The Impact of Private Sector Credit on Saudi Arabia Economic Growth (GDP): An Econometrics Model Using (ARDL) Approach to Cointegration

Dr. Eyas Gaffar Abdelraheem Osman
Economics Department
Shaqra Community College
Shaqra University
Kingdom of Saudi Arabia

Abstract

In this paper the autoregressive distributed lag (ARDL) models has been applied as an approach to cointegration, on annual time series data from (1974-2012) to investigate the relationship between private sector credit and economic growth in Saudi Arabia. Six variables were used, mainly GDP, private sector credit (BF) , and the rest other four control variables ,commercial bank's deposits (DS) ,government expenditure (G) , inflation rate (CPI) and open economy (OPE). Where the study found different results on the results of other researchers, The study found that there is a long-run relationship between (BF) and economic growth .Moreover, (BF) has positive long and short-run relationship and the elasticity of GDP to the (BF) was (0.054) and (0.068) for long-run and short-run respectively.

Keywords: private sector credit, Economic Growth, ARDL, Saudi Arabia

1. Introduction

One of the principal conclusions of modern economics is that finance is good for growth. The idea that an economy needs intermediation to match borrowers and lenders, channeling resources to their most efficient uses, is fundamental to our thinking. since the pioneering work of Goldsmith (1969), McKinnon (1973) and Shaw (1973), we have been able to point to evidence supporting the view that financial development is good for growth (Cecchetti & Kharroubi , 2012, p:1).

No doubt The financial sector usually plays a central role in the process of economic development, and play a key role in a country so, banks as financial intermediaries have a great influence on transforming deposits into financial assets. They channel funds from entities with surplus liquidity to those lacking it thereby facilitating capital formation and trade. Banks also 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 (Mohamed ,2008, p:2).

This study has a great importance because it reports values on Saudi Arabia economics which ranks the 23rd among the major 25 world economies, and the first in the Middle East and North Africa in terms of ease of business execution according to the "Business Practice" report for the year 2013 issued by the International Finance Corporation (IFC) ,World Bank. As well, Saudi Arabia is the largest free market economy in the Middle East and North Africa having a share of 25% of the total local product since its location provides ease of access to export markets in Europe, Asia, and Africa.

This paper primary focus is on the relationship between GDP and private sector credit (BF) in the Saudi Arabia economy over the period 1974 - 2012. The main focus of the study is to explore the determinants of economic growth through the commercial banks credits provided to private sector, drawing on along dataset which covered more than 35 years of data. Also this study tries to examine this relationship empirically by using the Autoregressive Distributed Lag (ARDL) approach to cointegration. This method is employed because it can be applied for all series regardless of their level of integration; whether I (0) or I(1). Besides, it is a powerful method for small sample size (Pesaran and Pesaran, 2002).

2. Literature Review

A group of researchers Addressing The relationship between finance and economic growth in many dimensions, is of concern to many researchers in the recent years. Researchers assume that the growth in the financial sector stimulates economic growth and classify this group as supply -leading. The second group views the demand-following which implies that as an economics develops the demand for financial service increases and as a result more financial institutions, financial instruments and services appear in the market. Samargand suggested another view for analyzing the relationship between financial sector and economic growth has a bidirectional effect. (Samargandi, et al, 2013)

Generally, there are controversial thoughts regarding the causal links between finance and economic growth. So the main idea behind this study is to examine the hypotheses of supply – leading for Saudi Arabia rather than demand – following point of view. While the all contributions of old economists and traditional economic theory beginning of, Bagenhot (1873), Schumpeter (1912) argues that the services provided by financial intermediaries encourage technical innovation and economic growth. The ideas are also supported by Gold smith (1955) Balaladhafah to Cameron (1967), Hicks (1969), Mckinnon (1973) and Show (1973). All these opinions were believed the centrality of the relationship between economic growth in economic theory, where the terms of funding is the main catalyst for economic growth. These views have centered on the importance of these opinions and the effectiveness of the financial sector in stimulating growth through allocated resource efficiently , induce liquidity, mobilizing savings, and reducing transaction cost, pooling risk (Mohamed, 2008 p: 12).

A group of Applied Studies, which prove empirically the relationship between financial development and economic growth have been introduced in the last recent years like studies conducted by King and Levine (1993), Gibson and Tsakalatos (1994) , Fry (1995) , Rajan and Zingales (1998) , Okedokum (1998) , Levine and Zervos (1998).

Throughout the survey of the literature, there are many studies conducted and arranged according to the date of the study, as shown in the following table.

Table (1): summary Survey of Literature in Financial Development &Economic Growth

Author	Date	The country where the study was conducted
Odedokun	1989	Nigeria
Wood	1993	Barbados
Murinde and eng	1994	Singapore
Lyons and Murinde	1994	Ghana
Ghatak	1997	Srilanka
Agung and Ford	1998	Indonesia
Muhsin and Pentecost	2000	Turkey
Thangavelu , et al	2004	Australia
Hondroyiannis, et al	2005	Greece
Khan, et al	2005	Pakistan
Oiliang , et al	2006	China
Ang, et al	2007	Thailand
Mohamed	2008	Sudan
Singh	2008	India
Abubader, et al	2008	Egypt
Sfdaria,et al	2011	Iran
AL-Malikawi, et al	2012	UAE
Samagandi ,et al	2013	Saudi Arabia

The researcher summaries the results of studies that used (ARDL) approach to test the relationship between commercial banks credits provided to private sector and economic growth reviewed the literature from many sources as follows:

Mohamed (2008), Arab Planning institute in Kuwait. The study aimed to examine the short-run and long –run relationship between financial development and economic growth in Sudan. His model has been estimated by autoregressive distributed lag approach (ARDL).

He finds that relationship between financial development and economic growth is weak, and the impact of credit of privet sector by banks to real GDP is negative and insignificant.

Al-Malkawi,et al (2012), King Abdulaziz University , Saudi Arabia. The purpose of this study is to investigate the relationship between financial development and economic growth in UAE, the study applied (ARDL) approach to cointegration and two indicators to examine this relation: the first is the size of the financial intermediaries sector ,and the second indicator is the ration of the credit provided to private sector by commercial banks as a percentage of the GDP .The study found a significant negative relationship between financial development and economic growth , also the results suggest a bidirectional causality between the two variables.

Samargandi,et al (2013), Burnel University, London. The study aimed to investigate the relationship between financial development and the economic growth in the context of an oil-rich economy "Saudi Arabia case study" and applied 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.

3. Methodology

To analyze the relationship between credits provided by commercial banks and economic growth in Saudi Arabia the paper suggests the following model of finance-growth nexus:

GDP = f (BF, DS, CV)   (1)

Where:

(GDP) stands for Gross Domestic Product and, (BF) private sector credit is defined as credit provided by commercial banks, (DS) represents the commercial banks total deposits. Which is a function of financial development and (CV) also symbolizing control variables. These variables are, trade openness (OPE), inflation rate (CPI) and government expenditures (G)

The main focus of this paper is to add two proxies so as to analyze this relationship. The first proxy for financial development is the commercial banks credits provided to private sector (BF) this variable has been widely suggested in the literature (see , King and Levine , 1993, Levine, 1997, Kemal , abdul Qayyum and Hanif , 2007 , and Al-Malkawi et al (2012).

(BF) indicates the extent of coverage of the banking sector to the size of the required funding from private sector. This proxy is more directly linked to investment and growth calderon and liu (2003). The second proxy is the total deposits of commercial banks (ds), which the researcher assumes that the larger the size of (ds) and stronger. The more it can contributes to financial system and financial supply by mobilizing savings and channeling them towards productive economic activities and hence growth: moreover, the total deposits (ds) measure the financial ability and size of the financial intermediaries sector.

3.1 Data Sources

The paper is based on annual time series data from 1974 to 2012. The data used was obtained from the (CDSI) Saudi Arabia. All values of variables are in term of Saudi riyal except inflation rate (CPI). The paper analyzes the relationship between GDP and BF and other control variables, this relation will be estimated in the analysis by using the model of finance – growth nexus.

3.2 Model Specification

To examine the relationship between private sector credit of the commercial banks and the economic growth, this study uses the ARDL bound testing approach to cointegration which is developed and introduced by Pesaran and Shin (1998), Pesaran et al .(1996), Pesaran(1997) and Pesaran et al .(2001). The choice of ARDL approach in this study is based on, its flexibility that it can be appalied when the variables are in different order of integration (Pesaran and Pesaran 1997). Also can be applied in studies with small sample size (Pesaran et al., 2001). Therefore, conducting bounds testing will be appropriate for the present study. Moreover, the ARDL approach can estimate the long –run and short-run parameters of the model simultaneously.

The ARDL model can be specified as:

$$\Delta GDP_t = \delta_0 + \sum_{i=1}^{p} \theta_i \Delta GDP_{t-i} + \sum_{i=0}^{p} \phi_i \Delta BF_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta DS_{t-i} + \sum_{i=0}^{p} \gamma_i \Delta G_{t-i} + \sum_{i=0}^{p} \mu_i \Delta OPE_{t-i} + \sum_{i=0}^{p} \psi_i \Delta CPI_{t-i}$$

$$+ \lambda_1 GDP_{t-1} + \lambda_2 BF_{t-1} + \lambda_3 DS_{t-1} + \lambda_4 G_{t-1} + \lambda_5 OPE_{t-1} + \lambda_6 CPI + \notin_{1t} \qquad (2)$$

After regression of Equation (2), the Wald test (F-statistic) computed to differentiate the long-run relationship between the concerned variables. The null and alternative hypotheses are as follows:

$$H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0 \quad \text{(no long-run relationship)}$$

Against the alternative hypothesis

$$H_1 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0 \quad \text{(a long-run relationship exists)}$$

The computed F-statistic value will be evaluated with the critical values tabulated in Table CI (iii) of Pesaran et al. (2001).

4. Empirical Results

4.1 Unit Root Test

Before analyzing the estimated results for the ARDL model to cointegration, the unit root tests are used to assess the order of integration of the variables. According to Pesaran & Pesaran, 1997, the ARDL bounds testing procedure can be applied irrespective of whether the variables are I(0) or I(1). First, Empirical analysis by testing the unit roots in GDP, BF, DS, G , OPE and CPI is used in this stage by applying the Augmented Dickey – fuller (ADF) test . Therefore, to confirm that the data are stationary and stable, so the (ADF) test to test the null of unit root against the alternative of stationary has been conducted. The ADF test results presented for all variables with trend and intercept as in table (2)

Table (2): Results of Unit Root/Stationary Tests

ADF test				
variables	LEVELS		1ST Differenced	
	Intercept	Intercept & trend	intercept	Intercept & trend
LGDP	-2.398	-3.164	-4.853***	-4.948***
LBF	-2.284	-2.106	-5.051***	-5.448***
LDS	-2.652*	-3.264*	-2.279*	-2.507*
LOPE	-2,258	-3.239*	-3.537**	-3.552**
LCPI	-3.793***	4.831***-	-2.069	-2.182
LG	-3.751***	-3.057	-2.629*	-2.686

Note: ***, **, and * indicates significance at 1%,5%, and 10% level respectively.

One of the main conditions for using ARDL model when some variables are stationary at level but others are stationary at first difference. So In this case the researcher cannot use Johnson cointegration model.   From the above table the results show that the null hypothesis of unit roots for a part of variables in level forms could not be rejected .But there is evidence that the variables in our model that is Ln(GDP), Ln(BF) and Ln(OPE) are stationary after first difference indicating that these variables are in fact stationary of order one, I(1). In other way Ln(DS), Ln (CPI) and Ln(G) are stationary at level which indicate that they are stationary of order zero I(0).

4.2 Co-Integration Test

The second step is to test the presence of the long run relationship through the bounds testing approach. Which represented in table (3).By using the ARDL bounds approach, which the (GDP) as dependent variables, note that the computed F-statistics is above the upper bound and lower bound critical values provided by Pesaran et al (2001). The calculated F-statistics is 77.2 while upper critical bound at significance level 1% lower bound is 3.267 and upper bound is 4.543 . This implies that there is long run relationship among GDP, BF, DS, OPE, CPI and G over the period of 1974 – 2012 in Saudi Arabia.

Table (3): Bounds test Results

F-Statistics	Significance level	Bound Critical Values	
		I(0)	I(1)
77.2	1%	3.257	4.543
	5%	2.476	3.646
	10%	2.141	3.250

The next stage of the procedure would be to estimate the coefficients of the long-run relations and the short-run .For that the study applied the General to specific method which mean removing the nonsignificant coefficients from model after estimated by optimal lags selection by the   Akaike information criterion (AIC), Hannan-Quinn information criterion (HQ),   Final prediction error (FPE) and sequential modified LR test statistic (LR) (each test at 5% level). Which turned out to be the ARDL (3,3,3,3,3,1).the long-run and short-run coefficient are shown in table (4) and table(5) respectively.

Table (4): Estimated Long-Run Coefficients using ARDL Model

Dependent variable: *LGDP*			
Variable	**Coefficient**	**Std.Error**	*p*- **value**
LGDP	-2.72***	0.214	0.000
LBF	0.15***	0.045	0.005
LDS	-0.41***	0.067	0.000
LOPE	1.56***	0.092	0.000
LCPI	1.92***	0.180	0.000
LG	0.21**	0.077	0.016
C	6.53***	0.424	0.000
TREND	0.05***	0.004	0.000
F-Test	239.3	0.017	0.000
R^2	0.993		

From Table 4: According to the sign of error correction term (ECT) is negative and significant. That means there is long run causality running from BF, DS, OPE, CPI and G to GDP. It shows the negative sign of (ECT) which is indicating a move back towards equilibrium , on other hand , if it has positive sign of an error correction term(ECT) it indicates that the system in the model are moving away from equilibrium (Granger, 1987). Furthermore it is observed that the estimated coefficients of the long-run relationship show the significant impact of all independent variables on the growth of GDP, During the period of the study. moreover, the variable namely BF bear the significant positive impact on the growth of GDP. The results about the significant impact of BF on GDP growth can be justified on the essential role of commercial banks in support of the development process and contribute to the economic growth. however During the period of the study , the variable DS has significant negative impact on the growth of GDP in log-run.

4.3 Short-run Analysis

Furthermore, the short-run dynamics estimated using the ARDL framework given in equation (2). It can be observed from Table 4 that in the short-run; the coefficients of LBF has significantly positive impact on the growth of the GDP. One percent rise in BF is expect to increase GDP by just 0.09% at level and 0.18% after three years. Which implies that the elasticity of GDP to change in BF is inelastic. But it is positive and significant.

Table (5): Short-run Representation for the ARDL Model

Variable	Coefficient	Std.Error	*p*-value
$\Delta LGDP(-1)$	1.105	0.146	0.0000
$\Delta LGDP(-2)$	0.404	0.074	0.0001
$\Delta LGDP(-3)$	0.170	0.058	0.0109
ΔLBF	0.095	0.032	0.0097
$\Delta LBF(-3)$	0.185	0.034	0.0001
ΔLDS	-0.245	0.084	0.0110
$\Delta LDS(-1)$	0.199	0.090	0.0440
$\Delta LDS(-2)$	0.243	0.087	0.0136
$\Delta LOPE$	0.521	0.038	0.0000
$\Delta LOPE(-1)$	-0.831	0.101	0.0000
$\Delta LOPE(-2)$	-0.276	0.051	0.0001
$\Delta LOPE(-3)$	-0.149	0.049	0.0087
$\Delta LCPI(-2)$	-1.69	0.223	0.0000
$\Delta LCPI(-3)$	-0.673	0.129	0.0001
ΔLG	0.229	0.069	0.0047
$\Delta LG(-1)$	0.175	0.065	0.0169
Ect (-1)	-2.728	0.214	0.0000
Serial correlation LM =	1.634		0.201
Heteroskedasticity	20.644		0.602
ARCH Test	0.001		0.97
Normality Test	0.6170		0.7345

4.4 Testing for Reliability and Stability of the Estimates

To check the reliability, the study applied the diagnostic tests e.g. Lagrange Multiplier (LM) for serial correlation , ARCH effects , white Heteroskedasticity and normality of residual terms from reported in table 4 suggest that the short-run model passes all diagnostic tests. The paper finds no evidence of serial correlation, autoregressive conditional Heteroskedasticity and white Heteroskedasticity, and the residuals are normally distributed and the functional form of the model appears well specified. Moreover, the study used (CUSUM) test to check the stability of our estimates. The cumulative sum of recursive residuals (CUSUM) tests of parameter stability, which introduced by Brown, Durbin and Evans (1975) plot recursively updated test statistics over time to check if any significant break in the statistics can be detected. The results for this test reported in Figure 1 indicate that all the coefficients of estimated model are stable over time within the critical bounds 5%. According to this stability test we can accept the results of this model.
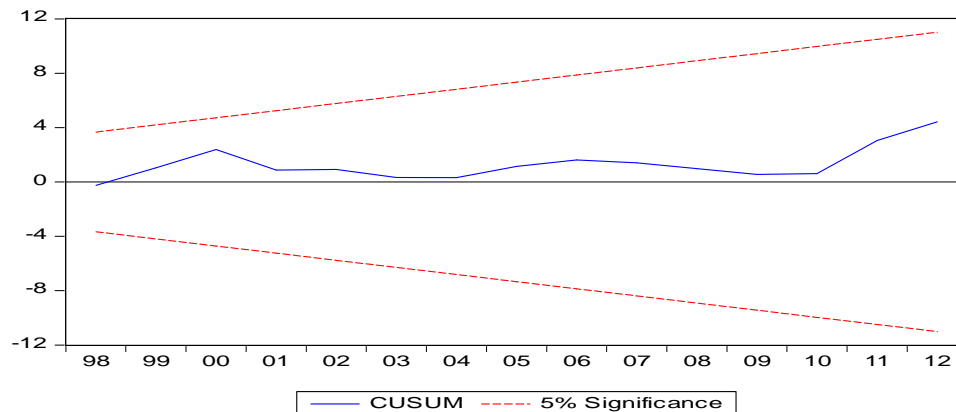

Figure (1): CUSUM Plots for Stability Test

5. Conclusion

This paper has empirically investigate the relationship between commercial banks credits provided to private sector (BF) on (GDP) growth in Saudi Arabia using annual data for the period 1974-2012. Appling autoregssive distributed lag (ARDL) approach, Six variables were used, mainly GDP, commercial bank's credit (BF), and the rest other four control variables ,commercial bank's deposits (DS) ,government expenditure (G), inflation rate (CPI) and open economy (OPE). The study found that there is long-run relationship between (BF) and economic growth, not only in short-run, but also in the long-run , and the elasticity of GDP to the (BF) was (0.054) and (0.051) for long-run and short-run respectively. This indicates that the elasticity will not approximately change over time. Moreover these findings imply that the commercial banks credits provided to private sector would contribute to the economic development in Saudi Arabia, also this indicates that there is a good allocation of resources by banks and the significant private investment promote the economic growth in the long-run but with very small elasticity. Estimating error correction term (ECT) revealed that the negative sign of (ECT) is indicating the system is move back towards equilibrium. On other hand the study found that the commercial banks deposits contribute negatively to the economic growth particularly in the long-run.

Appendix

1- VAR Lag Order Selection Criteri

VAR Lag Order Selection Criteria
Endogenous variables: LGDP LBF LDS LCPI LOPE LG
Exogenous variables: C
Date: 06/08/14 Time: 10:40
Sample: 1970 2012
Included observations: 40

Lag	LogL	LR	FPE	AIC	SC	HQ
0	45.04576	NA	5.72e-09	-1.952288	-1.698956	-1.860691
1	289.9289	404.0571	1.70e-13	-12.39644	-10.62312*	-11.75527
2	346.4243	76.26887	6.92e-14	-13.42122	-10.12790	-12.23046
3	395.0332	51.03935*	5.23e-14*	-14.05166*	-9.238356	-12.31132*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

2- E-views Model Estimation

Dependent Variable: D(LGDP)
Method: Least Squares
Date: 07/19/13   Time: 18:55
Sample (adjusted): 1974 2012
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP(-1)	-2.728231	0.214960	-12.69182	0.0000
LBF(-1)	0.148813	0.045989	3.235837	0.0055
LDS(-1)	-0.410323	0.067184	-6.107428	0.0000
LG(-1)	0.210285	0.077622	2.709081	0.0162
LOPE(-1)	1.564360	0.092834	16.85108	0.0000
LCPI(-1)	1.918619	0.180457	10.63198	0.0000
D(LBF(-3))	0.185563	0.034539	5.372537	0.0001
D(LDS(-1))	0.198948	0.090465	2.199177	0.0440
D(LDS(-2))	0.243420	0.087141	2.793392	0.0136
D(LG(-1))	0.175688	0.065400	2.686371	0.0169
D(LOPE(-1))	-0.830533	0.101815	-8.157307	0.0000
D(LOPE(-2))	-0.276209	0.051603	-5.352563	0.0001
D(LOPE(-3))	-0.149767	0.049709	-3.012886	0.0087
D(LCPI(-2))	-1.688819	0.223247	-7.564800	0.0000
D(LCPI(-3))	-0.673860	0.129743	-5.193807	0.0001
D(LGDP(-1))	1.105799	0.146924	7.526344	0.0000
D(LGDP(-2))	0.404056	0.074162	5.448300	0.0001
D(LGDP(-3))	0.170247	0.058615	2.904522	0.0109
D(LBF)	0.095221	0.032145	2.962263	0.0097
D(LDS)	-0.245661	0.084723	-2.899588	0.0110
D(LG)	0.229280	0.069046	3.320701	0.0047
D(LOPE)	0.520882	0.038364	13.57743	0.0000
C	6.533791	0.424329	15.39794	0.0000
@TREND	0.054737	0.004577	11.95876	0.0000

R-squared	0.997281	Mean dependent var	0.099909
Adjusted R-squared	0.993112	S.D. dependent var	0.211167
S.E. of regression	0.017525	Akaike info criterion	-4.975108
Sum squared resid	0.004607	Schwarz criterion	-3.951378
Log likelihood	121.0146	Hannan-Quinn criter.	-4.607802
F-statistic	239.2242	Durbin-Watson stat	2.248356
Prob(F-statistic)	0.000000		

3- Long-run Relationship Test (Wald Test)

Wald Test:
Equation: EQ02GDP

Test Statistic	Value	df	Probability
F-statistic	77.20854	(6, 15)	0.0000
Chi-square	463.2512	6	0.0000

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-2.728231	0.214960
C(2)	0.148813	0.045989
C(3)	-0.410323	0.067184
C(4)	0.210285	0.077622
C(5)	1.564360	0.092834
C(6)	1.918619	0.180457

Restrictions are linear in coefficients.

References

Atif, and others, (2010). Trade Liberalisation, Financial Development and Economic Growth: Evidence from Pakistan (1980-2009). Journal of International Academic Research Vol.10, No.2, 30-37.

Al-Malkawi. H. N. & Abdullah, N., (2011). Finance-Growth Nexus: Evidence from a Panel of MENA Countries. International Research Journal of finance and Economics, 63, 129-139

Cecchetti, S. G. & Kharroub, E., (2012). Reassessing the impact of finance on growth. BIS Working Papers, No 381.

Engle, R. F., & Granger C. W. J ., (1987). Cointegration and Error Correction: Presentation, Estimation, and Testing. Econometrica, 55, 251-276.

Kemal, A. R. , and others, (2007). Financial Development and Economic Growth: Evidence from Heterogeneous Panel of High Income Countries. The Lahore Journal of Economics, 12, 1-34.

King, R. G., & Levine, R., (1993). Finance and Growth: Shumpeter Might Be Right. Quarterly Journal of Economics, 108, 717-737.

Levine, R., (1997). Financial Development and Economic Growth: Views and Agenda. Journal of Economic Literature, 35, 688-726.

Maddala, G.S., (1992). Introduction to Econometrics. Second Edition, Macmillan Publishing Company, New York

Maddala, S. G. and Kim, I., (1998) Unit Root, Cointegration and Structural Change. Cambridge University Press, Cambridge.

Mohamed, S. E., (2008). Finance-Growth Nexus in Sudan: Empirical Assessment Based On An Application of the Autoregressive Distributed Lag (ARDL) Model. Working Paper, No. API/WPS 0803, Arab Planning Institute, Kuwait.

Pesaran, H. M., (1997). The Role of Economic Theory in Modeling the long-run. Economic Journal, 107, 178-191.

Pesaran, H. M., and Shin, Y., (1998). An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis. In: Storm, S. Editor, Econometrics and Economic Theory in the 20th Century, Centennial. Cambridge University Press, UK.

Pesaran, M. H. ,and others, (1996). Testing for the Existence of a long-run Relationship. Department of APPLIED Economics, University of Cambridge, UK, DAE Working Papers , No 9622.

Pesaran, M. H. and others, (2001). Bounds testing approaches to the analysis of level relationship. Journal of Applied Econometrics , 16, 289 – 326.

Samargandi, N. and others, (2013). Financial development and economic growth in an oil-rich economy: The case of Saudi Arabia. Economics and Finance Working Paper Series, Brunel University London , Working paper No:12-13.

Schumpeter, J. A., (1912). The Theory of Economic Development. Harvard University press, Cambridge, MA.