

The Effect of Financial Development on Economic Growth in Sudan: Evidence from VECM Model

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Abstract

The paper seeks to investigate the dynamic relationship between financial development and economic growth in Sudan during 1970–2012. Using Johnson approach to Co-integration and Vector Error Correction Model (VECM) to find out the long and short run effect of the financial sector development on economic growth. The test for Co-integration shows that there is a linear long run relationship between real GDP growth and financial development. The empirical results show that there is a marginal positive effect of financial sector development on economic growth in Sudan. Coefficient of error correction term is (-0.255) signifying about 25.46 percent annual adjustment towards long run equilibrium which is guaranteed the occurrence of a stable long run relationship among the variables. Financial sector reforms and changes into real sector required in order to allocate the financial resources efficiently. Hence, policy makers required to review the legal and institutional arrangements which contribute for financial repression to hinder financial sector efficiency.

Keywords: financial development, economic growth, financial intermediation, VECM

1. Introduction

It is now widely regarded that financial development, which contains the establishment and expansion of financial markets, intermediaries and other instruments is important for long run sustainable economic growth. In particular, financial development supports the growth process by mobilizing both domestic and foreign savings for investment to strengthen the most productive sectors.

The importance of the subject has been a great deal of interest by many scholars, researchers and practitioners they attempting to show the effect of financial development on economic growth and determine the appropriate of different financial intermediation variables. There are some suggesting variables have been used as the proxy of financial intermediation, depending on the specific characteristics of the financial system. The selected variables must relatively be significant for different financial intermediaries in the whole financial system in term of size and efficiency. Many empirical studies focused on the M2/ GDP % as the financial sector indicator; second the ratio of credit provided to the private sector to GDP uses as an alternative measure of financial intermediation, third market capitalization to GDP% fourth the bank deposit /GDP%. The theoretical basis of this relationship can be traced back to the study of Schumpeter (1911) and Mckinnon – Shaw (1973); they are the pioneers whom discovered the relationship between financial development and economic growth. Schumpeter (1911) describes the relationship between financial development and economic growth as a supply leading relationship. Mckinnon – Shaw (1973) investigates the impact of direct government intervention on the financial sector by imposing restrictions on the banking system, such as interest rate ceilings and credit programs have direct negative effects on the development of the financial sector then, consequently, hamper economic growth. However, despite the importance of the financial sector and its leading role in the economic growth and development process, its role to accelerate the growth in many developing countries still limited including Sudan. The reason behind that, the financial institutions in most of these countries is still undeveloped with lack of protection of their economies from the high competition. Moreover, the dominance of a small number of commercial banks on the financial sector in most developing economies, and this may undermine the efficient allocation of resources (Mohamad, 2008). As in most emerging economies, the Kireyev A. (2001) reached in his

paper that, following years of repression, political and economic instability coincide with long chronic civil war, Sudanese financial market is still young and underdeveloped.

Financial Intermediation in Sudan is low and non-bank financial markets and institutions are small and undeveloped. Financial sector was dominated by banking sector particularly commercial banks. Authorities have recently embarked on a series of reforms in attempts to strengthen the financial system and improve the performance of the banking sector using both direct and indirect financial policy instruments that facilitate it to supervise the credit policy as it used to control the quantity of money through interest rates. In the mid of 1990s central bank of Sudan turned to Islamic modes of finance, after the completion the Islamization of banking sector in 1997, the central bank of Sudan adopt the treasury bills and government bonds instruments such as Murabaha, Musharaka, Mudaraba and Salam were applied instead of interest rates.

According to (Kireyev, 2001) Beginning 1997, the central bank of Sudan adopted several Islamic instruments to reform the financial system including: eliminating long-standing, cost-free loan facilities to banks and public enterprises; and minimum customer's share under the musharaka contracts. The main indicators of financial sector such as M2, domestic credit and banks deposits, were steadily declining in relation to GDP before 1997. Sudan has experienced slight increase in broad money as percentage of GDP from 8.6% in 1997 and reached 27.9% in 2012 compared with 30.1% to 50.6 % for countries such as Congo republic and Kenya, and 60% to 118% for Arab countries, Sudan is still lag behind. Credit to the private sector contracted in real terms in 1993–1999, and in nominal terms in 1999. Thus, while demand for credit from the private sector increased during the 1990s, domestic credit to the private sector was shrinking annually by 16% in 1991–1993, by 1.5% in 1994–1996, and by 6% in 1997–1999. In total, domestic credit to the private sector decreased by 23% in 1993–1999. In the period 2000–2008, bank lending to the private sector ranged between 23% and 36% of total credit. Agriculture and construction were the most severely affected sectors.

Table 1. Flow of finance, 2000–2011, %

Period	*Murabaha ¹	*Musharaka ²	*Mudaraba ³	*Salam ⁴	Others	Total
2000	33.7	42.9	3.5	3.4	16.5	100
2001	39.5	31.0	6.2	5.0	18.3	100
2002	35.9	27.9	4.6	3.3	28.2	100
2003	44.7	23.2	5.7	4.8	21.6	100
2004	38.5	32.0	5.7	3.0	20.8	100
2005	43.3	30.8	4.2	2.1	19.6	100
2006	53.4	20.4	5.2	1.3	19.7	100
2007	58.1	13.0	4.0	0.6	24.3	100
2008	46.9	12.1	6.0	2.0	33.0	100
2009	55.5	11.1	6.5	2.4	24.5	100
2010	54.7	9.4	7.1	1.2	27.6	100
2011	61.4	6.6	6.1	0.7	25.2	100

Note. (*: 1, 2, 3, and 4 in appendix).

Source: Central Bank various annual reports.

As indicated in table (1) that Sudanese banks prefer Murabaha over other types of Islamic modes of finance. In the 1990s, almost half of the banking finance was in the form of Murabaha contracts. On the other hand Mudaraba, which is more suitable for entrepreneurs with no capital of their own, is the least mode of financing practiced by Islamic banks. Murabaha and Musharaka are the preferred mode of finance in Sudan; they collectively made about 74% of total finance in 2005, compare with 70.5% in 2001. Evidently, the flow of finance through Murabaha rose from 43.3% in 2005 to 61.4% in 2011. Similarly, finance through the “others modes” in the same went up from 19.6% in 2005 to 25.2% in 2011

This paper investigates whether financial development intermediaries enhance economic growth in Sudan or not and derives policy implication from the findings to promote financial reform programs in the Sudan economy. The rest of the paper is outlined as follows. Section 2 Literature Review of the link between financial development and economic growth. Section 3 presents the Data and econometric Methodology. Empirical results were presented in Section 4 and finally section 5 Conclusion of the study.

2. Literature Review

The relationship between financial development and economic growth has been investigated extensively in the literature using different techniques. The literature is usually more supportive to the argument that financial development promotes growth in the long run. Financial development and economic growth- nexus in United Arab Emirates (UAE) economy was examined by Marashdeh, Naziruddin & Al-Malkawi (2012) using time series data from 1974–2008, the model was estimated using Autoregressive Distributed Lag (ARDL) technique. The results show a negative and statistically significant a bi-directional causal relationship between financial development and economic growth. The UAE financial system was still in the transition phase and needs to reach a certain level of development before it will be able to promote economic growth. Ozturk, Ilhan (2008) investigate the causality between financial development and economic growth in Turkey for the period 1975–2005 using a vector autoregression (VAR) framework. The results of VAR suggest there is no long-run relationship between financial sector development and GDP growth, furthermore, the study shows unidirectional causal relationship from GDP growth to financial development. Erdal, Veli Şafakli and Behiye (2007) studied the causal relationship between financial sector and economic growth for Northern Cyprus applying Ordinary Least Squares (OLS) technique. The results of the study show that there is an insignificant positive effect of financial sector on GDP growth. Ruda Pradhan (2009) examined the causal nexus between financial development and economic growth in India using VAR. results revealed unidirectional causality from market capitalization to economic growth. Neusser and Kugler et al. (1998) investigated the long run relationship between financial depth and economic growth. The empirical findings provided supporting the supply-leading phenomenon. Xu (2000) revealed the effect of financial development on output for 41 countries between 1960 and 1993 using a vector-autoregressive (VAR), and concludes that, the financial development follows economic growth and has slight effect on it. Chang (2002) used the VAR model to test the demand-following and the supply-leading hypothesis for Mainland China. The empirical findings of granger causality test revealed that there is no association between financial development and growth, the cointegration test provides a long-run relationship among GDP, financial sector indicators and the trade. Jayaraman (2007) used private sector credit as determinant of financial sector development-growth nexus literature he concludes that a single index such as private sector credit is an inappropriate measurement of financial development and therefore not a reliable indicator at all. Thus, the study developed a measure based on the most frequently used variables which include banks liquid liabilities, domestic credit to private sector and the ratio of commercial bank assets to entire commercial banks and central bank assets. Mohamed, Patricia et al. (2008) studied the relationship between financial development and economic growth in Sierra Leone over the period 1970–2008 using Autoregressive Distributed Lag approach ARDL. The empirical results indicate a positive relationship between financial development and economic growth. Adeoye (2007), used three indicators to investigate the financial development nexus growth namely, ratio of money supply, ratio of bank deposits and ratio of bank credits to GDP as financial sector indicators in Nigeria, indicated that there is negative relationship between financial markets and economic growth. The recent study of Safiat A. Saber (2013) in her empirical investigation of long and short-run dynamic relationship between Sudan financial sector development and its economic growth. The results indicate that government expenditure, inflation, money supply and trade openness exert negative effects, while investment, private credit and bank deposits have positive effect on GDP. These results may be attributed to the weak capital base of Sudanese banks, the high cost of borrowing due to insufficient inter-bank competition, the risk of extending credit to sectors other than trade, which is considered by banks as unjustifiably high and the absence of a suitable climate for investment to promote private investment and economic growth in the long run. Songul Ka and Ilhan Oz (2009) employed GMM techniques and panel co-integration in sub-Saharan Africa to investigate the causality between financial development and economic growth. The empirical results of the study provide a bi-directional causal relationship between the GDP growth and the credit provided by the banking sector for the 24 of the study region countries. Emeka N. and Aham. K. Uko (2013), examined the financial development – growth, found evidence of a positive effect of financial sector development on economic growth in Nigeria. However, credits to private sector and financial sector depth are ineffective and fail to accelerate growth. An empirical analysis by Anthony and Tajudeen RG. et al. (2010) Using the Vector Error Correction Model (VECM) to investigate the long-run and causal relationship between financial development and economic growth for ten countries in sub-Saharan Africa and found that there is a long run relationship between economic growth and financial sector indicators of selected countries in the region. Godfrey Ndlovu (2013), this study investigates the causal relation between financial system development and economic growth from a Zimbabwean perspective, based on two inter-related broad aims, the first being the established of cointegration relationship between the two and the ultimate direction of the causal relationship. The study provided existence of demand following financial development in Zimbabwe, there is unidirectional causality from economic growth to financial

development. Dimitris K. Christopoulos, (2003) studied the relationship between financial development and economic growth for 10 developing countries using panel data. The findings provide strong support for the existence of a unidirectional equilibrium relation running from financial depth to GDP growth in real term.

3. Data and Econometric Methodology

The study employed annually data on selected variables from 1970–2011. A limitation of studies on the financial sector is that there is no single measure of financial sector development, therefore, instead of a single proxy; three measures are applied to improve robustness of the results. The first measure is money supply-GDP ratio (M2GDP) otherwise known as measure of financial deepening. The ratio measures the degree of monetization in the economy as well as the depth of the financial sector while it also shows an expansion of payment and saving functions. The second measure is the ratio of domestic credit to private sector to GDP (PCGDP) and the third is banks deposit liability to GDP (BDGDP). The paper used the cointegration procedure and vector error correction model (VECM) to test the long run equilibrium and short run relationship among the variables. According to Granger representation theorem, if the series are co integrated, the dynamic relationship involving the variables could be examined within VECM framework.

$$\Delta Z_t = \alpha \beta' Z_{t-1} + \sum_i^{p+1} \Gamma_i \Delta Z_{t-i} + \delta \emptyset + E_t$$

Where $\alpha \beta' Z_{t-1}$ represents the long-run information on the process of Z_t . Specifically, the rows of β' are explained as the distinct co integrating vectors and the rows of α are indicate the speed of adjustment of the dependent variables towards the long-run equilibrium state. The specific form of the VEC model is given as:

$$\Delta growth = \beta_{1j} + \sum_{p=1}^m \beta_{11ip} \Delta growth_{it-p} + \sum_{p=1}^m \beta_{12ip} \Delta pcgdp_{it-p} + \sum_{p=1}^m \beta_{13ip} \Delta bdgdp_{it-p} + \sum_{p=1}^m \beta_{14ip} \Delta m2gdp_{it-p} + \gamma_{1i} ECT_{1t-i} + e_{1it}$$

Where, Δ represents lag operator and p stands for lag length in the above VECM framework. The above framework allows for causality direction. ECT shows error correction term. The ECT coefficient i.e. γ_{1i} , quantity tendency of each variable to return towards equilibrium position.

4. Empirical Results

The empirical works start use unit root to check the stationarity of the variables, the results of Augmented Dickey Fuller ADF test showed that all the variable were non-stationary in levels but stationary in first difference, implying that all the variables are integrated of order one (I) in table (2).

Table 2. ADF unit root test

Variable	Level		First difference		Remarks
	Intercept	Trend and intercept	Intercept	Trend and intercept	
growth	-2.293669	-3.529834	-8.294179***	-8.216599***	I(1)
BDGDP	-1.763890	-1.698399	-5.943539***	-5.909451***	I(1)
M2GDP	-1.375872	-1.363908	-6.299028***	-6.228269***	I(1)
PCGDP	-2.078817	-1.826299	-5.385821***	-5.345419***	I(1)

Note. *, **and *** denote rejection of the null at the critical values of 10%, 5% and 1% respectively. ADF denotes Augmented Dickey Fuller tests.

The Johansen Co-integration test is presented in table (3) indicates that there is one cointegrating equations, implies a long run relationship between economic growth and the financial development proxies.

Table 3. Johansen Co-integration test

TRACE TEST				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 critical value	Prob.**
None *	0.809215	156.1764	95.75366	0.0000
At most 1 *	0.650756	89.91216	69.81889	0.0006
At most 2	0.457833	47.83280	47.85613	0.0503
At most 3	0.283953	23.34553	29.79707	0.2295
At most 4	0.164675	9.985133	15.49471	0.2819
At most 5	0.067320	2.787734	3.841466	0.0950

Unrestricted co integration Rank Test (Maximum Eigenvalue)				
	Eigenvalue	Max-Eigen Statistic	0.05 critical value	Prob.**
None *	0.809215	66.26425	40.07757	0.0000
At most 1 *	0.650756	42.07935	33.87687	0.0042
At most 2	0.457833	24.48728	27.58434	0.1186
At most 3	0.283953	13.36039	21.13162	0.4196
At most 4	0.164675	7.197399	14.26460	0.4661
At most 5	0.067320	2.787734	3.841466	0.0950

Note. *(**) denotes reject of the hypothesis at 5% and 1%. L.R. test indicates 2 co integrating equation(s) at 5% significance level.

Since the variables were integrated of same orders they could be cointegrated and thus we could proceed to construct a vector error correction model (VECM). An appropriate optimal lag length was found to be two using the Akaike Information Criteria (AIC) and results are shown in table 4.

Table 4. Vector error correction model

Vector Error Correction Estimates: Sample (adjusted): 1973 2012: Included observations: 40 after adjustments				
Dependent Variable: D(Growth)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002573	0.765840	0.003360	0.9973
D(Growth(-1))	0.547830	0.190049	2.882574	0.0072
D(Growth(-2))	0.338504	0.163957	2.064595	0.0477
D(PCGDP(-1))	0.089261	0.764484	0.1167598	0.0122
D(PCGDP(-2))	-0.1786335	0.699176	-0.2554915	0.0159
D(BDGDP(-1))	0.1320565	0.449012	0.2941045	0.0062
D(BDGDP(-2))	-0.119148	0.591656	-0.2013805	0.4739
D(M2GDP(-1))	-1.162342	0.541689	-2.145772	0.0401
D(M2GDP(-2))	0.681605	0.609476	1.118345	0.2723
ECM(-1)	-0.254625	0.254096	-1.002087	0.0007

R-squared= 0.608874, adjusted R-squared=0.491536 Breusch-Godfrey=0.369948 (0.8311), ARCH(1)= 0.144729 (0.7036), Jarque-Bera=0.167682 (0.919578), F-Statistics=5.189073 (0.000284)

*Values in bracket are probability values.

The results of some selected variables from VECM estimates are presented in table (4). The results show that credit to the private sector (PCGDP), deposit liability (BDGDP) were significant at 1 per cent with expected sign a 1% rise in credit to the private sector (PCGDP), deposit liability (BDGDP) lead an increase in economic growth by 0.08 and 0.13 respectively during the study period. It is obvious that a modest contribution to growth show that financial institutions in Sudan seem to have played a minor role in accelerating economic growth process. This low response of GDP growth to such indicators indicates that weak capital base of Sudanese banks and the absence of an appropriate investment climate required. Hence its need further improvements to ascertain efficiency and competition among commercial banks thereby reduce bank concentration. while financial deepening (M2GDP) is significant with unexpected sign, As far as the joint test applied to the coefficients of

each explanatory variable as well as vector error-correction term ECM(-1), there is a causal relationship between financial development and economic growth. The magnitude of the error correction model term provides the evidence of a long-run linkage between GDP growth and financial sector indicators. About 25% of disequilibrium will be corrected annually; it represents the speed of adjustment toward equilibrium. The VECM is stable, has no serial correlation, has no heteroscedasticity and the residuals are multivariate normal therefore, results passed all diagnostic statistics which are reported in table (4). With regard to short run results indicate that (PCGDP) and the bank deposits -GDP (BDGDP) were statistically significant and exert positive effect on economic growth, while money supply affects real GDP growth negatively which is not in tandem with general evidence in the empirical literature. Magnitude of (PCGDP) and bank deposits (BDGDP) have expected signs and results in the study are tandem with findings in some developing economies. In Sudan, for instance, Mohamed (2008) and Safiat A. Saber (2013) support the evidence of a weak relationship between financial intermediaries and economic growth presented in this study. These incredible results may be attributed to the banks inefficient allocation of their resources along with the absence of an appropriate investment climate required to promote growth in the long run.

4.1 Variance Decomposition

The results of variance decomposition of the model over ten year's horizon are presented in table (5) bellow.

Table 5. Variance decomposition of VECM

Variance Decomposition of GROWTH					
Peri	S.E	GROWTH	M2GDP	BDGDP	PCGDP
1	4.815144	100.0000	0.000000	0.000000	0.000000
2	7.036414	86.30587	1.602569	5.361435	6.730130
3	7.369970	85.55971	1.689304	6.579018	6.171973
4	7.601263	81.30653	5.563533	7.314992	5.814949
5	7.952958	74.61884	7.730771	12.32407	5.326324
6	8.087215	72.36037	9.180988	12.60889	5.849748
7	8.265903	72.52255	8.951548	12.43044	6.095470
8	8.453468	72.50484	8.826451	11.88545	6.783257
9	8.598062	72.16494	8.828973	12.05725	6.948841
10	8.708813	71.14416	9.376480	12.30353	7.175827
Variance Decomposition of BDGDP					
Peri	S.E	GROWTH	M2GDP	BDGDP	PCGDP
1	2.348355	3.070777	25.78903	71.14019	0.000000
2	3.624375	5.709419	33.77590	60.20384	0.310842
3	4.554455	12.43327	37.85819	47.57435	2.134190
4	5.340338	15.16781	43.17761	39.07515	2.579436
5	6.083456	13.74219	46.12340	36.95546	3.178945
6	6.776301	11.46772	48.76301	36.02173	3.747548
7	7.413418	9.921778	50.28626	35.59748	4.194477
8	7.952076	9.206936	51.58874	34.89650	4.307826
9	8.431640	9.041088	52.23636	34.33668	4.385868
10	8.876033	8.945129	52.84831	33.77152	4.435048
Variance Decomposition of M2GDP					
Peri	S.E	GROWTH	M2GDP	BDGDP	PCGDP
1	2.348355	16.73255	83.26745	0.000000	0.000000
2	3.624375	22.58439	72.28565	4.399623	0.730343
3	4.554455	28.74333	65.74199	2.510854	3.003820
4	5.340338	31.37042	62.93067	1.940878	3.758031
5	6.083456	29.46921	64.92858	1.453249	4.148963
6	6.776301	26.21558	67.50778	1.285520	4.991113
7	7.413418	23.61691	69.66405	1.144873	5.574175
8	7.952076	22.33026	70.83453	1.017986	5.817220
9	8.431640	21.89647	71.31188	0.898792	5.892859
10	8.876033	21.72886	71.49994	0.803979	5.967226

Variance Decomposition of BDGDP					
Peri	S.E	GROWTH	M2GDP	BDGDP	PCGDP
1	1.325804	3.185397	32.40583	5.340282	59.06849
2	2.244094	1.682129	48.35486	2.031395	47.93161
3	2.972001	1.194004	54.04285	1.278614	43.48453
4	3.591345	1.429674	55.39241	1.790883	41.38704
5	4.137373	1.285424	56.00860	2.011135	40.69484
6	4.637535	1.026085	56.95625	1.831212	40.18645
7	5.101131	0.915922	57.57055	1.584823	39.92871
8	5.518394	0.816985	58.04111	1.457858	39.68405
9	5.890006	0.717395	58.32138	1.425628	39.53560
10	6.231593	0.644159	58.50443	1.445488	39.40593

The variance decomposition apportions the total fluctuations in a particular variable to the constituent innovations in the system. The results show that the variables are largely driven by themselves. For example, about 86.31 percent of the variations in RGDP growth are due to its own innovations during the first two year of the forecast horizon. The financial deepening contributes about 21 per cent to the innovations in real GDP Growth by the tenth year. The contributions of other variables become noticeable in the tenth years as demotic credit to private sector contribute about 0.64 per cent, The banks deposit contributes about 8.94 per cent

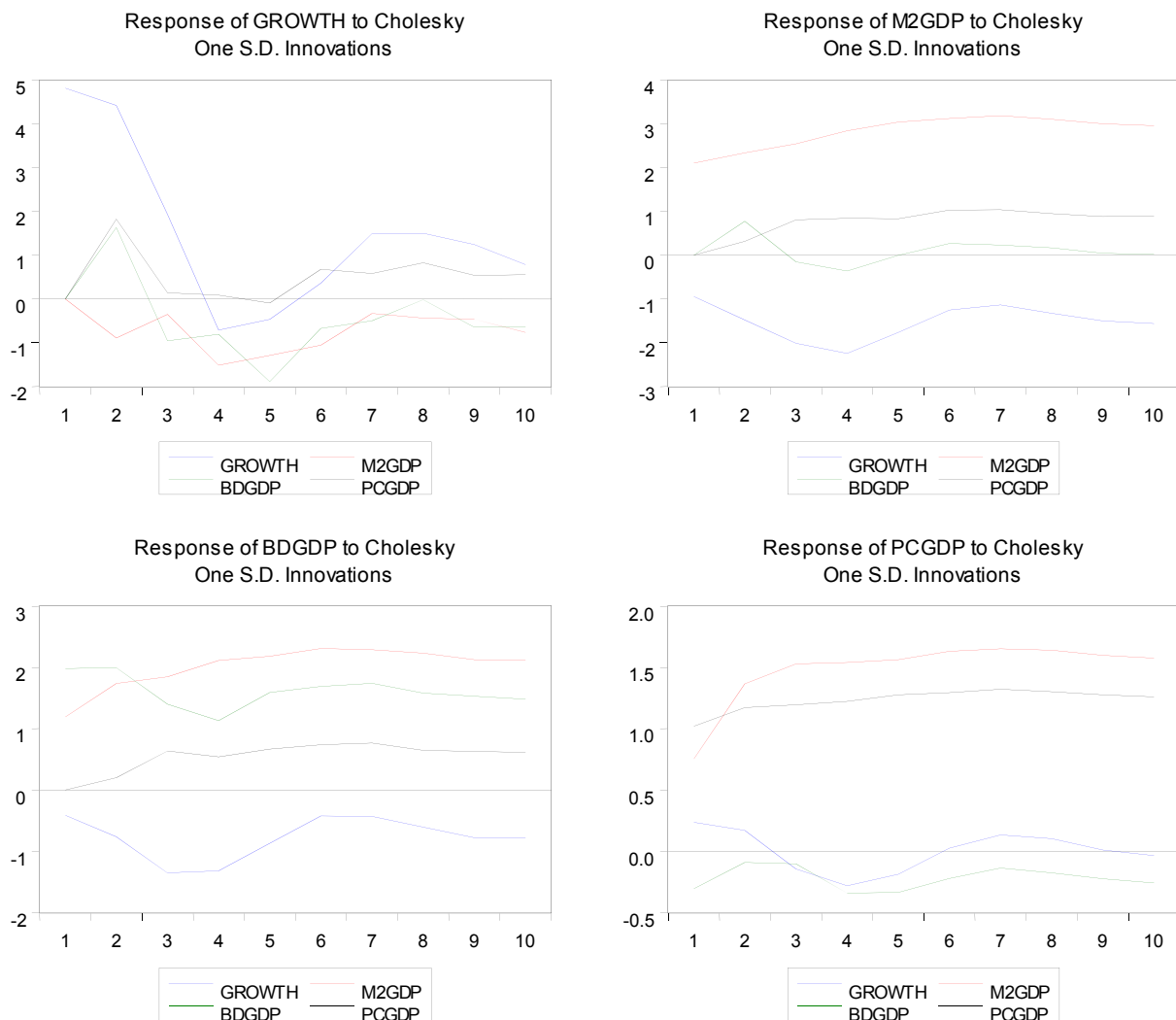


Figure 1. VECM impulse responses

4.2 Impulse Response Functions

The impulse response functions were presented in Figure 1. These indicate the long-run responses of a system of variables to one standard deviation shock to the system innovations spanning over ten (10) years. The results show that each variable respond significantly to its own one-standard deviation shock.

The first panel of Figure 1 explains how economic growth responded to various innovations, it's clear that there is a positive responses of growth to BDGDP and OCGDP that last for a longer period of time than M2GDP changes which revealed negative responses.

5. Conclusion

The study produces short and long term relationship between financial development and economic growth in Sudan using annual time series data during 1970–2012 by applying the VECM. The johanson cointegration test revealed the long-run relationship among the variables. As financial development indicators concerned, the empirical evidence indicated that ratio of broad money to GDP has negative and statistically significant impact on economic growth. The the ratio of domestic credit to the private sector to GDP (PCGDP), the ratio of bank deposits to GDP (BDGDP) have a marginal positive impact on economic growth during the investigation period, which confirms ineffectiveness to accelerate growth. The results of this study show that financial development has made a small contribution to accelerate economic growth in Sudan. The coefficient of the lagged error correction term (-0.254625) is negative and statistically significant at the 1 percent level. The magnitude of the coefficient implies that 25 percent of the disequilibrium caused by previous year's shocks converges back to the long-run equilibrium in the current year. To strengthen and enhance the weak relationship between financial sector development and economic growth in Sudan, attention should be given to financial reforms and changes in the real sector of the economy through innovations, adequate and effective regulation and efficient mobilization of funds and direct funding to the most productive sectors.

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Notes

Note 1. Murabaha: Murabahah is a trade financing contract. Typically, an Islamic bank purchases a product (commodity, raw material, etc.) to supply an entrepreneur who does not have his own capital to do so. The bank and the entrepreneur agree on a profit margin which is added to the cost of the product. Payment is delayed for a specific period of time during which the entrepreneur produces the final product and sells it to the market.

Note 2. Musharaka (Partnership) is a form of partnership contract where two or more people combine their capital to share the profits and losses, and where they have similar rights and liabilities. For more details, see Iqbal and Mirakhor (2007).

Note 3. Mudaraba: mudharaba or silent partnership when one party provides the capital, the other the labour.

Mudaraba is a special type of Musharaka. In a Mudaraba contract, one partner contributes the capital and the other partner provides labour and expertise

Note 4. Salam: Salam is a special type of sale contract, which is valid for both agricultural and industrial products. It is exactly the reverse of the deferred sale. In this contract, the price has to be paid immediately, whereas, the delivery of the commodity agreed on with specifications has to take place at a specific future period.

Appendix A.

Vector Error Correction Estimates

Date: 08/01/14 Time: 08:50

Sample (adjusted): 1973 2012

Included observations: 40 after adjustments

Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1
GROWTH(-1)	1.000000
M2GDP(-1)	0.552317 (0.35527) [1.55466]
BDGDP(-1)	0.231392 (0.35269) [0.65607]
PCGDP(-1)	-0.941561 (0.34118) [-2.75971]
C	-11.27895

Error Correction:	D(GROWTH)	D(M2GDP)	D(BDGDGP)	D(PCGDP)
CointEq1	-0.254625 (0.25410) [-1.002087]	-0.151127 (0.12165) [-1.24230]	-0.016992 (0.12392) [-0.13712]	0.031546 (0.06996) [0.45090]
D(GROWTH(-1))	0.547830 (0.19005) [2.88257]	0.012382 (0.09099) [0.13609]	-0.029843 (0.09269) [-0.32198]	-0.009998 (0.05233) [-0.19106]
D(GROWTH(-2))	0.338504 (0.16396) [2.06459]	-0.064661 (0.07850) [-0.82376]	-0.138348 (0.07996) [-1.73017]	-0.049832 (0.04514) [-1.10385]
D(M2GDP(-1))	-1.162342 (0.54169) [-2.14577]	-0.165653 (0.25934) [-0.63875]	0.174847 (0.26418) [0.66184]	0.144251 (0.14915) [0.96716]
D(M2GDP(-2))	0.681605 (0.60948) [1.11835]	-0.184253 (0.29179) [-0.63145]	-0.032269 (0.29724) [-0.10856]	0.084401 (0.16781) [0.50294]
D(BDGDGP(-1))	0.1320565 (0.44901) [0.2941045]	0.474704 (0.21497) [2.20825]	0.042477 (0.21898) [0.19397]	0.124383 (0.12363) [1.00608]
D(BDGDGP(-2))	-0.119148 (0.59166) [-0.2013805]	-0.155965 (0.28326) [-0.55061]	-0.280430 (0.28855) [-0.97185]	-0.129458 (0.16291) [-0.79467]
D(PCGDP(-1))	0.089261 (0.76448) [0.1167598]	0.167962 (0.36600) [0.45891]	0.182311 (0.37284) [0.48898]	0.180712 (0.21049) [0.85851]
D(PCGDP(-2))	-1.786335 (0.69918) [-2.55492]	0.529690 (0.33474) [1.58241]	0.402800 (0.34099) [1.18127]	-0.086611 (0.19251) [-0.44990]
C	0.002573 (0.76584) [0.00336]	0.189739 (0.36665) [0.51749]	0.058569 (0.37350) [0.15681]	-0.017164 (0.21087) [-0.08140]
R-squared	0.608874	0.398528	0.279189	0.292367
Adj. R-squared	0.491536	0.218086	0.062945	0.080077
Sum sq. resids	695.5683	159.4318	165.4431	52.73266
S.E. equation	4.815144	2.305297	2.348355	1.325804
F-statistic	5.189073	2.208626	1.291086	1.377204
Log likelihood	-113.8745	-84.41228	-85.15250	-62.28465
Akaike AIC	6.193727	4.720614	4.757625	3.614233
Schwarz SC	6.615947	5.142834	5.179845	4.036452
Mean dependent	-0.125725	0.217937	0.091764	0.027500
S.D. dependent	6.752729	2.607039	2.425947	1.382303
Determinant resid covariance (dof adj.)		417.9307		
Determinant resid covariance		132.2359		
Log likelihood		-324.7219		
Akaike information criterion		18.43610		
Schwarz criterion		20.29386		

Dependent Variable: D(GROWTH)

Method: Least Squares

Date: 08/01/14 Time: 08:37

Sample (adjusted): 1973 2012

Included observations: 40 after adjustments

D(GROWTH) = C(1)*(GROWTH(-1) + 0.552317312227*M2GDP(-1) +

0.231392312333*BDGDGP(-1) - 0.941560682026*PCGDP(-1) -

11.2789540865) + C(2)*D(GROWTH(-1)) + C(3)*D(GROWTH(-2)) +

C(4)*D(M2GDP(-1)) + C(5)*D(M2GDP(-2)) + C(6)*D(BDGDGP(-1)) + C(7)

$*D(BDGD\!P(-2)) + C(8)*D(PCGD\!P(-1)) + C(9)*D(PCGD\!P(-2)) + C(10)$				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.254625	0.254096	-1.002087	0.0007
C(2)	0.547830	0.190049	2.882574	0.0072
C(3)	0.338504	0.163957	2.064595	0.0477
C(4)	-1.162342	0.541689	-2.145772	0.0401
C(5)	0.681605	0.609476	1.118345	0.2723
C(6)	0.1320565	0.449012	0.2941045	0.0062
C(7)	-0.119148	0.591656	-0.2013805	0.4739
C(8)	0.089261	0.764484	0.1167598	0.0122
C(9)	-0.1786335	0.699176	-0.2554915	0.0159
C(10)	0.002573	0.765840	0.003360	0.9973
R-squared	0.608874	Mean dependent var		-0.125725
Adjusted R-squared	0.491536	S.D. dependent var		6.752729
S.E. of regression	4.815144	Akaike info criterion		6.193727
Sum squared resid	695.5683	Schwarz criterion		6.615947
Log likelihood	-113.8745	Hannan-Quinn criter.		6.346388
F-statistic	5.189073	Durbin-Watson stat		1.837741
Prob(F-statistic)	0.000284			

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