THE IMPACT OF GOLD EXPORT REVENUE ON ECONOMIC GROWTH IN TANZANIA

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ABSTRACT

This study investigates the impact of gold export revenue on economic growth in Tanzania using time series data from 1990 to 2020. The paper applies the Augmented Dickey Fuller test for unit root and a Vector Error Correction model to provide empirical evidence on the long-run relationship between gold export revenue and economic growth in Tanzania. Data evidenced that there is a positive and significant impact between gold export revenue and economic growth in Tanzania in the long-run not in the short-run. The analysis suggests that since gold export revenue has a significant positive impact the government should put more effort on skill and technology used in order to export more gold that have more value in the world market.

***Keywords*:** Gold export revenue, Economic growth

INTRODUCTION

Tanzania has a significant gold deposit that should be used to alleviate poverty Euroameriacan data, (2006) and FESS, (2010) explains that Tanzania has become one of Africa's fastest emerging gold producers after South Africa and Ghana. The country is estimated to have over 2,222 tons of gold deposits and reserves (Presidential Mining Review Report, 2008). However, gold mining is primarily dominated by foreign megacorporations that benefit from tax breaks and incentive packages provided by the government. Given the favorable business climate and environment as revealed by (Euroamerican Data, 2006), each year since 1998, a new gold mine has been opened in Tanzania some of which are owned by Resolute Ltd, Ashanti Gold Field, Barrick Gold Corporation, Meremeta Ltd and others.

Tanzania gold exports reached USD 2.957 billion in 2020 compared to USD 2.215 billion in 2019 as a result the revenue from gold exports in the country increased by 34 percent in 2020 making it the 32nd largest exporter of gold in the world. At the same year, gold was the 1st most exported product in Tanzania. The main destinations of gold exports from Tanzania are United Arab Emirates, Switzerland, Uganda, India, and Turkey. The increase in gold export and revenue in 2020 may be influenced by the increase in gold price in the world market by 28 percent and reached the record high of dollar 2,075 per ounce due to global economic uncertainty, primarily the impact of the spread of covid 19 lowering both short-term and long-term interest rates and widespread fiscal stimulus in major economies. Current Giant Firms Involved in Gold Mining Resources in Tanzania includes; Geita Gold Mine (AngloGold Ashanti), North Mara Gold Mine (Barrick), Bulyanhulu Gold Mine (Barrick), New Luika Gold Mine (Shanta Gold), Biharamulo Gold Mine (Stamigold) and Buckreef Gold Mine (Stamico).

Tanzania Mining Policies

In Tanzania the mining policies were influenced by the IMF and World Bank in their efforts to shape the African continent and Tanzania in particular, which has resulted in widespread criticism of the policies. That is why Campbell (2003), a mining governance expert, examines mining in Africa, particularly Sub-Saharan Africa and found that sectors fall short due to poor corporate governance, corruption and rent-seeking behaviour, and failure to belief the poor. The author stated that the mining sector requires new defined reforms on the role of the government in mine control. The author is commended for highlighting mining from a broad

perspective, but the author appears to be overly qualitative with no empirical evidence on the analysis.

Mining policies were implemented in the country beginning in1997 and 1998 to manage the mining sector, followed by the mining Act of 2010, however the recent changes to Tanzania's mineral law were done in 2017, where the laws were introduced to significantly increase government control over mining, oil and gas operations in Tanzania which include

1) The Natural Wealth and Resources Contracts (Review and Re-negotiation of Unconscionable Terms) Act, 2017 ('Unconscionable Terms Act') mandates the government to renegotiate or remove terms from investor-state agreements that Parliament consider 'unconscionable'
2) The Natural Wealth and Resources (Permanent Sovereignty) Act,2017 ('Permanent Sovereignty Act') requires Parliamentary approval for future investors-state agreements, which must 'fully secure' the interest of Tanzanian citizens, and restrict investors from exporting raw minerals, repatriating funds and accessing international dispute resolution mechanism.
3) The Written Laws (Miscellaneous Amendments) Act, 2017 ('Miscellaneous Amendments Act') amends the Mining Act, 2010 by establishing a Mining Commission to regulate the industry, overhauling the requirements for the storage, transformation and beneficiation of raw minerals and increasing royalty rates and government shareholding in mineral right holders.

Tax Incentives in the Mining Sector

In the mining activities there are tax advantages and incentives that private parties gain when calculating the income tax payable by mineral right holders, the following deductions specific to the mining sector are applied: annual charges incurred by the person under the Mining Act or mineral development agreement in respect of the mineral right; depreciation allowance at an annual rate of 20 percent for five years; contributions and other expenses incurred in respect of a rehabilitation fund; and expenses incurred in respect of acquisition of the rehabilitation bond. Further deductions may be made under the Income Tax Act. The perpetual loss making rule for corporations is not applicable to mining operations in the prospecting stage. In addition to this, a newly listed company with the Dar es Salaam Stock Exchange that has a least 30 per

cent equity ownership issued to the general public is taxed at a reduced corporate rate of 25 percent for three consecutive years from the date of listing (Shiyo, 2020).

LITERATURE REVIEW

Brunnschweiler (2006) studies the impact of the United States immense natural resources on growth of economy, and the effect of institutional quality, using the new resource endowment measuring standard. According to the findings, there is a positive and direct empirical relationship between abundant natural resources and economic growth. Both the Ordinary Least Square (OLS) and Two Stage Least Square (2SLS) regressions show that resources have a positive impact on underground wealth. In their findings, they also found no indication of negative indirect effects on natural resources through institutional channels.

Rastogi and Mwaitete (2016) investigated the relationship between Tanzanian gold exports and GDP to demonstrate that gold production and export has always been one of world's fastest expanding and most promising industries, with stable labor market prices. The study collected data through the use of time series method that spanned from years 1990 to 2014. They used simple linear regression and correlation analysis. The findings reveal a positive relationship between Tanzania's gold exports and GDP, implying that gold exports are critical to Tanzania's economic growth. Because gold has such a close association with the economy, the enormous achievements of GDP must be transmitted to citizens with skill and technology in order to grow gold exports.

It is also pointed by the Ausman *et al* (2012), that mining companies in Africa has been realizing high profit due to gold price increase over the past decade. Furthermore the companies enjoy lower tax rates and lower royalty rates and repatriate all the profit with less benefit to the local economy.

Ugurlu (2006) examined the association among real rates of exchange and economic growth rate using quarterly data from the first to second quarters of 1989 to 2001. The study used two groups of models, the first model condidered as the core model included real exchange rate, producer price index and behavior intervention plan. And the advanced model adds imports and exports to the previous variables. The results obtained showed that the 1989:Q1, 2001:Q3 subsample and total sample showed difference in values and statistical significance.

Kenneth *et al*. (2016) investigated the impact of Nigeria's rate of exchange system on economic growth. A study conducted from 1970 to 2014 predicted the unappealingly distant future economic development of the fixed exchange rate regime. In this investigation, the Generalized Method of Moments (GMM) was applied. Fixed exchange rates, according to estimates, will eventually limit the overall performance of Nigerian business development because actual exchange rates represent the inverse link between economic progress and exchange rate era.

Kryeziu and Durguti (2019) conducted research on inflation and its impact on growth. Using a multivariate linear regression model using least squares regression, they conducted a survey and obtained results. They also used multiple linear regression analysis to see if there is a substantial negative impact of inflation on the progress of the economy and diagnostic tests like the Durbin Watson test to look at series correlations and the Breusch-Pagan test to look at heterogeneity to test the data used in the model. The test findings clearly illustrate that there is no link between series correlation and heterogeneous variance model.

Chimobi (2010) studied if Nigerian inflation and economic growth are linked. The Consumer Price Index (CPI) was utilized as a substitute for inflation and GDP as a complete substitute for economic growth. In Nigerian data from the 1970s to 2005, test results reveal that there is no cointegration between inflation and economy.

Khobai *et al*. (2018) conducted a study to determine the long term relationship between openness to trade and economic growth between Ghana and Nigeria during the period 1980 to 2016. The results of the study suggested a long term relationship between the variables of both countries. The results also showed that trade openness had a positive impact on economic growth, which is important at 1 percent in Ghana, while trade openness in Nigeria is negative but not important for economic growth. These results suggest that different policy measures should be taken for each of these two countries.

Pigka-Balanika (2013) examined the connection between openness to trade and economic growth using a sample of 71 developing countries. By including the extended Thoreau Growth Model in the panel data analysis, both the fixed effects and bidirectional fixed effects specifications show that trade liberalization has a significant positive impact on economic growth. However, the Sub-Saharan African region seems to be different. High natural trade barriers, dependence on raw materials for exports and poor land infrastructure to large distant markets can explain why increased trade opening does not contribute to economic growth.

The impact of net exports on United States of America (USA) economic growth was explored by (Akalpler and Shamadeen, 2017). Claims of strong US economic resiliency and net exports necessitated this, but it also led to additional assertions from other research. As a result, the goal of this research was to look into the effect of net exports in growth of economy in the context of the United States. This study used a vector error correction algorithm to analyse secondary data from the first quarter of 1970: the first quarter. The poll's findings reveal a long-term relationship between USA net exports and economic growth. Import and unemployment rates have been proven to be inversely related to economic growth.

DATA AND MODEL

Data

The time series data on the variables from 1990 to 2020 were used. The GDP, exchange rate and inflation rate data were obtained from Bank of Tanzania and gold export revenue data were obtained from Tanzania Revenue Authority, trade openness and net export data were obtained from World Bank.

Theoretical Model

Macroeconomic models are mostly used for three purposes: first, to test economic theories, second, to provide economic projections, and third, to comprehend how unanticipated stocks and policy shifts impact macroeconomic variables in the short-run as well as long-run (Gujarati, 2004). In this study, a model that is driven from the work of Rastogi and mwaitete (2006) is used to explain the relationship between gold export revenue and economic growth. The model is modified to include only the variables of interest in this paper.

The model of estimation was influenced by insights from other researchers and modified using empirical findings and conceptual framework by introducing other economic variables. The multiple linear regression was applied to look on how gold export revenue, exchange rate, inflation, trade openness and net export impacts on gross domestic product.

Rostogi and Mwaitete (2016) model is expressed as shown below;

$$Real\ GDP\ growth(Gr) = f(Ge) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Their functional form; $LogGr = (\lambda 1 + \lambda 2Ge + \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$

The above equation (1) means that real GDP growth is a function of Ge,

Where,

Gr = Real GDP Growth

Ge = Gold Export

$From\ GDP = C + I + G + NX$ ……(3)

The above equation (3) is known as a formula for calculating GDP, the equation was modified to obtain the model suitable for the study as shown below in equation (4).

Model of the study;

$GDP = GER + ER + INF + TO + NE$ ……(4)

Where;

GDP = Gross Domestic Product a measure of growth of the economy

GER= Gold Export Revenue

ER = Exchange Rate

INF = Inflation Rate

TO = Trade Openness

NE= Net Export

3.3 Econometric Model

The econometric model that is analysed how GDP as a dependent variable relates to gold export revenue, exchange rate, inflation rate, trade openness and net export. This model is specified in equation (5) below.

$GDP = \beta_0 + \beta_1 GER + \beta_2 ER + \beta_3 INF + \beta_4 TO + \beta_5 NE + \mu$ ……(5)

Where;

β_0 = is an intercept

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Parameters of the independent variables to be estimated.

μ = Error term.

METHODOLOGY

Unit Root Test

The econometric methodology first examines the stationarity properties of each time series of consideration. The characteristics of time series data (mean, variance, and covariance) are considered to be stationary if they do not change systematically over time (Gujarati, 2004). The

present study uses Augmented Dickey Fuller (ADF) unit root test to examine the stationarity of the data series. If the mean and autocovariance of a time series remain constant across time, it is considered to be stationary.

Cointegration Test

A test of cointegration was applied to look into the long-run equilibrium among the variables under study. Cointegration is defined as the transformation of none stationary economic time series to a single series that is stationary (Gujarati, 2004). As a result, the regression of one variable on the other is not fake, but rather indicating long-run association among the variables under study.

Vector error correction model (VECM)

Once the cointegration is confirmed to exist between variables, then the third step entails the construction of error correction mechanism to the model dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state.

A vector error correction (VECM) is a restricted VAR designed for use with non-stationary series that are known to be cointegrated. Once the equilibrium conditions are imposed, the VECM describes how the examined model is adjusting in each time period towards its long-run equilibrium state. Since the variables are supposed to be cointegrated, then in the short-run, deviations from this long-run equilibrium will feedback on the changes in the dependent variables in order to force their movements towards the long-run equilibrium state. Hence, the cointegration vectors from which the error correction terms are derived are each indicating an independent direction where a stable meaningful long-run equilibrium state exists.

The VECM has cointegration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge on their cointegrating relationship while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. The dynamics specification of the VECM allows the deletion of the insignificant variables, while the error correction term is retained. The size of the error correction term indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium state (Mishra, 2011).

A VECM for two variables might look like;

$$\Delta y_t = \beta_{y0} + \beta_{y1}\Delta y_{t-1} + \ldots + \beta_{yp}\Delta y_{t-p} + \gamma_{y1}\Delta x_{t-1} + \ldots + \gamma_{yp}\Delta x_{t-p} - \lambda_y(y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + v_t^y$$

$$\Delta x_t = \beta_{x0} + \beta_{x1}\Delta y_{t-1} + \ldots + \beta_{xp}\Delta y_{t-p} + \gamma_{x1}\Delta x_{t-1} + \ldots + \gamma_{xp}\Delta x_{t-p} - \lambda_x(y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + v_t^x$$

Where $y_t = \propto_0 + \propto_1 x_1$ is the long-run cointegrating relationship between the two variables and λ_y and λ_x are the error correction parameters that measure how *y* and *x* react to deviations from long run equilibrium. However when we apply the VEC model to more than two variables, we must consider the possibility that more than one cointegrating relationship exists among the variables. For example, if *x*,*y*, and *z* all tend to be equal in the long run, then $x_t = y_t$ and $y_t = z_t$ (or, equivalently, $x_t = z_t$) would be two cointegrating relationships. To deal with this situation we need to generalize the procedure for testing for cointegrating relationships to allow more than one cointegrating equation, and we need a model that allows multiple error correction terms in each equation.

RESULTS AND DISCUSSION

The unit root test results are presented in table 1 below. The ADF test have confirmed that all variables are non-stationary at level except for trade openness. However, after taking their first difference, the results show that the series became stationary.

Table 1: Results of Unit Root Test

	AT LEVEL			AT FIRST DIFFERENCE			
Variables	Test statistics	Critical value	P value	Test statistics	Critical value	P value	Integration order
GDP	-1.512	-1.706	0.0713	-4.005	-1.708	0.0002	I(1)
GER	-0.028	-1.706	0.5111	-3.031	-1.708	0.0009	I(1)
ER	-0.053	-1.706	0.4792	-3.941	-1.708	0.0003	I(1)
INF	-1.328	-1.706	0.0979	-4.182	-1.708	0.0002	I(1)
TO	-2.119	-1.706	0.0219	-2.886	-1.708	0.0040	I(1)
NE	-1.823	-1.706	0.0399	-3.102	-1.708	0.0021	I(1)

According to Engel and Granger (1987), if two time series variables are integrated of order one, there may be a linear combination between them which may be integrated of order zero (Green, 2002). As a result, cointegration between the variables must be investigated. The study employed the Johnsonsen cointegration test. Table 2 displays the test results.

Table 2: Results of Johnson Tests for Cointegration

Maximum rank	Eigenvalue	Trace statistic	5% Critical value
0	.	172.7767	82.49
1	0.98788	97.2471	59.46
2	0.84892	65.1184	39.89
3	0.79811	37.9179	24.31
4	0.77448	12.5988	12.53
5	0.52178	0.0582*	3.84
6	0.00342		

Table 2 the tests reveal that there is cointegration and there are 5 maximum ranks, this is because the first significant value where the trace statistic is less than the critical value of 5 percent was found at maximum rank of 5. The presence of five cointegrating equations necessitated the usage of a Vector Error Correction Model (VECM) in this case.

The study used a Vector Error Correction Model (VECM) to indicate a short run and long run relationship between variables and the results are summarized as follows:

Table 3: Results of VECM on Short Run Relationship of the Variables

D_lngdp	Coefficient	Std. error	Z	P > / t /	[95% Conf. Interval]	
_ce1	-.2560067	.3340223	-0.77	0.443	-.9106783	.3986649
GDP	.1596315	.3317727	0.48	0.630	-.4906311	.8098941
GER	.0084848	.0078889	1.08	0.282	-.0069771	.0239467
ER	.0048281	.0064598	0.75	0.455	-.0078328	.017489
INF	.6142378	1.477742	0.42	0.678	-2.282084	3.510559
TO	.0141441	.0571709	0.25	0.805	-.0979087	.1261969
NE	-.2952103	.1555386	-1.90	0.058	-.6000604	.0096398
_cons	-.8514076	1.008643	-0.84	0.399	-2.828311	1.125496

According to the results in Table 3 above reveals that there is no short-run relationship between all variables and GDP because their P value are greater than 0.05, however this

is not a problem because in some cases variables tend to have no short-run relationship since some of the impacts can only be seen in the long-run.

The adjustment speed i.e a coefficient of (cel) -.2560067 implies that it takes one year to correct about 25.6 of the discrepancies of the model. This speed however is very low, for it will need 2 years and 6 months to attain equilibrium.

Table 4 below presents the results from vector error correction model that explains the long-run relationship between variables.

Table 4: Results of VECM for Long Run Relationship of the Variables

beta	Coef.	Std. Err.	z	P>	[95% Conf.	Interval]
ger	-.0092091	.0003289	-28.00	0.000	-.0098537	-.0085645
er	.0003758	.000689	0.55	0.585	-.0009745	.0017262
inf	-.043284	.2269295	-0.19	0.295	-.4880577	.4014897
to	.103322	.0056565	18.27	0.000	.0922354	.1144086
ne	-.2033049	.0287352	-7.08	0.000	-.2596249	-.146985
_cons	1.74629					

The following econometric equation was obtained from the results of table 4 above,

$$\mu = \mathbf{1}gdp - \mathbf{0.009}ger + \mathbf{0.0003}er - \mathbf{0.043}inf + \mathbf{0.103}to - \mathbf{0.203}ne + \mathbf{1.74629}$$

make gdp the subject

$$-gdp = 1.74629 - 0.009ger + 0.0003er - 0.043inf + 0.103to - 0.203ne - \mu$$

but $\mu = 0$

$$gdp = -1.74629 + 0.009ger - 0.0003er + 0.043inf - 0.103to + 0.203ne$$

Economic Interpretation of the Results

At 5 percent level, the gold export revenue coefficient (ger) was statistically significant with a positive sign. This suggests that a 1 percent rise of gold export revenue leads to an increase in gross domestic product by 0.01 percent when all other factors remain constant.

At 5 percent level, the trade openness coefficient (to) was statistically significant with a negative sign. This suggests that a 1 percent increase in trade openness leads to a decrease in gross domestic product by 0.1 percent when all other factors remain constant.

At 5 percent level the net export coefficient (ne) was statistically significant with a positive sign. This suggests that a 1 percent increase in net export leads to an increase in gross domestic product by 0.2 percent when all other factors remain constant.

Constant was -1.7 this suggests that when gold export revenue, exchange rate, inflation rate, trade openness, net export is equal to zero, leads to a decrease in gross domestic product by 1.7 percent

From the results in Table 4 above indicates that there is a log-run relationship between all the variables and gross domestic product except for exchange rate and inflation rate because their p value is greater than 0.05.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The results of gold export revenue demonstrated a positive and statistically significant correlation between Tanzania economic growth and the outcome of this investigation revealed that there is a link between gold export revenue and Tanzania growth of economy.

Policy Recommendations

Gold export revenue has a positive and significant impact on economic growth in Tanzania therefore gold production and exportation must be increased to increase the share of economic growth in Tanzania, for the big results of GDP the government must empower citizens with skills and technology this will help to increase the quality and value of gold exported to the world market which will increase more revenue to the country.

Giant firms and governments in the world involved in the exploitation of gold in Tanzania and Africa must increase responsibility, accountability and transparency on tax deals, incentives must be avoided and their capital flight must be controlled so that more money gained from sales of gold export and other natural resources to a large extent must be ploughed back to domestic economy before its depletion point and bring about development in the country

Also, a clear strategy is required on how to use gold for development. Gold export value can be used to supply the nation with technological needs. It can also protect the country during an

economic crisis and help stabilize the economy through stable currency unlike where there is no link to gold export and economic growth

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