agriculture sector is the leading sector to support the employment and job creation where the large number of the Tanzania population about 80% is employed in the Agriculture sector which results in the poverty decline to the Tanzania citizens. The World Bank Report (2019) insisted that, “Because agriculture and related value chains drive two-thirds of all jobs—three-quarters for the poor—the sector is central to creating more and better jobs at scale and significantly reducing poverty”.

Literature suggests that for the future growth of the economic development with the rapid employment generation and sustainable poverty reduction the Agriculture sector must be considered the central and core drive sector to achieve the desired targets for the Tanzania Government. The World Bank Report (2019, pg.24) argued that, “ moreAgricultural transformation in Tanzania can do much to drive future growth and employment and accelerate poverty reduction”.

THE CHALLENGES OF THE TANZANIA AGRICULTURE SECTOR

The Tanzania Government experienced the scarcity of public funds to finance the agriculture sector economic activities towards transforming the entire economy of the country and simultaneously achieving the global sustainable development goals of 2030. The world Bank Report (2019,pg.55) suggests that, “Scarce public funds should be better targeted to mobilize private sector finance, including for on-farm investment by smallholders, through institutional and infrastructural development that increases the returns to their labors. Public spending on agriculture needs both to grow and to shift from providing significant private goods, such as input subsidies, to providing core public goods, such as agricultural research and more efficient irrigation, that mobilize private investment in agricultural production and distribution”.

Literature evidence manifests that Tanzania Agriculture sector is facing the threat for the national freshwater withdrawals due to the fact that the recent Tanzania freshwater withdrawal level percentage is above the limit percentage set by Africa and the Global. (World Bank Report, 2019,pg.53) reported that; “Agriculture in Tanzania accounts for an estimated 89 percent of national freshwater withdrawals—higher than the global average of about 70 percent and the Africa average of about 80 percent. Though 90 percent is used mainly for irrigation. Any serious effort to manage the general efficiency of water use requires thoughtful attention to agricultural use. As is the case in most countries, water, and water use, are unevenly distributed, and Tanzania has nine river basins. Some areas of Tanzania have experienced frequent severe droughts for years, as has happened, e.g., in 8 of the last 20 years in the Pangani Basin. Climate change has aggravated the already high volatility in annual rainfall (up to 400 percent) in most of the country”.

The Tanzania economy mainly depends on agriculture however the recent evidence shows that the agriculture sector contribution to the economy is less than 4% means that the sector is not productive as expected. The main challenges of the Tanzania agriculture sector include the poor infrastructure, lack of storage and low productivity. The fact of the matter is that 40% of the domestic revenue collected spends to services the public debts instead with the absence of the such big amount servicing the debt means funds might be allocated to support other economic development projects including agriculture activities resulting to make the sustainable developments goals achievable as planned. Charle (2018,pg.3) argued that, “Agriculture remains the mainstay of the Tanzanian economy, employing about two-thirds of the workforce and supporting the livelihoods of three-quarters of the population. However, growth in the agriculture sector averaged less than 4% in the last five years. The reasons include poor infrastructure, lack of storage, and low productivity because of continued dependence on rainfed agriculture, lack of irrigation, and inadequate mechanization”.

The Tanzania Government has the history of experiencing the economic crisis during the year of 1970s due to the poor performance of the key economic indicators (Tanzania Government Report, 2001,pg1) argued that, “The record of economic performance was good in the 1960s and early 1970s before experiencing a crisis of unprecedented depth and breadth in the 1980s”.

Literature suggests that in order to transform the Tanzania agriculture sector substantial efforts must be made to support the smallholders agriculture farmers particulars to overcome their necessary challenges. Elibariki (2007) suggested that, “In order to transform the agricultural sector into one with high productivity and high quality output, effort is needed to understand and eliminate the barriers to smallholders that inhibit the growth of productivity”.

The impact of climate variability Tanzania’s predominantly rainfall-based agriculture is also very evident. Most of the country’s agriculture is directly dependent on annual rainy seasons, and there is a close relationship between variations in the amount of rainfall and differences in the country’s annual economic growth. Agricultural production accounts for nearly half of Tanzania’s GDP, and reduced agricultural productivity has already occurred as a result of changes in rainfall patterns (Ministry Of Foreign Affairs Of Denmark 2019).

TANZANIA AGRICULTURE FOOD PRODUCTION AND IT’S CHALLENGES

Tanzania Government has made substantial efforts to enhance Agriculture food production and security including initiating different investment scheme including Agriculture and Food Security Investment Plan (Cooksey, 2013.pg.5) argued that, “CAADP in Tanzania is enshrined in the Agriculture and Food Security Investment Plan (TAFSIP) which President Kikwete launched in November 2011. But TAFSIP has played a very secondary role in Tanzania’s agricultural policy processes compared to the earlier Kilimo Kwanza (2009) and later Big Results Now (BRN, 2013). TAFSIP is an expanded version of the Agricultural Sector Development Programme (ASDP, 2006-13), adding components (food security, climate change) and more than doubling the proposed budget”.

The Tanzania Agriculture sector is witnessing the obstacle of food security declining due to the climate change impact within the country. Channing et al, (2012, pg.1) argued that, “The authors find that, relative to a no-climate-change baseline and considering domestic agricultural production as the principal channel of impact, food security in Tanzania appears likely to deteriorate as a consequence of climate change”.

Evidence manifests that Tanzania's high poverty level is the main challenge for the Agriculture food insecurity challenge which hinder the Agriculture sector development and the Tanzania economic development. Tanzania Ministry Of Agriculture Report , (2006. pg2) reported that, “

Poverty is one of the major causes of food insecurity in Tanzania, The prevalence of income poverty is still high in Tanzania”.

Researchers identify Tanzania among the least developed countries with the low income status while facing the food deficit challenge in its economic development journey towards making the global sustainable development goals realistic. Cleaver et al, (2009, pg.23) wrote that, “Tanzania situated on the Eastern Coast of Africa, is one of the continent’s most politically stable countries. The country is categorized as a least developed and low-income food deficit country”.

THE STUDY HYPOTHESIS

The present study null hypothesis showing that there is no relationship between the Tanzania Public Debt and the Tanzania agriculture sector gross domestic product, assuming that “B” = 0, since “B” stands on the behalf of the correlation between the Tanzania Public Debt and the Tanzania agriculture sector gross domestic product. The Alternative Hypothesis is “B” < 0 which indicates that the Tanzania Public debt is opposite and negative correlated to the Tanzania Agriculture sector gross domestic product .

Therefore the study null and alternative hypothesis are:

$$H_0 : B = 0$$

$$H_1 : B < 0$$

Research methodology

The present study is undertaken to evaluate the influence of the public debt to the agriculture sector during the period from 1996 to 2018 in Tanzania. The study in particular assesses the influence of the public debt in the two different aspects; Firstly the study assesses the marginal change of the annual average public debt influence to the agriculture gross domestic product during the period from 1996 to 2018 in Tanzania. Secondly, the study evaluated the correlation between the public debt and the agriculture gross domestic product during the period from 1996 to 2018 in Tanzania.

To investigate the influence of the public debt to the agriculture sector in Tanzania the study employed the Time series data from the World bank and the Bank of Tanzania Annual report for the Tanzania public debt and Tanzania agriculture sector gross domestic product data during the period from 1996 to 2018 in Tanzania.

The study evaluated the annual growth rates for the Tanzania public debt and the Agriculture sector gross domestic product during the period from 1996 to 2018 in Tanzania. The growing rate evaluated by the following regression semi-log model:

$$\ln EQ_i = X_0 + X_1t + X_i \dots\dots\dots(1)$$

From the above equation : X_0 and X_1 stand as coefficients, X_i stands as random disturbance, and EQ_i stand as dependent variable factor in the natural log, while t stand for Time period from the year 1996 to 2018.

The growing amount and figure (Rate) evaluated by the following equation

$$R_{xy} = X_1 * 100 \dots\dots\dots(2)$$

The present study to compute the yearly growing figure for the divided periods of 1996 - 2000, 2001 - 2005, 2006- 2010, and 2011- 2015, the slope dummy and the intercept dummy have been applied (Gujarati, 2003). The study particularly employed the regression equation:

$$\ln EQ_i = X_0 + X_1t + X_2D_1 + X_3(D_1*t) + X_4D_2 + X_5(D_2*t) + X_6D_3 + X_7(D_3*t) + X_i \dots\dots\dots(3)$$

From the above equation:

$$D_1 \text{ (First Dummy)} = 1996 \text{ to } 2000 = 0$$

$$2001 \text{ to } 2015 = 1$$

$$D_2 \text{ (Second Dummy)} = 2001 \text{ to } 2005 = 0$$

$$2006 \text{ to } 2015 = 1$$

$$D_3 \text{ (Third Dummy)} = 2006 \text{ to } 2010 = 0$$

$$2011 \text{ to } 2015 = 1$$

From the equation, X_0 , X_1 , Stand as Coefficients, X_i stand as the random disturbance, while EQ_i and t stand as referred from the equation number 1.

Referring the regression equation , growing amount figure for the four divided periods were estimated by the following equation:

$$R_{xy} \text{ 1996 - 2000} = (X_1) * 100 \dots\dots\dots(4)$$

$$R_{xy} \text{ 2001 - 2005} = (X_1 + X_3) * 100 \dots\dots\dots(5)$$

$$R_{xy} \text{ 2006 - 2010} = (X_1 + X_3 + X_5) * 100 \dots\dots\dots(6)$$

$$R_{xy} \text{ 2011 - 2015} = (X_1 + X_3 + X_5 + X_7) * 100 \dots\dots\dots(7)$$

Key policy stakeholders and investigators believe and assume that all economic variables employed in this study were subject to increase as the time goes, the economic variables applied by the present study including Tanzania public debt and the agriculture sector gross domestic product.

In addition to that, the present study assumes yearly growing amount in the given factors during the period 2011 to 2015 is greater than that of during the period 2006 to 2010. While assumes yearly growing amount in the given factors during the period 2006 to 2010 is greater than that of during the period 2001 to 2005. In addition to that, the study assumes yearly growing amount in the given factors during the period 2001 to 2005 is greater than that of during the period 1996 to 2000. This assumption could be equated as follows:

$$R_{xy} \text{ 2011 to 2015} > R_{xy} \text{ 2006 to 2010}$$

$$R_{xy} \text{ 2006 to 2010} > R_{xy} \text{ 2001 to 2005}$$

$$R_{xy} \text{ 2001 to 2005} > R_{xy} \text{ 1996 to 2000}$$

From the above equations, the meaning is:

$$(X_1 + X_3 + X_5 + X_7) * 100 > (X_1 + X_3 + X_5) * 100$$

$$(X_1 + X_3 + X_5) * 100 > (X_1 + X_3) * 100$$

$$(X_1 + X_3) * 100 > X_1 * 100$$

Evaluating the Public debt and agriculture sector gross domestic product marginal annual change the study employed assumes to put in practice the Cobb - Douglas production function (Cobb and Douglas, 1928) and constant Elasticity of Substitution (CES) production function (Arrow et al., 1961), same applied by Sadhu and Mahajan (1982) and Gaur and Padney (2003), and Greene (2005) respectively, which are classified and stated as below:

$$O_i = EL^1 U_i \dots \dots \dots (8)$$

From the above equation, O_i is the output, EL represents Employment labour, and 1 is the quantity of labour applied in the production mechanism, and U_i stands for random disturbance factor.

From the above literature citation the present study compute the marginal public debt and agriculture sector gross domestic product as follows :

Extra public debt and the agriculture sector gross domestic product evaluated in the Double Log model below:

$$\ln O_i = \ln A + X \ln EL \dots \dots \dots (9)$$

From the above equation: X represents Elasticity of public debt or the agriculture sector gross domestic product during the from 1996 to 2018 in Tanzania.

THE MARGINAL CHANGE FOR THE ANNUAL AVERAGE PUBLIC DEBT INFLUENCE TO THE AGRICULTURE GROSS DOMESTIC PRODUCT (GDP)

The present study is undertaken to investigate the marginal change for the annual Public Debt influence to the Agriculture Gross Domestic Product during the period from 1996 to 2018 in Tanzania. To assess the marginal public debt and the marginal Agriculture Gross Domestic

Product the study calculates the marginal annual average for the different sub periods that are; 1996-2000, 2001-2005, 2006-2010, 2011-2015, 2016-2018, 1996-2005, 2006-2015, and 2016-2018 in Tanzania.

The Tanzania Government Public Debt record shows the increase of the Public debt from the amount of 7933 Usd in the year of 1996 to the amount of 28,063.1 Usd in the year of 2018. While the Agriculture sector gross domestic product showing the deterioration from the rate of 7.517% in the year of 1996 to the rate of 5.3% in the year of 2018. The study findings shows that the marginal annual average public debt for the sub periods (1996-200) is -2.036, (2001-2005) is 1.978, (2006-2010) is 6.29, (2011-2015) is 16.902, (2016-2018) is 10.65. While for the specific presidential term period of 1996-2005(Third Presidential Term) is -0.029, 2006-2015(Fourth Presidential Term) is 11.596 and 2016-2018(Fifth Presidential Term) is 10.65.

The Tanzania Agriculture sector Gross domestic product records shows the percentage contribution of the sector is deteriorating where the sector recorded the amount of 7.517% in the year of 1996 to 5.3% in the year of 2018. The study findings shows that the marginal annual average agriculture sector gross domestic product for the sub periods (1996-200) is -8.092, (2001-2005) is -3.11, (2006-2010) is -2.018, (2011-2015) is -0.74, (2016-2018) is 17.28. While for the specific presidential term period of 1996-2005(Third Presidential Term) is -5.601, 2006-2015(Fourth Presidential Term) is -1.379 and 2016-2018(Fifth Presidential Term) is 17.28.

Findings of the study revealed that the Tanzania marginal annual average public debt is increasing and positive similarly to the Tanzania marginal annual average Agriculture GDP where the agriculture GDP marginal annual average is also increasing and positive (Refer to the Appendix 2 below)

Different literatures supported the marginal annual average method on evaluating the extra units for the given time series period particularly (Dixit and Pandey, 2009. pg.96) argued that, “The average annual growth rate of total production of SSI for the entire period from 1973 to 2006 was recorded at 11.9%, while the average annual growth rate of GDP was 12.9% for the same period. The average annual growth rates of GDP for the subperiods, 1973-1980, 1981-1990, 1991-2000 and 2001-2006 were 10.0%, 13.05, 13.3% and 11.5% respectively”.

Appendix 1 : The following Table shows the Tanzania Public Debt and the Tanzania Agriculture sector Gross Domestic Product during the period from 1996 to 2018 in Tanzania.

YEAR	P.D	A/GDP

1996	7933	7.517
1997	8100.8	5.615
1998	7901.7	5.461
1999	7972.9	5.215
2000	7595.7	4.858
SUB TT	39504.1	28.666
2001	7702.3	4.768
2002	8032.8	4.659
2003	7606.6	4.527
2004	8088.3	4.43
2005	8345.1	4.056
SUB TT	39775.1	22.44
2006	8638.9	3.807
2007	5212.4	3.764
2008	6776.3	3.74
2009	8120.1	3.684
2010	9548.3	3.659
SUB TT	38296	18.654
2011	11336.1	3.704
2012	14098.1	3.638
2013	17087.4	3.687
2014	18804.1	3.589
2015	20718.9	3.523
SUB TT	82044.6	18.141
2016	23118.3	3.523
2017	25692.9	3.432
2018	28063.1	5.3
SUB TT	76874.3	12.255

Source : The World Bank Data Indicators and The Bank Of Tanzania Annual Report

Where : Y is the Year, A-P/D is the Public Debt and A-A/GDP is the Agriculture sector Gross domestic Product during the period from 1996 to 2018 in Tanzania.

Appendix 2 : Marginal annual average for the Tanzania Public Debt and the Agriculture sector gross domestic product for the period from 1996 to 2018 in Tanzania (Source : From Appendix 1).

Y	A-P/D	AV1	AV2	A-A/GDP	AV1	AV2
1995						
1996	-6.01			-1.07		
1997	2.12			-25.3		
1998	-2.46	-2.036		-2.74	-8.092	
1999	0.9			-4.5		
2000	-4.73			-6.85		
SUB TT	-10.18			-40.46		
			-0.029			-5.601
2001	1.4			-1.85		
2002	4.3			-2.29		
2003	-5.31	1.978		-0.83	-3.11	
2004	6.33			-2.14		
2005	3.17			-8.44		
SUB TT	9.89			-15.55		
2006	3.52			-6.14		
2007	-39.66			-1.13		
2008	30	6.29		-0.64	-2.018	
2009	20			-1.5		
2010	17.59			-0.68		
SUB TT	31.45			-10.09		
			11.596			-1.379
2011	18.72			1.23		
2012	24.36			-1.78		

2013	21.2	16.902		1.35	-0.74	
2014	10.05			-2.66		
2015	10.18			-1.84		
SUB TT	84.51			-3.7		
2016	11.58			0		
2017	11.14	10.65	10.65	-2.58	17.28	17.28
2018	9.23			54.43		
SUB TT	31.95			51.85		

Where : Y is the Year, A-P/D is the average annual Public Debt and A-A/GDP is the average annual Agriculture sector Gross domestic Product during the period from 1996 to 2018 in Tanzania.

THE CORRELATION BETWEEN PUBLIC DEBT AND THE AGRICULTURE SECTOR GROSS DOMESTIC PRODUCT (GDP) IN TANZANIA

The study to evaluate the relationship between the Public debt and the Agriculture sector GDP in Tanzania assumes the Tanzania public debt to be the independent variable while the Agriculture sector gross domestic product (GDP) to be the dependent variable. The study findings revealed that there is a negative and insignificant correlation between the Tanzania public debt and the Tanzania Agriculture sector GDP during the period from 1996 to 2018 in Tanzania (Table 1).

That means the Tanzania public debt has no influence on the agriculture sector gross domestic product during the period from 1996 to 2018 in Tanzania.

Kharel (2014, pg.50) similarly found the negative relation between the two macroeconomic variables (industries registered and economic openness) argued that , “ However, this relationship is found to be opposite in the post liberalization period (1991/92 - 2009/10)”.

Table 1: Regression Results Between Tanzania Public Debt and the Tanzania Agriculture sector Gross Domestic Product (GDP) during the period from 1996 to 2018 in Tanzania.

V	CT	SD	T	P
SR	-4.1431	0.0151	-274.17	0
C	4.8546			0
R2	0.0803			

AR	0.03650			
SER	476.47			
NOB =23				

Origin: Regression results from Appendix number 3

Where: V is Variable, CT is Coefficient, C is Constant, SD is the Standard Deviation, T is T-Statistic, P is Probability, SR is Slope of the regression line, R2 is R-Squared, AR is Adjusted R-Square, SER is Standard Error of Estimation NOB is number of Observation.

Appendix 3 : Regression calculations for the Tanzania Public Debt and the Tanzania Agriculture sector GDP during the period from 1996 to 2018 in Tanzania.

YEAR	PUBLIC DEBT	AGR GDP	X ²	Y ²	XY
1996	7933	7.517	62932489	56.505289	59632.361
1997	8100.8	5.615	65622960.64	31.528225	45485.992
1998	7901.7	5.461	62436862.89	29.822521	43151.1837
1999	7972.9	5.215	63567134.41	27.196225	41578.6735
2000	7595.7	4.858	57694658.49	23.600164	36899.9106
2001	7702.3	4.768	59325425.29	22.733824	36724.5664
2002	8032.8	4.659	64525875.84	21.706281	37424.8152
2003	7606.6	4.527	57860363.56	20.493729	34435.0782
2004	8088.3	4.43	65420596.89	19.624913	35831.169
2005	8345.1	4.056	69640694.01	16.451136	33847.7256
2006	8638.9	3.807	74630593.21	14.493241	32888.2

				9	923
2007	5212.4	3.764	27169113.76	14.16769 6	19619.4 736
2008	6776.3	3.74	45918241.69	13.9876	25343.3 62
2009	8120.1	3.684	65936024.01	13.57185 6	29914.4 484
2010	9548.3	3.659	91170032.89	13.38828 1	34937.2 297
2011	11336.1	3.704	128507163.2	13.71961 6	41988.9 144
2012	14098.1	3.638	198756423.6	13.23504 4	51288.8 878
2013	17087.4	3.687	291979238.8	13.59396 9	63001.2 438
2014	18804.1	3.589	353594176.8	12.88092 1	67487.9 149
2015	20718.9	3.523	429272817.2	12.41152 9	72992.6 847
2016	23118.3	3.523	534455794.9	12.41152 9	81445.7 709
2017	25692.9	3.432	660125110.4	11.77862 4	88178.0 328
2018	28063.1	5.3	787537581.6	28.09	148734. 43
TOTAL	276494.1	100.156	4318079373	457.3922 08	1162832 .161

Source : The world bank data indicator and the Bank of Tanzania Annual Report during the period from 1996 to 2018 in Tanzania.

HYPOTHESIS TEST FOR THE CORRELATION BETWEEN TANZANIA PUBLIC DEBT AND THE AGRICULTURE SECTOR GROSS DOMESTIC PRODUCT DURING THE PERIOD FROM 1996 TO 2018 IN TANZANIA

From appendix 3 and the regression results from the Table number 1 the study assumes the Tanzania public debt to be independent variable and represented by X, while the agriculture sector gross domestic product assume to be the dependent variable and represented by Y.

With reference to the regression results, the study outcome regression line is:

$$Y = 4.85 - 4.1431X$$

While, the study standard deviation is 0.0151

Regarding the above equation, b is -4.1431, and because it is negative means less than zero accept null hypothesis while not accepting alternative hypothesis.

Null and Alternative Hypothesis:

$$H_0 : B = 0$$

$$H_1 : B < 0$$

Thus, The Test Statistic $t_{0.01}(23-2) = 2.518$

Rejection Part of H_0 is t values of 2.518 or less than.

From the regression results

$$t = b/sb = -274.17$$

$$= -274.17 < 2.518$$

The meaning is there significant evidence that the correlation between Tanzania Public debt and the agriculture sector gross domestic product is strongly Negative and meaningless.

Summary of the findings

The study findings revealed that the public debt and the agriculture sector gross domestic product marginal annual average change is positive while the correlation between the public debt and the agriculture sector gross domestic product is negative and insignificant during the period from 1996 to 2018 in Tanzania.

The meaning is the marginal annual average of the Tanzania public debt and the agriculture sector gross domestic product trend is annually increasing at increasing rate. However, the correlation between the Tanzania public debt and the agriculture sector gross domestic product is negative and insignificant during the period from 1996 to 2018 in Tanzania.

Limitation of the study

The study did not mention the specific amount of public debt influence or not influence the agriculture sector gross domestic product during the period from 1996 to 2018 in Tanzania. This is the opportunity for further studies to investigate the specific amount of influence or impact of the public debt to the agriculture sector gross domestic product during the period from 1996 and onward in Tanzania.

Conclusions and recommendations

The present study is undertaken to evaluate the influence of the public debt to the agriculture sector during the period from 1996 to 2018 in Tanzania. The study in particular assesses the influence of the public debt in the two different aspects; Firstly the study assesses the marginal change of the annual average public debt influence to the agriculture gross domestic product during the period from 1996 to 2018 in Tanzania. Secondly, the study evaluated the correlation between the public debt and the agriculture gross domestic product during the period from 1996 to 2018 in Tanzania.

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Recommendation

Due to the fact that currently the Tanzania public debt is rapidly growing and the The Tanzania Government is using the 40% of the domestic public revenue to service the public debt that means the prosperity of the agriculture sector, economic development and global sustainable development goals 2030 are in danger and hard time to be achievable. The Tanzania Government should stop borrowing from high interest rates loans, where necessary borrowing can be done for the very long time period with the lowest interest rates. In addition to that, the Tanzania government should consider wisely broadening other means of raising the public finance including boarding the government tax base with innovative and friendly way to the public, international relationship strengthening which will guarantee for the donor funds for different development

projects, and the Tanzania government invested funds to the different governments institutions must provide the reasonable dividends for every year of their operations.

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