

**Financial Development - Economic Growth Nexus: Empirical Evidence from Uganda**

**by**

**Thomas Bwire<sup>4a</sup> & Andrew Musiime**

**Abstract**

*This paper investigates the finance-growth nexus in Uganda during the period 1970-2005. A generic growth model is estimated using modern multivariate cointegration technique developed in Johansen (1988) and applied in Johansen and Juselius (1990). This was complemented by Granger Causality test to establish whether financial development is supply-leading or demand-following. The study results reveal the supply-leading hypothesis to hold for the case of Uganda. The study results also show that financial development is a necessary but not a sufficient condition for stimulating economic growth that the economy has been experiencing in the past decade. The results indicate that a number of other policy reforms which have been implemented largely fiscal and trade policy reforms have been equally responsible for the impressive growth rates registered since 1992. This therefore implies that financial sector development must be supplemented with other policies aimed at removing some structural bottlenecks that characterize developing economies, Uganda in particular. The results have great relevance in the monetary and overall policy formulation in Uganda.*

**INTRODUCTION**

The role of the financial system in determining macroeconomic performance has long been of concern to economists. In developing countries, this issue has typically been analyzed in the context of financial repression hypothesis (FRH) advanced by McKinnon (1973) and Shaw (1973). Financial repression is a term used to refer to a web of government policies that distort the domestic capital and money markets through such measures as interest rate ceilings, directed credit, uncondusive legal and institutional framework and high reserve requirements. This, among others, undermines efficiency in financial intermediation and, as a result, cause fragmented financial markets, dependence on foreign aid and retards economic growth and development. McKinnon (1973) and Shaw (1973) advocates for the removal of many of these restrictions, that is, financial liberalization to, among others, establish positive real rates on deposits and loans as a growth promoting policy in the third world.

---

<sup>4</sup> Thomas Bwire ([tbwire@isae.mak.ac.ug](mailto:tbwire@isae.mak.ac.ug)) is the corresponding Author. Thomas Bwire is a lecturer in the department of Statistical Methods, Institute of Statistics and Applied Economics at Makerere University while Dr. Andrew Musiime a lecturer at Makerere University Business School.

The theoretical underpinning of the financial liberalization experiments implemented in Uganda and other developing countries since the mid 1980s is the role of financial markets in the growth process. The McKinnon-Shaw positive link between financial depth, defined broadly as the level of development of financial markets, and economic growth is in one sense fairly obvious. (see McKinnon, 1973; Shaw, 1973). That is, more developed countries, without exception, have more developed financial markets. Therefore, it would seem that the policies to develop the financial sector would be expected to raise economic growth. Moreover, the positive effect of financial development on economic growth is further complemented by Schumpeter (1911). He argues; in part, that entrepreneurs first require credit in order to produce. This is suggestive that economic growth requires investment and for the realization of investment, credit services are necessary. In addition, Gurley and Shaw (1955), and Goldsmith (1969), suggest that financial intermediation stimulates economic growth by improving resource allocation and investment opportunities.

While economists have generally reached a consensus on the impact of financial intermediation on economic growth, pointing to causation running from financial intermediaries, Patrick (1966) argues that causation is bi-directional. That is, financial intermediation is both supply-leading and demand-following. Thus, the setting up of financial intermediaries enhances economic growth via increase in savings and it may, itself be enhanced by the existence of “unintermediated” saving in the economy.

With particular reference to Uganda, despite the efforts to streamline (restructure) the financial sector and liberalize the regulations concerning financial institutions and markets, which in part was intended to serve efficient mobilization and channeling of savings to the private sector investment and, as a result, contribute positively to economic growth, Uganda’s economic growth trends have remained illusive (see Back ground to the Budget, 2006/07) with GDP declining from 7.8 percent in the late 1990s to about 5 percent in the mid 2000s. This raises curiosity and hence the need to investigate whether, Financial development is relevant or it may well be the case that, in addition to financial development, there are other structural factors which are important for stimulating long-run economic growth, in which case it may be argued that financial development is a necessary but not a sufficient condition for stimulating economic growth.

This paper aims to empirically investigate the links between financial development and growth. Specifically the paper aims to investigate the direction of causality between financial development and real GDP, and to study the relative impact of other structural factors which directly affect economic growth in Uganda.

In what follows, the remainder of the paper is structured in three sections. Section 2 presents the econometric methodology, including the model, the estimation and testing procedure and data and measurement. The empirical results are presented in Section 3. The conclusions and policy recommendations of the study are reported in Section 4.

## II THEORY

### 2.1 General Principles

To link financial intermediation to economic growth, recent contributors to the “new” economic growth literature have reconsidered the role of financial intermediaries. The new paradigm stresses the information-processing role of financial institutions. In the theoretical Arrow-Debre world, characterized by a complete set of state-contingent claims, with no information or transaction costs, there is no need of financial intermediation. However, what creates such a role is the existence of asymmetric information (possessed by the borrower, but not the lender), as well as contract negotiation and enforcement costs. Under such conditions, uncollateralized external finance creates incentive problems, since the costs of failed investment will not be borne entirely by the agent undertaking the project<sup>5</sup>. Lenders thus extract a premium to compensate them for evaluation, monitoring, and contract enforcement costs. In this world, financial intermediation is likely to be undertaken by specialized institutions, rather than by individuals, because the information-gathering and processing functions are likely to be subject to large fixed costs, making it cheaper for such activities to be carried out by agents who undertake them on a large scale<sup>6</sup>. Firms that specialize in this function also provide financing to investors. To do so, they must raise their own funds by borrowing from savers. Thus, financial institutions play two distinct roles. On the one hand, they identify the most promising investment projects and monitor the behavior of entrepreneurs. On the other, they channel resources from savers to investors<sup>7</sup>.

They are able to attract resources from savers because their liabilities offer attractive combinations of expected return, risk, and liquidity. All of these features arise from pooling. Asset pooling provides diversification, protecting savers from the idiosyncratic risks attached to individual projects and leaving them exposed only to systematic risk.<sup>8</sup> Liability pooling permits intermediaries to fund lumpy, high-return projects that would be beyond the reach of individual savers. It also insures the intermediary against withdrawals, permitting it to offer assets of short maturity to savers. The existence of intermediaries thus permits the economy to undertake projects that have high expected return but are risky, lumpy, and liquid.

How are these functions linked to economic growth? As emphasized by Gertler and Rose (1991), growth and financial development are mutually dependent. The level of per capita income partially determines the level of financial development, for at least two reasons. First, monitoring costs are likely to be inversely related to a borrowing firm’s net worth, both because net worth can serve as explicit collateral for loans and because having their own assets at stake serves to align the incentives of the investors more closely with those of lenders, even when those assets have not been offered collateral. Second, costs of

---

<sup>5</sup> Borrowers have an incentive to appropriate the resource provided by the lenders by, for example, shirking. This would then be disguised by the misrepresenting the outcome of the project.

<sup>6</sup> Such costs may include for example the acquisition of expertise required to value any investment project; but once acquired, it can be applied to evaluate new projects at low marginal cost

<sup>7</sup> See also King and Levine (1993)

<sup>8</sup> By making their liabilities more attractive, this lowers the cost of external funds for intermediaries.

evaluating and monitoring loans, as well as those of enforcing contracts, depend on the availability of public goods in the form of an established system of property rights, suitable accounting standards, and an efficient judiciary.

In addition, financial development promotes growth by providing the necessary funding. Competitive financial institutions permit high-return projects to be undertaken. If these institutions are efficient and not subject to excessive taxation, they pass on the return to their creditors, who may thereby be induced to save. Such institutions can thus potentially both enhance the efficiency of investment by allocating it properly and increase its volume. This direction of causation is explored in more detail below.

### 2.1.1 Financial development and growth

Consider, then, the growth effects of an innovation in financial development. In the context of the Solow growth model, the resulting increases in total investment and improvements in the allocation of investment would, with a given state of technology, result in a boost to the rate of economic growth while capital is being reallocated from less to more productive use and before diminishing returns drive the marginal product of capital down to its steady-state level. After the reallocation of capital has been completed and the steady state has been reached, growth would return to its natural level, albeit at a higher level of income per capita.

More sustained effects on the growth are possible if the productive factor that the economy can accumulate endogenously is not subject to diminishing returns. To study the effects of financial development on growth in this setting, consider the simplest possible model consistent with endogenous long-run growth. This is one in which the aggregate production function is given by “AK” technology (Rebelo, 1991), and the saving rate is constant:

$$Y = AK \tag{1}$$

$$\dot{K} = I \tag{2}$$

$$I = \phi s Y \tag{3}$$

Here equation (1) is the aggregate production function, with output proportional to the capital stock; Equation (2) describes the dynamics of the capital stock. The final equation is the goods-market equilibrium condition, which equates saving to investment. The assumption is that the notional saving rate is constant, with a value given by the parameters, but that the process of financial intermediation absorbs a fraction  $(1-\Phi)$  of all saving, which is diverted into consumption.<sup>9</sup> This model serves as a simple point of departure from which extensions are derived below to illustrate particular points.

The behavior of economic growth implied by this model is:

---

<sup>9</sup> This formulation is taken from Pagano (1993).

$$\hat{Y} = A\phi s \quad (4)$$

Thus, innovations in financial development can alter the growth rate through three channels:

- Improved efficiency of intermediation (increased  $\Phi$ ).
- Improved efficiency of the capital stock, measured by increases in the parameter  $A$ .
- An increase in the saving rate  $s$ .

Whether given innovation in financial development affects growth through any one (or more) of these channels depends, of course, on the nature of the innovation and the properties of the economy.

### 2.1.2 Improved efficiency of inter mediation

With improved financial intermediation, the portion of national saving that is diverted by the financial system into “nonproductive” uses falls, and the rate of capital accumulation consequently increases, for a given saving rate.<sup>10</sup> The parameter  $(1 - \Phi)$  is an index, among other things, of the resource cost of operating the financial system. Restrictions to entry into the financial system, high required reserve or liquidity ratios, ceilings on interest rates, and the other regulations that together compromise financial repression, can each increase the costs of financial intermediation. The first of these permits firms in the financial system to extract monopoly rents from savers and the borrowers, while the second extracts resources for the government. The third diverts intermediation into the informal financial system, where the scale of operation may be inefficient, or abroad, from where it may not find its way back into domestic investment.

### 2.1.3 Improved efficiency of the capital stock

The monitoring function of financial institutions described above takes the form of measuring the marginal product of capital in alternative activities. A simple extension of the model described above, due to Easterly *et al* (1992), illustrates the role that funding high-return projects can play in sustaining high rates of economic growth. Suppose that the aggregate capital stock consists of two types of capital  $K_1$  and  $K_2$ , which can be transformed into each other at a constant rate (perhaps because they are both traded goods, or because they are each made in the same way from some currently produced good). By choice of units, let one unit of  $K_1$  be convertible into one unit of  $K_2$ . Thus the aggregate capital stock is  $K_1 + K_2 = K$ . Aggregate output takes the form:

$$Y = F(K_1, K_2) \quad (5)$$

---

<sup>10</sup> In effect, saving by the household sector is partly offset by financial-sector dis-saving.

i.e. a standard neoclassical production function with constant returns to scale. Dividing  $F$  by  $K_2$  and defining  $\theta = K_1/K_2$ , the production function can be written as

$$\begin{aligned} Y &= F(K_1/K_2, 1) K_2 \\ &= f(\theta) \frac{1}{1+\theta} K \\ &= A(\theta)K \end{aligned} \quad (6)$$

The effect is to make the productivity parameter a function of the allocation of the aggregate capital stock. Under present assumptions, the value of  $\theta$  that maximizes  $A$  satisfies:

$$f'(\theta) \frac{1}{1+\theta} - f(\theta) \frac{1}{(1+\theta)^2} = 0 \quad (7)$$

Or

$$f'(\theta) = f(\theta) - f'(\theta)\theta \quad (8)$$

which is the requirement that the marginal product of the two types of capital be equalized. This outcome will emerge if financial institutions are able to identify the marginal product of capital in alternative uses, and channel funds in such a way as to give priority to high-productivity projects.

#### 2.1.4 Increases in the saving rate

In the simple framework above, the saving rate is exogenous. To investigate the role of the financial sector in influencing aggregate saving, it is necessary to examine household saving behavior. The upshot is that the effects of financial liberalization on household saving are ambiguous on theoretical grounds.

The most familiar framework for private saving is based on analyzing the behavior of a representative agent with an infinite horizon and additively-separable preferences. In this case, if the utility function is of the constant relative risk-aversion (CRRA) type, the rate of growth of consumption over time is given by:

$$\hat{c} = \sigma^{-1}(A - \rho) \quad (9)$$

Where the inverse of  $\sigma$  is the intertemporal elasticity of substitution, and  $\rho$  is the rate of time preference. With the same technology as before, from an arbitrary initial capital stock  $K_0$ , the growth rate of output, consumption, and capital stock will eventually converge to the growth rate of consumption given by Equation (9), so we have:

$$\hat{Y} = \sigma^{-1}(A - \rho) \quad (10)$$

Thus, an increase in the real rate of return on capital A, is likely to twist the consumption path, depressing present consumption in favour of future consumption, to a degree that depends on the intertemporal elasticity of substitution.<sup>11</sup> Whether household saving increases or decreases, however, depends on whether this effect dominates the positive income effect on current consumption emanating from a higher present value of lifetime resources.

Moreover, if utility is of CRRA type, but the argument in the utility function is the access of consumption over some subsistence level (rather than the level of consumption itself), then the intertemporal elasticity of consumption will be an inverse function of the initial level of consumption. This implies that “consumption twisting” in response to an increase in A will be weak in countries with low initial levels of per capita consumption. Further, this analysis assumes that financial liberalization affects household saving primarily through its effect of A. to the extent that it additionally serves to remove liquidity constraints faced by households under financial repression, this factor may lead to reduction in saving.<sup>12</sup>

### 3. ECONOMETRIC METHODOLOGY

#### 3.1 The Model

We specify an eclectic model that is inspired by King and Levine (1993). The model predicts that economic growth (proxied by real GDP) is determined by indicators of financial development (proxied by financial intermediation ratio - M2/GDP ratio and bank credit to the private sector ratio-measured by ratio of credit flow to private sector to GDP), real domestic interest rate, Fiscal deficits, exchange rates, population, manufactured exports, total exports and expected inflation rate (measured using CPI), such that:

$$P^e_t = \left( \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} \right) 100 \quad (11)$$

Where,  $CPI_t$ =Consumer price index in period t; and  $CPI_{t-1}$ = Consumer price index for the previous period (t-1).

Since Uganda began on meaningful financial sector liberalization programmes only in 1992, the sample is broken into the pre-ESAP (1970-1992) and the ESAP (1993-2005) periods in an attempt to investigate if there were any structural changes between the two periods. In addition, a dummy, which assumed values of one (1) for ESAP period and zero (0) otherwise and Chow break point test have been used for this structural policy change. Accordingly:

---

<sup>11</sup> Moreover, for give value of A, anything that increases the extent to which this rate of return is passed on to savers (e.g., low reserve requirements, more competition) will similarly affect the consumption path.

<sup>12</sup> See Japelli and Pagano (1994).

$$GY_t = \alpha_0 + \alpha_1 FR_t + \alpha_2 TCP_t + \alpha_3 IRR_t + \alpha_4 INF_t + \alpha_5 DEF_t + \alpha_6 EXR_t + \alpha_7 POP_t + \alpha_8 TEX_t + \alpha_9 D_{92} + \varepsilon_t \quad (12)$$

where,  $GY_t$  = economic growth, defined by real GDP,  $FR_t$  = financial intermediation ratio proxied by M2/GDP ratio;  $TCP_t$  = bank credit to the private sector as a ratio of GDP (a measure of financial development);  $IRR_t$  = real interest rate  $INF_t$  = expected inflation rate;  $DEF_t$  = fiscal deficits;  $EXR_t$  = exchange rates,  $POP_t$  = population,  $TEX_t$  = total exports  $D_{92}$  = dummy variable and  $\varepsilon_t = i.i.d N(0, \sigma^2)$  serially uncorrelated error term.

From Equation (12), it is expected  $\alpha_1, \alpha_2, \alpha_3, \alpha_7, \alpha_8 > 0$  and  $\alpha_5, \alpha_6 < 0$  while  $\alpha_4$  is indeterminate.

### 3.2 Estimation and Testing Procedures

The first step of the analysis involves pretesting each variable to determine its order of integration, since by definition, cointegration necessitates that the variables be integrated of the same order. The Augmented Dickey Fuller (ADF) unit root testing procedure (Dickey and Fuller, 1979) is used to test for the stationarity of the series. This tests the size of the coefficient  $\psi$  in the following equation:

$$\Delta y_t = \beta_o + \lambda t + \psi y_{t-1} + \beta_i \sum_{i=1}^k \Delta y_{t-i} + \varepsilon_t \quad (13)$$

Where,  $t$  denotes the time trend. Acceptance of the null hypothesis that  $|\psi| = 0$  confirms the presence of non-stationary process

Assuming that the results in step one indicate that at least one series is integrated of the same order as the dependent variable, step two involves formulation and estimation of the theoretical long run equilibrium relationship. The concept of cointegration implies that if there is a long run relationship between two or more non-stationary variables, deviations from long run relationship are stationary. To test for cointegration among these nine series, a multivariate cointegration technique developed in Johansen (1988)<sup>13</sup> and applied in Johansen and Juselius (1990) is used. Specifically, given an  $N \times 1$  vector of variables,  $X_t$ , where in this case  $X_t = (GY, FR, TCP, IRR, INF, DEF, EXR, POP, TEX)$ , assume at date  $t$ , and also, considering a VAR model of order  $p$  with Gaussian errors, the dynamics of  $X_t$  are pre-sumed to be governed by a  $p$ th-order Gaussian vector autoregression:

$$X_t = c + \pi_1 X_{t-1} + \dots + \pi_p X_{t-p} + \varepsilon_t \quad (14)$$

Where  $X_t = nx1$  vector of variables ( $GY, FR, TCP, IRR, INF, DEF, EXR, POP, TEX$ );  $c = nx1$  vector of constants or drift terms ( $9 \times 1$  in this case);  $\pi_i = nxn$  matrices of

<sup>13</sup> The test is preferred because its optimality has been shown by Phillips (1991) in terms of symmetry, unbiasedness, and efficiency properties. A Monte Carlo study by Gonzalo (1994) supports the superior properties of the Johansen technique relative to several other cointegration techniques, the ADF test suggested by Engle and Granger (1987) inclusive.

time-invariant coefficients (9 x 9 in this case);  $\forall i = 1, \dots, p$   $\varepsilon = nx1$  vector of i.i.d errors with a positive covariance matrix.

To distinguish between stationarity by linear combinations and by differencing, equation (4) is reparametrized to include an error correction term. Therefore the system in equation (4) can be written in vector error-correction form:

$$\Delta X_t = c + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-p} + \Pi X_{t-p} + \varepsilon_t \quad (15)$$

Where,  $\Pi = -I \left( -\sum_{i=1}^p \pi_i \right)$ ;  $\Gamma_i = -(\pi_{i+1} + \dots + \pi_i)$ ,  $\forall_i = 1, \dots, p-1$ ;  $\Delta =$  the first difference operator;  $p =$  optimal lag length;  $\varepsilon_t \sim iid(0, \delta^2)$  - serially uncorrelated random error term.

Equation (15) differs from a standard VAR in differences because it includes the error correction term  $\Pi X_{t-p}$ . The system represented in equation (15) also contains information on both the short- and long-run adjustment to changes in  $X_t$ , via the estimation of  $\Gamma_i$  and  $\Pi$  respectively and specifically whether the dynamic responses of the variables conform to theory.

Granger representation theorem asserts that if the stochastic matrix  $\Pi$  has reduced rank  $r < n$ , then there exist  $rxn$  matrices  $\alpha$  and  $\beta$  each with rank  $r$  such that  $\Pi = \alpha\beta'$  where  $\beta$  is the matrix of cointegrating vectors and  $\alpha$  the adjustment coefficients. Johansen's method is to estimate the  $\Pi$  matrix in an unrestricted form, and then test whether the restrictions implied by the reduced rank of  $\Pi$  matrix, that is, there are  $r \leq (n-1)$  cointegrating vectors present can be rejected.

### 3.3 Data and Measurement

Quarterly time series data on the Ugandan macroeconomic variables for the period 1970: I-2005: IV is used in the study. All variables are transformed to natural logarithms before estimation. The data are taken from the *International Finance Statistics* published by the International Monetary Fund. Since the series on income, and population were not readily available on quarterly basis, the existing annual data were transformed into quarterly data using the computer method of direct linear interpolation.

## 4. EMPIRICAL RESULTS

### 4.1 Univariate Test Results

Descriptive statistics for the data were undertaken and the results of the test are summarized in Table 1(a). This shows that all the variables satisfy the normality test in levels.

**Table 1 (a): Descriptive Statistics for Variables in Levels**

	<b>LGY</b>	<b>LM2Y</b>	<b>LIRR</b>	<b>LPOP</b>	<b>LDEF</b>	<b>LTCR</b>	<b>LEXR</b>	<b>LINF</b>	<b>LTEX</b>
Mean	39.19	11.26	20.98	21.08	43180.25	12359.52	2.817108	3.546	15.550
Median	32.97	8.57	10.77	14.08	125	2.007159	3.18	3.773	16.296
Maximum	113.33	30.99	87.63	80.83	287060	437365.6	5.27	6.314	20.985
Minimum	0.059669	0.010629	0	0.15	10	0.009788	0.99	-1.204	9.798
Std. Dev.	27.1758	8.070034	22.61044	18.62	81967	58383.89	1.267842	1.429	4.441
Skewness	0.9068	0.797171	1.132981	1.247411	1.38208	5.707479	-0.07179	-0.109	-0.109
Kurtosis	3.172205	2.698203	3.203772	3.15619	4.647136	3.46632	1.8965	1.289	1.289
Jarque-Bera	16.59398	13.16503	25.88055	34.786	77.0806	6251.48	6.191258	4.895	16.360
Probability	0.249	0.1384	0.401	0.421	0.142	0.211	0.45247	0.8066	0.2800
Observations	132	132	132	132	132	132	132	132	132

Using conventional testing procedures of Augmented Dickey-Fuller (ADF) the order of integration of the variables (and the degree of differencing required in order to induce stationarity) was determined. The unit root test results are presented in Table 1(b). The hypothesis of a unit root is not rejected for any of the Ugandan time series. All variables are stationary only for the first difference.

**Table 1(b): Testing for Unit roots**

<b>Macro Variables</b>	<b>ADF levels</b>		<b>ADF first difference</b>	
	<b>ADF</b>	<b>Order of Integration</b>	<b>ADF</b>	<b>Order of Integration</b>
LGY	-0.171	I(1)	-6.94*	I(0)
LDEF	-1.564	I(1)	-5.65*	I(0)
LINF	-2.910	I(1)	-11.25*	I(0)
LEXR	-2.509	I(1)	-11.98*	I(0)
LIRR	-2.031	I(1)	-10.68*	I(0)
LM2Y	-2.034	I(1)	-8.076*	I(0)
LPOP	-3.229**	I(1)	-4.93*	I(0)
LTCR	-2.1423	I(1)	-5.753	I(0)
LTEX	-1.26987	I(1)	-3.979**	I(0)

Notes: (i) L is logarithm and ADF is Augmented Dickey Fuller.

(ii) Asterisk \*, \*\* and \*\*\* indicate significance at the 1%, 5% and 10% significance levels respectively.

(iii) MacKinnon (1980) critical values are used for rejection of hypothesis of a unit root.

(iv) Critical values for ADF statistics (in levels) are -4.04, -3.4491, and -3.1495 at 1%, 5% and 10% respectively.

(v) Critical values for ADF Statistics (in first difference) are -4.0387, -3.4484, and -3.1491 at 1%, 5% and 10% respectively.

#### 4.2 Cointegration Test Results

After determining the order of integration, we try to establish whether the non-stationary variables are cointegrated. This was because, as pointed out by Engle and Granger (1987), even though individual time series are non-stationary, linear combinations of them can be, because equilibrium forces tend to keep such series together in the long run. When this happens, the variables are said to be cointegrated and error-correction terms exist to account for short-term deviations from the long-run equilibrium relationship implied by the cointegration.

Results from the cointegration test are presented in Table 2 in which the maximal Eigen value statistics are reported. The cumulative form of the Eigen value statistic and/or the trace statistic is not reported. Rather, we compute the trace statistic and only report the number of cointegrating equations.

The Eigen value statistics reject the null hypothesis that there are zero cointegrating vectors or nine common trends. The test suggests that there are 8 long-run relationships (see Table 2) among the nine variables (*GY, FR, TCP, IRR, INF, DEF, EXR, POP, TEX*). However, as shown in Table 3, only one long run Growth function has been specified<sup>14</sup>.

**Table 2: Johansen Cointegration Test Results**

Eigenvalue	Likelihood Ratio (L.R)	5 percent Critical Value	Hypothesized number of Cointegrating Equation(s)
0.400750	184.4063	146.78	None **
0.288612	125.5174	114.90	At most 1 **
0.233213	86.35561	87.31	At most 2**
0.179621	55.81778	62.99	At most 3**
0.124877	33.04908	42.44	At most 4**
0.111530	17.70912	25.32	At most 5**
0.035106	4.109811	12.25	At most 6**
0.150933	44.57840	42.44	At most 7*
0.105952	23.79909	25.32	At most 8

Notes: (i) The asterisk (\*\*\*) denotes rejection of the hypothesis at 5% (1%) significance level.

(ii) L.R. test indicates 8 cointegrating equation(s) at 5% significance level.

<sup>14</sup> The normalization process was guided partly by economic theory, according to which, financial savings is the regressand and all the other variables are regressors and partly by statistical reasons. The estimated F-statistic of one of the long run relationships (not tabulated herein) was 64.167 with a probability value of 0.054. The insignificance of this F-statistic implied model misspecification. Thus by these economic and statistical evidences, the equation was dropped.

**Table 3: Estimation Results for the Long-Run Growth Function**

C	-2.688798 (0.4332)
LM2Y	-1.152565 (0.56676)
LIRR	-0.351083 (0.045)
LINF	-0.265883 (0.12234)
LDEF	0.959197 (0.14369)
LPOP	-0.398175 (0.04219)
LTCR	0.024356 (0.03416)
LEXR	-2.229805 (1.28763)
LTEX	-1.092966 (0.67562)

In parentheses are  $t$ -statistic values and before the parentheses are parameter coefficients.

Following the results in Table 2, cointegration is accepted and therefore the residual generated from the long run growth function tabulated in Table 3, if lagged once (ECT\_1) can be used as an error correction term in the dynamic model.

### 3.3 Estimation of the Error Correction Model and Results

Following Engle-Granger (1987) representation theorem, the third step involved an estimation of the error correction of the relationship and testing the adequacy of the estimated equation. An error correction model is specified:

$$\Delta LGY_t = \delta_0 + \sum_{i=0}^k \delta_i \Delta LZ_{t-i} + \sum_{i=1}^k \delta_i \Delta LGY_{t-i} + \lambda_1 ECT_1 + \varepsilon_t \quad (16)$$

Where  $Z_t$ , a vector of cointegrated variables as is defined before and ECT\_1 is the error correction term lagged one period with  $\lambda_1$  as a measure of the adjustment mechanism.

Equation (16) represents the initial overparametrized error correction model. Using Hendry's (1986) general-to-specific approach, we proceeded through a simplification process to make the model more interpretable and a certainly more parsimonious characterization of the data. The simplification process, guided by statistical rather than economic reasons, proceeded principally by setting certain parameters starting with those with "t" values between less than one and zero in absolute terms to zero<sup>15</sup>. The model is also assessed in terms of the diagnostic tests such as residual autocorrelation, normality and heteroskedasticity, in addition to information criterion (Adams, 1997)

Using the general-to-specific modeling procedure, the analysis began with three lags<sup>16</sup> for each variable, the dummy variable and the error correction term, ECT\_1. The overparametrized model was reduced until a parsimonious one was obtained. The estimation results of the parsimonious model are presented in Table 4.

<sup>15</sup> The overall validity of the reduction sequence is the need to maximize the goodness of fit of the model with the minimum number of variables

<sup>16</sup> The optimal lag length of three (3) was one at which increasing the order of the model by one lag could not be rejected using a likelihood ratio test statistic. The residuals generated herein when subjected to whiteness test (heteroskedasticity, autocorrelation and normality tests) proved to be white

**Table 4: Estimation Results of the preferred model (1970:2-2005:4)**

Variable	Coefficient	t-Statistic
C	0.015551	3.426887
DLGY_1	0.344132	3.311146*
DLGY_3	0.229637	4.195804*
DLDEF	-0.238118	-4.779594*
DLEXR	0.135005	1.271662
DLEXR_1	-0.155128	-1.825316***
DLM2Y	0.350152	3.653356*
DLTCR_1	-0.612681	-3.604638*
DLTEX	0.079266	2.139104**
DLTEX_1	-0.274757	-1.082468
DLTEX_3	0.358054	2.373580**
D92	0.090537	3.198295*
ECT_1	-0.228010	-2.617762**

$R^2 = 0.783508$ , Adj.  $R^2 = 0.7421684$ ,  $F(13, 115) = 5.527104$  (0.000000)  $DW = 2.150763$

S.E of regression = 0.03871 and  $n = 128$ .

Notes: (i) The asterisk \*, \*\*, and \*\*\* indicates significance at the 1 percent, 5 percent and 10 percent levels.

(ii) Information criteria: AIC = -0.277202, and SBC = 0.176309

Comparing the general and the preferred model results, the reduction process eliminated most of the insignificant variables without losing valuable information. Specifically, the Akaike information criterion (AIC) and the Schwarz Bayesian information criterion (SBC) declined from -0.13 and 0.58 in the general model to -0.28 and 0.18 in the preferred model. The regression results show that the goodness of fit is satisfactory (Adj.  $R$ -squared=0.74), implying that the regressors in the model explain about 74 percent of the variations in GDP during the 1970-2005 period. Thus, about 26 percent of GDP remain unexplained. The  $F$ -statistic of 5.53, with probability value of 0.0000 indicates that the overall model is highly significant. This implies a rejection of the null hypothesis that all the right hand variables except the constant have zero parameter coefficients.

The Durbin-Watson statistics (DW) does not point to the serious autocorrelation problem. The Jarque-Bera statistic for testing for normality of the residual for the estimated model is 127.96, with probability value of 0.016. Therefore, the normality assumption is not rejected. The Auto Regressive Conditional Heteroskedasticity (ARCH) for stability of the residuals yields an  $F$ -statistic of 2.286, with a probability value of 0.133332. This is quite satisfactory in terms of explaining the coefficient stability of the model.

In addition, the Ramsey RESET test for specification error yields  $F$ -statistic of 1.35, with a probability value of 0.249. This suggests that the model is not misspecified. Also, the Breusch-Godfrey Serial Correlation LM test yielded an  $F$ -statistic of 1.34, with a probability value of 0.267. This reveals that there is no serial correlation among variables. The results of the model evaluation reveal that the fundamental statistical requirements have been adequately met, thus it can be inferred that the empirical results of the model are indeed reliable. The next section discusses the economic interpretation of the empirical results.

At a 1 percent level of significance, the coefficients of the first and third lags of real GDP growth (LGY), the first differences of financial intermediation ration (LM2Y) and fiscal deficits (LDEF), the first lag of total credit to the private sector (LTCR) and the dummy variable ( $D_{92}$ ) are significantly different from zero and bear the a priori expected signs. However,

The coefficients of the first difference and third lag of total exports (LTEX) and the lagged error correction term ( $ECT.I$ ) are significantly different from zero and bear the hypothesized positive signs at the 5 percent level while the coefficient of the first lag of the exchange rate (LEXR) has the expected negative sign and is weakly significant at the 10 percent level.

The results show that the error correction term ( $ECT.I$ ) in the model is correctly signed and is significant at the 5 percent level. This confirms our earlier results that the specified macro economic series are cointegrated. The error correction term ( $ECT.I$ ) coefficient of  $-0.228$  implies that in each period, the level of GDP adjust by about 22.8 percent of the gap between the current level and the long run equilibrium level.

The significant positive influence of the first difference of the financial development proxy (M2Y) on economic growth implies that financial development has a positive impact on the real GDP growth. This finding follows from the wide range of financial assets that have been made available to the public through a wide network of commercial bank branches since the liberalization of the financial sector in 1992. Moreover, the finding is in line with the arguments of Mckinnon's (1973) inside money model and the financial deepening approach by Edward Shaw (1973), as a catalyst to growth through investment in high yielding projects resulting in an increase in real income.

The coefficient for the first difference of fiscal deficits (DEF) is significant at the one percent level and bears apriori expected negative sign. In line with the findings of Easterly *et al.*, (1992), the results imply a negative relationship between fiscal deficits and economic growth. The dummy ( $D_{98}$ ), a variable representing the impact of structural change on GDP, has a significant and correctly signed coefficient. This implies that the changes brought about by the liberalization of the financial sector had a positive impact on Uganda's GDP. Moreover, the Chow break point test for testing structural breaks as at 1992 yielded an F-statistic of 1.58 with a probability value of 0.15. This further confirms the same results by rejecting the null hypothesis of stable coefficients and/or equal parameters in the two sub-periods (pre-ESAP and ESAP)

The coefficient of the first lag total credit to the economy (LTCP) is significant at the 1percent level but does not bear the expected positive sign. This implies that in the long run, bank credit to the economy and especially to the private sector (the private is in position to identify high yielding investment projects as compared to the unproductive public sector) has an indirect impact on savings via an improvement in investment and therefore economic growth. Accordingly, increasing bank credit to the private sector increases investment, and as a result causes a positive impact on the growth rate and further induces savings via the income effect. However, this negative result could be

attributed to the high default rate. Among the causes of high default rate include adverse costs or price movements inadequate funding of the projects, diversion of funds by the proprietor(s), insecurity, weather vagaries and perhaps, the still alien idea of banking to many<sup>17</sup>. The coefficient of the first lag of the exchange rate (EXR) is weakly significant at the ten percent level and bears the correct negative sign. In view of the ever unstable exchange rates in Uganda, this result would imply that over the long term, instabilities in the exchange rate negatively influence GDP. This finding is line with the findings of Fischer (1993) that distorted exchange rate markets negatively influences GDP.

The coefficients of the first difference and the third lag of total exports (TEX) are significant at the five percent level and bear the hypothesized positive sign. In the Ugandan context, this positive relationship between exports and GDP could be attributed to the massive trade reforms and relentless government efforts towards openness to the global economy. This has resulted in export diversification and international market openings under the African Growth and Opportunities Act (AGOA) initiatives. This finding is indeed supported by Gallup *et al.* (1988) who assert that open economies are generally in a better position to import new technologies and ideas from the rest of the world that are more consistent with their comparative advantages. Finally, the coefficients of the first and third lags of real GDP are significant at the one percent level and bear the apriori expected positive signs. This implies the fact that real GDP is predominantly explained by its past values. This is suggestive of the fact that the current period's rate of economic growth as measured by GDP influences the future GDP growth trends. This phenomenon can be attributed to the strong "lag-effect" typical of the business cycle.

An important issue that was ignored in table 4 is the direction of casualty between financial depth and growth. Theoretical models suggest that casualty runs both ways. If indeed financial development and growth are jointly determined, ordinary least squares (OLS) estimation of the growth equation presented in table 4 may be biased. In theory this bias can be asymptotically eliminated if appropriate instruments are used. Accordingly, pair wise Granger Causality tests are applied on M2Y since the long run relationship between financial development and economic growth is captured in the error-correction model. If the variables are cointegrated, tests incorporating only differenced variables will be mis-specified unless the lagged error-correction term is included (Granger, 1988). Thus, the second financial development indicator, TCR, is not included in the standard causality test because its information on causality with real GDP is captured through the long-run relationship with real GDP, explained by the error-correction model. The results of the test are tabulated in the table 5. The results indicate the rejection of the null hypothesis that M2Y does not Granger Cause GDP at a one percent level of significance.

---

<sup>17</sup> They see any credit extended to them as a favor hence chances of default are high.

**Table 5: Granger-Causality Test Results**

<b>Null Hypothesis</b>	<b>F-Statistic</b>	<b>Probability</b>
M2Y does not Granger Cause GY	2.56023	0.00563*
GY does not Granger Cause M2Y	0.67386	0.77233

Notes: The asterisk \* denotes rejection of the null hypothesis at 1 percent level of significance.

Therefore, the results in table 5 suggest that it is financial development which Granger causes real GDP in Uganda and NOT that real GDP Granger causes Financial Development. Therefore, the supply-leading hypothesis<sup>18</sup> is found to obtain in the case of Uganda.

#### **4. CONCLUSION AND POLICY IMPLICATIONS**

The econometric results reveal that the major determinants of real GDP growth in Uganda include past real GDP, financial depth ratio, fiscal deficits, total credit to the economy, exchange rates and total exports. Moreover, there is significant evidence that financial sector reforms adopted in the early 1990s have generally had positive contribution to the real GDP in Uganda.

In terms of policy implications, the findings of the study show that financial sector is crucial for the growth of the economy. Therefore, policies that promote financial development and intermediation should be promoted. Government can for instance improve intermediation by reducing taxation on the financial sector and give incentives for its development. An integration of the fragmented financial markets is highly desirable.

The current experiment with financial liberalization and restructuring that are designed to improve the efficiency of financial intermediaries will lead to economic growth only if credit to the productive private sector enterprises increase. This therefore calls for dismantling any impediments to increased availability of credit to the private sector. There is for example, need to cut down the bureaucratic procedures in the process of lending and depositing money. It should be realized that this among other factors make financial intermediation costly and are responsible for the narrow sizes of financial assets availed by financial institutions. To the problem of high default rates, in addition to commercial courts or tribunals that have been instituted to speedily deal with enforcement of loan contracts, commercial banks need to have a mechanism of sharing information on defaulters. This will close the information gap problem, as a result of which, adverse selection and moral hazard problems have been thriving.

In addition, empirical findings with respect to fiscal deficits point to one important fact-fiscal discipline. The negative influence of fiscal deficits on growth suggests that fiscal deficits must be minimized. Therefore, the current policy of running cash budgets among other policy measures should be applauded. Moreover, to the extent that the structural changes, financial sector liberalization in particular, enhance economic growth, then, for

---

<sup>18</sup> See Patrick (1966)

economic growth to exhibit rising trends, the government should continue with financial liberalization policy in particular. Emphasis should be put on structural reforms such as promoting a competitive and viable domestic banking system, with an adequate regulatory and supervisory framework. This should be complemented by macroeconomic stability that is, fiscal deficits, rapidly depreciating exchange rate and high inflation should be put in check. This calls for appropriate sequencing of the structural reforms. In implementing such reforms, it is wiser to move gradually and to improve economic fundamentals first before complete deregulation.

The fact the financial sector has to be complemented by other factors to enhance economic growth, additional policy implications can be drawn. Specifically, policies which harness the growth of export sectors should be encouraged. Government should establish incentives for the domestic entrepreneurs, particularly those in the export sector. Efforts should also be done to create value addition in the exports as this would reduce the cost of importation and increase its competitiveness at the international level.

## **REFERENCES**

- Adams, C.S. (1997) "African Economic Research Consortium Workshop in Time Series Econometrics", 19-27 May, Nairobi.
- Dickey, D. A. and Fuller, W. A. (1979), "Distribution of estimators for Autoregressive time series and unit Roots", *Journal of American Statistical Association*, 74(2): 427-31
- Easterly, W, R. King, R. Levine and S. Rebelo (1992), How Do National Policies Affect Long-run Growth? A Research Agenda. *World Bank Discussion Paper No. 164*.
- Engle, R. and Granger, C. (1987), "Cointegration and Error Correction: Representation, estimation and Testing", *Econometrica*, 55 (2): 251-78
- Gallup, J.L, J.Sachs and A.D, Mellinger (1988), Geography and Economic Growth. *Paper prepared for the Annual Bank conference on Development Economics*, Washington, D.C., April 20-21
- Gertler, M. and A. Rose (1991), "Finance, Growth, and Public Policy", World Bank, WPS 814, December.
- Goldsmith, R.W (1969), *Financial Structure and Development*, New Haven: Yale University Press
- Gonzalo, J. (1994) "Five alternative methods of estimating long run equilibrium relationships", *Journal of Econometrics*, 60: 203-233
- Gurley, J.E., and E.S, Shaw (1955), "Financial aspects of Economic Development", *American Economic Review*, 4: 515-538
- Hendry, D.F. (1986), "Economic Modeling with Integrated Variables", *Oxford Bulletin of Economics*, No.3
- Johansen, S. (1988), "Statistical Analysis of Cointegration Vectors", *Journal of Economic Dynamics and Control*, 12: 231-54

- Johansen, S. and Juselius, K. (1990), "Maximum likelihood estimation and inference on Cointegration with applications to the demand for Money", *Oxford Bulletin of Economics and Statistics*, 52: 169-210
- King, R.G., and R. Levine (1993a), "Finance and Growth: Schumpeter Might Be Right" *Quarterly Journal of Economics* 108, 3: 717-737
- \_\_\_\_\_ (1993b), "Finance, Entrepreneurship and Growth: Theory and Growth", *Journal of Monetary Economics*, 32: 513-542
- Mackinnon, J.E. (1980), "Critical values for cointegration tests", Discussion Paper, University of California, San Diego
- McKinnon, R.I. (1973), "Money and Capital in Economic Development". Washington D.C. Brookings Institution
- Rajan, R.G., and L. Zingales (1998), "Financial Dependence and Growth", *American Economic Review*, 88: 559-586
- Rebelo, S. (1991), "Long-run policy analysis and long-run growth" *Journal of Political Economy*, 99:500-521
- Shaw, E.S. (1973), "Financial Deepening in Economic Development", Oxford University Press