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A Startling New Empirical Finding on the Nexus Between Financial Development and Economic Growth in Kenya

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Abstract: The recent global financial crisis has plunged the Kenyan economy into massive currency depreciation, falling international demand, as well as the stagnation in its tourism industry. It is in reference to these episodes that this study aims to investigate whether the long-run financial development and economic growth prospects of the Kenyan economy have been affected. To achieve this, we measure the short-run and long-run impact of financial development on economic growth using time series data from 1980 to 2011. The ARDL bounds-testing approach to cointegration was applied and the U test methodologies. The finding of the study established that financial development has no contributory effects on Kenyan GDP in both the short-run and the long-run and this is immaterial to the course of the financial crisis. Trade openness was persistently discovered to be the most impeding factor to the growth of the Kenyan economy in both the short-run and the long-run. The study also discovered that the relationship between financial development and GDP is monotonic, meaning, there is no excessive monetary dilation in the Kenyan economy. The most startling empirical finding of this study is that the GDP of continents with evidence of the demand-following hypothesis, (as in the case of Kenya) has the fastest readjustment possibilities despite the crisis and other prevailing macroeconomic vices. The question of why and how opens up another area of empirical research.

JEL Codes: N27, O16, O47, G29
Key words: U-test · ARDL bounds-test · Economic growth · Financial crisis

INTRODUCTION

The Kenyan economy, which is driven by agriculture, financial intermediation, tourism and construction, experienced a drastic currency depreciation and rapid inflation in recent times, particularly during the 2007-2008 financial crisis. The crisis suppressed the economic activities of the country. The strong decline in global demand affected Kenyan horticultural exports to European markets and also caused stagnation in the tourism, manufacturing and construction sectors that constitute the mainstay of the Kenyan economy. It is now believed that Kenyan economic growth will not reach previously anticipated growth levels. An African Development Bank (AFDB) report [1] estimated that the Kenyan real GDP growth rate in 2012 was3.4%, compared to an annual real GDP growth rate of 4.4% in 2011 and 5.8% in 2010. The 3.2% figure was attributable to a slowdown in most economic sectors. While real GDP growth is expected by some to increase to 4.5% in 2013 and to 5.2% in 2014,to date, there have not been any indications that these targets will be achieved. Studies have attempted to identify reasons for volatile economic growth among countries. A seminal work is Moreno and Trehan [2], which argued that the dichotomies in economic growth tend to arise due largely from internal and external factors. Internal factors include the level of macroeconomic stability in a country; natural resource endowments; levels of applicable innovation and creativity (which relate to educational systems and how education is used to exploit technology and science); institutional development; levels of capital accumulation;

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the ability of the financial system to convert capital into meaningful productive possibilities; and the sophistication and modernity of the financial system and its ability to provide the necessary funds to ensure thriving entrepreneurial activity. External factors include efficient and effective international trade (exports and imports); exchange rate stability; and the frequency of international capital mobility and its influx. In the modern era, however, the most crucial factor affecting economic growth is arguably a country's ability to deal with international economic risks and to cushion itself against these risks effectively to mitigate their effects on economic systems and subsystems. Failure to do so may explain why countries such as Kenya may experience poor economic growth. Consequently, it is pertinent at this juncture to note that the relationship between financial development and economic growth may not be consistently linear, but rather dependent on the ups and downs of the economy.

Trade integration is argued by many to form the primary channel through which financial crises move from developed to developing economies. This is the experience of Kenya. More specifically, if there is a shock to an economic system that causes demand for imports to fall in a developed economy, the trade balance of the exporting developing country's economy will decline. Eichengreen and Rose [3] used a binary Probit model to ascertain whether there was transmission of crises through the mechanism of trade linkages between industrial countries over the period 1959 to 1993. Their finding was that there was a significant increase in the probability that a country would experience a financial crisis if that country had extensive bilateral trade linkages with countries that were experiencing their own financial crises. In a similar study of data from various countries between 1971 and 1997, Glick and Rose [4] found the same thing. Both sets of authors found that trade linkages, after controlling for other macroeconomic factors, help predict correlations in the exchange market pressures between countries during periods of crisis. In a similar line of research, Kaminsky and Reinhart [5] identified that a country that belongs to a trade bloc will be especially vulnerable to the financial crisis contagion originating in another trade bloc member's economy. The opposite is true; according to Baig and Goldfajn [6], for example, in the Asian Financial Crisis, trade was not important in explaining the contagion because there were small direct bilateral trade volumes between affected countries. Masson [45] made similar conclusions in respect of the Mexican crisis. To date, there have been no studies in this line in relation to the African economies.

Not all agree that trade linkages necessarily provide a complete or even correct explanation for the financial crisis contagion. A good example is the contagion that took place between Brazil and Russia in the late 1990s. There was contagion between these two countries, even though there were no substantial trade links between the two. Another possible explanation, besides trade integration, is that financial crises impact upon economic growth in another country to the extent that the two countries have a high level of financial market integration. An example of how this might occur would be if there was an initial shock associated with an international bank that then spilled over to other economies' real sectors via the mechanism of reductions in bank lending. In a classic work by Kaminsky and Reinhart [7], it was established that a common creditor may withdraw lending in one country when there has been a real shock in another country that weakens its capital position and that the primary channel through which contagion occurs is via declines in foreign capital flows. Such flows include reductions inflows of investment (both foreign direct investment and portfolio investment), reductions in trade credits, constrictions in official development assistance (ODA) (especially to developing countries) and reductions inflows of remittances (Glick & Rose, [4]; Eichengreen, Rose, & Wyplosz, [8]).

Having regard to the foregoing, this study aims to investigate whether the long-run financial development and economic growth prospects of the Kenyan economy have been affected by financial crises and to identify empirically the explanatory variables responsible for the recent slowing of Kenyan economic growth. The remainder of the paper is organized as follows. Section 2 provides an overview of the recent theoretical and empirical literature linking financial development and economic growth. Section 3 provides the theoretical framework. Section 4, the methodology section, introduces the data, the model specification and the model estimation procedure. Section 5 contains the results and discussion. Section 6 presents the conclusion and recommendations for policy.

Theoretical and Empirical Review: According to the literature on growth and finance, there is a symbiotic relation between the development of the real economy and the development of the financial system. According to McKinnon [9], investment is characterized by being lumpy, indivisible and self-financed. Unless adequate savings are amassed in the form of bank deposits, there cannot be investment. Accordingly, there is a complementary relationship between capital and money. According to the debt intermediation hypothesis of Shaw [10], however, productive investment is promoted by financial intermediaries and this productive investment then, through borrowing and lending, causes growth in output. In all of these models, the real rate of return on bank deposits is controlled by the interest rate. The real interest rate acts to discourage saving and then the economy's capital accumulation is affected. A negative influence on financial intermediation is also caused by higher reserve requirements and creates a wider gap between deposit rates and lending Fry, [46]. Capital accumulation and economic growth are encouraged by higher real rates of interest. These arguments gave support for the viewpoint that output growth occurred as a result of financial liberalization, which was caused by better financial development. Subsequently, the finance-growth model proposition was described as the 'supply-leading' hypothesis. Key advocates of this hypothesis included Bagehot [11], Schumpeter [47], Hicks [12], McKinnon [9], Shaw [10] and Christopoulos and Tsionas [13].

The supply-leading hypothesis posits that the financial sector is responsible for the transference of resources from sectors with low growth to sectors with high growth. It also says that the financial sector facilitates and promotes entrepreneurial responses in high-growth sectors Christopoulos and Tsionas [13]. There are two functions of 'supply leading'. The first is to move resources from old sectors with low growth rates to modern sectors with high growth rates. The second is to stimulate, in the modern sectors, entrepreneurial activity. According to the 'McKinnon-Shaw' hypothesis, economic growth can be stimulated by financial liberalization that takes the form of appropriate rates of return on real cash balances. The contention is that a financial system that is well functioning supports innovation by first finding, then choosing and then funding entrepreneurs who have the ability to create successful products and effective processes. According to structuralists, the quantity and the make-up of financial variables feed into economic growth. Researchers like Levine [14] and Kemal, Din, Qadir, Lloyd and Sirimevan [15] have identified that growth may, however, sometimes be impeded by financial development. On the one hand, financial institutions are able to assist by ameliorating risk and helping to allocate resources efficiently. On the other hand, however, they may have a negative effect on growth by reducing risk and returns Kemal *et al*. [15]. There is research that looks at the spillover of volatility from the stock market to foreign exchange markets. Volatility modelling studies have found that there are linkages between behavior in the stock exchange market and in the foreign exchange market. According to researchers such as Robinson [16], Liang and Teng [17] and Odhiambo [18], who support the 'demand-following' hypothesis, finance depends upon economic growth because growth stimulates demand for financial services. Robinson's [16] famous dictum that summarizes the situation is that "where enterprise leads, finance follows."

Other researchers put forward the contention that the model of finance and growth needs to incorporate consideration of public policy, especially policy that influences the sophistication and evolution of domestic financial systems. When public policies create situations of financial depression (e.g., interest rate ceilings, high reserve requirements and credit rationing), incentives to save, for example, are reduced. Further, there may be other financial and economic problems. Consequently, there will be a shortage of investment funds that will reduce economic growth. Researchers in this area therefore posit that financial liberalization is necessary to create economic growth because high rates of interest, particularly on savings, arising from financial liberalization stimulate household saving. This position, however, differs from the model of Goldsmith [19]. He argues that growth and financial intermediation are endogenous variables. In the endogenous growth literature, there is an argument that financial development is affected by the financial sector policies through a particular channel. For example, the simple AK growth models of Pagano [20] suggest that the influence of the financial sector policies on equilibrium growth and financial intermediation occurs through a raising of reserve requirements and through programs of directed credit. The endogenous growth model of King and Levin [21] depicts financial repression policies as negatively affecting financial development. In contrast, however, Arestis and Demetriades [22] and Demetriades and Luintel [23] identified that, in the case of Korea, using a time-series framework, financial repression has a positive effect on financial development. There are, to date, no relevant studies in this line in relation to African economies.

In a leading study, Rioja and Valev [24] examined the prevalence of structural breaks in the relationship between finance and growth. Using a panel of 74 countries and adopting GMM dynamic panel techniques, the authors examined the idea that productivity and capital accumulation may be differently affected by financial development depending on whether one is considering developing or industrialized economies. They found that productivity growth is strongly and positively impacted by finance, especially in more developed countries. They found that finance impacts output through the process of capital accumulation in developing economies. A similar study is Liang and Teng [48], which attempted to identify causality between financial development and economic growth. This was done by examining 11 economies using a structural break framework with a minimum Lagrange multiplier unit-root test and also Hsaio's causality test. These authors identified that most of the time series in their study could be described as segmented trend stationary processes around structural breaks rather than being stochastic unit-root processes. They found, however, that there were different patterns of causality in different economies. Recently, Esso [25] and Hansen and Seo [26] adopted a cointegration with structural change approach and also used Toda and Yamamoto's [49] procedure for a non-causality test. They were interested in identifying if the long-run relationship between growth and finance was unstable and they also tested for the presence of cointegration in the presence of a break point. They found a long-run relationship (with a structural break) between economic growth and financial development in Sierra Leone, Liberia, Ghana, Cote d'Ivoire, Cape Verde and Burkina Faso. Kenya was not included in their study.

A study by Ghirmay [27] used data from 13 sub-Saharan African economies and looked at whether there was a causal relationship between financial development in these countries and economic growth. A bivariate VAR model was used and the author found that, in the case of eight of the countries, financial development led to economic growth, but that in five countries, there was a bidirectional causal relationship. Research by Atindehou, Gueyie and Amenounve [28] that used time-series data for 1960 to 1997 and adopted VAR methods found that there was a causal, but weak, relationship between financial development and economic growth for 12 West African economies but not for Mauritania, where there was unidirectional causality running from finance to growth. A study by Odhiambo [29] looked at whether there was a causal relationship between financial development and growth. This study examined three Sub-Saharan countries and found that there was causality running from economic growth to financial development in the case of South Africa and Kenya but that causality in Tanzania ran from finance to economic growth. A study by Abu-Badr and Abu-Qarn [50] examined the situation in Egypt by studying data from 1960 to 2001 and by using a multivariate VAR approach. They found, in respect of four different measures of financial development, that there was bidirectional causality. Odhiambo [18] examined the situation in Kenya by adopting a dynamic Granger causality model. They adopted three financial development proxies and used real GDP per capita as a proxy for economic growth. They found that the type of financial development measure affects causality between financial development and growth and thereby concluded that it was difficult to conclude that there was an unambiguous causality between financial development and economic growth. Authors like Ronbinson [16] and Lucas [30] believe that there has been undue emphasis on the role played by financial development in supporting economic growth.

A study by Wolde-Rafael [31] studied the situation in Kenya using data from 1966 to 2005 with the use of a multivariate VAR model and a modified Wald test. In the case of three of the four measurements of financial development used in the study, it was found that there was bidirectional causality between financial development and economic growth. Gries, Kraft and Meierrieks [32] conducted a similar study that also used a multivariate VAR model but employed data from 16 Sub-Saharan African economies. Using measures of economic growth, trade openness and finance, the authors found that there was a causal relationship between finance and economic growth in the majority of the sample countries, but that the relationship was weak. They found, however, that there was a stronger relationship between finance and trade openness and between trade openness and economic growth.

Given that the nature of causality in the time-series studies on financial development and economic growth is inconclusive, this study takes note of the shortcomings of earlier research and makes a contribution to the literature surveyed in the following ways:

- It determines whether there is a monotonic or non-monotonic relationship between financial development and economic growth and the impacts of shocks on this relationship in the Kenyan economy. The aim is to ascertain whether, as a result of economic shocks, long-run or short-run changes can affect the direction of causality to have mitigating effects on the dependent variables to deviate from the observed relationship between financial development and GDP growth as theoretically and empirically established. This is done using the latest methodology in the form of the Lind and Mehlum, [53] (SLM) test. The test allows for an exploration as to whether the marginal impact of financial development is positive at a certain point and whether, after a point, financial development no longer contributes to boosting economic growth or may even have a negative outcome for economic growth because of the shock experienced.
- From the foregoing review of the literature, it can be seen that the majority of the papers reviewed concentrate more on finding the direction of causality between finance and economic growth. This paper instead investigates whether the long-run relationship between financial development and economic growth of the Kenyan economy has been affected by the recent financial crisis and also identifies empirically the explanatory variables responsible for the slow growth of the Kenyan economy.

Theoretical Framework: Solow [33], in an effort to present his version of the neoclassical growth model, made assumptions about the prices of the elements of production such as labor, capital and technology. He explained that these factors are the main determinants of output and they are the cardinal elements that are responsible for fostering the growth of GDP. The Solow growth model can be presented as *Y=F(K, AL)*, where *Y= GDP, K= capital* (this is where the concept of financial development and fixed capital formation are regarded as the proxy of capital) *and L= labor* (replaced by population). Following Romer [34], it is assumed that the labor of African countries is able to be referred to as effective labour (AL) since, due to trade liberalization, modern technologies become readily available. It should be noted that the initial level of capital, labor and knowledge are taken as given. Romer [34] further assumes that labor and knowledge grow at constant rates:

$$\dot{L}(t) = nL(t),\ and\ \dot{A}(t) = gA(t)$$

where $\dot{L}(t) = \frac{dL(t)}{d(t)}$ and $\dot{A}(t) = \frac{dA(t)}{d(t)}$

That means that labor and technology grow at n and g rates respectively. Output is divided between consumption and investment. The fraction of output devoted to investment, s, is exogenous and constant. One unit of output devoted to investment yields one unit of new capital. In addition, existing capital depreciates at the rate δ. Thus, $\dot{K}(t) = sY(t) - \delta K(t)$. With this, we can derive the output per unit of labour by dividing by AL:

$$\frac{Y}{AL} = F(\frac{K}{AL}, \frac{AL}{AL}) = F(\frac{K}{AL}, 1)$$

Here,

$\frac{Y}{AL}$ = output unit of effective labor,

$\frac{K}{AL}$ = capital per unit of effective labor

We define $k = \frac{K}{AL}, y = \frac{Y}{AL},$ and $f(k) = F(k,1).$

The whole equation can be rewritten as $y = f(k)$. This means that output per unit of effective labor is a function of capital per unit of effective labor. This function demonstrates that when labor consumes zero amount of capital then total production will be zero [f(0)=0]. Since $F(K, AL)\ equals\ ALf\left(\frac{K}{AL}\right),$ it follows that the marginal product of capital, $\frac{\partial F(K, AL)}{\partial K}$ equals $ALf'\left(\frac{K}{AL}\right)\left(\frac{1}{AL}\right),$ which is just $f(k)$. Thus, the model assumes that $f(k) > 0$ and $f'(k) < 0$, which indicates that the marginal product of c apital is positive but that it declines as the capital-labor ratio passes a certain point. In contrast to the marginal product of capital, labor productivity rises with a rise in the K/L ratio. In the case of less developed economies, labor consumes less capital and hence the marginal product of capital is higher than the marginal product of labor. Moreover, the problem worsens as K/AL decreases over time due to the inclusion of more labor and technology and depreciation of existing capital. From this theoretical analysis, the dynamics of k=K/AL as the economy grows over time can be shown and it is easy to focus on the capital stock per unit of effective labor, k, than on the unadjusted capital stock. Through the chain rule, it can be shown that:

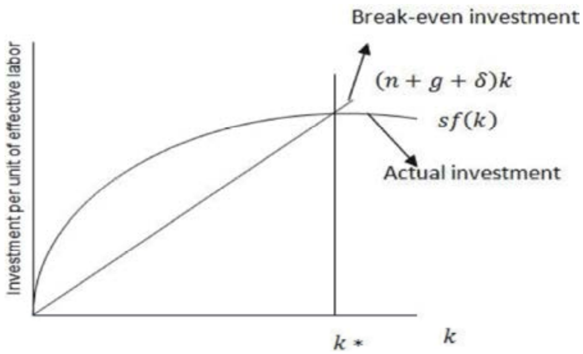

Fig. 1: Showing Actual and break-even investment

$$\dot{k}(t) = \frac{K(t)}{A(t)L(t)} - \frac{K(t)}{[A(t)L(t)]^2}[A(t)\dot{L}(t)\dot{A}(t)]$$

$$= \frac{K(t)}{A(t)L(t)} - \frac{K(t)}{A(t)L(t)}\frac{L(t)}{L(t)} - \frac{K(t)}{A(t)L(t)}\frac{A(t)}{A(t)}$$

$$\dot{k}(t) = \frac{sY(t) - \delta K(t)}{A(t)L(t)} - k(t)n - k(t)g$$

$$= s\frac{Y(t)}{A(t)L(t)} - \delta k(t) - nk(t) - gk(t)$$

Finally, the model will be:

$$\dot{k}(t) = sf(k(t)) - (n+g+\delta)k(t)$$

Hence, for ensuring steady growth, (n+g+δ) amount of capital has to be invested. In the case of less developed economies, if the capital-labor ratio is below the point k*, then the ratio will be falling due to depreciation of existing capital and inclusion of new effective labor. Diagrammatically, the above propositions can be shown as follows:

The diagram shows the total investment per unit of effective labor that needs to be committed in a country to produce a given steady state of the output. The horizontal axis represents the total capital per unit of effective labor (K/AL) employed. At this juncture, it should be pointed out that sf(k) is the representation of total actual investment that accrues as a result of the unit of labor and capital employed (i.e., f(k)), while the fraction of that output that is invested is s. Then, $(n + g + \delta)k$ will yield the break-even point of the investment required. It therefore represents the expected level of investment that must be committed in order to allow k to remain at the steady state. In order to keep K from depreciating, consistent capital replacement must be ensured, particularly in Africa; this is in line with the theory of creative destruction. Similarly, when the quantity of labor is accelerating due to population growth, sufficient investment must further be committed to keeping the capital stock (K) constant. This may not, however, be enough to keep the capital stock per unit of effective labor (k) constant.

MATERIALS AND METHODS

In this study, we use Kenyan annual time series data from the period 1980-2011. The data originate from the World Development Indicators (WDI) data sets. The explanatory variables are GDP per capita at constant 2000 rates, financial development (FD), government expenditure (LGOV), labor force (LLF) and trade openness (LTO). Three measures of financial development are employed: (1) the ratio of credit issued to the private sector by banks to GDP (PRIVATE); the ratio of commercial bank assets to central bank assets (BASSET); and the ratio of liquid liabilities to nominal GDP. This study adopts the approach of Ang and McKibbin [51] in the way it conducts a principal component analysis (PCA) of one measure of financial development. There are two advantages in using this method. The first is that it gets around the multicollinearity issue that arises because there is a high level of correlation between the three financial development variables. The second is that it allows for measuring the gross effect of financial development on the growth of GDP.

Traditionally, the approach taken in studies of this type that involve exploring the cointegration relationship amongst variables is to use the approach of Engle and Granger and Johansen. There are, however, problems with these approaches. The first problem is that the Engle and Granger approach is only for bivariate tests and cannot deal with the situation in which there are more than two variables at a time. Another problem is that one can only use the Johansen test for some orders of integration of variables. A further problem is that the Johansen test is quite sensitive to the choice of the optimal lag number Gonzalo [35]. In view of these problems, this study adopts the technique of Pesaran, Shin, & Smith [36] – the autoregressive distributed lag (ARDL) bounds-test technique. There are several important features of this that need to be explained. First, when the optimum lag has been selected, the OLS technique is used to estimate the cointegration relationship. Second, this test allows for simultaneous establishment of the long-run and the short-run relationships. Unlike the Engle and Granger and Johansen approaches, the test yields consistent results even in the situation in which there is an existing mix order of I(0) or I(1) or where there is mutual integration. This means that it is not necessary to do a unit-root test. That said, however, it is not possible to use this test procedure if there is an I(2) series in the model. Fourth, even if there is an endogeneity problem, the ARDL model yields unbiased coefficients of the explanatory variables and also yields valid test statistics. As noted by Inder [37], the ARDL model is able to correct for omitted lag variable bias. Finally, this test is consistent and efficient in the situation in which the sample size is small and finite.

Model Specification: Following Ang and McKibbin [38], Khan and Qayyum [39] and Fosu and Magnus [40], the ARDL version of the vector error correction model (VECM) can be specified as:

Model 1

$$\Delta \ln GDP = \beta_0 + \beta_1 \ln GDP_{t-1} + \beta_2 \ln GOV_{t-1} + \beta_3 \ln FCF_{t-1} + \beta_4 \ln LF_{t-1} + \beta_5 \ln TO_{t-1}$$
$$+\beta_6 \ln FD_{t-1} + \Sigma_i^p \gamma \Delta \ln GDP_{t-i} + \Sigma_l^q \varphi_l \Delta \ln FCF_{t-l} + \Sigma_m^q \varpi_m \Delta \ln LF_{t-m} + \Sigma_r^q \psi_r \Delta \ln TO_{t-r} +$$
$$\Sigma_k^q \lambda_k \Delta \ln GOV_{t-k} + \Sigma_n^q \eta_n \Delta FD_{t-n} + \varepsilon_t \text{....................................} (1a)$$

Model 2

$$\Delta \ln GDP = \beta_0 + \beta_1 \ln GDP_{t-1} + \beta_2 \ln FCF_{t-1} + \beta_3 \ln LF_{t-1} + \beta_4 \ln GOV_{t-1} + \beta_5 \ln TO_{t-1} + \beta_6 \ln M3_{t-1}$$
$$+\beta_7 PRIVATE_{t-1} + \beta_8 BASSET_{t-1} + \Sigma_i^p \gamma \Delta \ln GDP_{t-i} + \Sigma_j^q \delta_j \Delta \ln FCF_{t-j} + \Sigma_l^q \varphi_l \Delta \ln LF_{t-l} + \Sigma_o^q \lambda_o \Delta \ln GOV +$$
$$\Sigma_r^q \xi_r \Delta \ln TO + \Sigma_m^q \eta_m \Delta \ln M3_{t-m} + \Sigma_n^q \theta_n \Delta \ln PRIVATE_{t-1} + \Sigma_p^q \vartheta_p \Delta \ln BASSET_{t-m} + \varepsilon_t \text{.................................} (1b)$$

Estimation Procedure: We begin by estimating equation (1a in model 1) under the OLS approach and then conduct the Wald test or F-test for joint significance of the coefficients of the lagged variables for the purpose of examining the existence of a long-run relationship among the variables. The null hypothesis is (H_0): $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$, which says that there is no cointegration among the variables. The alternative hypothesis is (H_a): $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$. The calculated F-statistic is evaluated with the critical value (upper and lower bound) given by Pesaran *et al*. [36]. If the F-statistic is above the upper critical value given by Pesaran *et al*. [36], the null hypothesis of no cointegration is rejected, which indicates that a long-run relationship exists among the variables. If the F-statistic is smaller than the lower critical value, the null hypothesis cannot be rejected, implying no cointegration among the variables. If the F-statistic lies between the lower and upper critical values, the test is inconclusive. In the second step, after establishing the cointegration relationship among the variables, the long-run coefficient of the ARDL model can be estimated:

$$\ln GDP = \beta_0 + \Sigma_{i=1}^p \gamma_l \ln GDP_{t-i} + \Sigma_{j=0}^{q1} \tau_j \ln FCF_{t-j} + \Sigma_{i=0}^{q2} \varphi_l \ln LF_{t-l} + \Sigma_{j=0}^{q3} \psi_o \ln TO_{t-j} +$$
$$\Sigma_r^{q4} \xi_r \ln GOV_{t-0} + \Sigma_{m=0}^{q5} \eta_m \ln FD_{t-m} + \varepsilon_t \text{.....................} (2a)$$

$$\ln GDP = \beta_0 + \Sigma_{i=1}^p \gamma_l \ln GDP_{t-i} + \Sigma_{j=0}^{q1} \psi_j \ln TO_{t-j} + \Sigma_{k=0}^{q2} \delta_l \ln FCF_{t-k} + \Sigma_{j=0}^{q3} \varphi_1 \ln LF_{t-l} +$$
$$\Sigma_{o=o}^{q4} \Gamma_o \ln GOV_{t-o} + \Sigma_{n=0}^{q5} \eta_m \ln M3_{t-m} + \Sigma_{o=o}^{q6} \xi_o \ln PRIVATE_{t-l} + \Sigma_{o=o}^{q7} \omega_o \ln BASSET_{t-0} + \varepsilon_t \text{.....................} (2b)$$

In this process, we use SIC criteria for selecting the appropriate lag length of the ARDL model for all four variables under study. Finally, we use the error correction model (equations 3a and 3b below) to estimate short-run dynamics:

$$\Delta \ln GDP = \beta_0 + + \Sigma_{i=1}^p \gamma_l \Delta \ln GDP_{t-i} + \Sigma_{j=0}^q \tau_j \Delta \ln FCF_{t-j} + \Sigma_{j=o}^q \varphi_l \Delta \ln LF_{t-l} + \Sigma_{o=o}^q \Gamma_o \ln \Delta GOV +$$
$$\Sigma_{o=o}^q \psi_o \ln TO_{t-j} + \Sigma_{m=0}^q \eta_m \ln FD_{t-m} + \vartheta emc_{t-l} + \varepsilon_t \text{.....................} (3a)$$
$$\Delta \ln GDP = \beta_0 + + \Sigma_{i=1}^p \gamma_l \Delta \ln GDP_{t-i} + \Sigma_{j=0}^q \tau_j \Delta \ln TO_{t-j} + \Sigma_{k=o}^q \delta_l \Delta \ln LFCF_{t-k} + \Sigma_{j=o}^q \varphi_l \ln \Delta LF_{t-l} + \Sigma_{s=o}^q \Gamma_j \ln \Delta GOVT_{t-s} +$$
$$\Sigma_{n=o}^q \eta_m \Delta \ln M3_{t-m} + \Sigma_{n=0}^q \theta_n \Delta \ln PRIVATE_{t-1} + \Sigma_{o=o}^q \omega_o \ln BASSET_{t-m} + \vartheta emc_{t-l} + \varepsilon_t \text{.....................} (3b)$$

CUSUM and CUSUMSQ Stability Tests: We performed two tests of stability of the long-run coefficients together with the short-run dynamics. We have followed the suggestion by Pesaran [41] to check the stability of the short- and long-run parameters of the selected ARDL model after estimating the error correction model by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests.

RESULTS AND DISCUSSION

Prior to moving on to ARDL estimation, we did a unit root test to identify the stationarity of the variables to make sure that no variable exceeds I(1). This was done to make sure that there were no variables that were I(2) and thereby avoid obtaining a spurious result given that the ARDL model assumes I(0) and I(1) Outtara, [52]. This applied unit root test considers both the trend and the constant. As can be seen from Table 1, with the exception of LGDPC (which is stationary at I(0)), all of the variables are stationary at I(1). The presence of this mixed order of integration shows that it is appropriate to use an ARDL bounds-testing approach to cointegration other than the approach of Johansen and Juslieus.

Before estimating the ARDL bounds-test, we adopted a standard VAR model for choosing the optimal lag length. In this respect, we adopt the Schwarz Bayesian Criterion (SC), which shows the optimal lag length to be 1. Following on from our selection of the optimal lag order, we then estimate, using the OLS approach, Equations 1a and 1b. After that, we do the Wald test to measure the joint effect of all of the regressors. Tables 3a and 3b show the calculated F-statistics for the cointegration tests. These tables show that there are cointegration relationships in both models used. When, however, we normalize LGOV, TO, LF and FD, the Wald test F-statistic shows that there is no cointegration and when fixed capital formation (FCF)is normalized as the dependent variable, we do find cointegration. We do a similar procedure for model 2 and find that there is no cointegration in respect of GOV and LF. When we normalize PRIVATE, we see that there is an inconclusive outcome because the calculated F-statistic lies between the Pesaran critical values.

Table 3a reports the results of the calculated F-statistics when each variable is considered as a dependent variable (normalized) in the ARDL-OLS regressions. The calculated F-statistic F_{GDP}(GDP| TO, FCF, LF, GOV, FD)=2.99 is higher than the upper-bound critical value 2.94 at the 10% level, which means cointegration exists in the model. When LGOV, TO, LF and FD are normalized, however, the Wald test F-statistic indicates that there is no cointegration. When FCF is normalized as the dependent variable, cointegration exists.

Table 3b reports the results of the calculated F-statistics when each variable is considered as a dependent variable (normalized) in the ARDL-OLS regressions. The calculated F-statistic F_{GDP}(GDP| GOV, TO, FCF, LF,M3, PRI, BA) =3.450 is higher than the upper-bound critical value 3.15 at the 5% significance level, which means cointegration exists in the model. Likewise, when all the variables are considered as dependent variables one by one, the respective F-statistic falls within the upper bound of the Pesaran critical value, which reveals that they are cointegrated. In the case of GOV and LF, however, cointegration does not hold. When PRIVATE is normalized, the calculated F-statistic falls in between the Pesaran critical values, meaning the outcome is inconclusive.

Table 4a represents the long-run impact of each independent variable on GDP growth. It shows financial development adversely affects GDP. Likewise, trade does not have any significant impact on long-run GDP. Government expenditure, however, promotes Kenya's economy. The negative signed but insignificant coefficient of TO reveals that trade openness does not have any significant impact on GDP. LFCF and LLF, however, promote the long-run GDP of Kenya.

Table 4b reports that LGOV, LFCF, LLF and M3 all have positive and significant impacts on long-run GDP in Kenya. This time, however, trade openness has a negative and significant impact.The main point here is that when credits go to the private sector, the Kenyan economy suffers.

Table 5a reports that LGOV, LFCF and LLF have positive and significant impacts on GDP, while FD has a negative and significant impact in the short run. On the other hand, TO has a negative and insignificant impact on GDP in the short run. The error correction coefficient is negative and significant, which means that after any economic shock it adjusts 50% per year towards the long-run equilibrium.

Table 5b reports that LGOV, LFCF and LLF still have positive and significant impacts on GDP, while TO has a negative and significant impact in the short run. BASSET, on the other hand, negatively influences short-run GDP.

Table 1: Unit root test

	ADF GLS	
Variables	In level I(0)intercept & trend	First difference I(1)intercept & trend
LGDPC	-3.268*	-5.838***
LFCF	-2.452	-5.402***
LGOV	-1.751	-4.638***
LTO	-2.401	-5.510***
LLF	-2.116	-3.649**
M3	-3.082	-5.761***
PRI	-1.828	-5.299***
BA	-2.537	-7.707***

Table 2: Lag selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	233.4109	NA	6.68e-17	-14.54264	-14.17258	-14.42201
1	483.9750	355.6394*	4.54e-22*	-26.57903*	-23.24848*	-25.49336*

* indicates lag order selected by the criterion

Table 3a: Results from bounds test: model1: GDPC=F(GOV, TO, FCF, LF, FD)

Dep. Var.	SIC Lag	F-statistic	Probability	Outcome
F_{GDP}(GDP|GOV, TO, FCF,LF, FD)	1	2.990*	0.033	Cointegration
F_{GOV}(GOV|GDP, TO, FCF,LF, FD)	1	1.414	0.263	No cointegration
F_{TO}(TO| GDP,GOV, FCF,LF, FD)	1	1.089	0.409	No cointegration
F_{LF}(LF| GDP, GOV, TO,FCF, FD)	1	1.626	0.197	No cointegration
F_{FCF}(FCF| GDP, GOV, TO, LF, FD)	1	3.720**	0.014	Cointegration
F_{FD}(FD| GDP, GOV, TO, LF, FCF)	1	1.741	0.169	No cointegration

Notes: Asymptotic critical value bounds are obtained from Table F in Appendix C, Case II: intercept and no trend for k=6 Pesaran and Pesaran [41]. Lower bound I(0) = 1.99 and upper bound I(1) = 2.94 at the 10% significance level.

Table 3b: Results from bounds test: model1: GDPC=F (GOV, TO, FCF, LF, M3, PRI, BA)

Dep. Var.	SIC lag	F-statistic	Probability	Outcome
F_{GDP}(GDP|GOV, TO, FCF, LF,M3, PRI, BA)	1	3.450**	0.023	Cointegration
F_{GOV}(GOV|GDP, TO, FCF, LF M3, PRI, BA)	1	1.857	0.154	Inconclusive
F_{TO}(TO| GDP, GOV, FCF, LF M3, PRI, BA)	1	3.958***	0.014	Cointegration
F_{FCF}(FCF| GDP, GOV, TO, LF, M3, PRI, BA)	1	7.814***	0.001	Cointegration
F_{LF}(LF| GDP, GOV, TO, FCF, M3, PRI, BA)	1	0.821	0.598	No cointegration
F_{M3}(M3| GDP, GOV, TO, FCF, LF PRI, BA)	1	5.867***	0.003	Cointegration
F_{PRI}(PRI| GDP, GOV, TO, FCF, LF, M3, BA)	1	2.775	0.050	Inconclusive
F_{BA}(BA| GDP, GOV, TO, FCF, LF, M3, PRI)	1	3.103**	0.034	Cointegration

Notes: Asymptotic critical value bounds are obtained from Table F in appendix C, Case II: intercept and no trend for k=8 Pesaran and Pesaran [41]. Lower bound I(0) = 2.11 and upper bound I(1) = 3.15 at the 5% significance level.

Table 4a: Estimated long-run coefficients using the ARDL (1,1,0,0,1,0) selected based on Schwarz Bayesian Criterion

Regressor	Coefficient	Standard error	T-Ratio[Prob]
LGOV	0.463***	0.114	4.043[0.001]
LTO	-0.032	0.050	-0.642[0.527]
LFCF	0.266***	0.065	4.083[0.000]
LLF	0.302***	0.039	7.648[0.000]
FD	-0.023***	0.005	-4.713[0.000]
C	-0.909	0.770	-1.179[0.251]

Table 4b: Estimated long-run coefficients using the ARDL (1,1,0,0,1,1,0,0) selected based on Schwarz Bayesian Criterion

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LGOV	0.313***	0.081	3.842[0.001]
LTO	-0.088**	0.037	-2.328[0.031]
LFCF	0.185***	0.051	3.624[0.002]
LLF	0.266***	0.027	9.613[0.000]
BASSET	0.047	0.079	0.596[0.558]
M3	0.260**	0.113	2.301[0.033]
PRIVATE	-0.994***	0.199	-4.981[0.000]
C	0.604	0.596	1.013[0.324]

Table 5a: Error correction representation for the selected ARDL (1,1,0,0,1,0) selected based on Schwarz Bayesian

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLGOV	0.136	0.055	2.440[0.022]
dLTO	-0.016	0.025	-.623[0.539]
dLFCF	0.133	0.030	4.359[0.000]
dLLF	2.213	0.898	2.464[0.021]
dFD	-0.011	0.002	-4.537[0.000]
dC	-0.455	0.345	-1.319[0.200]
ecm(-1)	-0.500	0.093	-5.376[0.000]
ecm = LGDPC-0.463*LGOV +0.032*LTO-0.266*LFCF-0.302*LLF +0.023*FD +0.909*C			

Table 5b: Error correction representation for the selected ARDL (1,1,0,0,1,1,0,0) selected based on Schwarz Bayesian Criterion

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
Dlgov	0.129	0.055	2.321[.030]
dLTO	-0.063	0.032	-1.971[.061]
dLFCF	0.133	0.031	4.202[.000]
dLLF	3.632	1.082	3.355[.003]
dBASST	-0.036	0.043	-0.839[.410]
dM3	0.187	0.082	2.283[.032]
dPRI	-0.716	0.216	-3.310[.003]
dC	0.435	0.481	0.905[.375]
ecm(-1)	-0.720	0.128	-5.604[.000]
ecm = LGDPC -0.313*LGOV +0.088*LTO-0.185*LFCF-0.266*LLF -0.047*BASSET-0.260*M3 +0.994*PRIVATE-0.604*C			

Table 6a: ARDL-VECM model diagnostic tests: model 1

R^2=0.96, Adjusted R^2=0.94	
Serial correlation $X^2(1)$ = 0.893[0.745]	Normality $X^2(2)$ = 0.852[0.653]
Functional form $X^2(1)$ = 0.024[0.876]	Heteroscedasticity $X^2(1)$ = 0.095[0.758]

Table 6b: ARDL-VECM model diagnostic tests: model 2

R^2=0.97, Adjusted R^2=0.95	
Serial correlation $X^2(1)$ = 1.738[0.666]	Normality $X^2(2)$ = 1.267[0.531]
Functional form $X^2(1)$ = 0.001[0.965]	Heteroscedasticity $X^2(1)$ = 0.160[0.689]

Table 7: U-test: Results of the Sasabuchi-Lind-Mehlum test for an inverse U-shaped relationship

Kenya	
Slope at FD_{min}	0.008 (0.368)
Slope at FD_{Max}	-0.041 (0.108)
SLM test for inverse U shape	0.34
P value	0.36

Schedule A: Present CUSUM and CUSUMSQ Graph for Model 1

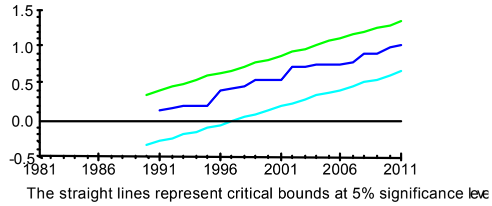

Fig. 2: Plot of Cumulative Sum of Squares of Recursive Residuals

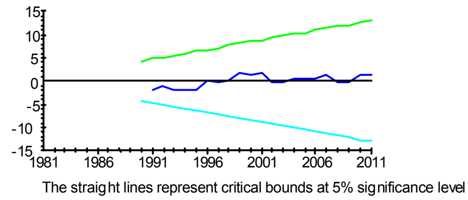

Fig. 3: Plot of Cumulative Sum of Recursive Residuals

Schedule B: Present CUSUM and CUSUMSQ Graph for Model 2

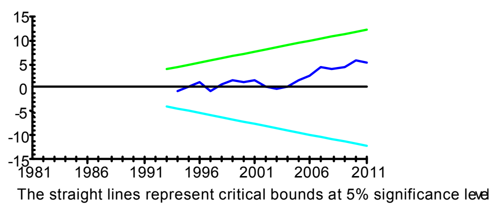

Fig. 4: Plot of Cumulative Sum of Recursive Residuals

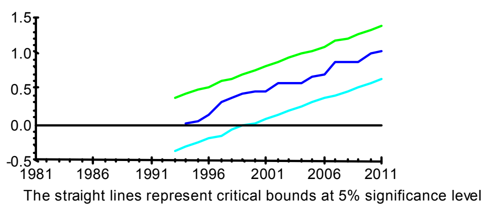

Fig. 5: Plot of Cumulative Sum of Squares of Recursive Residuals

M3 has a strong and positive association with short-run GDP. BASSET does not have any significant impact, but PRIVATE has a negative and significant impact on LGDP. The error correction coefficient is negative and significant, which means after any economic shock it adjusts 72% per year towards the long-run equilibrium.

Tables 7a and 7b present the overall goodness of fit of the two estimated models. It can be seen from the tables that the R^2 values are high. They are 97% for the R^2 value for model 1, 95% for the adjusted R^2 for model 1, 96% for the R^2 value for model 2 and 94% for the adjusted R^2 value for model 2. To make sure our results were accurate; we applied to the ARDL model several diagnostic tests. In so doing, we did not find any evidence, in either model, of problems of heteroscedasticity, error in functional form, multicollinearity, or serial correlation. In Figures 2, 3, 4 and 5, the stability test results of the CUSUM and CUSUMSQ stability tests are displayed. It can be seen that both fall within the critical boundaries at the 5% level of significance. This means that both the short-run coefficients and the long-run coefficients in the error correction model are stable and that they impact Kenyan economic growth.

Sasabuchi-Lind-Mehlum (SLM) Test: A non-monotonic relation between financial development and economic growth was found by Arcand, Berkes and Panizza [42]. We apply the same procedures to Kenya in order to identify if there is a positive marginal impact of financial development on growth at a given point and whether financial development subsequently does not aid economic growth or even potentially reduces it (especially in the case of the global financial crisis and the economic shocks it caused). What is usually done is to capture the non-monotonic relationship by using quadratic forms of the concerned variables. As noted by Lind and Mehlum [43], however, this is no guarantee that there is a non-monotonic relationship between economic growth and financial development. It is only possible to confirm such a procedure by the necessary condition that there is an inverted U-shaped relationship (this, however, is not a sufficient condition). Accordingly, to identify whether there is an inverted U-shaped relationship, Lind and Mehlum [43] created and altered the likelihood ratio test of Sasabuchi [44], which is today referred to as the Sasabuchi-Lind-Mehlum (SLM) test. In order to carry out this test, it is necessary to estimate the following model:

$$GDP_t = aFD + bFD_t^2 + Z_tC + \varepsilon_t$$

Next, it is necessary to conduct the following joint hypothesis test: H_0: $(a + b2FD_{min} \leq 0) \cup (a + b2FD_{max} \geq 0)$ against t. The alternative hypothesis is H_1: $(a + b2FD_{min} \leq 0) \cup (a + b2FD_{max} < 0)$ where FD_{min} and FD_{max} represent t. Here, FD_{min} and FD_{max} represent the maximum and minimum value of financial development. If the null hypothesis is rejected, it confirms the existence of a U-shaped relationship.

It can be seen from Table 7 that the lower-bound slope of FD is positive (0.008) but statistically insignificant while the upper-bound slope of FD is negative (-0.041) and insignificant. The SLM test in the bottom panel of Table 7shows that the null hypothesis cannot be rejected, which indicates that the relation is linear between FD and GDPC.

CONCLUSION AND POLICY RECOMMENDATIONS

In this paper, we examined the empirical relationship between financial development and economic growth in Kenya from 1980 to 2011 using an ARDL bounds-testing approach to cointegration. The study found that financial development (FD) has no contributory impacts upon Kenyan GDP in both the short run and the long run. This, however, may not necessarily be a result of the financial crisis, considering the quick adjustment of the long-run error correction model (72%) after any economic shock. This may, however, be attributed to the direction of causality, as clearly indicated by the cointegration results in Table 3a, which show no cointegration, particularly when government expenditure (LGOV), trade openness (TO), labor force (LF) and FD are normalized. The Wald test or the F-statistic indicates that there is no cointegration. When fixed capital formation (FCF) is normalized as the dependent variable, cointegration exists. Apart from this, the study found that TO has no significant impact on both the short-run and the long-run GDP. Surprisingly, it was discovered that LGOV, LFCF and LLF promote long-run GDP growth in Kenya. The study was equally able to discern that when credit is channeled to the private sector, the Kenyan economy suffers in the short run. Notwithstanding the insignificant contribution of financial development to the GDP growth of Kenya, the study found one of the variables of financial development (M3) to have a strong positive association with short-run GDP. Although the ratio of commercial bank assets to central bank assets (BASSET) does not have any significant impact, PRIVATE has a negative and significant impact on LGDP.

The most startling research finding in the case of Kenya is that while the financial crisis affected the economy in the short-run, the long-run effects of the crisis were mitigated by the mechanism of quick long-run economic re-adjustment. This meant that the Kenyan economy could not be impaired by the systematic risks inherent within the financial crisis. This was clearly suggested by the findings of the long-run error correction model readjustment factor of 72% and the short-run re-adjustment error correction model readjustment factor of 50%. It was also observed that all the error correction coefficients were negative and significant and this means that the Kenyan economy had a strong risk-cushioning effect to the crisis, as the results in Table 5b suggest. The insignificant contribution of TO in both the long run and short run constitute the major impediment to the fast improvement of Kenyan economic growth. This is attributable to the fact that the financial crisis has led to the crippling of the tourism sector and stagnation of demand for the country's industrial products from its European trading partners, most of whom are yet to recover from the repercussions of the crisis. Similarly, the insignificant contributions of BASSET could also have a combined influence in inhibiting the growth prospects of the Kenyan economy.

The result of the U-test confirmed that the relationship between FD and economic growth in the case of Kenya is monotonic (linear). This can be seen from Table 7, where the lower-bound slope of FD is positive (0.008) and statistically insignificant while the upper-bound slope of FD is negative (-0.041) and insignificant. The SLM test in the bottom panel of Table 7 shows that the null hypothesis is unable to be rejected, which indicates that the relation between FD and GDP is linear. This startling finding contradicts Arcand *et al*. [42] because too much finance does not prevail in the Kenyan economy. As a result of this finding, it becomes obvious to argue about what causes this because the study shows that the marginal contribution of FD towards boosting or reducing economic growth in the country is inconclusive. Similarly, this efficient performance did not contribute to the growth of the country's GDP. As a result of this evidence and having observed the error correction model readjustment to be fast, this raises the question of whether continents exhibiting compliance with the demand-following hypothesis, as in the case of Kenya, could not be affected by crisis despite other prevailing macroeconomic vices.

From the above findings, we recommend that policy makers should diversify and establish more trade linkages with countries that are not hard hit by the financial crisis, stimulate internal demand and encourage foreign direct investment and other form of international capital inflows into the country. In addition to this, government should adopt synergistic policies that will aid in the improvement of banking performance through technology and skill acquisition that will allow banks to enlarge their scale of operation to include not only the urban areas but the rural areas should also receive a significant boost with key intents of stimulating rural and urban entrepreneurial prospects. To ensure this, a policy towards efficient and effective banking competition, product diversification and risk minimization should be part of the strategy. This will also aid in supporting and stimulating the private sector of the economy for a continued productive effort that will synergistically assist in curving out unemployment and raising internal demand through productive work force. Finally, it should be noted that this paper exposed a future research gap on why continents in which the demand-following hypothesis is supported have the quickest readjustment of the error correction model after a shock, particularly in the Sub-Saharan African economies.

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