Research paper

Financial Intermediation and Economic Growth in Sudan: An Empirical investigation, 1970-2011

Safiat Ali Saber Ali

Department of Economics, University of Gezira, Wad Medani, Sudan
Email: safiatt2005@yahoo.com

ABSTRACT

This paper investigated the importance of financial development in the economic growth of Sudan. Using time series data from 1970 to 2011, the study employs the autoregressive distributed lag (ARDL) approach to co-integration and the associated error correction model (ECM). We found that among many financial development indicators, credit to the private sector is the only indicator that affect the economy in the long run but its effect is not considerable. Although we could not find any short-run relationship between the explanatory variables and real per capita GDP in Sudan, these variables are found to be related in the long-run. These findings 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 an appropriate investment climate required to foster significant private investment and promote growth in the long run.

Keywords: Long Run Growth; Financial Intermediation; Bounds testing.

UNDER PEER REVIEW

1.Introduction:

Financial markets play a significant role in the growth of the real economy by channeling funds from savers to borrowers in an efficient way to facilitate investment in physical capital and spur innovation and the creative destruction process. Also, the effectiveness of economic policy is positively associated with how well financial markets

work. Through their actions, financial intermediaries increase efficiency in many ways for example by decreasing leakages in savings, by allowing the development of longer term projects with higher returns or by allowing risk sharing. All these effects have been shown to have a positive impact on growth at the macroeconomic level. There are many empirical findings that support the argument that development in financial markets have a positive impact on economic performance in any economies.

However, despite the major role played by the financial sector in the process of growth and development, its role remains quite limited in many developing countries, especially in Sub-Saharan African countries (SSA). This is due to the fact that, the financial sector in most countries remains highly fragmented and inefficient, protected from competition or is highly segmented and regulated. Moreover, financial systems in most SSA countries are dominated by a small number of banks that command heavy markets power, which undermine the efficiency allocation of resources (Mohamed, 2008).

Historically, Sudan's financial system has been characterized by heavy government interventions and regulations, centralized lending by the central bank to public enterprises, absence of indirect monetary policy instruments, lax bank supervision and an inadequate accounting system. According to (Kireyev, 2001), the Sudanese banks still remain very small even by the modest international standard as compared with Islamic banks in other countries

Like many developing countries, the Sudanese financial sector is still young and underdeveloped following years of repression, political and economic instability up healed by long chronic civil war. The government embarked upon policies to reform the sector. As part of its economic and structural adjustment program, the government has adopted a comprehensive package of financial policy reforms in the early 1990s. The claimed objective is to create better business environment through relaxing some of the financial sector restrictions, modernize the financial sector to cope with the new achievements in the banking industry and to build more efficient financial market to promote economic growth through a more efficient allocation of credit.

This paper investigates empirically the long-run relationship and short-run dynamic linkages between financial development and economic growth in Sudan during the period 1970- 2011. The study employs the autoregressive distributed

UNDER PEER REVIEW

lag (ARDL) approach to co-integration. The analysis is carried out using three indicators to measure the level of financial developments. The first indicator is the ratio of the credit provided to private sector by commercial banks as a percentage of GDP. The second indicator of financial intermediation is the ratio of liquid liabilities of commercial banks to nominal GDP. Broad money supply as a percentage of GDP is the third indicator which is a standard measure of financial depth and an indicator of the overall size of financial intermediary activity. We included four control variables in our analysis. These variables are inflation rate, trade openness, gross investment and government expenditures. We found that among financial development indicators, credit to the private sector is the only indicator that affect the economy in the long run. Although we could not find any short-run relationship between the explanatory variables and real per capita GDP in Sudan, they are related in the long-run.

The rest of the paper is organized as follows: Section (2) discusses the issues of finance and growth addressed in the literature. Section (3) provides some background about the Sudanese economy and its banking sector. Section (4) discusses the research methodology, including model specification and methods of analysis. The main results of the paper are contained in section (5). Finally, section (6) contains our concluding remarks.

2. Literature review:

Theoretical disagreements do exist about the role of financial systems in economic growth. Some economists see the role as significant while others see it as minor. The significant role of financial development, however, has begun to receive considerable attention in the growth process. In his work, Schumpeter (1911) concluded that the well-functioning financial system will spur technological innovations through the efficiency of resource allocation from unproductive sector to productive sector. This idea was viewed as the first framework in analyzing the finance-led growth hypothesis. In contrast, Robison (1952) argues that the relationship should be started from growth to finance. According to this thought, a high rate of economic growth leads to a high demand for particular financial arrangement, and the well-developed financial sector will automatically respond to these types of demand. This view was defined recently as growth-led finance hypothesis.

Several empirical studies have attempted to test the relationship between financial intermediation and economic growth since the work of Goldsmith (1969). Goldsmith

UNDER PEER REVIEW

(1969), using data from 35 countries between 1860 and 1963 examined the correlation between financial intermediation and economic growth and argued that a rough parallelism can be observed between economic and financial development if periods of several decades are considered. Similarly, McKinnon (1973) and Shaw (1973) reported close association between financial development and economic growth in a number of countries.

In an earlier work, Lanyi and Saracoglu (1983) have proved the effect of financial repression on economic growth taking a sample of 21 developing countries. They have found a significant positive relationship between real GDP growth rate and the interest rate dummy variable for the1971-1980 period.

Recent theoretical work on financial activity and growth emphasized that the emergence of financial intermediation spurs higher growth. For instance, Greenwood and Jovanovic (1990) highlight financial intermediaries' risk-pooling and monitoring functions. By pooling savings for diversified investment projects and by monitoring the behavior of the borrowing firms, banks ensure higher expected rates of returns to promote growth. Saint-Paul (1992) considered similar portfolio diversification via the stock market. In both models financial intermediation costs are fixed or less than proportional to the volume of intermediated funds, and economic growth and financial development reinforce each other while raising welfare. Bencivenga and Smith (1991) followed Diamond and Dybvig (1983) to elaborate the liquidity management role of banks. Financial intermediaries reduce low return investment due to premature liquidation and redirect funds into longer-term, high-yield projects, leading to faster growth.

Moreover, the evidence presented by King and Levine (1993 a, b) has also given support to Goldsmith (1969) and McKinnon (1973) and Shaw (1973), insofar as they have claimed that financial sector affects economic growth both through the improvement of investment productivity (better allocation of capital) and through the higher level of investment. King and Levine's claims are also supported by the findings of De Gregorio and Guidotti (1995), who considered that financial deepening affects growth through a combination of the two effects, but with more importance for the efficiency effect. This finding constituted the principal conclusion of the empirical evidence, based on a large cross-country sample, where financial deepening is proxied by the ratio of bank credit granted to the private sector to GDP. Furthermore, De Gregorio and Guidotti (1995) have claimed that real interest rates are far from being good indicators of financial development or repression.

Roubini and Sala-i-Martin (1992) analyzed the relationship between financial intermediation and growth by emphasizing the role of government policy. In particular, they develop a model in which financial repression becomes a tool that governments may use to broaden the base of the inflation tax. Thus financial repression yields higher seignior age to finance government expenditures. In an optimal taxation framework

UNDER PEER REVIEW

where the tax instruments at the government's disposal are the inflation tax and an income tax that is subject to tax evasion, Roubini and Sala-i-Martin (1992) showed that high income tax evasion induces policymakers to repress the financial system and set a high inflation rate in an attempt to generate higher revenues from the inflation tax. Since financial repression reduces the productivity of capital and lowers savings, it hampers growth.

From a different perspective Jappelli and Pagano (1994) analyzed the effects of financial market developments on the savings rate. They concentrate attention on the effect of borrowing constraints on economic growth. This work shifts the focus from the effects of financial markets on the production side of the economy to their effects on household behavior. This study concluded that the full or partial inability of individuals to borrow against future income induces them to increase savings. The reason is that when individuals are unable to borrow, they must build up financial wealth by increasing savings in order to finance current consumption. Thus, this study suggested that financial deepening on the side of consumer credit is unlikely to increase savings. This result is consistent with casual observation in Latin America, where episodes of financial liberalization have not increased savings rates.

The "finance causes growth" hypothesis was supported by Odedokun's (1996) findings as well. He used a time-series regression analysis (71 developing countries, varying periods that generally span the 1960s and 1980s) and concluded that financial intermediation promoted economic growth in roughly eighty five percent of the countries and that the growth-promoting patterns of financial intermediation were practically invariant across various countries and regions.

Also Rajan and Zingales (1998), in a more original study, have tested the finance-growth nexus by focusing on the importance of the differential cost of external finance for firms. More specifically, they have tried to see whether firms or sectors that need more external finance (because of the scarcity of funds available for investment opportunities) have grown disproportionately faster in countries where financial markets are more developed. The authors then focused on the details of a mechanism where finance affects growth and, on the same occasion, provides another test of causality, since they found evidence for a channel through which finance theoretically influences growth.

Levine, Loayza, and Beck (2000) address directly the issue of joint endogeneity of financial development through the use of instrumental variables in their growth regressions. They used the countries' legal origin as the "external" instrument for financial depth in their cross-sectional regressions and the lagged observations of all explanatory variables as "internal" instruments in their pooled (cross-country and time-series) regressions. The data panels used by Levine et al. consist of about 74 countries and, for each of them, no overlapping five-year averages covering the period 1960-95. They used five-year averages, rather than annual observations, to smooth out transitory or business-cycle fluctuations. Confirming previous results, Levine et al. found robust

UNDER PEER REVIEW

evidence that financial development and depth lead to an improved growth performance. In contrast, Chang (2002) provides neither the demand following nor the supply-leading hypothesis for Mainland China. In his study, he uses multivariate VAR models for Mainland China over the period 1987:Q1 to 1999:Q4 to test both the demand-following and supply-leading hypotheses. Based on Johansen cointegration test, the findings indicate that there exists one cointegrating vector among GDP, financial development and the degree of openness of three variables. The results from Granger causality tests based on multivariate error-correction models (ECM) suggest independence between financial development and economic growth.

According to Wachtel (2001), moreover, there are at least four channels in which financial intermediaries promote economic growth through efficient allocation of resources. First, the financial intermediaries act as fund-transferring mechanisms to channel the excess fund from surplus units to deficit units (productive sectors). Second, financial intermediaries will offer more attractive and innovative instruments and incentives to encourage the mobilization of savings, which in turn may promote higher saving rates. Third, financial institutions lower their costs of project evaluation and origination through economies of scale, and facilitate the monitoring of projects via corporate governance. Finally, as institutions which operating at economies of scale and obtain symmetry information, financial intermediaries provide opportunities to reduce risk management and promote liquidity level by promoting the development of markets and instruments with attractive characteristics that enable risk-sharing.

Calderon and Liu (2003) analyzed a larger number of countries (one hundred and nine countries from 1960 to 1994) and on pooled data employed the Geweke decomposition test. Their results are the following: "a) financial development generally leads to economic growth; b) the Granger causality from financial development to economic growth and the Granger causality from economic growth to financial development coexist; c) financial deepening contributes more to the causal relationship in the developing countries than in the industrial countries; d) the longer the sampling interval, the larger the effect of financial development on economic growth; e) financial deepening propels economic growth through both a more rapid capital accumulation and productivity growth, with the latter channel being the strongest". In contrast to Calderon and Liu, but on a sample of ten developing countries from 1970 to 2000, Christopoulos and Tsionas (2004) found that long-run causality runs from financial development to economic growth but that there is no evidence of bi-directional causality. However, they do not found any short-run causality between financial deepening and output. The authors stressed that an important policy implication is that policies aimed at improving financial markets will have an effect on growth that is delayed but nevertheless significant. Fink et al. (2005) obtained the opposite result in terms of the time perspective. They found a strong finance-growth link in eleven transition countries (1990-2001) and the main growth impact ran via the productivity channel. However, financial sector development

UNDER PEER REVIEW

triggers short run growth effects rather than spurring long term growth. Their financial indicator includes not only bank credit, but also stock market capitalization and value of outstanding debt securities divided by GDP.

Following the assumptions of an AK model of growth with financial intermediation, a dynamic panel data analysis was undertaken by Valverde, del Paso and Fernánde (2004) for the Spanish regions in order to show the impact of various regional banking sector developments and innovations during 1986-2001. The results were in line with cross-country studies, in that there was a positive and significant correlation between bank financial deepening and regional growth. Nevertheless, their empirical evidence was more detailed with regard to the sources of financial intermediaries' development: product and service delivery innovations contributed positively to GDP, investment and gross savings growth.

The most skeptical view of the importance of finance and growth can be found in papers written by Shan (2005) and Zang and Kim (2007). The first author applied time-series and the other two panel analysis, but their results are similar. Based on Shan's variance decomposition analysis, there is little evidence that financial development leads economic growth in the eleven countries in his sample (from 1985 to 1998, quarterly data). Also, no substantial differences were found between eight Western countries that have more developed financial systems and the three Asian countries with less developed financial systems. The author concluded: "To the limited extent that one does find some support for the hypothesis that financial development leads economic growth, it seems clear that financial development is no more than a contributing factor and, almost certainly, not the most important factor. It is clear that whatever causality may exist, it is not uniform in direction or strength, and highlights the inappropriateness of cross-sectional analysis in this regard". Zang and Kim (2007) used the large panel data set provided by Levine et al. (2000) but get completely different results: there is no evidence of any positive unidirectional causal link from financial development indicators to economic growth. On the contrary, there is substantial indication that economic growth preceded subsequent financial development. The authors emphasized that their result does not imply that the role of financial development is not important, but that the bottom line is that a more balanced approach to studying the relationship between finance and growth needs to be adopted. The motivation for their paper came from the "casual observation that superstar East Asian countries with the world's highest growth rates for the last four decades, such as Japan, South Korea, and China, could not be classified as more financially developed than their competitors". This is especially true for South Korea whose financial institutions did not operate under market forces until very recently.

Lee (2005) examined the relationship between financial intermediation and economic performance in Canada for the periods 1870-1926 and 1948-2002 using time series econometrics. After determining the stationarity of the variables, he constructed a

UNDER PEER REVIEW

Vector Auto Regression to establish the relationship between the financial and the real sectors. Using Granger causality tests, he found evidence that financial development leads to economic growth for the 1948- 2002 sample and no evidence of the reverse. Also he concluded that in 1870-1926, only the monetary base variable is significant for growth. The other variables were insignificant.

Guryay et al (2007) empirically examined the relationship between financial development and economic growth. The study employed Ordinary Least Squares technique to show that there is insignificant positive effect of financial development on economic growth for Northern Cyprus. They posited that causality runs from growth to financial development without a feed back.

Acaravci, Ozturk and Acaravci (2007) examined the causal relationship between financial development and economic growth in Turkey for the period 1986-2006 using dynamic time series model. The results showed a one-way causal relationship running from the financial development to economic growth in Turkey.

Ahmed (2010), Song, Zan et al. (2010) and Halkos and Trigoni (2010) find that there is a long-run equilibrium relationship among financial development and economic growth. However, the effect of financial development on economic growth is unstable in the short-run.

There are only a few studies that explicitly address the finance-growth linkages in Africa. Except few studies, the existing evidence suggested that financial development has a positive effect on economic growth. Allen and Ndikumana (1998) Using various indicators of financial development, investigated the role of financial intermediation in stimulating economic growth for members of the Southern African Development Community (SADC). The results landed some support to the hypothesis that financial development is positively correlated with the growth rate of real per capita GDP. This relationship was more evident in regressions that used pooled data (5-year cross sections) than those using annual data. This finding suggested that the finance-growth nexus is a long-run phenomenon. The data indicated that while Botswana and Mauritius are catching up with South Africa towards a high-income steady state, the rest of the countries were stagnating to low income levels and low growth rates.

Ndebbio (2004) investigated financial deepening, economic growth and development for Sub-Saharan African countries. The study used two financial deepening variables namely the degree of financial intermediation measured by M2 as ratio to GDP, and the growth rate of per capita real money balances. The study found that a developed financial sector spurs overall high but sustainable growth of an economy.

Azege (2004) examined the empirical relationship between the level of development by financial intermediaries and growth in Nigeria. The study employed data on aggregate deposit money bank credit over time and gross domestic product to establish that a moderate positive relationship exist between financial deepening and

UNDER PEER REVIEW

economic growth. He concluded that the development of financial intermediary institutions in Nigeria is fundamental for overall economic growth.

Atindehou, Gueyie and Amenounve (2005), using causality tests to empirically examine the relationship between finance and economic growth in the context of the West African countries members of the Economic Community of West African States (ECOWAS) found a weak causal relationship between finance and economic development on one side, and between economic development and finance on the other side.

Abu-Bader and Abu-Qarn (2008) examined the causal relationship between financial development and economic growth in Egypt during the period 1960-2001. Their results significantly support the view that financial development Granger causes economic growth either through increasing investment efficiency or through increasing resources for investment.

Meanwhile, as far as Sudan is concerned, Mohamed (2008) examined the short and long run relationship between financial development and economic growth in Sudan, one of the Middle East and North Africa (MENA) countries. Covering the period from 1970 to 2004, the study employed the ARDL modeling approach to co-integration. Specifically, he used two proxies for financial development. That is, the ratio of M3 to GDP (M3Y) and the credit provided by the commercial banks to private sector as a percentage of GDP (CBS). The result showed that financial development variables negatively affect real GDP. The coefficient on M3Y is found to be negative and statistically significant at the 1% level and the coefficient on CBS is also negative but insignificant. Mohamed attributed his finding to the inefficient allocation of resources by banks, the absence of proper investment climate, and to the poor quality of credit disposal of the banking sector in Sudan

In a very recent paper Mahran (2012) examined the empirical relationship between economic growth and financial intermediation for Saudi Arabia during the last four decades (1968-2010). He adopted the autoregressive distributed lag (ARDL) methods to cointegration and the associated error correction model (ECM). He argued that despite the minimal restrictions imposed on the functioning of the domestic financial system with a view to "fighting terrorism", the results overwhelmingly indicate that financial intermediation has impacted negatively on long-run real GDP. According to him these findings are attributed to two sets of factors relating to the dominance of economic activities by the public sector and the characteristics of the institutional environment surrounding the private sector, as well as to some functional and structural characteristics of the financial system that have impeded its development.

Also, Al-Malkaw, Marashdeh and Abdullah (2012) empirically examined the relationship between financial development and economic growth in a small open economy of United Arab Emirates (UAE). Using time series data from 1974 to 2008, the study employd the autoregressive distributed lag (ARDL) approach to co-integration. The

UNDER PEER REVIEW

analysis was carried out using two indicators to measure the level of financial development. The first indicator was the financial depth or size of the financial intermediaries sector as measured by the monetization ratio (M2/GDP). The second indicator was the ratio of the credit provided to private sector by commercial banks as a percentage of the GDP (financial intermediation ratio). The results showed a negative and statistically significant relationship between financial development, as measured by M2/GDP, and economic growth. The results also suggested a bi-directional causality between the two variables. Over all, the evidence supported neither the demand-following nor the supply-leading hypotheses for UAE.

3. The Economy and the Banking Sector in Sudan:

3.1 Economic Growth in Sudan:

Over the years, Sudan's growth rates have shown fluctuating trends reflecting the effect of fluctuating weather conditions on agricultural production. The performance of the country in many ways typifies the severe economic decline that has affected many countries in the region since 1970s. In the late 1990s, oil and natural gas has also emerged as major sources of economic growth and revenue for the government as reflected in the balance of payments and investment flows.

Since independence in 1956, the economy has registered positive growth during two periods, namely the 1971-1983 and the 1990s onward periods (table A.1). During the first period (1971-1983) real GDP registered an annual average growth of 3.8 percent. This period was characterized by relative political stability after the 1971 Addis Ababa Peace Agreement which ended the civil war in the South. As a result, the economy witnessed substantial inflows of funds from the oil-exporting Arab countries following the first oil price hike in 1973, as well as funds to finance the so-called bread basket strategy. The inflow of capital over this period compensated for the relatively low saving-GDP ratio and the resulting low investment-GDP ratio.

The sub-period 1984-1991 witnessed a decline in the saving-GDP ratio and the investment-GDP ratios compared to their levels in the previous period. As a result, real GDP growth declined at an annual average rate of 2.5 percent. The main causes behind this poor performance of the economy were the outbreak in 1983 of the civil war in the South, the poor economic policies and the natural disasters such as the drought during 1984-1985 and the floods of 1988.

Since 1989 when the present government has taken office, the economy has witnessed dramatic changes following the adoption of economic and institutional reforms as well as privatization and liberalization policies. The reforms started with the three year economic salvation program (1990-1993) which focused on addressing economic stagnation where the agricultural sector was given priority. Despite the enormous resources, the performance of the agricultural sector was below its potential. An

UNDER PEER REVIEW

expansionary monetary policy was adopted while banks were instructed to direct 50 percent of their finance to the sector (Bank of Sudan, 1990).

A second wave of reforms started in 1992 when the National Economic Salvation Program was initialed under the National Comprehensive Strategy (1992-2002). This period witnessed the adoption of liberalization and privatization policies. According to Mahran (2007), "It has been a monumental task to move the economy dramatically from a state of downward trend and somewhat central control that characterized the period of the 1970s and 1980s, to a free-market economy where market forces set the rules of the game in resource allocation and economic growth in the 1990s". Thus, since 1992 the government pursued an economic stabilization and reform program, the main elements of which involved abolition of price controls, quantitative restrictions, and consumer subsidies, together with the privatization of the loss-making public enterprises.

However, the inflationary pressure has increased tremendously, registering its first three digit rate of 122.5 in 1991 while reaching a highest rate of 130.4 percent in 1996 (table A.1), with an average annual inflation rate of 104 percent during 1990-1997. Efforts were made to suppress inflation. As a result, macroeconomic and price stabilization has become the focus of a strengthened reform program during 1997-2001. This program was boosted by the production and export of oil in 1998, which constituted a major source of economic growth and revenue for the government (Saber, 2009). For this reason inflation rate was declined to reach 4.9 percent in 2001 but again started to increase to reach 14.9 percent in 2008, due to increase in world food prices and the global economic crisis, and 18.1 percent in 2011 due to the secession of Southern Sudan.

While the reforms of the early 1990s revived growth performance and reduced fiscal imbalances, inflation rates escalated and other macroeconomic imbalances persisted. Thus, the first half of the 1990s registered positive, though erratic growth, while the second half of the decade witnessed sustained and stable positive growth at progressively higher rates. According to Ali and Elbadawi (2003), this is the only half decade since the 1960s during which the economy has achieved sustained positive growth. The growth reached the high rate of 8.3 percent in 2000, but declined to 4.9 percent in 2001 to recover once more to 10.5 percent in 2007 and declined once more to reach 6.5 in 2008 due to increase in world food prices and the global economic crisis and more to reach 2.7 in 2011 because of the secession of Southern Sudan.

In summary, it may be argued that the period 1992-2008 witnessed strong performance of the economy with considerable improvement in the most important economic fundamentals. The strong economic performance may be attributed to a number of factors, including the efforts made toward economic reforms, the favorable weather conditions for agriculture, the high investment in the oil sector, the resulting relaxation of the tight foreign exchange resource constraint and the increase in FDI inflows (which increased from 12.3 million US dollar in 1990 to about 7000 million

UNDER PEER REVIEW

dollar in 2008). Thus, average GDP growth is estimated at 6.6 percent during 1992-2008, in contrast to 1-2 percent during 1985-1991.

3.2 The Banking Sector in Sudan:

Like many developing countries, the Sudanese financial sector was dominated by commercial banks' rather than by bonds and equity markets, which require a mature system of accounting and financial information. The financial system in the Sudan has undergone significant developments since the establishment of the Bank of Sudan on February 22, 1960. In addition to the Central Bank of Sudan (CBOS), which is responsible for articulating and conducting monetary and exchange rate policy, the available statistics suggest that in 2004 banking sector in Sudan consisted of other 26 banks (23 commercial banks and three specialized banks). In 2005, the number of commercial banks increased by more than 8 percent to reach 25 banks. The two new banks which started their operations in 2005 were EL Salam Bank and the Sudanese Egyption Bank. In 2008, the number of banks reached 35 banks. The new banks which started their operations in 2008 were ELGezira Bank, the Family Bank and Qatar Bank in the north and Bvlo Bank in the south.

Historically, Sudan's financial system has been characterized by heavy government interventions and regulations, centralized lending by the central bank to public enterprises, absence of indirect monetary policy instruments, Lax bank supervision and an inadequate accounting system. According to (Kireyev, 2001), the Sudanese banks still remains very small even by the modest international standard as compared with Islamic banks in other countries. The total amount of deposits of the banking system has been hovering around $ 500 million since mid-1990 and is dominated by demand deposits with a share of over 70% whereas saving and investment deposits remain relatively small. According to him, this reflects the cash nature of the Sudanese economy where individuals prefer to have instant and easy access to their funds.

The performance of the banking sector as measured by a number of conventional financial indicators was examined in this section. Examples of these indicators include assets to GDP ratio, which is considered to be one of the basic indicators of the degree of financial intermediation through the banking sector, and deposit to GDP as well as finance to GDP ratios, which give information about the breadth of financial systems and the extent to which enterprises and households use financial services.

To begin with, we may note that the banking sector is the backbone of the Sudanese financial sector. Despite this, the size of the sector is very small by regional and international standards. Table (1) reveals that the ratio of assets to GDP is estimated at an annual average of 20.8% during 1995-2011. This ratio is very low compared to the averages of 100% for peer Arab countries and of 136% for emerging economies. These low assets to GDP ratios underscore the sector's inability to play a larger and more

UNDER PEER REVIEW

important role in the development process. While this ratio is estimated at 25% in 1995, it exhibited a downward trend to reach only 12% in 2000 before recovering in 2001 to reach its 1995 level of about 25% in 2005 and increased further to reach 28.2% in 2006.

Small bank size (as measured by the bank assets to GDP ratio) together with the weak performance of the sector, particularly during the 1990s, have given rise to considerable government intervention and regulations that shattered public confidence in banks in the early 1990s (Elhiraika, 1998).

Table (1). Ratios of Banking Finance to Total Banks Assets and GDP,1995-2011 (In million SD)

Year	Total Finance	Total Assets	GDP	Assets-GDP Ratio (%)	Finance -Assets Ratio (%)
1995	14,140	103,511	413,366	25.0	13.7
1996	33,950	161,445	1,021,750	15.8	21.0
1997	41,556	237,508	1,592,931	14.9	17.5
1998	47,383	328,176	1,991,613	16.5	14.4
1999	48,732	424,848	2,448,885	17.3	11.5
2000	79,224	357,068	2,969,452	12.0	22.2
2001	140,068	455,348	3,258,715	14.0	30.8
2002	193,201	611,238	3,923,817	15.6	31.6
2003	281,928	789,597	4,549,449	17.4	35.7
2004	429,071	1,044,506	5,245,245	19.9	41.1
2005	695,368	1,530,310	6,150,174	24.9	45.4
2006	1,113,960	2,314,430	8,001,578	28.2	48.1
2007	1,299,850	2,619,740	9,329,965	28.1	49.6
2008	1,496,110	3,065,000	12,073,400	25.4	48.8
2009	1,498,470	3,666,690	13,565,900	27.0	40.9
2010	2,099,280	4,310,770	16,220,390	26.6	48.7
2011	2,332,920	4,650,410	18,655,630	24.9	50.2

Source: Bank of Sudan Annual Reports (various issues) and own calculations.

Two financial ratios could be used as indicators of the ability of banks to make loans for investment purposes. The first of these ratios is the finance-assets ratio. From table (1) we observe that banking finance in Sudan represents a small proportion of banks total assets. This ratio is estimated at an average value of 33.6% for the period 1995-2011. Thus, banking finance to economic sectors constitutes only a small fraction of total assets. This may be attributed to a number of factors, important among which is that banks maintain a large proportion of their resources in the form of liquid assets since short-term deposits dominate the liabilities side of the banking balance sheet.

Similar observations could be made on the basis of other financial indicators. Thus, from table (2) we observe that the ratio of deposits to GDP is very low by any standard. It varied between 5.1% in 1998 to 16% in 2010, which is far below the estimated averages of 69% and 102.3% for Arab and emerging countries, respectively, and is even worse compared to the 65% and 97% in Egypt and Jordan, respectively. Similarly, the ratio of finance to GDP amounted to 13.9% which is also far below the estimated averages of 40% and 88% for the Arab and emerging countries, respectively.

UNDER PEER REVIEW

These low ratios indicate that the banking sector has ample room to further consolidate its efforts in resource mobilization as well as in efficiently allocating these resources for investment purposes.

Since the early 1990s, banks were instructed to direct 50% of their credit to finance agriculture. As a result, the share of agriculture in total bank lending rose to 32% by 1993. However, following the financial liberalization and reform program, coupled with the high risk and relatively low or even negative real rate of return on agricultural finance, the share of agricultural loans declined to 22% in 2000 and further to 6.5% in 2005 (table 3).

Table (2). The Ratio of Total deposits and Total Bank Finance to GDP (%), 1995-2011 (In million SD)

Year	Total Finance	Total Deposits	GDP	Finance - GDP Ratio (%)	Deposit-GDP Ratio (%)	Finance - Deposit Ratio (%)
1995	14,140	41,642	413,366	3.4	10.1	33.9
1996	33,950	67,793	1,021,750	3.3	6.6	50.1
1997	41,556	96,754	1,592,931	2.6	6.1	43.0
1998	47,383	102,113	1,991,613	2.4	5.1	46.4
1999	48,732	145,519	2,448,885	2.0	5.9	33.5
2000	79,224	197,200	2,969,452	2.7	6.6	40.2
2001	140,068	274,188	3,258,715	4.3	8.4	51.1
2002	193,201	363.075	3,923,817	4.9	9.3	53.2
2003	281,928	472,952	4,549,449	6.2	10.4	59.6
2004	429,071	646,649	5,245,245	8.2	12.3	66.4
2005	695,368	977,595	6,150,174	11.3	15.9	71.1
2006	1,113,960	1,230,860	8,001,578	13.9	15.4	90.5
2007	1,299,850	1,394,240	9,329,965	13.9	14.9	93.2
2008	1,496,110	1,650,850	12,073,400	12.4	13.7	90.6
2009	1,498,470	2,084,800	13,565,900	11.0	15.4	87.1
2010	2,099,280	2,587,440	16,220,390	12.9	16.0	79.6
2011	2,332,920	2,777,560	18,655,630	12.5	14.9	82.3

Source: Bank of Sudan Annual Report (various Issues) and own calculations..

Increased lending to the agricultural sector during the 1990s was accompanied by a sharp fall in lending to the industrial and export sectors. Banking finance to industry diminished from 26% in 1989 to reach 10.5% in 2000, but then recovered to reach 15.9% in 2001. In view of table (3), these trends suggest that industry has received more attention in terms of banking finance during more recent years. The share of exports in total bank financing decreased from 27.2% in 1995 to 2.2% in 2008.

The relatively small share of industry in banking finance is attributed to the small size of the sector, which contributes only about 10-15 % of GDP. Until the late 1990s, the sector was dominated by relatively small family-owned processing firms. In addition, with the increase in the size of the sector in more recent years, it may be extremely difficult and risky for the small and generally under capitalized banks in Sudan to finance bulky capital investment in industry and other sectors. Thus manufacturing investment

UNDER PEER REVIEW

relies on investors' own resources, while bank financing is largely limited to working capital. .

The financing of the social development sector (which includes handicrafts and other small household-owned industries) remains weak despite the special attention given to it by the CBOS in the context of its monetary and credit policy since 1998. For example, the CBOS earmarked a minimum of 10% of the total portfolio of commercial banks for financing the social sector. However, commercial banks rarely comply with this regulation as the share of finance allocated to this group of borrowers ranged between just 3-5% throughout the last decade. According to commercial banks, this is attributed to various reasons most important of which is the high risk involved in lending to this sector.

Table (3). Banking Finance by Sector (%), 1995 -2011

Year	Agriculture	Industry	Exports	Imports	Domestic Trade	Other Sectors
1995	25.0	18.5	27.2	8.5	2.9	17.9
1996	27.0	18.8	19.6	5.0	3.6	26.0
1997	30.0	17.5	20.2	2.1	4.2	26.0
1998	33.0	18.8	17.1	0.7	4.3	26.1
1999	30.4	14.7	17.2	3.1	5.8	28.8
2000	22.0	10.5	21.0	1.0	10.0	35.5
2001	14.0	15.9	21.6	9.0	15.7	23.8
2002	12.3	13.2	12.0	13.5	20.4	28.6
2003	15.3	10.6	12.1	1.1	23.1	37.8
2004	9.5	11.5	10.2	1.2	36.3	31.3
2005	6.5	14.8	6.4	2.6	31.8	37.9
2006	11.9	9.3	4.0	2.5	22.5	49.8
2007	9.3	9.9	2.4	14.9	19.9	43.6
2008	10.7	9.3	2.2	12.3	18.6	46.9
2009	13.0	8.1	2.5	11.0	17.8	47.6
2010	14.9	9.0	2.6	6.3	16.0	51.2
2011	13.2	10.2	3.3	6.7	15.5	51.1

Source: Bank of Sudan Annual Reports: various issues.

In what follows, we examine the allocation of credit according to the Islamic modes of finance. For this purpose, we note that there are many Islamic modes of finance, the most important of which include Musharaka, Murabaha, Mudaraba, and Salem.

Financial sector reform and liberalization efforts appear to have no significant impact on credit allocation by mode of finance. It is clear from table (4) 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, although it fluctuated afterwards to reach 61.4% in 2011. This preference is attributed to the fact that Murabaha is the closest to conventional banking principles compared to other modes of finance in the sense that the loan is collateralized and hence offers greater security. On the other

UNDER PEER REVIEW

hand Mudaraba, which is more suitable for entrepreneurs with no capital of their own, is the least mode of financing practiced by Islamic banks.

Musharka is also a popular form of finance among Sudanese banks with an average share of 14.3% of total finance for the period 1995-2011. Due to the increase in non-performing loans in agriculture, banking finance through Salam contracts has declined from 7% in 1994 to 0.7% in 2011.

Table (4). Banking Finance by Mode of Finance (%), 1995 -2011

Years	Murabaha	Musharaka	Mudaraba	Salam	Other	Total
1995	54.4	35.1	2.7	3.9	3.9	100
1996	53.0	32.0	2.0	4.0	9.0	100
1997	52.0	22.6	5.4	8.4	11.6	100
1998	54.3	21.1	6.1	6.5	12.0	100
1999	49.1	30.8	4.1	5.0	11.0	100
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

Source: Bank of Sudan Annual Report: various issues.

We have noted earlier that Sudanese people prefer to have instant access to their funds. A similar phenomenon is observed among Sudanese banks, which also prefer to accumulate reserves rather than providing finance to private sectors. Thus, in 2000, banks excess reserves at the bank of Sudan reached 50% of banking finance. Holding excess reserves by banks make indirect monetary policy less effective. Kireyev (2001) argued that while demand for credit from the private sector has been reportedly high during the 1990s, credit to the private sector was shrinking annually by 16% during 1991-93, by 1.5% during 1994-96, and by 6% during 1997-1999. In total, real credit to the private sector declined by 23% during 1993-1999. During 1990-2003, bank lending to the private sector ranged between 23% and 36% of total credit. Agriculture and construction were the most severely affected sectors.

Such a decline in credit to the private sector reflects both healthy trends and inherent deficiencies of the Sudanese financial sector. With the exception of some seasonal increases, associated mainly with trade finance, credit to private sector remained broadly stagnant in 2000, which forced the Bank of Sudan to provide emergency bridge

UNDER PEER REVIEW

financing for agricultural schemes from its own resources. The decline in credit to the private sector should have been expected, since the value of credit was overblown by centralized allocation of government financing and growing non-performing loans. However, current lower credit is a result of better risk assessment and improved vigilance by commercial banks, as well as of tighter CBOS prudential policy. Indeed, as part of its efforts to enforce its supervision role, the Bank of Sudan encourages banks to take a closer look at the quality of their credit portfolio and to assume full responsibility for the recovery of non-performing loans. Credit decline is also a sign of better and more efficient intersectional allocation of financial resources after the Bank of Sudan removed numerous floors and ceilings on credit for particular sectors, which had guided credit allocation in the mid-1990s. Also, the CBOS promotes commercialization of former specialized banks, such as the Agricultural Bank, which was a vehicle of centralized, and in most cases, unrecoverable financing. Thus, declining in real terms, credit activity is looking for its real value, consistent with the current level of economic development in Sudan.

The decline in credit to the private sector may also reflect the prolonged structural deficiencies of the Sudanese financial system and in the economy as a whole. These deficiencies relate to such deeply rooted problems of the Sudanese economy, as the dominance of risky rain-fed agriculture, immature industrial and service sectors, repressive credit policy, remarkably low public confidence in banks, complete lack of external financing during the 1990s, and the inefficiency of the banking sector itself.

Kireyev (2001) has also cited other factors that may explain low bank lending to the private sector in Sudan. These factors include:

1. The weak capital base, which does not allow banks to extend sizable loans. Even a consortium type of bank financing may not be sufficient to finance large public projects such as the Gezira scheme. Despite government directives, consortium financing was never enough to meet the demand for working capital in agriculture.
2. The risk of extending credit to sectors other than trade, which is considered by banks as unjustifiably high. This is particularly true for agriculture, which accounts for about 85% of all non-performing loans. For this reason, all banks have become reluctant to extend credit for investment in the sector without a government guarantee.
3. The high cost of borrowing due to insufficient inter-bank competition, the large geographical size of the country, which complicates transactions and transfers, the absence of computerized inter-bank networks, and the high level of administrative fees and charges from which banks extract the bulk of their profits. Despite the high cost of borrowing, Haroun (2001) argues that the profits of the banks are very low by international comparisons. For example, the ratio of total expenses to total revenues has reached 98 percent in public and joint banks in 1997, while total expenses have

UNDER PEER REVIEW

exceeded total revenues by 30 percent in government banks in 1999. In addition to the high cost of administering Islamic Profit and Loss Sharing (PLS) contracts, low profits in Sudanese banks may be attributed to the small average bank size and the high percentage of non-performing loans. The average staff and administration costs in the Sudanese banks range between 9% and 20% of total assets.

4. The high returns from investing in CMCs and GMCs and the resulting high opportunity cost of investing in the private sector have diverted bank credit from the private sector. When banks were instructed to comply with the strict prudential policy of the Central Bank of not investing in CMCs and GMCs, they opted for not investing in the private sector too, since lending to the private sector obviously carries a higher risk than investing in such assets as government bonds.

To solve the problem of credit decline, the BOS has adopted a number of key measures within the framework of bank restructuring. These include encouraging amalgamation of banks through recapitalization, mergers, or liquidation; modification of banking and other financial laws to allow for greater filterability in bank registration and liquidation; and collection of non-performing loans and selling collaterals with banks. In addition, the BOS continued its policy of financial liberalization by further relaxing the ceiling of credit for domestic trade, reducing and unifying reserve requirements, and enforcing international standards of prudential regulation and banking supervision. The BOS has also provided additional support to the economy by auctioning its credit to banks on competitive basis.

4.Research Methodology:

4.1 The Theoretical model:

Economic performance is estimated using the natural logarithm of real GDP obtained by deflating nominal GDP by the CPI (or by the GDP deflator) at the January 1990 prices. Alternatively, we use the natural logarithm of real per capita GDP (LPGDP) as a measure of economic growth.

Following common practice, two sets of explanatory variables that impact economic growth are employed in this study. The first includes variables that capture the impact of financial development, while the second captures the impact of factors other than financial development.

Construction of financial development indicators is an extremely difficult task due to the diversity of financial services catered for in the financial system. What represent an appropriate measure of financial development (FD) seems to be controversial in the literature Several measures (proxies) representing the liquid liabilities of the financial system, such as M1/GDP, M2/GDP, or M3/GDP

UNDER PEER REVIEW

have been widely used in econometric models (see, for example, Goldsmith 1969, Gelb, 1989, World Bank, 1989, King and Levine 1993a, 1993b).These measures are not good proxies of financial development since they are likely to measure the extent to which transactions are monetized rather than the ability of the financial system to channel funds from depositors to investment opportunities As an alternative measure, bank credit to the private sector is often argued to be a more superior measure of functioning financial development because it is a measure of the quality and quantity of investment (Mohammed, 2006).

In light of the above, and following Mahran (2012), this study uses three indicators of financial intermediation. The first indicator is the ratio of private credit to nominal GDP (CPS), where private credit is the credit extended to the private sector by commercial banks. This ratio indicates the importance of the role played by the financial sector, especially the deposit money banks, in the financing of the economy. It isolates credit issued to the privates sector from credit issued to governments, government agencies, and public enterprises. Also, it excludes credits issued by the Central Bank (Levine, et al 2000). The underlying assumption is that credit provided to the private sector increases investment and productivity to a much larger extent than do credits to the public sector. It is also argued that loans to the private sector are given under more stringent conditions and that the improved quality of investment emanating from financial intermediaries. Evaluation of project viability is more significant for private sector credits (Levine and Zervos, 1998, Levine 1998). The second indicator of financial intermediation is the ratio of liquid liabilities (currency plus demand and interest-bearing liabilities of banks) of commercial banks to nominal GDP (LIQ). This is a typical measure of the overall size of the financial intermediary sector. Broad money supply as a percentage of GDP (MS) is the third standard indicator of financial depth and of the overall size of financial intermediary activity. An increase in MS may be interpreted as an improvement of financial deepening in the economy.

Other variables were added to control for the possible effects of other growth determinants such as inflation rate (INF), gross investment as percent of GDP (INV), size of government also as percent of GDP (GOV), and openness to trade (OPEN). The inflation rate and size of government expenditure are commonly used as indicators of macroeconomic stability (Easterly and Rebelo, 1993; Fischer, 1993; Allen and Ndikumana, 1998 and Levine et al 2000). High inflation distorts economic activity and reduces investment in productive enterprises, thus reducing economic growth. Government expenditure could reduce economic growth because of the crowding out effect on private investment and the inflationary pressures it can lead to (Allen and

UNDER PEER REVIEW

Ndikumana, 1998). Inflation is measured in the analysis as the percentage change in CPI (at 1990 base year). The size of government is measured as the percentage share of government expenditure in GDP. The share of investment in GDP is one of the few economic variables that have robust effect on growth (Levine and Renelt, 1992). The effect of international trade on growth is captured by the openness variable, which is measured as the sum of imports and exports as a percentage of nominal GDP (Levine et al 2000). Theoretically, the effects of trade can be negative and positive; as such the net effects can only be determined empirically. Exports may positively affect growth if it increases the market for domestic products and generates foreign exchange reserves necessary to import capital goods. Imports can positively affect growth if increases in imports are associated with capital goods. However, openness also can adversely affect growth. In addition to these variables, we introduce a dummy variable (D) which takes the value of one for the peace years (from 1971 to 1983 and also from 2005 to 2011), and the value of zero for the other (war) years, to account for the effect of civil war in Sudan.

Following the literature (see, king and Levine 1993a, 1993b; Allen and Ndikumana 1998) we estimate three versions of the model of the impact of financial development on growth in Sudan. The three versions are different in that the dependent variable (the natural logarithm of real per capita GDP) will be regressed on each of the three indicators of financial development, namely bank credit to the private sector (CPS), financial depth (MS), and the size of the financial intermediary sector (LIQ). The rest of explanatory variables included in the regressions are the same. Thus, after taking the natural logarithm of the variables, the three estimable versions of the model are:

$$\text{Ln } PGDP_t = \alpha_0 + \alpha_1 t + \alpha_2 \ln GOV_t + \alpha_3 \ln INF_t + \alpha_4 \ln INV_t + \alpha_5 \ln OPEN_t + \alpha_6 \ln FD_t + \alpha_7 D_t + U_{1t} \quad (1)$$

where FD represent the financial development variable, which is either LIQ, or MS, or CPS; lnGOV is the log of government spending/GDP ratio; lnINF is the log of inflation rate; lnINV is the log of current investment/GDP ratio; lnOPEN is the log of trade openness; t is time trend; D is dummy variable, and u is a white noise error term. Each of the equations in (1) represents only the long-

UNDER PEER REVIEW

run equilibrium relationship and may form a cointegration set provided that all variables included in each equation are integrated of order one, i.e. I(1).

4.2 Analytical Methods:

To examine the effect of financial intermediary development on economic growth in Sudan, we collect annual time series data from various issues of the Bank of Sudan Annual Reports for the period 1970-2011. In this study we examine the empirical long-run relationships and dynamic interactions among the variables, using the autoregressive distributed lag (ARDL) bounds testing approach to cointegration, as developed by Pesaran and Smith (1995) and Pesaran *et al*. (2001). An ARDL model is a general dynamic specification, which uses the lags of the dependent variable and the lagged and contemporaneous values of the independent variables, through which the short-run effects can be directly estimated, and the long-run equilibrium relationship can be indirectly estimated. Pesaran and Shin (1999) introduce the bounds test for cointegration that can be employed within an ARDL specification. This method has definite advantages in comparison to other cointegration procedures since it can be employed regardless of whether the underlying variables are I(0), I(1) or fractionally integrated. Thus, the bounds test eliminates the uncertainty associated with pre-testing the order of integration. Secondly, it can be used in small sample sizes, whereas the Engle–Granger and the Johansen procedures are not reliable for relatively small samples (Narayan, 2004). Given that our sample size is limited with a total of 42 observations only, conducting bounds test will be appropriate.

In an attempt to estimate the relationship between economic growth and financial intermediation in Sudan, the first task is to test for the presence of unit root. This is necessary in order to ensure that the parameters are estimated

UNDER PEER REVIEW

using stationary time series data. Thus, this study seeks to avert the occurrence of spurious results. To do this, the Augmented Dikky-Fuller (ADF) test is used. The null hypothesis is that the variable in question has a unit root (i.e. it is non-stationary), which is tested against the alternative hypothesis that the variable has no unit root (i.e. it is stationary). To reject the null hypothesis, the ADF statistics must be more negative than the critical values and significant. Along the lines of Pesaran *et al*. (2001) if all variables involved are stationary, the next step is to apply the bounds testing approach to examine cointegration between the variables.

The ARDL approach involves two steps for estimating the long-run relationship. The first step is to examine the existence of a long-run relationship among all variables in the equation under examination. Conditional upon cointegration is confirmed, in the second stage, the long-run coefficients and the short-run coefficients are estimated using the associated ARDL and ECMs. To test for cointegration in Equation (1) by the bounds test, the following conditional Unrestricted Error Correction Model (ECM), is constructed assuming maximum lag lengths of q and k for the dependent and explanatory variables, respectively:

$$\Delta \text{Ln}\, PGDP_t = \alpha + \beta\, t + \rho\, D + \lambda_1 \text{Ln}\, PGDP_{t-1} + \lambda_2 \ln GOV_{t-1} + \lambda_3 \ln INF_{t-1}$$

$$+ \lambda_4 \ln INV_{t-1} + \lambda_5 \ln OPEN_{t-1} + \lambda_6 \ln FD_{t-1} + \sum_{i=1}^{q} \emptyset i\, \Delta \text{Ln} PGDP_{t-i}$$

$$+ \sum_{i=1}^{k} \varepsilon i\, \Delta \ln GOV_{t-i} + \sum_{i=1}^{k} \varphi i\, \Delta \ln INF_{t-i} + \sum_{i=1}^{k} \xi_i \Delta \ln INV_{t-i}$$

$$+ \sum_{i=1}^{k} \gamma_i\, \Delta \ln OPEN_{t-i} + \sum_{i=1}^{k} \delta_i\, \Delta \ln FD_{t-i} + U_{1t} \qquad (2)$$

UNDER PEER REVIEW

where FD is as defined above; the parameters λ_1, λ_2, λ_3, λ_4, λ_5 and λ_6 are the long-run parameters (elasticities), while $\emptyset i$, εi, φi, ξ_i, γ_i and δ_i are the short-run dynamic coefficients of the underlying ARDL model, and U_{it} are white noise errors. To examine the existence of a long-run relationship between the system variables, the OLS methods were applied to each of the three versions of the (unrestricted) ECMs given in Equation (2). Since the coefficients λ's of the lagged variables represent the long-run parameters of the underlying ARDL model, the existence of a long-run relationship among the variables is examined by conducting an F-test for the joint significance of these coefficients. Thus, for each of the three versions in Equation (2), the null hypothesis of "non-existence of the long-run relationship" defined by

$$H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$$

and it is tested against the alternative hypothesis

$$H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$$

These hypotheses are examined using the standard Wald or F-statistics. The F-test statistic has distribution which depends upon (*i*) whether variables included in the ARDL model are I(0) or I(1), (*ii*) the number of regressors, (*iii*) whether the ARDL model contains an intercept and/or a trend, and (*iv*) the sample size. The F-test has a nonstandard distribution. Thus, Pesaran and Pesaran (1997) and Pesaran et al (2001) have provided two sets of critical values for the cointegration test. The lower critical bound assumes that all the variables are I(0), meaning that there is no cointegration among the variables, while the upper bound assumes that all the variables are I(1). If the computed F-statistic is greater than the upper critical bound, then the null hypothesis will be rejected suggesting that there exists a cointegrating relationship among the variables. If the F-statistic falls below the lower critical bounds value, it implies that there is no cointegration relationship.

UNDER PEER REVIEW

However, when the F-statistic lies within the lower and upper bounds, then the test is inconclusive. In this context, the unit root tests should be conducted to ascertain the order of integration of the variables. If all the variables are found to be I(1), then the decision is taken on the basis of the upper critical value. On the other hand, if all the variables are I(0), then the decision is based on the lower critical bound value.

The ARDL model requires prior knowledge of the lag orders of variables, which is also sufficient to correct for autocorrelated residuals and the problem of endogenous regressors simultaneously (Pesaran and Shin (1999)). Thus, if there is evidence for the existence of cointegration (long-run relationship) between variables, the next step involves selecting the appropriate lag orders of the dependent variable and regressors involved to obtain what is known as the conditional (restricted) ARDL model. This is normally accomplished by applying OLS methods to estimate the general ARDL model of the form:

$$\text{Ln } PGDP_t = \alpha + \beta\, t + \rho D + \sum_{i=1}^{q} \lambda_{1i} \text{ Ln } PGDP_{t-i} + \sum_{i=0}^{k1} \lambda_{2i} \text{ ln } GOV_{t-i}$$

$$+ \sum_{i=0}^{k2} \lambda_{3i} \text{ ln } INF_{t-i} + \sum_{i=0}^{k3} \lambda_{4i} \text{ ln } INV_{t-i}$$

$$+ \sum_{i=0}^{k4} \lambda_{5i} \text{ ln } OPEN_{t-i} + \sum_{i=0}^{k5} \lambda_{6i} \text{ ln } FD_{t-i} + U_t \qquad (3)$$

Following Pesaran and Shin (1999), because of the small size of annual data a maximum lag length of two is used, so that ($q = 2$, $k_i = 2$) in Equation (3). By applying OLS method to the conditional ARDL long-run models in Equation (3) to obtain estimates of the long-run parameters λ_1, λ_2, λ_3, λ_4, λ_5 and λ_6. The estimated equation is also used to obtain an estimate of the error correction term (EC_{t-1}), which is obtained from Equation (3) as:

$$EC_{t-1} = \text{Ln } PGDP_t - \alpha - \beta\, t - \rho D - \sum_{i=1}^{q} \lambda_{1i} \text{ Ln } PGDP_{t-i}$$

$$- \sum_{i=0}^{k1} \lambda_{2i} \text{ ln } GOV_{t-i} - \sum_{i=0}^{k2} \lambda_{3i} \text{ ln } INF_{t-i}$$

UNDER PEER REVIEW

$$- \sum_{i=0}^{k3} \lambda_{4i} \ln INV_{t-i} - \sum_{i=0}^{k4} \lambda_{5i} \ln OPEN_{t-i}$$

$$- \sum_{i=0}^{k5} \lambda_{6i} \ln FD_{t-i} \quad (4)$$

In this step, the resulting underlying ARDL equation (3) is also verified with all its statistical diagnostic properties in order to get unbiased and consistent/efficient estimates. The test for serial correlation (Breusch-Godfrey test), functional form (regression specification error test (RESET), normality (Jarque-Bera normality test) and heteroscedasticity (White's general heteroscedasticity test,) are carried out to ensure that the models are well specified and congruent with data. The stability of the estimated coefficients over the sample period will also be examined by adopting the recursive residual test for structural stability. The Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Square of Recursive Residuals (CUSUMQ) obtained from a recursive estimation of the models will be plotted against the time horizon of the sample. These are compared with the bound critical values at specified significance level. If the plot of the CUSUM and CUSUMSQ remains within the boundaries of the 5 percent critical bound the null hypothesis that all coefficients are stable cannot be rejected.

After the long-run parameters and the error correction term are estimated, the final step involves estimating the short-run dynamic parameters by applying OLS to the error correction representation of the conditional ARDL model in Equation (3). The ECM model is given by:

$$\Delta \text{Ln } PGDP_t = \alpha + \beta\, t + \rho\, D + \sum_{i=1}^{q} \emptyset i\, \Delta \text{Ln } PGDP_{t-i}$$

$$+ \sum_{i=1}^{k1} \varepsilon i\, \Delta \ln GOV_{t-i} + \sum_{i=1}^{k2} \varphi i\, \Delta \ln INF_{t-i}$$

$$+ \sum_{i=1}^{k3} \xi_i \Delta \ln INV_{t-i} + \sum_{i=1}^{k4} \gamma_i\, \Delta \ln OPEN_{t-i}$$

UNDER PEER REVIEW

$$+\sum_{i=1}^{k5} \delta_i \Delta \ln FD_{t-i} + \mu \, EC_{t-1} + U_{tt} \qquad (5)$$

where EC_{t-1} is the error correction term in (4) obtained from Equation (3). The parameters $\emptyset i$, εi, φi, ξ_i, γ_i and δ_i in Equation (5) are the short-run dynamic coefficients which measure the model's convergence to equilibrium, while the coefficient of the error correction term μ is the adjustment parameter, which gives the proportion of the deviations (errors) of the dependent variable from its long-run equilibrium value that has been adjusted (corrected). The coefficient must be negative and statistically significant. The negative sign of the coefficient means that the dependent variable adjusts back to its equilibrium value (or the dynamic model converges to equilibrium) following a disturbance; the magnitude of the coefficient measures the speed of adjustment.

5. Empirical Results:

5.1 Unit Root Test Results:

ARDL framework depends on time series characteristics of the data sets. So, initially we have to investigate the order of integration. This is to ensure that the variables are not 1(2) stationary to avoid spurious results. As Ouattara (2004) argued, in the presence of 1(2) variables the computed F- statistics provided by Pesaran *et al*. (2001) are not valid. Because the bound test is based on the assumption that the variables are 1(0) or 1(1), therefore, the implementation of unit root tests in the ARDL procedure might still be necessary in order to ensure that none of the variables is 1(2) or beyond. The results of the ADF test are reported in Table 5. The results suggest that all the variables are integrated of order one i.e. stationary after first difference. This result gives support to the use of ARDL bounds approach to determine the long-run relationships among the variables.

UNDER PEER REVIEW

871 Table 5. ADF Unit Root Tests for Stationarity of Variables.

variable	Calculated *ADF* statistic					Order of Integration I(d)
	Levels		Ist differenced			
	With Intercept	With Intercept and Trend	With Intercept	With Intercept and Trend	Without Intercept and Trend	
ln*PGDP*	-1.612922	-1.565826	-3.979996*	-4.025534**	-4.024296*	1(1)
lnCPS	-1.396029	-1.214033	-2.380996	-2.498455	-2.413873**	1(1)
lnMS	-1.274461	-1.145045	-4.042218*	-4.031531**	-4.094587*	1(1)
lnLIQ	-1.333035	-1.940286	-4.609452*	-4.543903*	-4.660453*	1(1)
lnGOV	-1.936874	-2.020637	-4.779986*	-4.735750*	-4.830296*	1(1)
lnINF	-1.590161	-1.840765	-4.295784*	-4.230920*	-4.354367*	1(1)
LnINV	-2.460584	-3.095191	-6.746778*	-6.649705*	-6.801842*	1(1)
LnOPEN	-1.537737	-1.710687	-4.284918*	-4.222987*	-4.347577*	1(1)

872 Source: Author's calculations. *, and ** mean significant at 1% and 5%, respectively

873 ## 5.2 Cointegration Analysis:

874 Since all used variables in the study become integrated by one
875 differentiation (I(1)), we may use Pesaran et al. (2001) test for long term relation.
876 As seen in table 6 below, the calculated F-statistic for all equations exceeds the
877 corresponding upper critical bound values at the 1% significance level. Therefore,
878 we reject the null hypothesis of no cointegration and conclude that there is a
879 long-run level relationship between the regressors and the dependent variable in
880 each model.

881 Table 6. Cointegration Test: Dependent Variable ΔlnPGDP.

Financial Variable Included	*F*-Statistica	Critical value bounds of the F-statistics			
		1% Level		5% Level	
		1(0)	1(1)	1(0)	1(1)
lnCPS	7.468	3.34	4.63	2.69	3.83
lnMS	9.200				
lnLIQ	6.501				

Source: Author's calculations. Critical Values are from Pesaran et al. (2001), Table CI(iv) Case IV: Unrestricted intercept and trend.

882

883

UNDER PEER REVIEW

5.3 Estimation of the Long-Run Relationship:

Having found a long run relationship, we applied the ARDL method to estimate the long run coefficients for the different versions of Equation (3). Table 7 reports the regressions of the long-run relationship. The overall goodness of fit of the estimated equations, as shown in Table 7, are high; the F-statistic measuring the joint significance of all regressors are statistically significant.

Table 7. Estimation of Long-Run Coefficients Using the Selected ARDL Model for lnPGDP.

Model Version	Regressor	Coefficient	t-Ratio	Significance Level	R^2	Calculated-F	Significance Level
1	*Constant*	4.1511	9.6378	0.0000	0.786	17.335	0.000
	trend	-0.0006	-0.2593	0.7970			
	D	0.1332	1.7540	0.0887			
	LnGOV$_{-1}$	-0.1327	-1.4527	0.1558			
	LnINF$_{-1}$	-0.1075	-4.0856	0.0003			
	LnINV$_{-1}$	0.1212	3.1840	0.0032			
	LnOPEN$_{-1}$	-0.0938	-1.7883	0.0829			
	Ln CPS$_{-1}$	0.1243	2.0483	0.0486			
2	*Constant*	4.4987	9.6576	0.0000	0.769	15.678	0.000
	trend	0.0001	0.0495	0.9608			
	D	0.2903	4.2975	0.0001			
	LnGOV$_{-1}$	-0.0114	-0.1100	0.9130			
	LnINF$_{-1}$	-0.1038	-3.6196	0.0010			
	LnINV$_{-1}$	0.1142	2.7771	0.0090			
	LnOPEN$_{-1}$	-0.1558	-3.0412	0.0046			
	ln MS$_{-1}$	-0.1114	-1.1834	0.2451			
3	*Constant*	4.2759	9.217124	0.0000	0.760	14.919	0.000
	trend	0.0004	0.162222	0.8721			
	D	0.2395	4.123000	0.0002			
	LnGOV$_{-1}$	-0.0892	-0.865258	0.3931			
	LnINF$_{-1}$	-0.1186	-3.984457	0.0004			
	LnINV$_{-1}$	0.1321	3.161991	0.0034			
	LnOPEN$_{-1}$	-0.1325	-2.440159	0.0202			
	LnLIQ$_{-1}$	0.0263	0.345919	0.7316			

Source: Authors' calculations.

It is obvious from Table 7 that in the long run government expenditure, inflation, money supply and trade openness exert negative effects, while

UNDER PEER REVIEW

investment, private credit and liquidity have positive effect on real per capita GDP. As expected the coefficients of government expenditure are negative but statistically insignificant in all versions of the model. An increase in government expenditure by 1% leads to a reduction in real per capita GDP over time by 0.13, 0.01, 0.09 percentage points in first, second, third version of the model, respectively. This is because government expenditure reduce economic growth through the crowding out effect on private investment and the inflationary pressure it may create (Al- len and Ndikumana, 2000).

Also long run equations state a significant positive effect of investment on real per capita GDP in Sudan. In all versions of the model, this coefficient indicates that, other things being equal, a 1% rise in investment leads to an increase in real per capita GDP over time by 0.11 - 0.13 percentage points. This low response of real per capita GDP to investment indicates that investment in Sudan does not have an important effect on real per capita GDP. This weak relationship between investment and real GDP is attributed usually to the prevailing situations of political instability, prolonged civil wars, and other factors such as uncertainty over agricultural leases which resulted in declining investment, particularly in major agricultural projects. In all versions of the model, the coefficient of inflation is highly significant and negative as expected. A 1% rise in inflation leads to a reduction in real per capita GDP over time by 0.10 - 0.11 percentage points in the long run. In late 1980s and in 1990s Sudan witnessed very high inflation rates which distorted economic activity and reduced investment in productive enterprises, which in turn reduced economic growth. The coefficient of trade openness is negative and significant in all versions of the model. Accordingly, an increase in trade openness by 1% leads to a decrease in real per capita GDP by 0.09 - 0.15 percentage points. A possible explanation of the negative relation between trade openness and real per capita GDP is that since imports

UNDER PEER REVIEW

dominate the trade in Sudan, and apparently most imports are consumer goods, this may tend to crowd out domestic production.

With regard to financial development indicators, the result of the long run analysis indicates that credit to the private sector and the liquid liabilities exert positive effect while money supply affect real per capita GDP negatively. Coefficients of credit to the private sector and liquid liabilities have expected signs. Although the result of the negative relationship between money supply and real per capita GDP reported in this study is inconsistent with general evidence in the empirical literature, it is not surprising in the case of Sudan. A possible explanation for that over our study period is that money supply increased to finance deficit in Sudan. Furthermore, the result obtained in this paper is consistent with Mosesov and Sahawneh (2005) who reported negative relationship between financial development as measured by M2/GDP and economic growth in the UAE. In an earlier study, Ram (1999) did not support the view that financial development promotes economic growth. Using data for 95 individual countries including UAE, Ram found negligible or weakly negative correlation between financial development and economic growth. The coefficient of correlation between M2/GDP and GDP is found to be negative for UAE, but insignificant. Also, Gillman and Harris (2004) obtained negative and significant coefficient on M2/GDP for 13 transition countries. More recently, Mohamed (2008) reported similar result for Sudan. Also Mahran (2012) reached the same conclusion that money supply with other financial development indicators had negative impact on economic growth in Saudi Arabia. The coefficient of the credit to the private sector is statistically significant at 5% level while the other coefficients are insignificant. But despite the fact that, the credit to the private sector exerts a positive and statistically significant impact on real per capita GDP in the long run, the relationship between them in term of elasticities remains very

UNDER PEER REVIEW

weak i.e. 1% increase in the credit to the private sector leads to a respective real per capita GDP increase of 0.12% only. Although the relation between financial development indicators and real per capita GDP is low and insignificant specially in the case of liquid liabilities and money supply, credit to the private sector is the only indicator that affect economy in Sudan. The dummy variable is positive and significant in the all version of the model indicating that during the peace period the real per capita GDP increased.

Table 8 below reports the results of the diagnostic tests for the estimated long-run versions of the ARDL model. All versions pass all diagnostic tests of normality, serial correlation, functional form, and heteroscedasticity. For the first version of the model, Jarque-Bera, $\chi2(2)$ test statistic has a very high p-value, suggesting normality of the residuals, but it is small for the second and middle for the third version. Ramsey RESET F-statistic is highly significant, meaning that the model is correctly specified. White heteroscedasticity $\chi2(2)$ test statistic with cross terms is also insignificant, suggesting that there is no heteroscedasticity in the models. Breusch-Godfrey $\chi2(2)$ test statistic for serial correlation is insignificant for the all version of the model.

Table 8. Diagnostic Tests of the Estimated Long-Run ARDL Models for lnPGDP (P-Values).

Version	Normality (Jarque-Bera)	Functional Form		Autocorrelation		White Heteroscedasticity
		AIC	Ramsey RESET	DW	Breusch-Godfrey	
1	0.160 (0.923)	-1.220	14.396 (0.000)	1.484	1.776 (0.183)	37.843 (0.298)
2	2.490 (0.289)	-1.142	7.584 (0.010)	1.465	1.930 (0.165)	39.236 (0.247)
3	1.510 (0.474)	-1.104	10.149 (0.003)	1.521	1.645 (0.200)	40.510 (0.205)

Source: Authors' calculations.

It is important to investigate whether the above long run relationships are stable for the entire period of study. The stability of the model parameters is examined using the cumulative sum (CUSUM) and the cumulative sum of

UNDER PEER REVIEW

squares (CUSUMSQ) of the recursive residual test for structural stability proposed by Brown *et al*. (1975). CUSUM and CUSUMSQ are plotted against the break points. Parameter stability is indicated when the CUSUM and CUSUMSQ plots against time remain within the 5 percent significance level over the sample period, while parameters and hence the variance are unstable if these plots move outside the 5 percent critical lines. The plots of the CUSUM and CUSUMSQ in Figures 1 - 6 below are obtained from a recursive estimation of the three versions of the model. These plots indicate stability in the coefficients of the first and the third versions of the model and instability in the coefficients of the second version of the model.

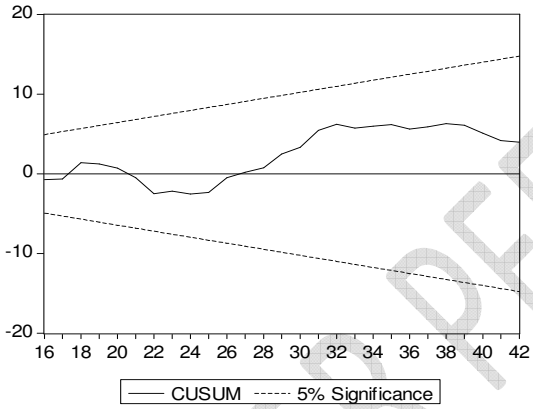


Figure 1. Cumulative sum of recursive residuals: model with CPS.

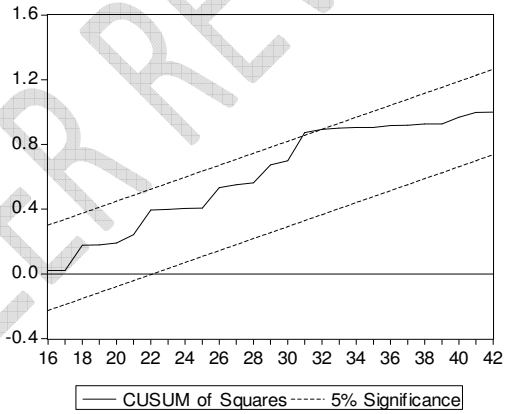
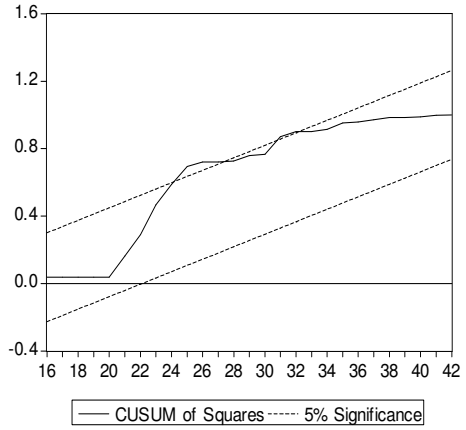


Figure 2. Cumulative sum of squares of recursive residuals: model with CPS

UNDER PEER REVIEW



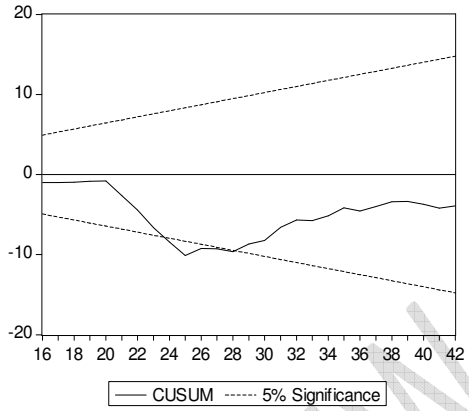
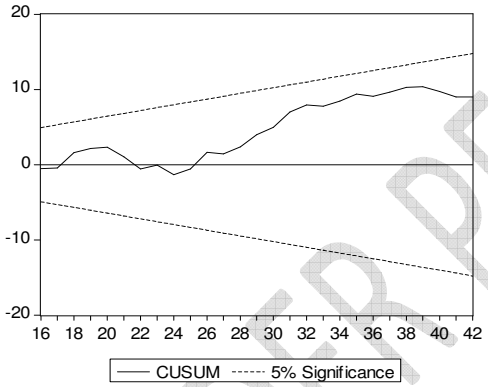


Figure 3. Cumulative sum of recursive residuals: model with MS.

Figure 4. Cumulative sum of squares of recursive residuals: model with MS



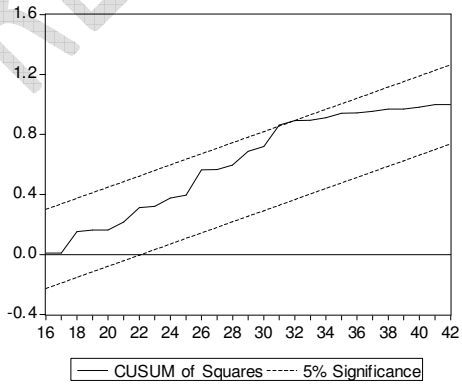


Figure 5. Cumulative sum of recursive Residuals: model with LIQ.

Figure 6. Cumulative sum of squares of recursive residuals: model with LIQ.

5.4. Estimation of Short-Run Parameters:

Finally, we estimate the short-run dynamic coefficients by using OLS method to estimate the ECM equations associated with the ARDL long-run relationships. Table 9 below reports the results of the error correction representation of the estimated versions of the ARDL model. It is obvious from table 9 that the overall models are insignificant and the goodness of fit are very low. Although we could not find any short-run relationship between the

UNDER PEER REVIEW

explanatory variables and real per capita GDP in Sudan, they are related in the long-run. In the short run most variables are statistically insignificant and have the wrong signs. In contrast to the long - run analysis, all financial development seems to have insignificant negative impact on real per capita GDP in the short-run as well. The coefficient of the lagged residual (EC_{-1}) in the ECM model shows the speed of adjustment towards the equilibrium following a shock to the system. The coefficient has the correct signs in the first and the third versions of the model and has the wrong sign in the second version of the model and only significant in the first version of the model. The coefficients of ECt_{-1} are very low and equal to (-0.018) and (-0.056) for first and third versions of the model respectively and imply that deviations from the long-term real per capita GDP are corrected by only 1.8 percent in the first version and 5.6 percent in the third version of the model between two successive time periods.

UNDER PEER REVIEW

Table 9. Estimation of the Short-Run Dynamic Coefficients of the Error Correction Representations of the ARDL Models: Dependent Variable Δ lnPGDP

Regressor	Coefficient	t-Ratio	Signific Level	R^2	AIC	F-Statistic
Constant	0.029	0.822	0.034	0.152	-1.169	0.697
Δ LnGOV$_{-1}$	0.020	0.215	0.091			
Δ LnINF$_{-1}$	-0.032	-0.801	0.040			
Δ LnINV$_{-1}$	0.074	1.824	0.041			
Δ LnOPEN$_{-1}$	0.004	0.066	0.057			
Δ Ln CPS$_{-1}$	-0.027	-0.180	0.151			
D	-0.044	-0.728	0.060			
EC$_{-1}$	-0.018	-1.189	0.016			
Constant	-0.009	-0.312	0.029	0.302	-1.363	1.676
Δ LnGOV$_{-1}$	0.107	1.252	0.085			
Δ LnINF$_{-1}$	-0.027	-0.734	0.036			
Δ LnINV$_{-1}$	0.022	0.609	0.036			
Δ LnOPEN$_{-1}$	0.031	0.597	0.052			
Δ Ln MS-1	-0.353	-2.795	0.597			
D	0.039	0.788	0.050			
EC$_{-1}$	0.030	0.432	0.069			
Constant	-0.004	-0.135	0.028	0.110	0.479	-1.12
Δ LnGOV$_{-1}$	0.045	0.458	0.099			
Δ LnINF$_{-1}$	-0.031	-0.731	0.043			
Δ LnINV$_{-1}$	0.046	1.236	0.037			
Δ LnOPEN$_{-1}$	0.020	0.310	0.065			
Δ LnLIQ-1	-0.034	-0.407	0.084			
D	0.024	0.555	0.043			
EC$_{-1}$	-0.056	-0.572	0.099			

Source: Author's Calculations.

6. Conclusion:

The purpose of this study is to examine the long and short run relationship between financial intermediation and real per capita GDP in Sudan using annual time series data during 1970-2011 by employing the ARDL bounds testing approach to cointegration and the associated error correction model (ECM).. As financial development indicators concerned, the result of the long run analysis indicates that credit to the private sector and the liquid liabilities exert positive effect while money supply affect real per capita GDP negatively. The credit to the private sector and the liquid liabilities coefficients have an expected signs. Although the relation between financial development indicators and real per capita GDP is low and insignificant specially in the case of liquid liabilities and money supply, credit to the private sector is the only indicator that affect economy in Sudan in the

UNDER PEER REVIEW

long-run. A possible explanation for the negative relation between money supply and real per capita GDP over our study period is that money supply increased to finance deficit in Sudan. This result is consistent with the study of Mohamed (2008) for Sudan. As Mohamed (2008) argued, the weak findings may be attributed to the inefficient allocation of resources by banks, along with the absence of an appropriate investment climate required to foster significant private investment and promote growth in the long run, and to the poor quality of credit disbursal of the banking sector in Sudan. Also, the weak capital base, the high cost of borrowing due to insufficient inter-bank competition and the risk of extending credit to sectors other than trade, which is considered by banks as unjustifiably high lead to this weak findings. With regard to the factors other than financial development, we found that the size of government as percent of GDP, inflation rate, gross investment as percent of GDP, and openness to trade affect real per capita GDP in the long-run. Although we find long-run relationship between the explanatory variables and real per capita GDP in Sudan, they are not related in the short-run. One of the most obvious implications of our results is that if Sudan is to realize its target growth rate it needs to reform the financial sector well, create a stable political and economic climate conducive to investment and to finance its budget deficit from real resources.

References:

1. Abu-Bader,S. and Abu-Qarn,A (2008): "Financial Development and Economic Growth: The Egyptian Experience," *Journal of Policy Modeling*, forthcoming
2. Acaravci, A., I., Ozturk and S., K., Acaravci (2007): "Finance-Growth Nexus: Evidence from Trukey", International Research *Journal of Finance and Economics*. ISSN 1450-2887,issue 11 (2007).
3. Ahmed, A.,D., (2010): "Financial liberalization, financial development and growth linkages in Sub-Saharan African countries: An empirical investigation." *Stud. Econ. Financ., 27: 314-339.*
4. Al-Malkawi, H., A., Marashdeh, H., and Abdullah, N., (2012): "Financial Development and Economic Growth in the UAE: Empirical Assessment Using ARDL Approach to Co integration". *International Journal of Economics and Finance Vol. 4, No. 5;* Published by Canadian Center of Science and Education.

UNDER PEER REVIEW

5. Ali, A.A.G. and I.A. Elbadawi (2003): “Explaining Sudans\’s Economic Growth Performance”, Cambridge General Economic Surveys of Africa: Eastern and Southern Africa (Draft).
6. Allen, D., S., and Ndikumana, D., (1998): "Financial Intermediation and Economic Growth in Southern Africa". Working Paper 1998-004B, Federal Reserve Bank of ST. Louis, Research Division.
7. Atindehou,R.B., Gueyie,J.P. and Amenounve, E.K.(2005): “Financial intermediation and economic growth: evidence from Western Africa”, *Applied Financial Economics*, 15.
8. Azege M. (2004), The Impact of Financial Intermediation on Economic Growth: The Nigerian Perspective, Lagos State University.
9. Bank of Sudan: Annual Reports (Various Issues).
10. Bencivenga, Valerie and Smith, Bruce (1991): "Financial Intermediation and Endogenous Growth", *Review of Economic Studies 58, 195-209.*
11. Calderon, C., Liu, L., (2003): “The direction of causality between .nancial development and economic growth”. *Journal of Development Economics 72, 321.334.*
12. Cameron, Rondo (1967): “Banking in Early Stages of Industrialization*”,* Oxford University Press, New York.
13. Chang, T (2002): "Financial development and economic growth in Mainland China: a note on testing demand-following or supply-leading hypothesis". *Appl. Econ. Lett., 9: 869-873.*
14. Christopoulos, D. M., Tsionas, E. G., (2004): “Financial development and economic growth: evidence from panel unit root and cointegration tests.” *Journal of Development Economics 73, 55.74.*
15. De Gregorio, José and Guidotti, Pablo (1995): "Financial Development and Economic Growth", *World Development* 23, March, 433-438.
16. Diamond D.W. and P.H. Dybvig. (1983): “ Bank runs, deposit insurance, and liquidity ”, *Journal of Political Economy*, Vol.91:401-419.
17. Elhiraika, A.B. (1998), "Macroeconomic Instability, Financial Repression and Islamic Banking in Sudan", *Journal of Economics and Management*, International Islamic University of Malaysia, Vol. 6, No. 2, July: pp. 61-85.
18. Fink, G., Haiss, P. and Mantler, H. C., (2005): “The Finance-Growth Nexus: Market Economies vs. Transition Countries”. Europainstitut *Working Paper, No. 64.*
19. Gillman, M., and Harris, M. N. (2004): "Inflation, Financial Development and Growth in Transition Countries".Working Paper, No. 23/04, Department of Econometrics and Business Statistics, Monash University, Australia.

UNDER PEER REVIEW

20. Goldsmith, R. W. (1969): “Financial Structure and Development”. Yale University Press, New Haven, Ct.
21. Greenwood, J. and B. Jovanovic (1990): “Financial Development, Growth, and the Distribution of Income,” *Journal of Political Economy, 98: 1076-1107.*
22. Halkos, G., Trigoni, M., (2010): "Financial development and economic growth: evidence from the European Union." *Manage. Financ., 36: 949-95.*
23. Haroun, N. S. (2001) "Performance of Sudanese Banking System: Current Challenges and Future Prospects", Presented at a Seminar on Banking Sector in Arab Countries: Performance and Challenges, 19-20 Feb. 2001, Kuwait (in Arabic).
24. IMF (2005):"Sudan: Staff Report for the 2005 Article IV Consultation and Midyear Review of the 2005 Staff Monitored Programme", IMF Country Report No. 05/430.
25. Jappelli, T. and M. Pagano, (1994): “Savings, Growth and Liquidity Constraints,” Quarterly *Journal of Economics 109, 83–109.*
26. King, Robert G. and Levine, Ross (1993a):"Finance and Growth: Schumpeter Might Be Right", Quarterly *Journal of Economics 108, August, 717-737.*
27. King, Robert G. and Levine, Ross (1993b):"Finance, Entrepreneurship and Growth: Theory and Growth*", Journal of Monetary Economics 32, December, 513-542.*
28. Kireyev, A. (2001), "Financial Reform in Sudan: Streamlining Bank Intermediation", IMF Working Paper No. 53.
29. Lanyi, Anthony and Saracoglu, Rüsdü (1983): "The Importance of Interest Rates in Developing Countries*", Finance and Development 20, 20-23.*
30. Lee, J., (2005): "Financial Intermediation and Economic Growth Evidence from Canada". Presented at the Eastern Economics Association New York, New York, March 4, 2005.
31. Levine, R., Loayza, N., Beck, T., (2000): “ Financial Intermediation and Growth: Causality and Causes,” *Journal of Monetary Economics 46, 31--77*
32. Mahran, H. A. (2007): "Public Policy and Poverty Reduction in Sudan, 1971-2002", in Ali, A.A. and S. Fan (eds.): Public Policy and Poverty Reduction in the Arab Region, the Arab Planning Institute, Kuwait.
33. Mahran, H. A. (2012): " Financial Intermediation and Economic Growth in Saudi Arabia: An Empirical Analysis, 1968-2010." *Modern Economy, 2012, 3, 626-640.*
34. McKinnon, R, (1973): “Money and Capital in Economic Development**”.** Washington: The Brookings Institute.
35. Mohamad, 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.

UNDER PEER REVIEW

36. Mosesov, A., and Sahawneh, N. (2005): "UAE: Financial Development and Economic Growth". *Skyline Business Journal, 1, 1-11.*

37. Ndebbio, John E. U. (2004): "Financial deepening, economic growth and development: Evidence from selected sub-Saharan African countries," *AERC Research Paper 142.*

38. Odedokun, M.O. (1996): "Alternative econometric approaches for analyzing the role of the financial sector in economic growth: time-series evidence from LDCs", *Journal of Development Economics*, 50(1), 119,135.

39. Rajan, Raghuram G. and Zingales, Luigi (1998): "Financial Dependence and Growth", *American Economic Review* 8, 559-586.

40. Ram, R. (1999).: "Financial Development and Economic Growth: Additional Evidence", *The Journal of Development Studies, 35, 164-174.* http://dx.doi.org/10.1080/00220389908422585

41. Roubini, N. and X. Sala-i-Martin (1992): "Financial Repression and Economic Growth," *Journal of Development Economics, 39: 5–30.*

42. Saber, S.A. (2009): " Efficiency in Sudanese Banks: An Empirical Analysis, 1996-2004". Unpublished Ph.D. thesis, Department of Economics, University of Gezira, Sudan.

43. Saint-Paul, G., (1992): "Technological Choice, Financial Markets, and Economic Development." *European Economic Review 36:763–81.*

44. Schumpeter, J.A. (1911): The theory of economic development. (Harvard University Press, Cambridge, MA.

45. Shan, J. Z., (2005): "Does financial development "lead" economic growth? A vector auto-regression appraisal". *Applied Economics, 37(12), 1353-1367.*

46. Shaw, E. S. (1973): "Financial Deepening in Economic Development". New York: Oxford University Press.

47. Song, Z., C., Zhu, Z., (2010): "Financial development and economic growth in South Korea: an application of smooth transition error correction analysis." *Applied Economics., 42: 2041-2052.*

48. Valverde,S., C., R.,l L., del Paso and F., R., Fernánde (2004): "Banks, Financial Innovations and Regional Growth", Department of Economics, University of Granada, Spain.

49. Wachtel, P. (2001): "Growth and finance: what do we know and how do we know it?" *International Finance., 4: 335-362.*

50. World Development indicators Database.

51. Zang, H. and Kim, Y. C., (2007): "Does financial development precede growth? Robinson and Lucas might be right". Applied *Economic Letters, 14(2007), 15-19.*

UNDER PEER REVIEW