

FINANCE-GROWTH NEXUS AND INFLATION DYNAMICS IN KENYA: AN EMPIRICAL INVESTIGATION

NICHOLAS M. ODHIAMBO¹

Abstract

This study takes a fresh look at the direction of causality between financial development and economic growth in Kenya by examining the impact of inflation on the finance-growth nexus. The empirical results reveal that economic growth Granger-causes financial development in Kenya irrespective of whether the causality is estimated in a bivariate framework or in a trivariate setting. The study, therefore, concludes that the financial sector development in Kenya is largely dependent on the demand for, rather than the supply of, financial services. Other results show that economic growth Granger-causes inflation while inflation Granger-causes financial development in Kenya. The results apply irrespective of whether the causality is estimated in the short run or in the long run.

JEL classification: E44, O11, O16.

Keywords: Kenya, Financial Development, Inflation, and Growth

1. INTRODUCTION

The direction of causality between financial development and economic growth has recently been emphasized by numerous empirical works in sub-Saharan African countries. For a very long time it has been assumed that financial development is very important for economic growth and, therefore, leads to economic growth (supply leading phenomenon). Little had been discussed on the converse, where economic growth can also drive the development of the financial sector, i.e. demand-following effect. However, in practice, there is likely to be an interaction between supply-leading and demand-following phenomena.

¹ Economics Department, University of South Africa, P.O Box 392, UNISA, South Africa, 0003, Email: odhianm@unisa.ac.za / nmbaya99@yahoo.com, Phone: 27-12-4294829.

Patrick's (1966) hypothesis, for example, argues that the direction of causality between financial development and economic growth changes over the course of development. In his view, financial development is able to induce real innovation of investment before sustained modern economic growth gets underway, and as modern economic growth occurs, the supply-leading impetus gradually becomes less and less important as the demand-following response becomes dominant. As Patrick puts it, this sequential process is also likely to occur within and among specific industries or sectors. For instance, one industry may initially be encouraged financially on a supply-leading basis and, as it develops, have its financing shift to demand-following, while another may remain in the supply-leading phase. This would be more related to the timing of the sequential development of industries, particularly in cases where the timing is determined more by governmental policy than by private demand forces (Patrick, 1966: 177). According to the demand following phenomenon, lack of financial growth is a manifestation of the lack of demand for financial services. Therefore, as the real side of the economy develops, its demands for various new financial services materialise, and these are met rather passively from the financial side. In the second view called supply-leading phenomenon, the financial sector precedes and induces real growth by channelling scarce resources from small savers to large investors according to the relative rate of return (see also Jung, 1986).

Although a number of studies have been conducted on this subject, the majority of these studies have concentrated mainly on Asia and Latin America, affording sub-Saharan African (SSA) countries either very little coverage or none at all. Even where such studies have been undertaken, the empirical findings on the direction of causality between financial development and economic growth have been inconclusive. Moreover, previous studies on this topic have mainly concentrated on a bivariate system to test the causal relationship between financial development and economic growth. Yet it is now known that the inference drawn from a bivariate causality framework may be invalid due to an omission of an important variable in the causality model. In other words, the introduction of a third variable in the bivariate causality system may not only alter the causal inference but also the magnitude of the estimates (see Loizides and Vamvoukas, 2005).

The aim of the current study is two-fold: i) to examine the dynamic causal relationship between financial development and economic growth in Kenya; and ii) to examine whether the introduction of inflation in the bivariate causality model changes the direction of the causality between financial development and economic growth. The study, therefore, begins by first using

a bivariate framework and, thereafter, adding a third variable (inflation) in order to form a simple trivariate system. The inflation rate has been chosen as the third variable because of its impact on both financial development and economic growth.

2. FINANCIAL DEVELOPMENT, INFLATION AND ECONOMIC GROWTH IN KENYA

The financial sector in Kenya is among the most developed systems in sub-Saharan Africa [Popiel, 1994]. The sector comprises a number of commercial banks and non-bank financial institutions. By 1993, the country had 32 commercial banks and 55 non-bank financial institutions (of which 25 were subsidiaries of commercial banks), 32 building societies, 10 development finance institutions, and a large Post Office Savings Bank network, among others. In November 1998, the banking system comprised 55 commercial banks, 16 non-bank financial institutions (NBFIs), 4 building societies and 2 mortgage finance companies (MFCs). The number of operational foreign exchange bureaus increased from 37 to 44 by the end of November 1997. However, five commercial banks were under statutory management of the Central Bank [Monthly Economic Review, Central Bank of Kenya, December, 1998]. In June 2000, the number of commercial banks declined to 51, from 52 in June 1999, following the merger of four banks into two banks and one new bank becoming operational. The number of non-bank financial institutions (NBFIs) further declined to 10, from 13 in June 1999, as a result of two merging with their parent banks and one converting into a commercial bank [Central Bank of Kenya, Annual Report, 2000]. Currently, there are about 41 commercial banks, two non-bank financial institutions (NBFIs), two mortgage finance companies and 89 foreign exchange bureaus, amongst others (see Odhiambo, 2008).

Although, on average, financial depth in Kenya has shown a significant improvement since the onset of financial liberalisation, economic growth has, in contrast, taken a different trend. During the early years of independence, Kenya achieved commendable economic growth compared to other SSA countries. However, in 1991 the percentage change in GDP growth declined significantly to 1.44%, and in 1992 Kenya recorded a historic low GDP growth rate of -0.80% – the lowest since independence. Although the GDP growth increased considerably between 1993 and 1995, with the highest rate of 4.41% recorded in 1995, the rate later declined to about 0.48% in 1997. In 1998 the rate increased significantly to 3.29%, but later declined considerably

to 0.60% in 2000, before increasing again to 3.80% in 2001. Although in 2002 the GDP growth rate decreased to its lowest level since 1997, it later increased systematically from about 0.55% in 2002 to 5.81% in 2005 – the highest rate recorded since 1988.

On the inflation side, Kenya's policy over the years has been to maintain low and stable inflation, necessary for sustainable economic growth and job creation. This policy is based on the premise that low and stable inflation contributes positively to a favourable macroeconomic environment. In turn, a favourable macroeconomic environment bolsters savings, investment, and economic growth – thereby increasing employment opportunities. Although Kenya has over the years succeeded somewhat in containing inflation, the recent inflation increase during early 2008, has been a major concern for the Central Bank of Kenya. The inflation rate increased from 12% in December 2007 to 29.3% in June 2008. A number of reasons have contributed to the recent increase in inflation in Kenya. These include: i) the disruption of supply chains in early 2008; ii) the increase in international oil prices – driven large-

Table 1: Trends of Financial Indicators and Economic Growth in Kenya

Year	M2/GDP	GDP Growth Rate (%)	Inflation (%)
1980	0.3614050	5.59	13.86
1991	0.313993	1.44	20.04
1992	0.364494	-0.80	27.33
1993	0.370651	0.35	45.98
1994	0.380119	2.63	28.81
1995	0.421957	4.41	1.55
1996	0.465722	4.15	8.86
1997	0.474901	0.48	11.36
1998	0.438959	3.29	6.72
1999	0.436347	2.28	5.74
2000	0.351647	0.60	9.98
2001	0.341069	3.80	5.74
2002	0.376271	0.55	1.96
2003	0.383136	2.98	9.82
2004	0.390494	4.85	11.62
2005	0.380317	5.81	10.31

Source: Author's own computations from the IFS Yearbook (various issues); World Development Indicators, 2007.

ly by limited spare capacity and inelastic demand; iii) high food prices due to unfavourable weather conditions and slow restoration of supply capacity; and iv) the post-election disturbances in early 2008, which exerted enormous pressure on the food supply networks in most parts of the country. In order to reduce further inflationary pressures, in 2008 the Central Bank of Kenya decided to set a target of 17% for money supply and 16.2% for reserve money for the period ending June 2009. Table 1 shows the trends of M2/GDP, real GDP growth rate and inflation rate in Kenya during the period 1991-2005 as compared with 1980.

3. INFLATION, GROWTH AND FINANCE: A THEORETICAL LINKAGE

The relationship between inflation and financial development on the one hand, and inflation and economic growth on the other, remains a controversial issue on both the theoretical and empirical fronts. Mallik and Chowdhury (2001), in a study on inflation and economic growth in four South Asian countries, for example, find compelling evidence of a long run positive relationship between the GDP growth rate and inflation for all four countries. The authors also find that the sensitivity of inflation to changes in growth rates is larger than that of growth to changes in inflation rates. The authors conclude that moderate inflation is helpful to growth. Yet a number of studies have shown that inflation increases the transactions and information costs, which hinder economic growth and development (see Rousseau and Wachtel, 2002). When inflation is high and persisting, economic agents find planning difficult because of the uncertainty about future absolute and real prices. This uncertainty about future nominal values makes it difficult for economic agents to enter new contracts, which in turn inhibits investment, resource allocations and economic growth. The negative relationship between inflation and economic growth has been widely supported by studies such as Fischer (1993), Burdekin et al. (1994), Barro (1996) and Bruno and Easterly (1998). Fischer (1993), for example, argues that inflation is not good for long-term growth, however weak the evidence may be. Burdekin et al (1994), while conducting a study on the effects of inflation on economic growth in both industrial and developing countries using a panel data, find significant negative effects of inflation on economic growth in the countries studied. However, the authors find that the magnitude of these effects is much larger for the industrial countries than for the developing countries. The authors conclude that further research is needed to investigate the underlying reasons for the variations in the effects of inflation on economic

growth. Barro (1996) finds that there is a negative and significant relationship between inflation and economic growth when inflation exceeds 20%. However, when inflation is below 20% the relationship remains negative but statistically insignificant. In an attempt to examine the relationship between the inflation crisis and long-run economic growth, Bruno and Easterly (1998), find a negative relationship between high inflation (more than 40%) and economic growth. The authors argue that the negative relationship between high inflation and economic growth is largely due to high inflation episodes. Recent studies, however, have shown that there is a threshold level of inflation beyond which a negative effect on economic growth is exerted. Khan and Senhadji (2001), while using panel data for both developing and industrialised countries, find that the threshold estimate for industrialised countries is 1-3%, while that of developing countries is 7-11%.

As in the case of inflation-growth relationship, the relationship between inflation and financial development remains unclear. Studies done by Boyd et al (2001) and Haslag and Koo (1999) show that inflation is associated with financial repression, and that the financial sector becomes less developed as inflation increases, especially when the average inflation rate is very high. There has also been an argument that inflation adversely affects the holding of all classes of financial assets, including the narrow money. In addition, it has been argued that inflation tends to encourage the holding of currency and discourage the holding of quasi-money (see Odhiambo, 2009b; Ikhide, 1992). According to English (1999), a higher inflation rate encourages households to substitute purchased transaction services for money balances, thereby boosting the financial sector. In this way, inflation may have a positive impact on financial development.

4. FINANCE-GROWTH NEXUS - SOME EMPIRICAL LITERATURE

The relationship between financial development and economic growth has recently been emphasized by numerous empirical works. Three groups exist in the literature (Odhiambo, 2009a; 2008). The first group argues that financial development leads to economic growth (supply-leading response). This view has recently been widely supported by McKinnon (1973), Shaw (1973), and King and Levine (1993), among others. The empirical work, which is associated with the supply-leading response in developing countries, includes studies such as: Jung (1986), King and Levine (1993), De Gregoria and Guidotti (1995), Odedokun (1996), Rajan and Zingale (1998), Ahmed and Ansari (1998), Darrat (1999), Ghali (1999), Xu (2000), Jalilian and

Kirkpatrick (2002), Calderon and Liu (2003), Bhattacharya and Sivasubramanian (2003), Christopoulos and Tsionas (2004), Habibullah and Eng (2006), and more recently Yang and Yi (2008), amongst others. The second view maintains that it is economic growth that leads to the development of the financial sector (demand-following response). In developing countries, the empirical work associated with this view includes Agbetsiafa (2003), Waqabaca (2004), Odhiambo (2004), Zang and Kim (2007), and more recently Odhiambo (2008), amongst others. Despite the arguments in favour of the supply-leading response and demand-following response, the empirical results from a number of studies have shown that financial development and economic growth can Granger-cause one another. Some of the studies in developing countries that are consistent with this view include studies such as Wood (1993), Demetriades and Hussein (1996), Akinboade (1998), Luintel and Khan (1999), Al-Yousif (2002) and Odhiambo (2005), among others. Table 2 shows the empirical findings of the causality between financial development and economic growth in developing countries from previous studies (see also Odhiambo, 2008; 2009a).

Table 2: Selected Empirical Findings on the Finance-Growth Nexus in Developing Countries

Author(s) & Year	Region/Country	Methodology	Direction of causality Finance ↔ Growth
A: Studies Consistent with the Supply-Leading Response			
Jung (1986)	56 Countries (19 of which are industrialised)	Cross-section data	Finance Growth (supply-leading pattern occurs more often than demand-following pattern in LDCs)
King and Levine (1993)	80 Countries	OLS; cross-section data	Finance → Growth
De Gregoria and Guidotti (1995)	100 Countries	Panel data analysis	Finance → Growth (the impact of financial development is found to increase from high to low-income countries)
Odedokun (1996)	71 LDCs	Time series regression analysis	Finance → Growth (evidence of supply-leading response is found in 85% of the sample countries)

Rajan and Zingale (1998)	Developing and developed economies	Industry-level data	Finance → Growth
Ahmed and Ansari (1998)	India, Pakistan and Sri Lanka	Pooled data analysis	Finance → Growth
Darrat (1999)	Three Middle-East Countries	Bivariate VAR	Finance → Growth
Ghali (1999)	Tunisia	Time-series	Finance → Growth
Xu (2000)	41 Countries	Multivariate VAR model	Finance → Growth
Jalilian and Kirkpatrick (2002)	Low Income Countries	Pooled-panel data approach	Finance → Growth
Calderon and Liu (2003)	109 Developing and industrial countries	Panel data analysis	Finance → Growth (although financial development is found to enhance economic growth in all study countries, its contribution to the causal relationship is greater in developing countries than in industrial countries)
Bhattacharya and Sivasubramanian (2003)	India	Time series data analysis	Finance → Growth
Christopoulos and Tsionas (2004)	10 Developing countries	Panel cointegration analysis	Finance → Growth
Habibullah and Eng (2006)	13 Asian Developing Countries	Dynamic panel data analysis	Finance → Growth
Yang and Yi (2008)	Korea	Superexogeneity test	Finance → Growth

B: Studies Consistent with the Demand-Following Response

Agbetsiafa (2003)	Eight Emerging SSA Countries	Time series - VECM	Growth → Finance (in Ivory cost and Kenya)
Waqabaca, 2004	Fiji	Time series – Bivariate autoregressive framework	Growth → Finance
Odhambo (2004)	South Africa	Time series - Bivariate causality test based on error-correction modelling technique	Growth → Finance

Zang and Kim (2007)	74 countries	Panel data analysis	Growth → Finance
Odhiambo (2008)	Kenya	Time series - Trivariate causality test based on error-correction modelling technique	Growth → Finance

C: Studies Consistent with the Bi-directional Causality Response			
Wood (1993)	Barbados	Time series - Hsiao (1979) causal testing procedure	Finance ↔ Growth
Demetriades and Hussein (1996)	16 Less developed Countries	Time series analysis	Growth ↔ Finance (considerable evidence of bi-directional causality is found)
Akinboade (1998)	Botswana	Time series analysis	Finance ↔ Growth
Luintel and Khan (1999)	10 developing countries	Multivariate vector auto regression framework	Finance ↔ Growth
Al-Yousif (2002)	30 developing countries	Bivariate VAR	Finance ↔ Growth
Odhiambo (2005)	Tanzania	Bivariate causality test based on error-correction modelling technique	Finance ↔ Growth

5. ESTIMATION TECHNIQUE

5.1 Empirical Model Specification

In this study, the cointegration and error-correction model within bivariate and trivariate causality systems has been used to examine the direction of causality between financial development and economic growth in Kenya. Granger (1988) argues that if a set of variables is stationary or cointegrated, a causality test can be conducted. The Granger-causality test method is chosen in this paper over other alternative techniques because of its favourable response to both large and small samples (see also Odhiambo, 2008). According to Engle and Granger (1987), if F_{Dt} and y/N_t are cointegrated, an ECM representation of the following form could be formulated.

$$\Delta y/N_t = a_0 + \sum_{i=1}^n a_{1i} \Delta y/N_{t-i} + \sum_{i=1}^n a_{2i} \Delta FD_{t-i} + a_3 EC_{t-1} + u_t \quad [1]$$

$$\Delta FD_t = b_0 + \sum_{i=1}^n b_{1i} \Delta y/N_{t-i} + \sum_{i=1}^n b_{2i} \Delta FD_{t-i} + b_3 EC_{t-1} + \varepsilon_t \quad [2]$$

Where

EC_{t-1} represents one period lagged error correction term captured from the cointegration regression.

FD_t represents three proxies of financial development, i.e. the monetisation variable (M_2/GDP), the currency ratio (CC/M_1), and the ratio of bank claims on the private sector to nominal GDP (DCP/GDP).

y/N_t represents per capita income.

The error-correction model has an interesting temporal causal interpretation in the sense that a bivariate cointegrated system must have a causal ordering in at least one direction (Engle and Granger, 1987:259). In the error-correction based causality test based on equations [1] and [2], financial development (FD) does not Granger-cause economic growth (y/N) if all $a_{2i} = 0$ and $a_3 = 0$. Likewise, economic growth (y/N) does not Granger-cause financial development (FD) if all $b_{1i} = 0$ and $b_3 = 0$. However, as discussed in the previous section, it is possible that the causal link between FD_t and y/N_t estimated from equations [1] and [2] could be due to the omission of an important third variable. This possibility can be explored by including a third important variable in the model, e.g. inflation (INF). Consequently, the causal relationship between FD_t and y/N_t can also be examined within the following error correction model².

$$y/N_t = \lambda_0 + \sum_{i=1}^m \lambda_{1i} y/N_{t-i} + \sum_{i=1}^n \lambda_{2i} FD_{t-i} + \sum_{i=1}^n \lambda_{3i} INF_{t-1} + \lambda_4 ECT_{t-1} + \mu_t \quad [3]$$

$$FD_t = \varphi_0 + \sum_{i=1}^m \varphi_{1i} y/N_{t-i} + \sum_{i=1}^n \varphi_{2i} FD_{t-i} + \sum_{i=1}^n \varphi_{3i} INF_{t-1} + \varphi_4 ECT_{t-1} + \varepsilon_t \quad [4]$$

$$INF_t = \delta_0 + \sum_{i=1}^m \delta_{1i} y/N_{t-i} + \sum_{i=1}^n \delta_{2i} FD_{t-i} + \sum_{i=1}^n \delta_{3i} INF_{t-1} + \delta_4 ECT_{t-1} + \nu_t \quad [5]$$

² See also Loizides and Vamvoukas (2005).

The difference between equations [1]-[2] and [3]-[5] is that the introduction of the inflation variable in equations [3], [4] and [5] could alter the causal inference obtained from a simple bivariate causality system presented in equations [1]-[2]. Based on the equations [3]-[5], the following causal relationships can be derived between financial development, economic growth and inflation:

Causal Flow	Conditions
(1) Financial development (FD) → Inflation (INF)	$\delta_{21} \neq 0; \delta_4 \neq 0$
(2) Inflation (INF) → Financial development (FD)	$\phi_{3i} \neq 0; \phi_4 \neq 0$
(3) Economic growth (y/N) → Inflation (INF)	$\delta_{11} \neq 0; \delta_4 \neq 0$
(4) Inflation (INF) → Economic growth (y/N)	$\lambda_{3i} \neq 0; \lambda_4 \neq 0$
(5) Financial development (FD) → Economic growth (y/N)	$\lambda_{21} \neq 0; \lambda_4 \neq 0$
(6) Economic growth (y/N) → Financial development (FD)	$\phi_{1i} \neq 0; \phi_4 \neq 0$

5.2 Data Sources

Annual time series data, which covers the period 1969-2006, is utilised in this study. The data used in the study are obtained from different sources, including various series of the Central Bank of Kenya reports, International Financial Statistics (IFS) Yearbooks published by the International Monetary Fund and African Development Indicators.

5.3 Stationarity Tests

Before conducting the causality tests the variables were tested for stationarity using both the parametric tests originally proposed by Dickey and Fuller (1979, 1981) and the semi-parametric approach proposed by Philips and Perron (1988). The rationale for using Phillips-Perron semi-parametric tests alongside DF and ADF tests is now clear. It has been proved, using Monte Carlo simulations, that the power of the ADF test is very low. The Phillips-Perron semi-parametric tests give robust estimates when the series has serial correlation and time-dependent heteroscedasticity. The results of stationarity tests at levels (not reported here) show that all the variables are non-stationary at levels. The results of difference stationarity tests however show that the variables are stationary after first difference. The results of stationarity on first difference are reported in Tables 1 and 2.

Table 1: Stationarity Tests of Variables on first Difference - DF and ADF Tests

Variable	DF	ADF	Stationarity Status
DLy/N	-5.230	-3.438	Stationary
DLM2/GDP	-5.481	-4.204	Stationary
DINF _t	-6.543	-5.544	Stationary

Critical values:

1% level: DF= -4.32, ADF = -4.12; 5% level: DF= -3.67, ADF = -3.29; 10% level: DF = -3.28, ADF = -2.90.

Table 2: Stationarity Tests of Variables on first Difference - Phillips-Perron Test

Variable	Phillips – Perron(PP)		Stationary Status
	Without Trend	With Trend	
DLM2/GDP	-5.382526	-5.30044	Stationary
DLy/N	-5.73299	-5.81295	Stationary
DINF _t	-8.43949	-11.24294	Stationary

Note: The truncation lag for the PP tests is based on Newey and West (1987) bandwidth.

* denotes significance at 1%.

The DF, ADF, and SBDW test results reported in Tables 1 and 2 confirm that all variables became stationary after being differenced once. It is therefore concluded that the variables are integrated of order one.

5.4 Cointegration Analysis

Having confirmed that all variables included in the causality tests are integrated of order one, the next step is to test the existence of a cointegration relationship between the variables included in the bivariate and trivariate models. For this purpose, the study uses the Johansen-Juselius (Maximum-Likelihood) technique. The results of cointegration tests are presented in Table 3³.

³ The Akaike and Schwarz criteria were used to determine the number of lags for the cointegration test.

Table 3: Maximum Likelihood Cointegration Test-Bivariate Test

Trace Test				Maximum Eigenvalue Test			
Null	Alternative	Statistics	95% Critical value	Null	Alternative	Statistics	95% Critical value
Cointegration Between Ly/N and LM2/GDP							
$r = 0$	$r \geq 1$	18.08	15.4	$r = 0$	$r = 1$	15.07	14.1
$r \leq 1$	$r = 2$	3.01	3.8	$r \leq 1$	$r = 2$	3.01	3.8
Cointegration Between Ly/N, LM2/GDP and INF							
$r = 0$	$r \geq 1$	52.63	29.7	$r = 0$	$r = 1$	45.22	21.0
$r \leq 1$	$r \geq 2$	7.415	15.4	$r \leq 1$	$r = 2$	7.352	14.1
$r \leq 2$	$r = 3$	0.0626	3.8	$r \leq 2$	$r = 3$	0.0626	3.8

Notes:

- 1) r stands for the number of cointegrating vectors
- 2) The lag structure of VAR is determined by the highest values of the Akaike information criterion and Schwartz Bayesian Criterion.

The results of the Johansen-Juselius cointegration tests reported in Table 3 indicate that there exists a stable long-run relationship between the variables included in both bivariate and trivariate models. Both the trace test and the maximum eigenvalue statistics reject the null hypothesis of no cointegration in both models. Specifically, the results show that there is a unique cointegrating vector in the bivariate and trivariate models.

5.5 Analysis of Causality Test Based on the Error Correction-Model

The preceding results show that cointegration has been accepted by the Johansen-Juselius (maximum likelihood) test in both models. The next step, therefore, is to examine the direction of causality using the error-correction mechanism (ECM). In addition to indicating the direction of causality amongst variables, the ECM enables us to distinguish between the short-run and the long-run Granger-Causality. The F-test of the explanatory variables indicates the "short-run" causal effects, whereas the "long-run" causal relationship is implied through the significance of the t-test of the lagged error-correction term. The results of the error-correction model in the bivariate and trivariate models are displayed in Tables 4 and 5, respectively.

Table 4: Bivariate Causality Analysis between $\Delta Ly/N$ and $\Delta LM_2/GDP$

Variables in equation	Dependent Variables	
	$\Delta Ly/N$	$\Delta LM_2/GDP$
Constant	0.0078 (0.241)	-0.012(-0.725)
$\Delta Ly/N-1$	-	0.052(0.870)
$\Delta Ly/N-2$	0.2505 (1.451)	-
$\Delta Ly/N-4$	0.02637 (0.459)	0.166(2.578)**
$\Delta Ly/N-5$	0.1671(2.660)***	0.066(1.062)
$\Delta LM_2/GDP$	-0.1830(-0.511)	-
$\Delta LM_2/GDP-2$	0.22626 (0.687)	0.188(0.846)
$\Delta LM_2/GDP-3$	-0.19845 (-0.618)	-0.326(-1.427)
$\Delta LM_2/GDP-4$	0.37876(1.220)	-0.307(-1.585)
$\Delta LM_2/GDP-5$	-	0.216(0.955)
ECM _{t-1}	-0.038301(-0.547)	-0.114(-2.819)**
F-Test	1.7942 [0.1301]	1.5757 [0.2046]
R ²	0.38	0.43
DW	2.40	2.31

Table 5: Trivariate Causality Analysis between $\Delta Ly/N$, $\Delta LM_2/GDP$ and $\Delta LINF$

Variables in equation	Dependent Variables		
	$\Delta Ly/N$	$\Delta LM_2/GDP$	$\Delta LINF$
Constant	-0.054995(-0.446)	0.041094(0.302)	0.057698(0.428)
$\Delta Ly/N-1$	0.20150(1.019)	0.75663(2.077)**	0.81532(2.247)**
$\Delta Ly/N-4$	0.8557(0.823)	-	-
$\Delta LM_2/GDP$	-0.55729(-0.725)	1.7268(1.097)	-
$\Delta LM_2/GDP-1$	1.8602(2.383)**	-	1.8269(1.171)
$\Delta LM_2/GDP-2$	-0.20851(-0.241)	-	-
$\Delta LM_2/GDP-4$	-	-	-1.6925(-1.094)
$\Delta LINFt-3$	0.04197(0.5721)	0.028965(0.195)	0.036790(0.243)
ECM _{t-1}	-0.1349(-1.487)	-0.8357(4.678)***	-0.81486(-4.400)***
F-Test	1.9472[0.1077]	5.9676 [0.0015]	4.4933[0.0035]
R ²	0.37	0.48	0.53
DW	1.88	1.88	2.06

The empirical results reported in Tables 4 and 5 show that economic growth proxied by per capita income Granger-causes financial development in both bivariate and trivariate models. The long run causality is supported by the statistically significant error-correction terms in the financial development equation in both models, while the short run evidence is largely supported by the lagged economic growth variable in the financial development equation in both models, which is found to be statistically significant as expected. The results also show that economic growth Granger-causes inflation in Kenya both in the short-run and in the long-run. This is supported by the error-correction term and the lagged economic growth variable in the inflation model, which are both statistically significant. The results of the long-run bivariate and trivariate causality tests are summarised in Table 6.

Table 6: Summary of Causality Test

Variables	Causality	General Response
Bivariate - Causality		
$\Delta Ly/N$ (dependent variable) and $\Delta LM2/GDP$	- No long-run causality from financial development to economic growth is detected.	- Financial development does not Granger-cause economic growth.
$\Delta LM2/GDP$ (dependent variable) and $\Delta Ly/N$	- A unidirectional causality from economic growth to financial development is detected.	- Economic growth Granger-causes financial development.
Trivariate - Causality		
$\Delta Ly/N$ (dependent variable), $\Delta LM2/GDP$ and ΔINF	- No long-run causality from either financial development or inflation to economic growth is detected.	- Neither financial development nor inflation Granger-causes economic growth.
$\Delta LM2/GDP$ (dependent variable), $\Delta Ly/N$ and ΔINF	- A long-run causality from economic growth and inflation to financial development is detected.	- Both economic growth and inflation Granger-cause financial development.
ΔINF (dependent variable), $\Delta Ly/N$ and $\Delta LM2/GDP$	- A long-run causality from economic growth to inflation is detected.	- Economic growth Granger-causes inflation.

6. CONCLUSION

In this study, the direction of causality between financial development and economic growth in Kenya is investigated using the cointegration based error-correction mechanism. Previous studies on this subject suffer from two major limitations. First, the majority of the previous studies used cross-sec-

tional data analysis, which cannot satisfactorily address the country-specific issues. Secondly, they over-relied on the bivariate causality analysis, which suffers from the omission of variables bias. In other words, the introduction of a third variable affecting both financial depth and economic growth in the bivariate causality system may not only alter the direction of causality between financial depth and economic growth, but also the magnitude of the estimates. In an attempt to fill this lacuna, the current study uses both bivariate and trivariate causality tests to examine the causal relationship between financial development and economic growth using Kenyan data. The study proceeds by first conducting a dynamic Granger-causality test within a bivariate framework and, thereafter, adding inflation variable as a third explanatory variable in a trivariate framework. The empirical results of this study find a distinct uni-directional causality from economic growth to financial development. This applies irrespective of whether the causality is estimated in a bi-directional framework or in a trivariate setting. The results also show that economic growth Granger-causes inflation in Kenya both in the short run and in the long run. The study, therefore, concludes that the financial sector development in Kenya is largely dependent on the demand for, rather than the supply of, financial services.

References

- Agbetsiafa D.K., 2003, "The Finance Growth Nexus: Evidence from sub-Saharan Africa", *International Advances in Economic Research*, 9(2).
- Ahmed S. and M. Ansari, 1998, "Financial Sector Development and Economic Growth: The South Asian Experience", *Journal of Asian Economics*, 9(3), pp. 503-17.
- Akinboade O.A., 1998, "Financial Development and Economic Growth in Botswana, A Test for Causality", *Savings and Development*, Vol. 22, No. 3, pp. 331.
- Al-Yousif Y.K., 2002, "Financial Development and Economic Growth: Another Look at the Evidence from Developing Countries", *Review of Financial Economics*, Vol. 11, No. 2, pp. 131-150.
- Barro R.J., 1996, "Inflation and Growth", Federal Reserve Bank of St. Louis, Vol. 78, pp. 153-169.
- Bhattacharya P. and M. Sivasubramanian, 2003, "Financial Development and Economic Growth in India: 1970-1971 to 1998-1999", *Applied Financial Economics*, Vol. 13, No. 12.
- Boyd J.H., R. Levine and B.D. Smith, 2001, "The Impact of Inflation on Financial Sector Performance", *Journal of Monetary Economics*, Vol. 47, pp. 221-248.
-

-
- Bruno M. and W. Easterly, 1998, "Inflation Crisis and Long-run Growth", *Journal of Monetary Economics*, Vol. 41, pp. 3-26.
- Burdekin R.C.K., T. Goodwin, S. Salamun and T.D. Willett, 1994, "The Effects of Inflation on Economic Growth in Industrial and Developing Countries: Is There a Difference?", *Applied Economics Letters*, Vol. 1, No. 10, pp. 175-177.
- Calderon C. and L. Lin, 2003, "The Direction of Causality between Financial Development and Economic Growth", *Journal of Development Economics*, Vol. 72, pp. 321-334.
- Christopoulos D. and E. Tsionas, 2004, "Financial Development and Economic Growth: Evidence from Panel Unit Root and Cointegration Tests", *Journal of Development Economics*, Vol. 73, No. 1, pp. 55-74.
- Darrat A.F., 1999, "Are Financial Deepening and Economic Growth Causally Related? Another Look at the Evidence", *International Economic Journal*, Vol. 13, pp. 19-35.
- De Gregorio J. and Guidotti P.E., 1995, "Financial Development and Economic Growth", *World Development*, Vol. 23, No. 3, pp. 433-448.
- Demetriades, P.O., and A.K. Hussein (1996) Does Financial Development Cause Economic Growth? Time Series Evidence from 16 Countries. *Journal of Development Economics* 51, 387-411.
- Engle, R.F. and Granger, C.J., 1987, "Cointegration and Error-correction - Representation, Estimation and Testing", *Econometrica*, Vol. 55, No. 2, pp. 251-78.
- English, W.B., 1999, "Inflation and Financial Sector Size", *Journal of Monetary Economics* 44, pp. 379-400.
- Fischer, S., 1993, "The Role of Macroeconomic Factors in Growth", *Journal of Monetary Economics*, Vol. 32, pp. 485-512.
- Ghali K.H., 1999, "Financial development and economic growth: the Tunisian experience", *Review of Development Economics*, Vol. 3, No. 3, pp. 310-322.
- Granger, C.W., 1988, "Some Recent Developments in a concept of causality", *Journal of Econometrics*, Vol. 39, pp. 199-211.
- Habibullah M.S. and Y. Eng, 2006, "Does Financial Development Cause Economic Growth? A Panel Data Dynamic Analysis for the Asian Developing Countries", *Journal of the Asia Pacific Economy*, Vol. 11, No. 4, pp. 377-393.
- Haslag J. and J. Koo, J., 1999, "Financial Repression, Financial Development and Economic Growth", Federal Reserve Bank of Dallas, Working Paper, No. 99-02.
- Hsiao C., 1979, "Autoregressive Modelling of Canadian Money and Income Data", *Journal of American Statistical Associations*, Vol. 74, pp. 553-560.
- Ikhide S., 1992, "Financial Deepening, Credit Availability and the Efficiency of Investment: Evidence of Selected African Countries", *Development Research Paper Series*, Research Paper No 2.
- Jalilian H. and C. Kirkpatrick, 2002, "Financial Development and Poverty Reduction in Developing Countries", *International Journal of Finance and Economics*, Vol. 7, No. 2, pp. 97-108.
-

-
- Jung W., 1986, "Financial Development and Economic Growth: International Evidence", *Economic Development and Cultural Change*, Vol. 34 (January), pp. 333-346.
- Khan M.S. and S.A. Senhadji, 2001, "Threshold Effects in the Relationship between Inflation and Growth", *IMF Staff Papers*, Vol. 48, No. 1.
- King R.G. and R. Levine, 1993, "Finance and Growth: Schumpeter Might Be right", *Quarterly Journal of Economics*, August 1993, Vol. 108, No. 3, pp. 713-37.
- Loizides J. and G. Vamvoukas, 2005, "Government Expenditure and Economic Growth: Evidence from Trivariate Causality Testing", *Journal of Applied Economics*, Vol. VIII (May), pp. 125-152.
- Luintel R B and M. Khan, 1999, "A Quantitative Reassessment of the Finance-Growth Nexus: Evidence from a Multivariate VAR", *Journal of Development Economics*, Vol. 60, pp. 381-405.
- Mallik, G. and A. Chowdhury, 2001, "Inflation and Economic Growth: Evidence from Four South Asian Countries", *Asia-Pacific Development Journal*, Vol. 8, No. 1, pp. 123-135.
- McKinnon R.I., 1973, *Money and Capital in Economic Development*, The Brookings Institution, Washington D.C.
- 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*, Vol. 50, No. 1, pp. 119-146.
- Odhiambo, N.M (2004), "Is Financial Development Still A Spur to Economic Growth? A Causal Evidence from South Africa", *Savings and Development*, Vol. 28, No. 1, pp. 47-62.
- Odhiambo N.M., 2005, "Financial Development and Economic Growth in Tanzania: A Dynamic Causality Test", *African Finance Journal*, Vol. 7, Part 1.
- Odhiambo N.M., 2008, "Financial Depth, Savings and Economic Growth in Kenya: A Dynamic Causal Linkage", *Economic Modelling*, Vol. 25, No. 4, pp. 704-713.
- Odhiambo N.M., 2009a, "Finance-Growth-Poverty Nexus in South Africa", *The Journal of Socio-Economics*, Vol. 38, No. 2, pp. 320-325.
- Odhiambo N.M., 2009b, "Interest Rate Reforms, Financial Deepening and Economic Growth in Kenya: An Empirical Investigation", *The Journal of Developing Areas*, Vol. 34, No. 1, pp. 295-313.
- Patrick H.T., 1966, "Financial Development and Economic Growth in Underdeveloped Countries", *Economic Development and Cultural Change*, Vol. 14, No. 1, pp. 174-189.
- Popiel P.A., 1994, "Financial Systems in sub-Saharan Africa: A comparative Study. *World Bank discussion Papers*, No. 260, African Technical Department Series.
- Rajan R.G. and L. Zingales, 1998, "Financial Dependence and Growth", *American Economic Review*, Vol. 88, No. 3.
- Rousseau P.P. and P. Wachtel, 2002, "Inflation Thresholds and the Finance-Growth Nexus", *Journal of International Money and Finance*, Vol. 21, pp. 777-793.
-

- Shaw E.S., 1973, *Financial Deepening in Economic Development*, New York, Oxford University Press.
- Waqabaca C., 2004, "Financial Development and Economic Growth in Fiji", Working Paper 2004/03 (December), Economics Department, Reserve Bank of Fiji.
- Wood A., 1993, "Financial Development and Economic Growth in Barbados: Causal Evidence", *Savings and Development*, pp. 379-389.
- Xu Z., 2000, "Financial Development, Investment and Economic Growth", *Economic Inquiry*, Vol. 38, No. 2, pp. 331-344.
- Yang Y.Y. and M.H. Yi, 2008, "Does Financial Development Cause Economic Growth? Implications for Policy in Korea", *Journal of Policy Modelling*, Vol. 30, pp. 827-840.
- Zang H. and Y.C. Kim, 2007, "Does Financial Development Precede Growth? Robinson and Lucas might be Right", *Applied Economics Letters*, Vol. 14, pp. 15-19.

Résumé

Cet étude jette un nouveau regard sur la causalité entre le développement financier et la croissance économique au Kenya grâce à une analyse de l'impact de l'inflation sur la connexion finance-croissance. Les résultats empiriques montrent que la croissance économique cause (selon la théorie de Granger) le développement financier au Kenya indépendamment du contexte bivariable ou trivariable où la causalité s'est produite. D'après cet étude, il en ressort que le secteur du développement financier au Kenya est strictement dépendant de la demande de, plutôt que de la fourniture de, services financiers. D'autres résultats révèlent que la croissance économique cause (au sens de Granger) l'inflation, alors que l'inflation cause (au sens de Granger) le développement financier en Kenya. Les résultats ne tiennent pas compte si la causalité est estimée à court terme ou à long terme.

