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PRIVATE SECTOR CREDIT - ECONOMIC GROWTH NEXUS IN UGANDA (2000-2018): A FULLY MODIFIED OLS ANALYSIS

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ABSTRACT: *This study analyses the the private sector credit -economic growth nexus in Uganda using the Fully Modified Ordinary Least Square (FMOLS). The method was applied to quarterly data spanning from 2000: Q1 to 2018: Q4. We found a cointegrating relationship between economic growth and its selected determinants. Amongst others, findings from the error correction model confirmed a positive and statistically significant effect of private sector credit on output. In view of the financial intermediation roles of deposit money banks, the paper supports the ongoing efforts of the Central Bank of Uganda (BoU) in promoting a sound and real sector-friendly financial system. Also, the commitment of the bou to the gradual reduction in interest rates is meaningful for the country's growth objectives.*

KEYWORDS: Private Sector Credit, Economic Growth, Cointegration, Ols Analysis, Uganda

JEL Classification: C01, C32, E44, G17, G21

INTRODUCTION

Private sector Credit can be defined as financial resources provided to the private sector, such as loans and advances, purchases of non-equity securities, trade credits and other accounts receivable, which establish a claim for repayment. Economic growth is the endless improvement in the capacity to satisfy the demand for goods and services, resulting from increased production scale, and improve productivity (innovations in products and processes) which is usually measured over a certain period of time. In other words, it is the measurement of annual percentage increase in real GDP over a certain period of time.

No matter what perspective Economic growth is viewed indicates the ability of an economy to increase production of goods and services over a certain period of time using the available factor inputs such as capital and labour (Aliero, 2013). The discussion on the role of finance in economic development is so far inconclusive especially in developing countries like Uganda. The theoretical benchmark dates back and may be traceable to the work of Schumpeter (1934), Mckinnon (1937) and Shaw (1973) in the finance-led economic growth.

Ssebatta (2015) investigated the ddeterminants of commercial banks' credit to the private sector in Uganda over the period of 1997-2013. His study reported that studies reported that domestic credit to private sector is instrumental in increasing per worker output and hence promoting economic growth in the long run. Specific research works on the nexus between private sector credit and economic growth in Uganda have not been able to use econometric analysis and according to the researcher's best knowledge, no research work on the private sector credit -economic growth nexus have adopted the recently developed Fully modified

Ordinary Least Square (FMOLS). This provides the background motivation to conduct this study in Uganda. The paper seeks to fill this gap in developing countries especially Uganda.

During the years 2000 – 20I8, private sector credit for Uganda has been generally moving in an upward direction with the highest of 11679.80 billion shillings recorded in the third quarter of 2015 as indicated in figure 1

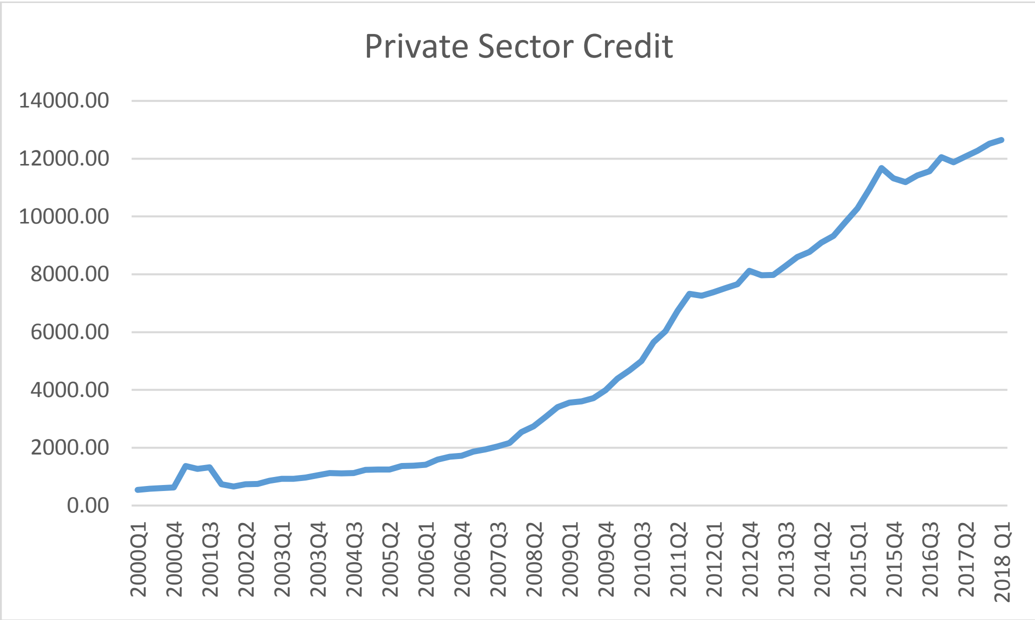

Fig 1: Trend of Private Sector Credit (2000-2018)

The figure above indicates how private sector credit has been changing. Together with changes in other variables, they perhaps have influenced the economic growth of Uganda. Uganda Bureau of Statistics (UBOS) released the final estimates for Gross Domestic Product (GDP) for FY 2017/18 which indicated that the economy expanded by 6.1 percent. This is an upward revision from the 5.8 percent growth that had been estimated in June 2018. The total stock of outstanding private sector credit increased by 1.3 percent to Shs 13,553.5 billion in August 2018 from Shs 13,379.0 billion in the previous month.

Most of this expansion was recorded in the stock of foreign currency denominated credit which grew by 2.7 percent from the equivalent of Shs 4,913.2 billion in July 2018 to Shs 5,043.8 billion in August 2018. The stock of shilling denominated credit also expanded by 0.5 percent during the month from Shs 8,465.8 billion in July 2018 to Shs 8,509.7 billion in August 2018. Lending institutions disbursed credit worth Shs 1,045.1 billion to the private sector in August 2018 which partly accounts for the growth in the stock of outstanding private sector credit. There was increased demand for credit by the private sector when compared with the previous month as value of loans applied for increased by 50.9 percent although only 56.1 percent of this was approved.

Important to note is the fact that the Uganda Shilling depreciated by 1.9 percent against the United States Dollar, recording an average midrate of Shs 3,800.68/USD in September 2018 compared to the average midrate of Shs 3729.53/USD recorded for August 2018 as demand for the US Dollar from manufacturing, oil and telecommunications sectors outmatched its supply during the month. Also, Annual Headline inflation reduced from 3.8 percent in August 2018 to 3.7 percent in September 2018, mostly attributed to price reductions for a number of food crops and related items. Core Inflation, on the other hand, continued to rise registering 3.9 percent for the year ended September 2018 up from 3.5 for the year ended August 2018.

The paper is divided into five sections. The foregoing section is this introduction. Section 2 reviews the related empirical studies. Section 3 presents our econometric models and methodology. Section 4 is the data used in the study. Finally, section 5 discusses the results and offers policy recommendations.

LITERATURE REVIEW

Private sector usually plays a key role in the process of economic growth of both developed and developing countries world over. This means that commercial banks and other financial institutions can use the possible channels to transform the deposits from the surplus spending unit to other forms of financial assets.It is worth noting that following the world economic depression of 1930 which impacted negatively the economic growth and developing of economies world over, the public sector has received immerse interest in financial sector literature(Jan and Syed ,2002). This is based on the fact that public sector plays a bigger role either directly or indirectly. Different scholars have argued differently about private sector credit as explained in the forth coming paragraphs.

Gaffar (2014) in his study about the impact of Private Sector Credit on Saudi Arabia Economic Growth (GDP): An Econometrics Model Using Auto- regressive Distributed Lag (ARDL) Approach to Cointegration argues that financial institutions play a key role in filtering information by screening borrowers and asymmetric information, hence their improved efficiency is therefore quite crucial in ensuring the success of financial liberalization. Related to the above is the study by Al-Malkawi,et al (2012), whose study investigates the relationship between financial development and economic growth in United Arab Emirates using ARDL approach to cointegration and two indicators to examine this relation,the study found a significant negative relationship between financial development proxied by private sector credit and economic growth .

Similarly , another study by Samargandi,et al (2013 in an attempt to investigate the relationship between financial development and the economic growth in the context of an oil-rich economy "Saudi Arabia case study" using the Autoregressive Distributed Lag (ARDL) .The study found that the financial development has a positive impact on the growth of the non-oil sector in Saudi Arabia. The study showed a negative and insignificant impact on total GDP growth. This contracts with other studies like Were et al. (2012) who investigates the impact of access to bank credit on the economic performance of key economic sectors using sectoral panel data for Kenya. The study found a positive and significant impact of credit on sectoral gross domestic product measured as real value added

In Nigeria, Fapetu and Obalade (2015) studied the impact of sectoral allocation of deposit money bank loans and advances on economic growth using ordinary least square method. The results showed that only the credit allocated to government, personal and professional have significant positive contributions on economic growth. However, it was revealed that bank credits generally have no significant contribution to economic growth. In another study, also from Nigeria by Ezeaku (2014) on the impact of bank credit on economic growth using time series data ranging from 1987 to 2012 using OLS regression econometric technique. It was found out that bank credits impacted positively and significantly on economic growth over the period of the study. In a related study, Yakubu and Affoi (2013) analysed the impact of the commercial banks credit on economic growth in Nigeria using data from 1992 to 2012.

The Economic Model and Estimation Technique

In order to investigate the effect of private sector credit growth on output in Uganda, we model output/Gross domestic product as a function of five independent variables, starting with credit to the private sector as follows:

$$LGDP_t = \alpha_0 + \alpha_1 LPSC_t + \alpha_2 LINF_t + \alpha_3 LNEER_t + \alpha_4 LR_t + \alpha_5 LM2_t + \mu_t \qquad (1)$$

where GDP is the Real Gross Domestic Product; PSC is the credit to private sector and it includes only the loans, INF is inflation proxied by core consumer price index (CPI), NEER is the Nominal effective exchange rate, $M2$ is the log of Broad money supply and LR is the prime lending rate. The parameters to be estimated are α_0 (constant) and α_i (i=1,2,…,5), which are the slope coefficients. L represents the log. For simplicity, all the variables (with the exception of the lending rate) were expressed in logs so as to avoid outlier and make the interpretations in terms of elasticities and normalise them. μ_t is an error term that is identically and independently distributed with zero mean and constant variance σ^2 hence it is assumed to be a white noise error term.

Estimation Technique

In order to account for possible long run endogeneity in the included variables of equations (1), the parameters are estimated using the Fully Modified Ordinary Least Squares (FM-OLS) method suggested by Phillips and Hansen (1990). This method is appropriate for this study as it allows for the estimation of cointegrating relations directly by modifying the traditional OLS with non-parametric corrections that take account of serial correlation caused by unit roots and system endogeneity caused by cointegration. The meat of this paper relates to testing the statistical significance of β1, which is the coefficient of Private Sector Credit.

Diagnostic Tests

The Unit Root Test

The unit root test were carried out before running the model to avoid spurious regression, as Brooks (2008) insists .It is suggested that when dealing with time series data, a number of econometric issues can influence the estimation of parameters using Ordinary Least Squares (OLS) Regressing a time series variable on another time series variable using the OLS estimation, can obtain a very high R-squared although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process. Therefore, it is recommended that stationarity (unit root) test is carried to test for the order of integration.

On this background Dickey and Fuller (1981) developed an approach for testing the existence of unit root in the time series known as the Augmented Dickey-Fuller unit root test. The objective of applying the Augmented Dickey-Fuller unit root test (ADF) for individual series included in the model is provide evidence as to whether or not the variables used in the regression process are stationary and to indicate the order of integration.

The Augmented Dickey-Fuller (Dickey and Fuller, 1979) test used in this study is based on the following equations:

$$\Delta y_t = \alpha_0 + \beta_t + \alpha_1 y_{t-1} + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t \qquad (2)$$

Where: t denotes the time trend and acceptance of the null hypothesis of non-stationary ε is the white noise error term. Δ is the first difference operator, Y is the times series, α_0 is the intercept and k is the optimum number of lags of the dependent variable. The variable is said to be stationary if the value of the coefficient α_1 is less than the critical values from ADF table.

Determination of Optimal Lag Length

In this paper, we chose the optimal lag-length (the lag at which the residuals are free from serial correlation), in an attempt to reduce the number of lags as much as possible to get as simple a model as is possible, but at the same time we want enough lags to remove autocorrelation of the residuals. We choose the appropriate lag-length (ρ)using the information criteria: Akaike information criterion (AIC), Schwarz Bayesian information criterion (SBC) and Hannan Quinn (HQ) information criteria. These criteria have the same basic formulation, i.e. derive from the log likelihood ratio (LR) function but penalize for the loss of degrees of freedom due to extra ρ lags to different degrees, hence, in practice, need not to select the same preferred model and often they do not. A re-known researcher gives a very detailed exposition of these frameworks (Juselius, 2006).

Data

This study makes use of quarterly data spanning from 2000: Q1 to 2018: Q1 on the following macroeconomic variables: gross domestic product (GDP), PSC is the private sector credit. Inflation (INF), nominal effective exchange rate (NEER), and lending rate (LR). Data on the variables were obtained from the Central Bank of Uganda (BoU) Statistical Bulletin and various publications of the Uganda Bureau of Statistics (UBOS). GDP is used as a proxy to measure the overall economic activity/ Economic growth in Uganda, while PSC captures deposit money banks' credit to the private sector as a proportion of nominal GDP. M2, NEER and LR are proxies for, exchange rate and monetary policies, respectively. Fiscal policy was excluded due to data problems.

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EMPIRICAL RESULTS

Table (1) reports the results of the unit root test (ADF) for the variables for their levels and at the first difference.

Table (1): The Results of the ADF Unit Root Test

	Levels				**First difference**				Order of Int
Variables	Intercept		Intercept & Trend		Intercept		Intercept & trend		
	Test Stat	5%	Test Stat	5%	Test Stat	5%	Test Stat	5%	
LGDP	-0.275	-2.904	-2.590	-3.477	-4.396.	-2.904	-4.319	-3.477	I (1)
LPSC	-1.087	-2.902	-2.363	-3.476	-8.230	-2.902	-8.217	-3.474	I (1)
LM2	-1.311	-2.902	-0.748	-3.473	-9.355	-2.903	-9.557	-3.474	I (1)
LR	-2.367	-2.902	-2.559	-3.473	-8.367	-2.902	-8.307	-3.474	I (1)
LINF	-0.441	-2.902	-2.032	-3.474	-4.135	-2.903	-4.079	-3.474	I (1)
LNEER	-0.048	-2.903	-2.025	-3.476	-6.464	-2.904	-6.460	-3.476	I (1)

We fail to reject the null of unit root if the test statistics of the ADF > 5% critical value.

As shown in table (3) the ADF results indicate that the null hypothesis of a unit root cannot be rejected for all the variables at 5% significant level and hence, the variables are non-stationary at their levels**.** The variables are stationary at first difference**.** This means that such series were differenced once to turn stationary.

Table 2: Optimal Lag length

Lag	LogL	LR	FPE	AIC	SBC	HQ
0	121.0919	NA	1.30e-09	-3.435580	-3.238145	-3.357455
1	549.1002	766.5820	1.08e-14	-15.13732	-13.75527*	-14.59044
2	605.3548	90.67904	6.05e-15	-15.74193	-13.17528	-14.72630
3	648.3379	61.58775	5.24e-15	-15.95039	-12.19912	-14.46600
4	716.7366	85.75360*	2.27e-15*	-16.91751*	-11.98163	-14.96437*

For 4 lags, FPE, AIC HQ choose 4 lags, and SBC choose only one lag. All these criteria have different penalties; However, SBC is preferred hence only one lag was used in this study.

Cointegration Analysis

Following the unit root test results shown in table (1) which indicate that the time series variables are integrated of order one I(1), the next step is to examine whether or not there is at least one linear combination of the variables that is integrated of order zero, I(0), and hence, if there exists a stable and non-spurious cointegrated relationship in the long run between time series variables (Miguel, 2000). The Johansen approach can determine the number of cointegrated vectors for any given number of nonstationary variables of the same order. The Johansen's maximum likelihood test is based on maximal eigenvalue of stochastic matrix and the trace of the stochastic matrix. The technique was developed in Johansen (1988) and applied in Johansen and Juselius (1990). The test uses the Trace and Max Eigen test Statistic to identify the number of co integrating variables. The Johansen Co-integration test is conducted under the null hypothesis that there is no long run relationship among the variables. The trace and maximum eigen values are calculated as below:

$$J_{trace} = -T \sum_{i=r+1} \ln\left(1 - \hat{\lambda}_i\right) \quad (3)$$

$$J_{\max} = -T \ln\left(1 - \hat{\lambda}_{r+1}\right) \quad (4)$$

Where T is the sample size and $\hat{\lambda}_i$ is the estimated eigen values and ln is the natural log. The trace tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors while the maximum eigen value tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of r+1 cointegrating vectors. In most cases the trace is preferred to the max eigen test. However, the trace test suffers from infinite sample bias. The sample bias adjustment is done using the correcting procedure suggested by Reimers (1992) and Harris and Sollis (2005) as specified in the equation below.

$$J_{trace\#} = -(T - nk) \sum_{i=r+1}^{n} ln(1 - \lambda) \quad (5)$$

Where: n and k are the number of variables in the system (5 in this case) and lag-length used when testing for cointegration (1 lag in this case)

The cointegration tests were summarized in table 4a and 4b below

Table 4a. Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Trace #
None *	0.663831	160.4734	95.75366	150.29
At most 1 *	0.384949	85.25363	69.81889	77.25
At most 2 *	0.300717	51.71618	47.85613	44.68
At most 3	0.194066	27.03489	29.79707	20.72
At most 4	0.124698	12.14789	15.49471	11.79
At most 5	0.041964	2.958020	3.841466	2.87

Note: ***Trace stat # are personal computations by the authors***
*Trace test indicates 3 cointegrating eqn(s) at the 0.05 level and * denotes rejection of the hypothesis at the 0.05 level*

Table 4b: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.663831	75.21977	40.07757	0.0000
At most 1	0.384949	33.53745	33.87687	0.0548
At most 2	0.300717	24.68129	27.58434	0.1126
At most 3	0.194066	14.88700	21.13162	0.2969
At most 4	0.124698	9.189875	14.26460	0.2707
At most 5	0.041964	2.958020	3.841466	0.0854

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
** denotes rejection of the hypothesis at the 0.05 level*

From the table above, both the trace indicates three while the maximum eigen tests indicate that there is one cointegrating equations at 0.05%. Since the trace is more superior to the maximum eigen values., this relies on the trace statistics. The trace statistics however , suffers from sample bias and was adjusted / computed using the formula specified in equation (5) and values represented as trace stat # in the table (4).The trace # test statistics of the null hypothesis (r=0) of no cointegration vector against the alternative hypothesis (r=1) of cointegrating vector. The trace tests # statistic suggest that there are three cointegrating vectors.

Error Correction Model (ECM)

Having found that there is cointegration, the next step involves estimating a corresponding error correction model for economic growth. The error correction model captures both the long-run equilibrium to which output converges over time and the rate of adjustment following disequilibrium. The study found out that the coefficient of error correction was negative and statistically significant at 10 percent with a probability of 0.08. When the economic growth deviates from the equilibrium, its adjustment coefficient to bring it back to the equilibrium is 46.1 percent quarterly. In other words, 46.1 percentage is the percentage of disequilibrium in the economic growth that is adjusted quarterly.

Since the model variables are cointegrated, they can be presented by long-run FMOLS estimate of equation The Fully Modified Ordinary Least Square method (FMOLS) was originally proposed by Phillip and Hansen (1990). The method employs the semi-parametric correction to eliminate the long-run correlation between the cointegrating equation and the innovations. **Table (6)** reports the estimated results of the FMOLS approach.

Table 6: Fully modified ordinary least squares (FMOLS) Regression Results

Variable	Coefficient	Std error	t-value	Probability
LINF	0.202060	0.143124	1.411782	0.1629
LR	-0.007913	0.003267	-2.422257	0.0183
LM2	0.294655	0.058553	5.032254	0.0000
LNEER	0.014889	0.048434	0.307419	0.7595
LPSC	**-0.008215**	**0.033194**	**-0.247475**	**0.8053**
C	5.896778	0.226001	26.09180	0.0000
Durbin-Watson Stat	1.843370	Adjusted R-squared	0.969373	

According to the Fully Modified Ordinary Least Square (FMOLS) results, M2 has a positive and have significant impacts on Economic Growth. The prime lending rate has a significant negative effect on economic growth. Exchange rate, inflation and privates sector credit are insignificant. After exploring various econometric techniques, it was revealed that M2 has positive relationship with GDP. The results also showed that public sector credit has negative and non-significant impact on economic growth in Uganda. This can be attributed to the fact that chunk of the loans and advances to the public sector may have been diverted or misappropriated. Such facilities may have also been invested in socially desirable but economically unprofitable ventures that do not create value hence do not lead to increase in output. This very finding has raised doubt on the justification for public sector in developing countries. Thus, this is in line with the findings of Okafor et al. (2016) In Nigeria. Moreover, it can be seen that adjusted R^2 value is 0.97 indicating a good fit. The private sector credit exerts a significant positive impact on Economic growth.

CONCLUSION

There are very few studies in literature that sought to examine the effect public sector have on economic growth. The public sector in Uganda, which comprises the local, state and central government have often sought for credit from deposit money banks as a way of bridging financing gaps, and with the perceived aim of enhancing growth through investment, empowerment and developmental projects. The theoretical expectation however is that such activities would translate to rapid, or some measure of growth of the domestic economy. Most of the qualitative researches by public sector administrators and social scientists have only succeeded in giving us theoretical postulations and opinions on public sector financial habit without elucidating an empirical scientific approach in assessing the link between public sector credit and economic growth.

Disclaimer: The views expressed in this paper are those of the authors and do not necessarily reflect the Position and Policies of Islamic University in Uganda and Institute of development management (Botswana). All correspondences should be directed to the first author, Sawuya Nakijoba.

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