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Trapping Revenue from Natural Gas Industry: Does the financial system matters? Case of Tanzania

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Abstract: *This study examined the idea that "having the inclusiveness of natural gas industry booming in the economy does the financial system development influence revenue growth and hence avoid the natural resource curse". The study uses a case study research design and employs the OLS but with some corrections using ridge regression. Results reveals that financial development (proxy as gross loan, advance, and overdraft), the differential effect in financial development and stock market size relative real activity influenced by natural gas discovery, have positive and statistically significant impact towards revenue growth. These findings suggest that financial development in Tanzania has been a crucial factor for revenue growth despite natural gas discoveries since in most natural resource endowed countries there financial natural resource curse. Apparently, policymakers in resource-based economies should care about financial sector deepening as much as policymakers in other countries.*

Keywords: *Financial system, Natural gas, Resource Curse, Revenue growth, Utility Model*

I. Introduction

In Tanzania, trapping revenue in different sectors has been a challenge such that the country depends heavily on donor's funds. During 2007-11, an average of 33 percent of Tanzania's budget (see table, p.62 of 2014-15 Budget speech), and as much as 80 percent of the country's development spending, was provided by international donors. In 2011-13 budget years, official development assistance paid for 22 percent of the budget on average; in 2014-15, aid will still fund a sum equivalent to what the government aims to raise from domestic debt markets. Under these financial circumstances, donor influence over Tanzania is, to a certain extent, inevitable (MOF, 2014). The contribution of revenue is still important and essential as donor funds appear to running short and understanding the factors key to revenue generation may prove to be vital to sustainability of the economy. However, with the discovery of natural gas in Tanzania, the industry is eye marked as an important tool for revenue growth but still there is key question not well answered, "given near- and long-term needs for abundant, cleaner energy sources and decarbonization, how can more compelling business models be created so that domestic form of energy work in greater concert?". This study contributed to the issue by investigating the role that of financial system can play in trapping revenue in a natural resource led-economy.

In critically contributing for country's economic growth and prosperity energy resource comes with two things, blessing or curse. When they are plentiful, they can be blessing in the sense that the national income and linkage to other sector can positively be affected by the industry, but curse if and only if they debilitate growth in economic productivity and income levels. The role of the industry in the energy-led economy is to effect economic growth, bring inter-linkage between economic structures, and enable intra-regional integration which in return facilitates revenue growth at economic growth at large (Fattouh & El-Katiri, 2012) and (Ernest &Young, 2013).

The traditional energy/utility model emphasizes that, revenue and investment flows will be possible if a utility industry can earn a return that exceeds cost of obtaining the fund to make that investment. However, the new utility model explains that risky, and therefore uncertainty environment can turn financially sound utility project into an unsound one. The factors associated with uncertainty return are; greenhouse regulations, interest rates, exchange rate, inflationary pressures, falling electricity demand, fuel price volatility, financing process, and sunk costs (Koller et al., 2010; Kihm et al., 2014). These factors among them such as interest rates, exchange rate, inflation rate, financing processes are more related to macroeconomic goals and the stability of the financial system.

Financial system development can be explained in terms of financial assets. The financial assets constitutes bank credit (credit to private and credit to the public sectors), and stock market development which include all instruments, long run or short run, traded in the stock market (Levine et al. 2000). Precisely, the financial system consists of: financial markets (such as the money markets and capital markets which channel excess funds from lenders to borrowers), financial intermediaries (such as banks and insurance companies which indirectly bring lenders and borrowers together though borrowers can also obtain fund directly from financial

markets by issuing securities), and financial infrastructure which allows the transfer of payments and the trading clearing and settlement of securities.

Developed and stable financial system is a critical factor for inclusive economic development (Beck, Demirgüç-Kunt, & Levine, 2009). Deeper financial system leads a country to grow faster that those without, and it's a lowest income quintile that benefit most from this deepening. In addition, it influences a country to enhance faster reduction in income inequality and poverty rate. Financial development helps industries that are most reliant on external finance to grow faster, and it helps enterprises which are smaller and more opaque ones to overcome financing constraints (Beck et al. 2005).

Similarly, the role of financial-sector development in the growth of resource-based economies is of the same importance as to the non-resource based economies. However, there is a natural resource curse in the financial system development in recourse-based economies where; banking systems are smaller and stock markets are less liquid with lower trading activity; financial deepening is less income-elastic suggests that resource-based economies invest less in their economies as they grow; although banks are more liquid, more profitable, and better capitalized, but they do not have different business models nor are they more or less efficient or stable than banks in other countries; and firms in resource-based economies are less likely to have a loan, and they finance a lower share of their working capital and fixed asset investment using external finance((Beck., 2011).

Furthermore, in resource-based economies fiscal stabilization is of essential consideration. These economies depend on commodity prices which have volatile prices since natural abundant resource tend to go hand in hand with fluctuation in export revenues. Taxes on rents are relatively efficient and less distorting. Therefore, higher levels of taxation in the natural resource sector make sense and facilitate lower taxes in other sectors. However, this usually leads to a structure of government revenues that is dependent on commodity prices and earnings and so can be highly volatile (Gylfason., 2011).

Therefore, the study has investigated the role of financial variables on revenue growth assuming that the natural gas prospective abundant economy leads to more flow of investment activities both domestic and international (FDI) but volatility or development of the financial system affects GDP, revenue and investment returns. It also contributed to the role of financial system in mitigating the natural resource curse (van der Ploeg, 2011). The results show that, the financial system development, financial system development influenced by natural gas discovery and stock market relative to real economic activity influenced by natural gas discovery, significantly affects revenue positively.

1.2 Natural Gas Industry Development in Tanzania

Natural gas is one of the principal sources of energy, along with oil and coal whilst it's also one of the cleanest and safest energy sources. Natural gas contributes to economic growth, energy independence, and carbon mitigation, sometimes independently and sometimes collectively. The use of natural gas, for different countries, has both social and economic impacts. Natural gas serves millions of houses, and businesses, and generates high percent of country's electricity (Banks, 2015). Specifically, gas is mainly used for heating and cooking, power generation, providing energy for industrial activities, and as a feedstock for the manufacture of petrochemical products such as fertilizer, chemicals, and plastics (Banks, 2015). Consuming natural gas domestically implies that energy consumption will increase hence economic growth because energy consumption has strong relationship with economic growth (Lee & Chang, 2008); Mehrara, 2007). However, by selling natural gas internationally, this would mean that the Tanzanian government can collect tax revenue from the foreign operations, which in turn can be used for further economic development.

Tanzania has in a short space of time become the focus of attention as a source of new global gas supply such that five years ago, this country would not have appeared in a list of potential supplier of large volume of natural gas and exporter of Liquefied Natural gas (LNG). The long-time committed gas exploration in Tanzania, which started in 1952, has magnificent benefit due to continuous increase of both offshore and onshore natural gas initial in place discoveries (GIIP). This hasn't only attracted International Oil Companies (IOCs) and National Oil Companies (NOCs) to compete in order to secure investment opportunities in this resource now resource prospective country, but has raised development prosperity expectation in Tanzania (TPDC, 2014). In 1974 Agip Company, now a subsidiary of Italian oil and gas multinational Eni SpA, discovered natural gas at Songo Songo Island which is located on and offshore, about 15km from the Tanzanian mainland and 200km south of the commercial capital, Dar es Salaam. This was followed by another discovery at Mnazi Bay in Mtwara in 1982. However, the discovered natural gas was abandoned due to believed uneconomical benefit of the reserve. Lack of political has had impeded the process as well since a huge number of redundancies of workers, and lack of funds for research and development in the sector were dominance.

Despite the difficulties, the process of explorations continued under the Tanzania Petroleum Development Company (TPDC) to the extent that the total stock of discoveries Gas initially in place (GIIP) to date is estimated to be 57.25 Trillion Cubic Feet (TCF), which has and will attract more billion dollars in

investment The multinational companies (MNCs) that are actively in the natural gas industry in Tanzania with the share of the total natural gas discovery are Statoil (46.29%), Shell (BG TZ) (36.04%), M&P (9.08%), PanAfrican Energy (4.37%), Dodsal (3.79%), and Ndovu Resource (0.43%). Other companies are ExxonMobil, Ophir, Pavillion. The remarkable discovery of natural gas was made in 2012 and 2013 with by Statoil and Shell (GB), as shown in table 1. The attraction of many companies in Tanzania is generally associated with the country's stability compared to other African countries which reduces the overall risk ranking despite the fact that legislative, taxation, and operation risks are highly ranked (Ernest & Young, 2012).

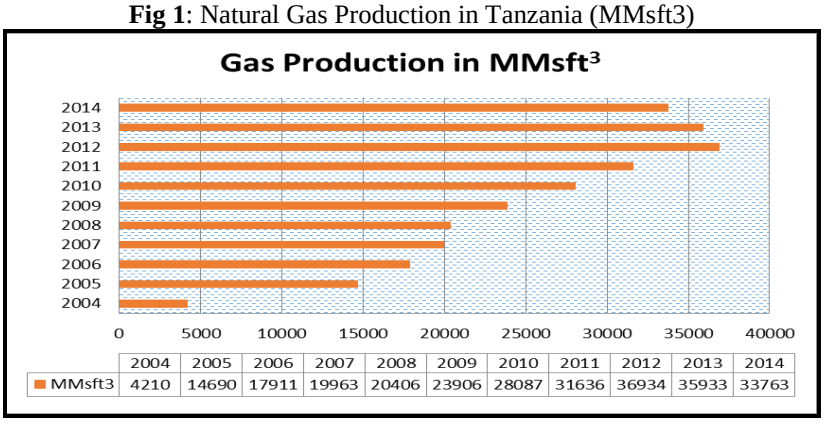
Table 1: Gas Initial in place (GIIP) discovery Trend

Year	GIIP Discovery (TCF)	GIIP Discovery Share to Total Stock	GIIP Stock	GIIP Stock Share to Total Stock
1974	2.50	4.37	2.50	4.37
1982	5.00	8.73	7.50	13.10
2007	0.20	0.35	7.70	13.45
2008	0.07	0.12	7.77	13.57
2010	3.70	6.46	11.47	20.04
2011	0.47	0.82	11.94	20.86
2012	17.81	31.11	29.75	51.96
2013	17.20	30.04	46.95	82.01
2014	4.63	8.09	51.58	90.10
2015	3.66	6.39	55.24	96.49
2016	2.01	3.51	57.25	100.00

Source, TPDC, 2016

The nature of the gas found in Tanzania cements on huge infrastructure development/investment in Tanzania because its methane (CH4) where the means of transportation and distribution is mainly through pipeline and the area of uses are electricity generation, direct households and industries (Statoil, 2016). Production and consumption of natural gas in Tanzania have being growing substantially year by year. The two natural gas fields being utilized to date are Songo Songo (run by PanAfrican Energy Tanzania) and Mnazi Bay (run by Wentworth Resource Limited) fields which are developed with a proved reserve of 7.5 TCF. Mnazi Bay gas extraction started in 2007 as compared to 2004 for Songo Songo gas field. According to TPDC, the production annual average growth rate for ten (2004-2014) years was 23 percent by 2014. The production grew from 4210 (MMsft3) in 2004 to 33763.49 (MMsft3) in 2014 (See figure. 2). The consumption data shows the similar trend as that of production because all of the produced gas is domestically consumed.

Fig 1: Natural Gas Production in Tanzania (MMsft3)



Source: TPDC, 2015

The main uses of natural gas from Songo Songo and Mnazi Bay fields include the following; first, power generation with rapidly increased demand influenced by productive investment, increasing population, and increasing access to electricity. Power generation in Tanzania was dominated by hydro generation but due to lower than anticipated rain fall hydro power account for less than 40% of annual required power generation (USAID, 2014). Mnazi Bay's gas primary end user is the Tanzania Electric Supply Company Limited where it has constructed a 532 km long pipeline, worth $1.2 billion, which now carries Mnazi Bay gas along 36" line to Dar es Salaam and other major population and industrial centers. The plant for power generation is well known as Kinyerezi Gas Power Plant (KGPP). KGPP is in four phases where by Kinyerezi (I) was inaugurated on December, 2015 with the ability to generate 150MW and Kinyerezi II project for 240MW is under construction

after the Japan's Sumitomo Corporation Company was commissioned for the work in March, 2016. Mnazi Bay's gas also will be used to supply gas for power generation to Mtwara 400MW gas fired-power plant Project. This is the US$1 billion project to be constructed in a team between a U.S consortium of General Electric International and Symbion Power. In addition, the project will expand the electrical power national grid by 650 km in the south of the country and will be able to supply power to a US$500 million; 300 million tonnes per annum cement plant by Nigeria's Dangote Group as well as other are around the project.

Second, Industrial use of natural gas account to 37 industries, 70 houses, 1 hotel, and two institutions one is Keko Custody and the other one is Mgulani JKT (TPDC, 2014). PanAfrican has also constructed compressed natural gas (CNG) distribution in Dar es Salaam. These include one "Mother Station" consisting of a compressor, a vehicle refuelling dispenser and two trailer filling facilities which vehicle converted to run on CNG. There about 60 cars using the service in Tanzania. The service not only being the first in East Africa but also provides a clean alternative to diesel and gasoline. Serving a wide range of consumers PanAfrican has three "Daughter Stations" which supply CNG to some industries, hotels and on Institution. The CNG service is potential for customers beyond the reach of the low pressure pipelines network.

Furthermore, The multinational companies (Shell (BG), Statoil, ExxonMobil, Pavillion, and Ophir Energy) operating in the Tanzania Natural Gas industry have agreed to build the onshore LNG export terminal in partnership with the state-run Tanzania Petroleum Development Corporation (TPDC) (Statoil, 2016). Despite the delay of acquiring the land for the project, early this year (2016), TPDC was entitled for some 2,071.705 hectares of land set aside for the construction of the planned LNG plant. The land is located at Likong'o village in Lind, the Southern part of Tanzania where the tremendous offshore gas has been discovered. There is additional 17,000 hectares of land allocated around the site for the prosed LNG terminal purposely for and industrial park. LNG plant will have two-three processing trains, common shared facilities such as storage tanks, jetties, and utilities with the expandable capacity up to six trains in the future. The train has the size of 140-260 k CBM (Fumbuka & Ng'wanakilala, 2016).

Tanzania like many other countries has longer-term economic prospects despite the high persisting short-term risk from the global economy. Tanzania's natural gas discovery has raised better expectation from different stakeholders. There is a belief that this is the end of poverty, and new future of prosper economy in terms of enough energy for consumption, decent employment, industrial, infrastructure, and high technology training development. Generally, attaining inclusive economic growth and development's goal for Tanzania is promising if the natural gas resource is efficiently utilized. Therefore, it's of great interest and significant to investigate the situation since the country has and will be in the point of making major decision to ensure that the resource leads to sustainable growth and development.

II. Literature Review

2.1 Theoretical Review

2.1.1 New Utility Business Model

Business model can be understood as a structural template that describes the firm's organizational and financial architecture (Chesbrough & Rosenbloom, 2002). The literature shows that many definitions of the business model are comprised of four basic elements: value proposition, customer interface, infrastructure, and revenue model (Johnson, 2010; Osterwalder and Pigneur, 2009). The new utility business model is surrounded by future investment decision, risk, and uncertainty factors. The business model's basic as compared to traditional (that says r should be greater to k) explains that utility business during its expansion is surrounded by uncertainty environment. In this regards, economic performance of countries with abundance natural resources is ranked poor compared with non-resource rich countries so referred a curse and not blessing. The potential reasons behind this are loss of competitiveness in potentially dynamic, non-natural resource sectors; a consequent narrowing of the production base; excessive reliance on commodities for both government revenues and export earnings; high vulnerability of fluctuations in commodity prices; macroeconomic and financial volatility; rent-seeking behavior that can undermine governance and exacerbate the difficulty of building robust, growth-enabling institutions (Gylfason, 2001).

2.1.2 The importance of financial System in an Economy

Mobilizing financial resources is done from surplus economic units which is then channeled to economic activities or deficit economic unit by financial institutions. In doing this, they evolve appropriate structure necessary for the intermediation function which they perform (Nzotta & Okereke, 2009). The positive relationship between financial sector and economic growth has been since then supported by various studies. Porter (1966) argues that the level of financial institution development is the best indicator of general economic development. Goldsmith (1969) argued that financial institutions development is of prime importance for real development because financial superstructure in the form of both primary and secondary securities accelerates economic growth and improves economic performance since it facilities the migration of funds to the best users.

Patrick (1966) explains that there are two channels to how the financial development is important; first, as the economy grows, it generates demand for financial services, termed as "a demand-following phenomenon". The view implies that lack of financial institutions in a society is an indication of lack of demand for their services. According to Gylfason, (2004) in natural resource economies, windfall gains from natural resources abundance and the consequent expansion of the non-traded goods sector can lead to higher demand of financial services, including consumer credit. On the other hand, there might be less demand for external financing from the natural resource sector than from the non-resource traded sector which will suffer in the Dutch disease scenario. The literature also has documented lower saving and investment rates in these economies implying lower demand for financial services. Resource rich countries can use their resource revenues for consumption smoothing which weakens the incentive to build an effective financial system to serve as a buffer to smooth consumption over the business cycle.

Second view is popular among governments in developing countries, financial development as a means to promoting economic growth and development (Habibullah & Eng, 2006). However, the supply side can be negatively affected by the presence of natural resource because higher investment in the natural resources sector can lead to lower investment in the financial sector and draw away skills from the financial system. In addition, the fact that financial system depend heavily on sound institutional frame work, including effective contractual frameworks, this can hamper financial deepening in countries where natural resource abundance countries undermines institutional development (Beck, 2011).

If the economies more reliant on natural resources while have lower level of financial development then there is a resource curse in financial development (Beck, 2011). Lack of economic growth in natural resource abundant countries is what referred as resource course (Frankel, 2010). According to Gylfason (2001) they are four main transmission channels from resource abundance or intensity to slow economic growth which are mostly suggested in the literature. First, Dutch disease and foreign capital, where natural resource abundance often results in an overvaluation of the national currency (exchange rate, inflation which hurts level or compensation of other export, FDI and reduces liquidity). The recurrent boom and busts tend to increase exchange volatility which sometimes it's enough to reduce total export. Second, natural resource rich-economies seems to be prone to socially damaging rent-seeking behaviour on the part of producers (rent seeking and social capital), natural resource tend to divert resource away from socially fruitful economy activity, and enhances corruption. Third false sense of security, (poor quality of policies and institutions), where natural resource abundance can lead government lose sight of the need for good and growth-friendly economic management including free trade, bureaucratic efficiency, and institutional quality . Fourth, since most of the nations are confident that their natural resources are their most important asset they tend to neglect development of their human resource by not devoting enough attention and expenditure to education. Furthermore, natural resource abundance may blunt private incentive to save and invest and thereby impede economic growth.

2.2 Empirical Review

Stock market and banking sector complement each other since not only the development of banking sectors helps in the reduction of the poverty but also the stock market increases the growth. Gordon & Li (2005) found that in countries with weak financial sectors, tax revenue as a share of GDP is low, the tax base is narrow and optimal tax structure puts more weight on capital taxes. The financial sector development is further complemented that it helps economic growth through more efficient resource allocation and productivity growth rather than through the sale of investment or saving mobilization. Demirguc et al. (2002) use financial planning model to show that more developed financial system, proxy by larger banking systems and more liquid stock markets, allow firms to grow faster than the rate they finance internally. The financial development plays a crucial role in dampening the impact of external shocks on the domestic economy despite the fact that financial crises do occur in developed and developed countries (Raddatz, 2006).

The empirical work of this study is motivated by studies on risks and challenge that countries with abundance of natural resource often face. This countries show a record of relatively poor economic performance compared with non-resource-rich countries (Lipschitz, 2011). Theory makes ambiguous prediction about the finance-growth relationship in resource-based economies. The first one is that financial system might be less important, since growth depends less on finance-incentive sectors. On the other hand, financial system development might be more important to compensate for the negative effect of Dutch diseases and in order to diversify the economy and help counter the negative impact of real exchange rate volatility (Aghion, Bacchetta, Ranciere, & Rogoff, 2009).

In energy-led-economy the financial variables fluctuate with energy price volatility (price shocks). In the Gulf Cooperation Council (GCC) , there evidences that stock returns and oil prices have causal relationship. Hammoudeh et al. (2006) using VAR model and cointegration tests show evidence of bidirectional relationship between Saudi stock returns and oil prices movements. Rizvi and Masih (2014) found that; In Oman there exist only traces of high correlation between oil price and stock market volatilities in medium term. Giovannini et al.

(2004) found low to extreme interdependence between the volatilities of companies' stock returns and the relevant stock market indexes or crude oil prices. Ramos & Veiga, (2011), analysed the exposure of the oil and gas industry returns of 34 countries to oil prices using panel data. They find that oil price is a globally priced factor for the oil industry.

III. Methodology

3.1 Empirical Model

The importance of financial development in natural resource based economy is widely discussed in literature, where the results show a positive relationship among the variables. However, resource based economies have less developed financial system, and while their banks are more liquid, better capitalized, and more profitable, the give fewer loans to firms. Firms in this economies use less external finance than firms elsewhere, and a smaller share of them uses bank loans. If the economies more reliant on natural resources while have lower level of financial development then there is a resource curse in financial development (Beck, 2011).

The role and structure of the financial system in resource based revenue in this study is built on the literature that has explored the so called curse of natural resource abundance (van der Ploeg, 2011, Beck, 2011). Due to the resource curse explained in the theoretical part, this study modes the variables as in the study by Beck (2011), investigating if financial development is an important factor for growth in resource-based economies as in other countries. However, the different is that this study uses revenue ratio to GDP as dependent variable and not GDP growth as in the former study because the question in hand is the role of financial system on influencing revenue as in Gordon & Li (2005). The model estimated is as follows;

$$REVR = \alpha_1 + \beta_1 MCR + \beta_2 TOR + \beta_3 LEXR + \beta_4 CPI + \beta_5 FDIR + \beta_6 MIER + \beta_7 LOAR + \beta_8 LGR + \beta_9 MGR + \varepsilon i \quad \ldots(1)$$

REVR is the Revenue to real GDP ratio, the market capitalization to real GDP ratio (MCR) is the measure of stock market size relative to real economic activity, and stock market turnover (TOR) is an indicator of stock market trading relative to stock market capitalization and therefore measure of the liquidity of the market. The study captures the impact of natural resource endowment with time on market cap using variable (MGR) obtained when MCR is timed by the ratio of natural gas reserves per year. The study uses loans, advances and overdraft to real GDP (LOAR) as an indicator of financial development. This is the total claim by financial institutions outstanding on the domestic nonfinancial private sector, divided by GDP. The researchers further introduces a variable (LGR) which captures the differential effect in time-series of the discovery of natural resource in Tanzania by taking LOAR times the ratio of natural gas reserve per year.

In this framework the control variables were added due to the fact that variables related to macroeconomic stability are important for financial deepening. Hence, exchange rate (LEXR exchange rate in natural log), inflation rate (CPI), FDI (FDI is the foreign direct investment (inflow) to the real GDP (in two cases; (1) the total FDI as FDIR, (2) FDI in mining and quarrying plus FDI on electricity, gas, steam and air conditions supply referred as (MIER)), are purposely included in the model as control variables since they can also affect revenue growth (Boyd, Levine, & Smith, 2001). $\varepsilon i.$ is the error term. Software Analysis System (SAS) 9.0 was used to perform statistical analysis. Based on this discussion, we predict and test the following four hypotheses: first, financial development have positive impact on revenue growth, second, financial development influenced by natural gas discovery has positive impact on revenue growth, third, stock market relative to real economic activity positively affect revenue growth, and fourth, stock market relative to real economic activity influenced by natural gas discovery has positive impact on revenue growth.

3.2 Empirical Analysis

This study employs the OLS but with some corrections because the only problem that seems to persist in the fit of the model is that of multicolinearity. The study utilizes one of the two more remedial measure (ridge regression and principle component) namely ridge regression. Ridge regression provides alternative estimation method that may be used where multicolinearity is suspected. Multicolinearity, leads to small characteristic roots and when one or more of the λ's are small, the total mean square error of β is large suggesting imprecision in the least square estimation method. The ridge variables are chosen by looking at variance inflation factors (VIF) close to 1, the estimated coefficients should be stable and modest change in R2.

3.3 Data

The study's revenue data were collected from Tanzania Revenue Authority (TRA) reports, inflation rate collected from Tanzania Bureau of Statistics (TBS) reports, FDI data obtained from Tanzania Investment Centre (TIC), exchange rate and loan, advance and overdraft and real GDP obtained from the Bank of Tanzania (BOT) annual reports. These data are quarterly arranged from year 2006 to 2014. The duration is sampled purposely because from 2007 the proven reserve of natural gas has been increasing (TPDC, 2014).

3.4 Statistical test for empirical Model's Specification

Before applying the OLS method different tests were done to check for fit in the model (checking for violation of OLS conditions). The tests were heteroskedasticity (testing if error terms variances are homogenous (constant)) (table 2), autocorrelation (testing if error terms are uncorrelated (observation are independent)) (table 3), and Multicolinearity (testing if several predictors in a multiple regression model are highly not correlated) (table 4.). The only disease that the data suffered from is the multicolinearity.

Table 2: Heteroskedasticity Test

Test	**Pr>ChiSq**	**Variables**
White's Test	0.4215	Cross of all Variables
Breusch-Pagan	0.7525	1, MCR, TOR, FDIR, CPI, LEXR, MIER, LOAR, MGR, TGR

Source, Researchers, 2016

Table 3: Autocorrelation Test

Durbin-Watson Test	
Durbin-Watson Coefficient	1.85
Number of Observations	36
1st Order Autocorrelation	0.063

Source: Researcher, 2016

Table 4: The Multicolinearity Test

Variable	**Tolerance**	**Variance Inflation Factor (VIF)**
MCR	0.034	29.453
TOR	0.161	6.207
CPI	0.356	2.807
EXR	0.147	6.788
FDIR	0.041	24.321
MIER	0.080	12.536
LOAR	0.040	25.142
LGR	0.017	57.872
MGR	0.016	86.681
TGR	0.115	8.709
Mean VIF		**26.052**

Source: Researcher, 2016

Table 5 reports a Person's pair-wise correlation matrix between the variables. The result shows that there several extremely large positive correlations. This is the sign that several predictors in a multiple regression model are highly correlated with each other (multicolinearity which can affect estimates of regression coefficients (signs may be flipped entirely) and their significance tests (standard error tend to be "inflated" relative to the case where predictors are not correlated) (see table 6 for the pairs of correlated variables using the eigenvalue)

Table 5: Correlation Matrix

	REVR	MCR	TOR	CPI	LEXR	FDIR	MIER	LOAR	LGR	MGR	TGR
REVR	1										
MCR	0.862***	1									
TOR	0.014	0.006	1								
CPI	0.229	0.029	-0.226	1							
LEXR	0.878***	0.810***	0.041	0.168	1						
FDIR	0.816***	0.718***	-0.012	0.129	0.693***	1					
MIER	0.781***	0.750***	-0.186	0.206	0.711***	0.885***	1				
LOAR	0.937***	0.830***	0.013	0.229	0.868***	0.895***	0.788***	1			
LGR	0.822***	0.934***	0.083	-0.099	0.791***	0.720***	0.658***	0.842***	1		
MGR	0.795***	0.954***	0.075	-0..162	0.758***	0.644***	0.638***	0.771***	0.977***	1	
TGR	0.403	0.474	0.801***	-0.241	0.393	0.0301	0.186	0.416	0.542**	0.528**	1

Source; Researchers, 2016

Table 6: Collinearity Diagnosis

The REG Procedure
Model: MODEL1
Dependent Variable: REVR REVENUE/GDP

Collinearity Diagnostics

Number	Eigenvalue	Condition Index	Proportion of Variation: Intercept	MCR2	TOR	CPI
1	8.87341	1.00000	5.103526E-7	0.00009117	0.00050221	0.00047869
2	1.04052	2.92025	0.00000368	0.00002887	0.00068112	0.00779
3	0.79425	3.34245	9.81377E-7	0.00031677	0.03269	0.00022684
4	0.12298	8.49414	0.00003819	0.00114	0.00537	0.00123
5	0.08502	10.21623	0.00003339	0.00049370	0.02014	0.39280
6	0.03666	15.55707	0.00002658	0.01207	0.40592	0.01439
7	0.03136	16.82244	0.00011108	0.03072	0.42225	0.00536
8	0.00840	32.50538	0.00032220	0.33781	0.03121	0.10942
9	0.00418	46.06780	0.00001221	0.06542	0.01692	0.18085
10	0.00320	52.68412	0.00000762	0.53707	0.04201	0.22279
11	0.00002188	636.89305	0.99944	0.01474	0.02232	0.06467

Collinearity Diagnostics

Number	LEXR	FDIR	Proportion of Variation: MIER	LOAR	LGR	MGR
1	4.753146E-7	0.00006770	0.00023255	0.00004775	0.00008877	0.00006137
2	0.00000319	0.00006287	0.00015434	0.00004624	0.00103	0.00111
3	7.880565E-7	0.00003704	0.00153	0.00001212	0.00116	0.00116
4	0.00003276	0.00625	0.07048	0.00004499	0.00244	0.00587
5	0.00002764	0.00423	0.01259	0.00000618	0.00094322	0.00002721
6	0.00002208	0.02023	0.10358	0.01170	0.01056	0.01451
7	0.00008996	0.01228	0.01723	0.00914	0.04975	0.00033174
8	0.00024501	0.02908	0.22981	0.07917	0.18796	0.00000307
9	0.00002648	0.50548	0.29047	0.46404	0.00346	0.00078056
10	4.99274E-7	0.08857	0.03470	0.01225	0.70747	0.33595
11	0.99955	0.33372	0.23912	0.42355	0.03515	0.04019

Source: Researchers, 2016

Despite other methods of correcting multicolinearity, the researchers decided to select the final model using the R-square selection method so as to solve the problem of multicolinearity. This method selected the best five variables (smallest error means square) models for each subset. The CP is specifies the printing of the Mallows C(P) statistic in the output for each subset. The method is the most popular of several statistics to aid selection of the final model. Table 7 summarizes the multicolinearity analysis of the model with 5 best variables. It shows the mean value of VIF is greater than one and the largest condition index is greater than 30. But if any of the VIF values exceeds 5 or 10, it is an indication that the associated regression coefficients are poorly estimated because of multicolinearity (Montgomery, Peck, & Vining, 2001). Therefore, the data are still suffering from multicolinearity which increases the variance of beta, although it strictly does not violate OLS assumptions (Greene, 2012).

Table 7: Multicolinearity Test in Reduced Model

Variable	**Variance Inflation Factor (VIF)**
CPI	1.5541
LEXR	4.4087
LOAR	8.1205
LGR	39.3787
MGR	28.8007
Mean VIF	**16.45**

Source: Researchers, 2016

IV. Empirical Results and Discussion

4.1 Descriptive Statistics

Table 8 presents descriptive statistics for all variables in this study. The mean value of revenue (tax revenue refers to compulsory transfers to the central government for public purposes) to real GDP is 15.8 percent. This implies that revenue collection efficiency/performance and contribution to total real GDP in Tanzania is still low. The market capitalization ratio mean value to real GPD is 58 hence Buffett valuation indicator is 5800 percent. This is a long economic climate that is approaching "bubble". The mean value of turnover ratio to real GDP is 0.004 or 0.4 percent which shows less value of money is used by firms to generate revenue. The mean inflation rate is 9.6 percent triggering the issue of double digit inflation rate while the mean exchange rate is TZS 1429. The FDI to real GDP is 5.9 percent while loan advance and overdraft to real GDP is 18 percent. The FDI in mining quarrying, electricity, gas, steam and air conditions supply to real GDP is 3.5 percent implies that on average, 59.32 percent of foreign direct investment from 2004 to 2014 is in these sectors.

Table 8: Descriptive Statistics of the Variables

Variable	No. obs	Mean	Std Error	Std Dev	Min	Median	Max
REVR	36	0.158	0.007	0.042	0.086	0.153	0.232
MCR	36	0.580	0.052	0.314	0.284	0.416	1.266
TOR	36	0.035	0.005	0.028	0.008	0.027	0.169
CPI	36	0.096	0.007	0.039	0.051	0.087	0.194
LEXR	36	7.257	0.125	0.125	7.057	7.252	1.706
FDIR	36	0.059	0.004	0.024	0.019	0.060	0.092
LOAR	36	0.182	0.010	0.061	0.077	0.176	0.273
MIER	36	0.035	0.003	0.021	0.005	0.030	0.070
LGR	36	0.023	0.004	0.023	0.003	0.010	0.067
MGR	36	0.809	0.166	0.998	0.106	0.215	3.166
TGR	36	0.036	0.011	0.064	0.003	0.020	0.385

Source: Researchers, 2016

4.2 OLS Results

Table 9: Regression Results

Dependent Variable REVR				
Variables	Model (1)	Ridge Model (1	Model (2)	Ridge Model (2)
Constant	- 0.479	-0.46	-0.379 (0.243)	-0.537
MCR	0.005 (0.039)	0.02		
TOR	0.053 (0.199)	0.028		
CPI	0.110 (0.096)	0.115	0.082 (0.066)	0.125
LEXR	0.073 (0.047)	0.075	0.059* (0.035)	0.086
FDIR	0.286 (0.465)	0.211		
MIER	-0.162	0.123		
LOAR	0.458*	0.196	0.556*** (0.10)	0.286
LGR	(1.644)*	0.066	(1.545)* (0.565)	0.165
MGR	0.040*	0.005	0.037**(0.11)	0.01
TGR	-0.021	0.003		
Obs	36	36	36	36
R-Square	0.93	0.93	0.93	0.93
Adj- R-Sq	0.9	0.9	0.92	0.92
F-Value	32.85***	32.85.20***	76.95***	76.95***
RIDGE		0.155		0.15

Notes t-statistics in parentheses; * , **, *** means that significance at 10% ($p<0.1$), 5%($p<0.05$) and 1% ($p<0.01$), respectively

Source: Researchers, 2016

Table 9 provides results from the regression models. Model (1) represents the results for all variables, and ridge model (1) corrects the problem of multicolinearity in model (1) as seem in figure 2. Financial environment development (proxy as LOAR) has a positive impact on revenue to real GDP which is statistically significant. The impact of natural gas discovery as an influence on financial development on revenue growth is also positive and statistically significant together with the impact of natural gas discovery as an influence factor to the stock market size relative to real economic activity. The exchange rate, inflation rate, turnover ratio, stock market size relative to real economic activity, and foreign direct investment have positive effect but statistically insignificant to revenue ratio to real GDP. The liquidity of the stock market as influenced by the discovery of natural gas has a negative impact on revenue, though when ridge is used it shows a smaller part of positive impact. Model (2) is obtained by selecting the best 5 variables which excludes other variables due to the problem of multicolinearity. The financial development variable (proxy as LOAR), exchange rate, financial development influenced by natural gas discovery, stock market size relative to real economic activity as influenced by natural gas discovery have significant positive impact on revenue growth. Ridge model (2) corrects the problem of multicolinearity as seen in figure 3.

Fig. 2: Simulation of Coefficients of the Independent Variables

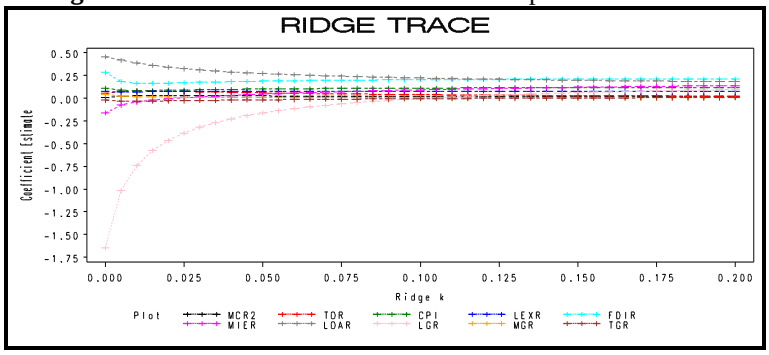
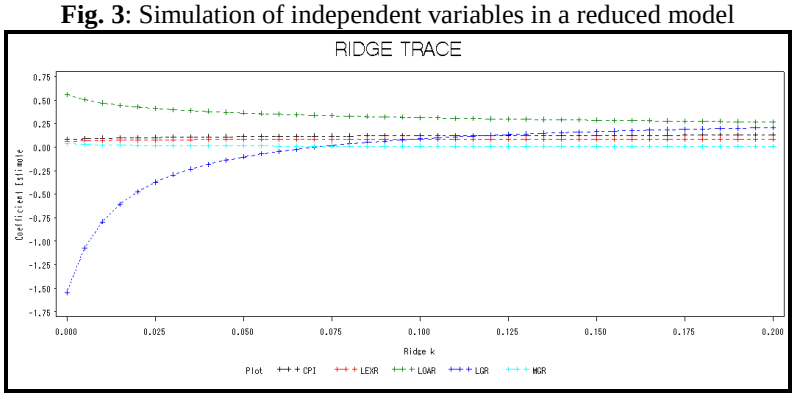


Fig. 3: Simulation of independent variables in a reduced model



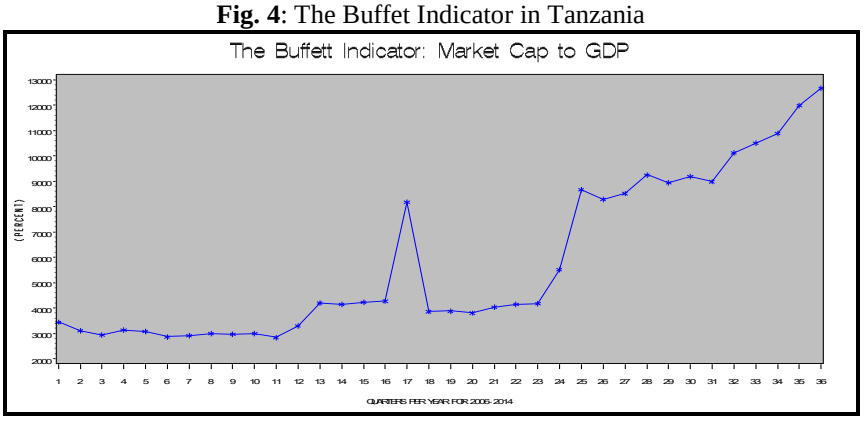
Source: Researchers, 2016

4.3 Discussion of the findings

In this study the two variables market capitalization to real GDP and loans, advances and overdraft to real GDP represents the proxy of financial system development in the country. The two variables were separated because the market cap is believed to outstrip depository institution in the financial intermediation process since the equity market has become more important as an investment vehicle, and the derivative market has grown extraordinary rapidly (Dudley & Hubbard, 2004).

The ratio of Market Cap to GDP is a long-term valuation indicator that has become popular in recent years, thanks to Warren Buffett. Back in 2001 he remarked in a Fortune Magazine interview that "it is probably the best single measure of where valuations stand at any given moment." Warren Buffett evaluation expresses the view that if that stocks aren't "too frothy" (Short, 2015). Frothy is a term to describe an economic climate that is approach a "bubble". A frothy market has an excess of optimism and investment speculation, which drives up the value of seemingly value-less companies and investments like real-estate. The results shows that the climate is "frothy" for Tanzania before the burst of the so-called "dot-com bubble", and subsequent recession. Figure 2 shows the "Buffett Index" which suggests that today's market is indeed at lofty valuations, now well which can lead to the housing-bubble peak. In other words it explains that the Tanzania stock market is overvalued. Probably leads to the bubbly housing market which is said to have negative impact on productivity which in turn affects wages and so to the revenue. "Unless productivity picks up, wages cannot grow" and hence revenue will not grow to the government (Economist, 2015).

Fig. 4: The Buffet Indicator in Tanzania



Source: Researchers, 2016

Despite the sign of overvalued market, the findings of this study are similar to other studies which emphasize the importance of capital market development and quality on growth of the economy. The study of Sawhney et al. (2006) analyses the relationship between the stock market returns and the growth of the country. The study suggests that the purpose of stock market is to mobilize the part of savings of the people, creating the liquidity in the markets, diversifying the risk associated with investment and improving the quality of information. However, the result does not support this calling for more policy measure to support the theory for Tanzania. In case of the liquidity's help in the growth of the nation by decreasing the risk associated with the investment. In this study we find that financial system development (proxy as LOAR) has a significant positive impact of 0.56 on ratio of revenue to real GDP. Suggesting that more financial development/stability of 10 measures would lead to 5.6 increases on revenue ratio to real GDP.

Exploring the role of financial-sector development plays in the growth of resource-based economies is interesting and important both academics and policymaker. The resource curse is well discussed in literature context together with the channels through which resource abundance can stimulate or dampen economic development. This study takes the same weight where it shows that there positive effect of financial development and stock market size relative to real economic activities as influenced by the natural resource discovery with time. This is to say taking into account the discovery of natural resource as a catalyst factor of financial development, the industry has a positive significant impact of 0.17 increase on revenue to real GDP, while the natural gas resource discovery as a stimuli for stock market size relative to real economic activity has a positive significant impact of 0.01 increase on revenue to real GDP. These two variables explains that the more the natural gas discovery is made the financial system grows appealing for more policies to ensure financial system stability.

The controlling factors also support the findings that financial development goes hand in hand with the development of macroeconomic variables. Ten percent currency devaluation has a positive impact of 0.5 increases on revenue to real GDP. The exchange rate and inflation variables shows the benefits of trade liberalization's effective because its accompanied by currency devaluation which favor export and import. The positive impact of exchange rate implies its favor to export though associated exchange rate risk offset that positive effect. The positive impact of inflation emphasizes the hypothesis that nominal tax base is positively affect by inflation while real value are negatively affected.

V. Conclusion and Recommendation

5.1 Conclusion

This study finds that financial system development/stability have impact on revenue to real GDP ratio in Tanzania. Stock market size relative to real economic activity is growing at a higher pace which speculates the presence of bubble in Tanzania's economy. This study shows that such growth is indeed supported by the natural gas discovery in Tanzania. The study further shows the importance of financial sector development, where the variable loan, advances, and overdraft significantly affect revenue to GDP ratio positively. The positive relationship explains that the more the financial sector is developed the overall development of the economy grows because the revenue performance increases. The stock market in other hand is important for mobilizing the part of savings of the people, creates liquidity in the markets, diversifies risks associated with investment and improves the quality of information. Therefore, apparently, then, policymakers in resource-based economies should care about financial sector deepening as much as policymakers in other countries.

5.2 Recommendations

Based on the study findings, policy makers should strive to create an enabling environment that will stimulate local firms' ability to compete and participate in the natural gas industry. The stable and enabling financial sector will give more incentives to local companies to use the financial sector as source of capital. The development of financial sectors helps in the allocation of resources which in turn boost the economy. Therefore, there is a need of more institutional development to complement deeper financial system because without the first it leads to poor handling or even magnification of risk rather than its mitigation. Better functioning financial systems make financial services available to a wider segment of the population, rather than restricting them to politically connected incumbents and financial deepening does positively affect per capital growth (Morck, Wolfenzon, & Yeung, 2005). Finally, Potential Avenue for further research into real-estate regulation and contribution to economy, the study on the other risks dimensions, natural gas markets characteristics like competitive, intra-trade, and export density opportunities in the EAC still exist. In addition, specific research can focus on the role/effectiveness of the government in natural gas regulations, formation of natural gas export processing hubs and trading centers, interdependence of energy sources for energy security technology growth, generally the natural resource curse signals and Dutch Disease.

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