Financial Development and Economic Growth in Uganda[Ψ]

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This study provides the empirical findings on the relationship between financial development and economic growth in Uganda from 1970 to 2002. The results support the McKinnon-Shaw hypothesis, which suggests that removal of distortions in the financial sector stimulates economic growth. In Uganda, there have been financial sector reforms since 1992. These factors help to explain the positive relationship between financial development and economic growth in the country. The study uses a dummy variable to examine the effect of financial sector reforms. The coefficient of the dummy variable is positive and significant, implying that the changes induced by the liberalization of the economy had a positive impact on real economic growth in Uganda.

Introduction

Financial development stimulates economic growth; and economic growth requires investment; and credit is necessary for investment. Other economists like Gurley and Shaw (1955) and Goldsmith (1969) observed that financial intermediation promotes economic growth by improving resource allocation and investment opportunities. Recent studies include Bencivenga and Smith (1991); Smith and Starr (1995); King and Levine (1993); Greenwood and Jovanovic (1990) and Beck (2000). MacKinnon (1973) and Shaw (1973) advanced the Financial Repression Hypothesis (FRH), suggesting that distortions in the financial market retard economic growth. The McKinnon–Shaw hypothesis transformed monetary management in developing countries. Some countries in Asia and Latin America liberalized their financial system. By the mid-1980s, the wave of liberalization reached Sub-Saharan Africa (SSA), including Uganda.

This study analyzes financial development and economic growth in Uganda from 1970 to 2002. The study also provides empirical findings on the relationship between financial development and economic growth in Uganda. Recent studies on financial development and economic growth in African countries include Odedokun (1989) on Nigeria; Lyons and Murinde (1994) on Ghana; Kalima (2001) on Zambia; and Ghazi and Mohamed (2002) on Tunisia. Some of these studies used pooled cross-sectional data, while others used country specific case studies. This study deals with the specific case of Uganda, but there are similarities between Uganda and other African countries. Like in other African countries, the financial reforms in Uganda are

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implemented as part of the broad Economic Structural Adjustment Program (ESAP). The next part of this paper gives the background to the ESAP and financial sector reforms in Uganda. This is followed by the methodology and empirical findings.

Financial Sector Reforms in Uganda

Since it became an independent republic in 1962, Uganda has gone through a series of significant economic policy shifts, which can be analyzed in periods, such as:

- The early post-independence period, 1962-1970;
- The regulation and repression period, 1971-1986;
- The transition adjustment period, 1987-1991; and
- The financial sector reform period, 1992-2000.

This paper briefly highlights the major aspects of these periods.

Early Post-independence Period: 1962-1970

The early post-independence era in Uganda was relatively stable and gave hope for a prosperous future in the country. During this period, the economy grew steadily, as much as 10.7% in 1969 (Musinguzi and Katarikawe, 2000). After Uganda achieved independence on October 9, 1962, the government employed interventionist policies that led to the nationalization of many enterprises in finance and industry. Government intervention was deemed necessary to ensure that the financial sector played a supportive role in the development process. Interest rate controls and public sector banks were established; the government also purchased shares in the foreign banks, and established a variety of administered lending programs. Two public sector banks were established in this period following independence: the Uganda Commercial Bank (UCB) and the Cooperative Bank. Table 1 shows that the Cooperative Bank and the UCB were established in 1963 and in 1965 respectively, and both are 100% government-owned.

From the mid-1960s, the government implemented a variety of agricultural and rural lending schemes. The UCB and Cooperative Bank were the only banks with branches in the rural areas. As a result, the two public sector banks became conduits for the government lending schemes. This period was generally characterized by credit expansion by these banks as they tried to fulfill the development objectives of the government. However, the banks incurred losses because commercial practices were not always followed. The 1969 Banking Act and the Bank of Uganda (BoU) were inadequate to provide the legislative framework and supervision for the banking industry.

Regulation and Repression Period: 1971-1986

The second period begun with the ousting of President Milton Obote by General Idi Amin Dada in a coup de tatin 1971. The coup led to economic, social and political instability. It is estimated that real GDP fell by 38% during this period (Brownbridge, 1996). The sectors most affected were agriculture and trade. There was a significant reduction in coffee production because of the acute security problems and the unattractive prices paid to farmers. Trade was affected by government takeovers and uncertainties in the private sector. The country was also deprived of skilled personnel as a result of the expulsion of the

Ugandan-Asians in the early 1970s and the liberation war that followed in the late 1970s and the 1980s.

This period was also characterized by credit and interest rate controls. Inflation rose rapidly, fuelled by monetary financing of the government deficits. Inflation averaged 103% during 1985 to 1989, while nominal lending rates averaged 31% for commerce and 24% for time deposits (Brownbridge, 1996). As a result, real interest rates were substantially negative. The negative returns on financial assets contributed to a steep decline in financial depth. Meanwhile, the government directed that all banking business of the public sector, parastatals, and cooperative unions be transferred to the Uganda Commercial Bank; the only fully indigenous bank at that time. This resulted in a number of expatriate banks closing down their rural branches and sub-branches, making UCB the biggest bank in the country and the only one operating in the rural areas. Table 1 shows that in 1991, UCB had 190 branches, by far the largest number in the country.

Table 1: A Summary of Commercial Banks as of August 1991

Name of Institution	Shareholding	Year of Establishment	Number of Branches
Barclays Bank (U)	49% Government 51% Barclays Bank International	1927	4
Bank of Baroda (U) Ltd.	49% Government 51% Bank of Baroda, India	1953	6
Grindlays Bank (U) Ltd.	49% Government 51% Grindlays Bank, London	1906	1
Libyan Arab Bank, (U) Ltd.	49% Government 51% Libyan Arab Foreign Bank, Tripoli	1973	3
Standard Chartered Bank (U) Ltd.	100% Standard Chartered Bank, London.	1912	1
Uganda Commercial Bank	100% Government	1965	190
The Cooperative Bank Ltd.	100% Government Cooperative Movement	1963	24
Gold Trust Bank	100% Private	1985	3
Nile Bank Ltd.	100% Private	1988	2
Teefe Trust Bank	100% Private	1989	1
Sembule Investment Bank	100% Private	1989	4
Greenland Bank Ltd.	100% Private	1991	2
Total		**242**	

Source: Mukwanason (1994), p.54.

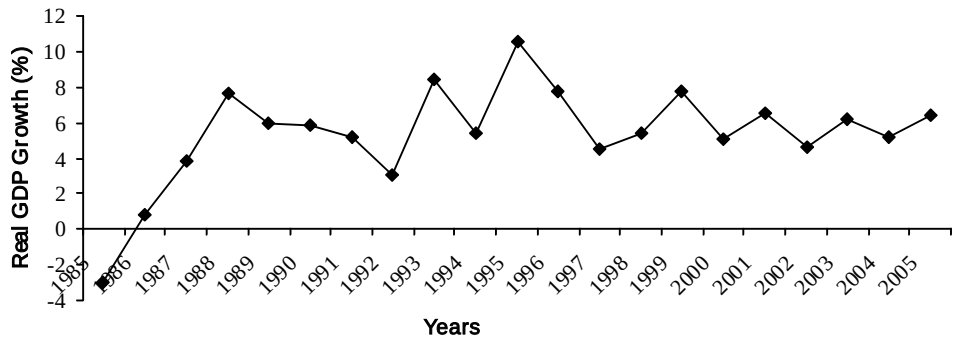
In 1981, the government instituted a program designed to eliminate market distortions and revive the economy. The BoU adjusted its Bank rate and rediscount rate, and commercial rates rose sharply. This triggered a shift in the structure of financial assets, favoring quasi-money and treasury bills. Treasury bill rates were raised again in 1982 and taxes on earnings were also waived. Credit ceilings for individual banks and the selective credit policy were abandoned. In 1986, the National Resistance Movement (NRM) seized power and Yoweri Museveni became the president. This was a dawn of new era in Uganda.

Transitional Adjustment Period: 1987-1991

This was the transitional adjustment period, because it set the stage for the reforms during 1992-2000. The new government restored security and revived the economy. Figure 1 shows that real GDP growth rose between 1986 and 1988, and was above 2% during 1987-1991.

In 1987, the government adopted the Economic Recovery Program (ERP), which was designed mainly to restore macroeconomic stability. A key target of the ERP was controlling inflation by restricting the monetary growth largely associated with the monetization of budget deficits. In 1987, the government also introduced a new Uganda shilling in order to reduce the excessive liquidity and generate additional tax revenue. Other reforms were on public expenditures and revenues, pricing and marketing policies, and the rehabilitation of industries. However, the coffee prices fell and the targets on revenue could not be achieved. Consequently, the government borrowed from the banking system, which expanded the money supply rapidly and raised inflation to about 86%. Thus, the ERP measures had the unintended effect of raising inflation.

Figure 1: Real GDP Growth from 1985-2005



The experience in 1987 was that the ERP overestimated the speed with which stabilization could be achieved. Therefore, countervailing measures were introduced in 1989. The Coffee Marketing Board (CMB) aimed these at controlling credit expansion, mainly for crop financing, and the repayment of debt. As a result, the domestic situation improved significantly, monetary growth decelerated, and the real GDP growth rate was higher than 7% (see Figure 1). In 1990, foreign exchange bureau was introduced as part of the gradual process of liberalizing the exchange rate system. The authorities recognized the importance of the secondary market, parallel to the official market. The secondary market provided a legitimate channel for the execution of certain foreign exchange transactions at market-based exchange rates. The official exchange rate underwent a series of devaluations in order to improve the competitiveness of exports, and also to reduce the spread between the official and bureau rate. Fiscal restraint was exercised in 1992/93, when the Government of Uganda repaid some of its debts and the Treasury bill auction was initiated. These measures reduced inflation to less than 1%.

Financial Sector Reform Period: (1992-2000)

This period was characterized by comprehensive financial sector reforms. These reforms were implemented as part of the stabilization and structural adjustment program that was begun in 1987. However, most of the financial sector reforms were not implemented until the 1990s, since policies introduced in the late 1980s were mainly directed at restoring economic growth in a more stable environment (see Kasekende and Atingi-Ego (1995). To liberalize the

exchange rate regime, a Dutch exchange auction system was introduced in 1992. It was used as a mechanism for the financing of eligible imports using donor import funds. Under this system, all authorized dealer banks and eligible forex bureaus were permitted to bid for foreign exchange currency and each successful bidder paid the bid price. The lowest bid was adopted as the clearing rate until the next auction. More reforms were initiated in 1992 under the Financial Sector Adjustment Credit (FSAC) program of the World Bank.

In 1994, the interbank shilling market was introduced. This was intended to help limit BoU credit to commercial banks. In 1995, the Capital Markets Authority (CMA) was constituted. Controls on interest rates and credit by the BoU were gradually eliminated beginning in 1992; but in 1994, commercial banks were formally allowed to set their own interest rates based on their own analysis of market conditions. Positive real interest rates were achieved and maintained, mainly through credible macroeconomic policies, which successfully reduced inflation to low levels. The reforms also led to the establishment of new banks and the emergence of non-bank institutions such as insurance companies and credit institutions. Regulatory and legal reforms were also introduced in order to strengthen bank supervision and enable market participants to assume greater risks under liberalization. The BoU Statute was amended and a new Financial Institutions Statute (FIS) was introduced in 1993. The FIS clearly established the responsibility of the BoU to supervise, regulate, control and discipline all financial institutions, insurance companies and pension funds institutions.

Presently, the financial system in Uganda, as in other developing countries, is characterized by a formal and an informal financial sector (see Bwire, 2003). The informal financial sector consists of a wide range of moneylenders, savings circles and similar financial structures. The Formal Financial System (FFS) is led by the BoU and consists of a network of banks, insurance companies, capital markets, credit institutions, building societies, a social security fund, and foreign exchange bureaus. In 2000, the FFS had 17 commercial banks, 18 insurance companies, two development banks, 18 credit institutions, three building societies, a Social Security Fund, 62 foreign exchange bureaus, and the Postal Savings Bank and one Capital market, the Uganda Securities Exchange. Commercial banks in the FFS constitute the largest part of financial intermediation and dominate the financial system.

The Model

This study adopts the neoclassical growth model used by King and Levine (1993) in their analysis of the relationship between financial development and economic growth. The formulation begins with the aggregate production function:

$$Q = F(K, L) \qquad ...(1)$$

where Q is output, K is capital, and L is labor. The properties of the production function and the derivation of the model are given in Appendix B. The intensive form and Cobb-Douglas nature of equation (1) yields:

$$q = Ak^{\alpha} \qquad ...(2)$$

where, q is the output-labor ratio, k is the capital-labor ration, A is technological progress, and á is the degree of homogeneity, a production parameter. King and Levine (1993) decomposed growth into two components: the rate of physical capital accumulation and everything else that determines real per capita GDP growth. The result is given as:

GYP D GK EFF ...(3)

where, GYP is real per capita GDP growth, GK is growth rate of real per capita physical capital stock, and EFF is the growth rate of everything else that determines per capita GDP growth. Rearranging equation (3) and taking GK on the left hand side gives EFF, which may consist of many factors, for example technology, human capital accumulation, increases in the number of hours per worker and improvements in the employment of factor inputs. Specifically, EFF is constructed as a measure of the residual of real per capita GDP growth after accounting for the rate of physical capita accumulation. Thus, EFF is referred to as improvements in "efficiency". King and Levine (1993) studied 77 countries for the period 1960-1989. They specified the model:

G(j)) i ; 0 ...(4)

where G(j) represents the value of the j^{th} growth indicator; F(i) represents the value of the i^{th} indicator of financial development; X is a matrix of other factors associated with economic growth; L, E, ., are parameters; and / is the error term (see Appendix B). The King and Levine model is modified in this study in order to suit the Ugandan environment. The modifications are as follows.

- First, whereas King and Levine used the model for a cross-sectional study of 77 countries for 1960-1989, the current study is a country specific for 1970-2002;
- Secondly, unlike King and Levine, the variables used in this study are real GDP, M2/GDP, total credit, real interest rate, inflation rate, fiscal deficits, exports, exchange rates and population; and
- Thirdly, unlike King and Levine, this study includes two dummy variables to account for the policy change and political instability in Uganda.

The study investigates if there are structural changes between the two periods: the pre-ESAP period (1970-1987) and the ESAP period (1988-2002). A dummy (DE) which assumes values of one (1) for ESAP period zero (0) otherwise. A Chow break point test is used for this structural policy change. The underlying test, however, is that the coefficients of the financial sector development in causing economic growth are the same for the two periods (1970-1987 and 1988-2002). Furthermore, a dummy variable for political instability (DP), which assumes a value of (1) used for political instability during (1979-1986) and zero (0) otherwise. Thus, the growth equation employed in this study is:

GYt E0 E1FI it E2X it ht ...(5)

Where GY is economic growth, defined as the log of real GDP, FI represents the i^{th} indicator of financial development, (M2Y and TCR), X is a matrix of conditioning variables; E0, E1, E2

are parameters to be estimated, and ε_t is the error term. The financial development variables are defined as follows: *M2Y* is broad money stock as a ratio of GDP; *TCR* is total credit to the economy. Specifically, equation (5) can be stated as follows:

$$GY_t = \beta_0 + \beta_1 M2Y_t + \beta_2 TCR_t + \varepsilon_t \quad ...(6)$$

However, as emphasized by King and Levine (1993), there are other factors associated with economic growth, such as education, political stability, fiscal and monetary policy. Therefore, the following variables are included the specified model:

- Real interest rate (*IRR*);
- Inflation rate (*INF*);
- Fiscal deficit (*DEF*);
- Exchange rates (*EXR*), population (*POP*);
- Manufactured exports (*MEX*); and
- Total exports (*TEX*).

The dummy variables for political instability (DP) and for structural change (DE) are included as control variables. The relationship between financial development and economic growth in Uganda is established using the following equation:

$$GY = \beta_0 + \beta_1 M2Y + \beta_2 IRR + \beta_3 TCR + \beta_4 INF + \beta_5 DEF + \beta_6 EXR + \beta_7 MEX + \beta_8 POP + \beta_9 TEX + \beta_{10} DP + \beta_{11} DE + \varepsilon \quad ...(7)$$

All variables and parameters are as defined above. Equation (7) is the econometric model in this study. The E-views 3.1 computer econometric package was employed in the estimation of the model.

Data and Variables

The estimation is done using quarterly time series data on for 1970 and 2002 years. The data are from the Uganda Ministry of Finance, Planning and Economic Development; Bank of Uganda reports; statistical abstracts from the Uganda Bureau of Statistics; as well as the International Finance Statistics published by the International Monetary Fund.

Economic growth is measured as real GDP and financial deepening is measured as the ratio of broad money stock, M2 to GDP (see Benhabib and Spiegel, 2000; Baliamoune and Chowdhury, 2003). Financial deepening is denoted as M2Y, and it is hypothesized that this variable is positively related to real GDP growth. Other variables that are expected to positively influence real GDP growth are: real interest (*IRR*); total credit to the economy (*TCR*); total exports (*TEX*); and manufactured exports (*MEX*). These variables are included as suggested by Shaw (1973), World Bank (1998), Kang and Sawada (2000), Wang (2000), Evans *et al.*, (2002), which are expected to negatively affect real GDP growth are: government budget deficits (*DEF*); inflation (*INF*); exchange rate (*EXR*); and population growth (*POP*). Previous studies also included in these variables (Easterly and Rebelo (1992), Fischer (1991).

A dummy variable for political instability (DP) is included to capture the impact of political instability in the country for the 1970s to 1980s. Countries that experience more revolutions and coups are expected to grow more slowly than those that are more stable. Gallup et al. (1998) find a strong negative relationship between political instability and economic growth. Barro (1991) finds that all measures of political instability are negatively related to economic growth. It is expected that the dummy variable for political instability is negative, while that of the structural change (DE) is positive. The dummy for structural change is included to test whether the shift from financial repression to liberalization had an impact on real GDP growth.

Empirical Results

The time-series properties, unit root and co-integration tests, as well as the error correction models are presented in Appendix A. Appendix A also describes the general-to-specific modeling procedure, which is employed for the empirical results in Table A.6. As shown in Table A.6, the modeling procedure begins with three lags for each variable, the dummy variables, DE and DP and the error-correction term, ECT_1. Table A.6 represents the over parameterized general model, which yields the specific model after the simplification process. 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 (heteroscedasticity, autocorrelation and normality tests) proved to be white noise. We then proceed with the simplification of the overparametized model of which the results are presented in Table 2. Hendry's (1986) general-to-specific approach is used to eliminate lags with insignificant parameter estimates. Accordingly, the overparametized model is reduced until a parsimonious one is obtained. The estimation results of the parsimonious model are presented in Table 2.

Table 2: Estimation Results of the Specific Equation for DLGY by OLS

Variable	Coefficient	t-Statistic
C	0.028812	3.695603*
DLGY_1	0.367428	5.534833*
DLGY_3	0.257742	4.078380*
DLDEF	-0.070586	-4.293529*
DLEXR	0.011080	1.373276
DLEXR_1	-0.013720	-1.736484***
DLM2Y	0.093101	3.263687*
DLMEX	0.059704	2.407986**
DLTCR_1	-0.075163	-3.313640*
DLTEX	0.118412	2.536802**
DLTEX_1	-0.072966	-1.514731
DLTEX_3	0.090604	2.191177**
DE	0.026505	3.349812*
ECT_1	-0.050045	-2.699470*

R^2 = 0.8214, Adj.R^2 = 0.801, F (14, 114) = 40.3369 (0.00000), DW =1.964. S.E of regression = 0.0387 and n = 128.

Notes: i). The asterisks *, ** and *** indicate significance at the 1, 5 and 10% levels.

ii). Information Criteria: AIC = -3.56, and SBC = -3.23.

Comparing the general and the specific model results, it is clear that the reduction process has eliminated most of the insignificant variables without losing valuable information (see Table 2 and Table A.6). The entire information criterion shows improvement in the results of the specific model over the general model. Specifically, the Akaike

Information Criterion (AIC) and the Schwarz Bayesian Information Criterion (SBC) decline from -3.1373 and -2.09 in the general model to -3.56 and -3.23 in the specific model (Table 2 and Table A.6). Furthermore, as the results in Table 2 and Table A.6 show, the standard error of the model declines from 0.0439 in the general model to 0.0387 in the specific model.

Regression results in Table 2 show that the goodness of fit is satisfactory (Adj. R^2 = 0.801), implying that the regressors in the model explained about 80% of the variations in real GDP during 1970-2002. Thus, about 20% of growth in GDP remains unexplained. The F-statistic of 40.3369, with a 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 serious autocorrelation. The Jarque-Bera statistic for testing for normality of the residual for the estimated model is 21.94, with probability value of 0.024. Therefore, the normality assumption is not rejected. The Auto Regressive Conditional Heteroscedasticity (ARCH) for stability of the residuals yields F-statistic of 0.838730, with a probability value of 0.361524. This is quite satisfactory in terms of explaining the coefficient stability of the model. Moreover, the residuals are white noise as per the correlogram plot (not reported herein) of the residuals.

In addition, the Ramsey RESET test for specification error yields an F-statistic of 12.807, with a probability value of 0.51000. This suggests that the model is not misspecified. Also, the test for serial correlation among variables in the model using Breusch-Godfrey serial correlation LM test is carried out. The result is an F-statistic of 0.138741, with a probability value of 0.870603. This reveals that there is no serial correlation among variables.

The results of the model evaluation reveal that no weakness has been found. The fundamental statistical requirements have been adequately met, thus it can be inferred that the empirical results of the model are indeed reliable. The economic interpretation of the empirical results is as follows.

At a 1% level of significance, the coefficients of the first and third lag of real GDP growth (GY) are significantly different from zero. This implies that current real GDP growth depends on its past values. The coefficient for the first difference of fiscal deficits (DEF) is significant at 1% level and has the expected sign. This is consistent with a related study by Easterly *et al.*, (1992), who find a significant and negative relationship between growth and fiscal deficits. With respect to the current study, it implies that there exists a negative relationship between fiscal deficits and real GDP growth in Uganda. This finding can be attributed to the economic shocks in the country in the 1970s upto the late 1980s, when there were large and fiscal deficits.

The coefficient of the first lag of the exchange rate (EXR) is significant at a 10% and bears the correct sign. It means that a lagged negative relationship exists between distorted exchange rates and real GDP. Fischer (1993) argues that distorted exchange rate markets are negatively related to growth. The findings of the study are as expected, since there have been periods of administered controls in Uganda. Because of financial restrictions, informal financial markets emerged and intensified as an escape route from the highly repressed exchange and interest rates that dominated the formal financial sector. The informal foreign

exchange market called "kibandá" was where illicit foreign exchange transactions were conducted until the foreign exchange market was liberalized in 1994. It is these factors that help explain the negative relationship between the exchange rate a real GDP.

The first difference of the financial development proxy (M2Y) is significant at a 1% level with the expected sign. It means that financial development has a positive impact on real GDP growth. This result supports the arguments of MacKinnon (1973) on the notion of inside money and Shaw (1973) on financial deepening. Uganda's experience shows the impact of financial sector reforms. Since the liberalization of the financial sector in 1992, a wide range of financial assets have been made available to the public through a network of commercial banks. It is these factors that held explain the positive relationship between financial development and real economic growth in Uganda.

The first difference of the coefficient for manufactured exports (MEX) is significant at a 5% level and has the expected sign. This implies a positive relationship between manufactured exports and real GDP growth. This can be attributed to the shift in trade policy in 1988 and the government emphasis on value-added exports.

The first lag of total credit to the economy (TCR) is significant at 1% level, but does not have the expected sign. It implies that there exists a lagged negative relationship between total credit and real GDP growth. This can be attributed to the predominance of the public sector, the high default rates in loan repayments, corruption and political interference credit allocation in Uganda. In the 1980s, economic reforms were instituted, and a credit scheme, known as the Rural Farmers Scheme, was launched in 1987. Under the scheme, significant credit was extended to rural farmers through the Uganda Commercial Bank (UCB). However, the beneficiaries of this scheme interpreted the credit to be a reward for their political support to new government, and therefore, the credit scheme failed. Further, government efforts to launch a new credit scheme, the "Entandikwâ" credit scheme, have also been unsuccessful.

Levine (1997) contends that a financial system that simply channels more credit to government or state-owned enterprises does not employ economic criteria, select viable investment projects, pool risk and provide financial services to the same degree as a financial system that allocates credit to the private sector. Similarly, Lynch (1996) argues that government credit from banks in countries with a highly regulated financial system is frequently captive and that banks have no control over its use. These arguments are plausible for the case of Uganda. There was gross mismanagement of parastatal enterprises, including the largest bank, the UCB, until it was privatized.

The coefficient of the first difference of total exports (TEX) and the third lag are significant at 5% level. They also bear the hypothesized signs. This implies that there exists a positive relationship between total exports and real GDP growth. This may be due to the trade reforms that have been undertaken since 1988 and the government campaign for export diversification away from the traditional exports, coffee and cotton. As already indicated, coffee and cotton fetch lower international market prices and these prices are prone to fluctuations on the world market.

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[1] A vernacular jargon for the black-market.
[2] Loosely translated as "seed-money".

Gallup *et al.* (1998) explore the relationship between such basic government policies as openness to the global economy (which is captured by exports in the current study) and growth of real GDP. They conclude that open economies are generally in a better position to import new technologies and ideas from the rest of the world. In addition, they are likely to have a greater division of labor and production processes that are more consistent with their comparative advantages, which enable them, grow faster. Owing to the above theoretical underpinning, the empirical finding of the current study on openness of the economy is therefore not surprising.

The coefficient of the dummy variable (DE) is significantly different from zero and bears the hypothesized positive sign at the 1% level. The coefficient represents the impact of the structural change on real GDP. The implication of this is that the changes brought about by the liberalization of the economy had a positive impact on real GDP growth in Uganda. Moreover, the Chow break point test for testing structural breaks as of 1988 yielded an F-statistic of 41.84715(0.00000). This further confirms the same results by rejecting the null hypothesis of equal and stable parameters in the two sub-periods (pre-ESAP and ESAP).

The results show that the error-correction term (ECT-1) in the model is correctly signed and is significant at the 1% level. This confirms that the real GDP (GY), fiscal deficits (*DEF*), exchange rates (EXR), the financial development proxy (M2Y), manufactured exports (*MEX*), total credit to the economy (TCR) and total exports (*TEX*) are co-integrated. The error-correction term (ECT-1) with a coefficient of -0.05005 implies that in each period, the level of real GDP adjusts by about 5% of the gap between the current level and the long run equilibrium level.

Finally, in the general model presented in Table 2, population growth (POP) is found to be insignificant. This may have largely been due to the structure of population growth in developing countries, where the dependence ratios are high which constrains the saving behavior of households. The dummy variable for political instability (DP) is also insignificant. This is because political instability was mainly concentrated in a few areas of the country, thus not severely affecting the general economic activity for the study period.

Summary and Conclusions

This study provides empirical findings on the relationship between financial development and economic growth in Uganda from 1970 to 2002. The study adopts the neoclassical growth model used by King and Levine (1993). The dependent variable is real GDP growth and independent variables are M2/GDP, total credit, real interest rates, exports, exchange rates, inflation rate, fiscal deficits, and population. The financial development proxy is M2/GDP denoted here as (M2/Y). This variable is found to have a positive and significant effect on the economic growth in Uganda. The coefficient of the dummy variable (DE) is also significantly different from zero and has the expected sign. This variable represents the impact of the structural change on real GDP. The implication of this is that, the changes brought about by the liberalization of the economy had a positive impact on real GDP growth in Uganda.

Other variables significantly and positively related to real GDP growth in Uganda are: past values of real GDP, manufactured exports and total exports. Those significantly and negatively related to real GDP growth are: fiscal deficits and the exchange rate. All these

variables have the expected signs. However, the coefficient of total credit to the economy (TRC) is significant, and contrary to prior expectations the coefficient is negative. It suggests that the total credit has a significant but negative effect on the real GDP growth in Uganda. This can be explained by such factors as the predominance of the public sector, the high default rates, corruption and political interference in credit allocation in Uganda. This is also the reason why changes brought about by the liberalization of the economy has had a positive impact on the real GDP growth in Uganda. Clearly, Uganda's experience suggests that liberalization and financial development stimulate economic growth. Y

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Appendix A

Time-series Properties and Error—Correction Model

This paper presents the analysis of the empirical results of the study on financial development and economic growth in Uganda for the period 1970-2002. It is subdivided into sections: presentation of the time series properties of the data; the econometric results; and economic interpretation of the results.

Time Series Properties

Prior to estimation of the model investigating the impact of financial development on economic growth in Uganda, preliminary tests were carried out on the data to establish its normality and stationarity. First, descriptive statistics for the data were undertaken for variables in levels, a summary of which is given in Table A.1. This shows that most of the variables satisfy the normality test.

Table A.1: Descriptive Statistics for Variables in Levels: 1972-2002

	LGY	LM2Y	LIRR	LPOP	LDEF	LTCR	LEXR	LINF	LTEX	LMEX
Mean	17.932	1.734	2.279	2.740	14.558	15.830	5.735	3.546	15.550	14.769
Median	18.630	1.783	2.221	2.728	14.937	15.931	6.220	3.773	16.296	16.001
Maximum	23.159	3.206	3.922	3.232	20.277	21.345	8.188	6.314	20.985	20.622
Minimum	11.456	0.336	-1.221	2.283	8.388	9.608	1.902	-1.204	9.798	7.527
Std. Dev.	4.415	0.645	0.808	0.268	4.171	3.952	1.541	1.429	4.441	5.049
Skewness	-0.178	-0.244	-0.697	0.215	-0.046	-0.149	-0.351	-0.471	-0.109	-0.290
Kurtosis	1.358	2.426	5.592	1.994	1.332	1.501	1.897	2.947	1.289	1.458
Jarque-Bera	15.516	3.123	47.65	6.586	15.350	12.849	9.436	4.895	16.360	14.933
Probability	0.0427	0.20987	0.00210	0.37105	0.4065	0.1603	0.8099	0.80656	0.2800	0.57200
Observations	132	132	132	132	132	132	132	132	132	132

Unit Root Tests

The Augmented Dickey-Fuller (ADF) test was used to establish the order of integration of the variables (and the degree of differencing required in order to induce stationarity). The unit root test results for values in levels are presented in Table A.2. of which, indicate that the variables in levels non-stationary at all levels of significance (see Table A.2).

Table A.2: Results for Unit Root Tests for Variables in Levels

Macro Variable	ADF	Order of Integration
LGY	-1.446754	I(1)
LDEF	-1.199661	I(1)
LEXR	-3.424346	I(1)
LINF	-2.15154	I(1)
LIRR	-1.242204	I(1)
LM2Y	-1.215387	I(1)
LMEX	0.103856	I(1)
LPOP	-0.943654	I(1)
LTCR	-2.142255	I(1)
LTEX	-1.269867	I(1)

Notes: (i) L denotes logarithm and ADF is Augmented Dickey Fuller.
(ii) MacKinnon (1980) critical values are used for rejection of hypothesis of a unit root.
(iii) The critical values for the ADF in levels are, -4.0325, -3.4455, -3.14474 at 1, 5 and 10% respectively.

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Time-series Properties and Error—Correction Model *Contd...*

To confirm that the order of integration identified in Table A.2 is correct, the first differences of the log of the non-stationary series are subjected to the unit root tests. The summary of the results is presented in Table A.3.

Table A.3: Results of Unit Root Tests for Variables in First Difference

Macro Variable	ADF	Order of Integration
DLGY	-4.100546	I(0)
DLDEF	-5.841763	I(0)
DLEXR	-6.749567	I(0)
DLINF	-11.048690	I(0)
DLIRR	-7.867788	I(0)
DLM2Y	-8.3144449	I(0)
DLMEX	-5.928920	I(0)
DLPOP	-4.553443	I(0)
DLTCR	-5.753443	I(0)
DLTEX	-3.978036	I(0)

Notes: (i) L denotes the logarithm, D is the first difference and ADF is Augmented Dickey Fuller.
(ii) Mackinnon (1980) critical values are used for rejection of hypothesis of a unit root.
(iii) Critical values for ADF Statistics are -4.0314, -3.4450, and -3.14471 at 1, 5 and 10% respectively.

The results for unit root tests for variables in first differences (see Table A.3) reveal that the series are integrated of order zero in their first differences.

Cointegration Tests

After establishing the order of integration, the next step is to establish whether the non-stationary variables are cointegrated. According to Engle and Granger (1987), individual time series could be non-stationary, but their linear combinations can be stationary if the variables are integrated of the same order. This is because equilibrium forces tend to keep such series together in the long-run. As such, 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. Furthermore, the differencing of nonstationary variables to achieve stationarity leads to loss of some long-run properties. To test for cointegration among these ten non-stationary series, a more superior multivariate technique developed in Johansen (1988) and applied in Johansen and Juselius (1990) was used.

To implement the Johansen procedure (see Johansen (1988), Johansen and Juselius (1990) for cointegration analysis, the maximum likelihood procedure developed in Johansen (1988) and applied in Johansen and Juselius (1990) was adopted. Results from the cointegration test are presented in Table A.4 in which the maximum eigenvalue statistics are reported.

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Time-series Properties and Error—Correction Model

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Table A.4: Johansen Cointegration Test

Eigenvalue	Likelihood Ratio	5% Critical Value	1% Critical Value	Hypothesized No. of CE(s)
0.715865	555.9518	263.42	279.07	None**
0.556840	396.1471	222.21	234.41	At most 1**
0.470781	292.7914	182.82	196.08	At most 2**
0.403217	211.9745	146.76	158.49	At most 3**
0.294785	146.4170	114.90	124.75	At most 4**
0.206137	102.0619	87.31	96.58	At most 5**
0.198910	72.74469	62.99	70.05	At most 6**
0.150933	44.57840	42.44	48.45	At most 7*
0.105952	23.79909	25.32	30.45	At most 8
0.072626	9.575577	12.25	16.26	At most 9

Notes: (i) Asterisks *(**) denotes rejection of the hypothesis at 5% (1%) significance level.
(ii) L.R. test indicates 8 cointegrating equation(s) at 5% significance level.

Table A.5: Long-Run Growth Function

LGY	1.000000
C	57.71007
LM2Y	-7.259508 (6.24799)
LIRR	1.508792 (1.40411)
LPOP	-12.02378 (27.7655)
LDEF	-0.019887 (0.45465)
LTCR	-2.143933 (2.07571)
LEXR	-1.229805 (1.28763)
LINF	1.086121 (1.28497)
LTEX	-1.092966 (0.67562)
LMEX	-0.662658 (0.72166)

Log likelihood = 1412.933

Notes: In the parentheses are the standard errors, before parentheses are parameter coefficients.

The test suggests that there are eight long-run relationships (see Table A.4) among the ten series (GY, M2Y, IRR, INF, TCR, POP, TEX, MEX, EXR, DEF). However, as shown in Table A.5, only one long-run growth function is specified. The normalization process was guided partly by economic theory, according to which, GY is the regress and all the other variables are regressors and partly by statistical reasons. The estimated F-statistics for the other long run relationships (not tabulated herein) are insignificant. The insignificance of the F-statistics implies model misspecification. Thus by these economic and statistical considerations, the other seven equations were dropped.

Following the results in Table A.4, co-integration is accepted, and therefore, the residual generated from the long run growth function tabulated in Table A.5, is lagged once (ECT_1) and used as an error-correction term in the dynamic model.

Estimation of the Error-correction Model

Following Engle-Granger (1987) representation theorem, an error-correction model is estimated for the relationship and tests the adequacy of the estimated equation. Henceforth, an error-correction specification of the form:

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Time-series Properties and Error—Correction Model

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$$\Delta LGY_t = \beta_0 + \sum_{i=1}^{k} \beta_i \Delta LGY_{t-i} + \sum_{i=0}^{k} \beta_i \Delta Z_{t-i} + \lambda_1 ECT\_1 + \varepsilon_t \quad \text{...(A.1)}$$

where, Z_t a vector of co-integrated variables as is defined before and ECT_1 is the error-correction term lagged one period with λ_1 as a measure of the adjustment mechanism, is formulated and estimated.

Equation (A.1) represents the initial overparametized error-correction model. At this stage, the overparametization of the model makes it difficult to be interpreted in any meaningful way and also leads to loss of degrees of freedom. Accordingly, using Hendry's (1986) general-to-specific approach to econometric modeling, there was need for a simplification to make the model more interpretable, and specifically, a more parsimonious characterization of the data. The simplification process, which was guided more by statistical rather than economic considerations, proceeds principally by setting certain

Table A.6: Estimation of Equation (A.2) for DLGY by OLS 1970: I-2002: IV

Variable	Coefficient	t-Statistic
C	0.024784	1.279309
DLGY_1	0.376418	3.623851*
DLGY_2	0.011385	0.101290
DLGY_3	0.241675	2.383228**
DLDEF	-0.068875	-2.860472*
DLDEF_1	-0.018355	-0.592054
DLDEF_2	0.008849	0.268088
DLDEF_3	0.018895	0.618009
DLEXR	0.010277	1.062984
DLEXR_1	-0.014473	-1.378095
DLEXR_2	0.002879	0.275199
DLEXR_3	0.000388	0.037581
DLINF	0.000944	0.140621
DLINF_1	-0.000159	-0.020709
DLINF_2	-0.000826	-0.107823
DLINF_3	-0.004093	-0.529292
DLIRR	-0.009602	-0.378906
DLIRR_1	-0.003879	-0.203970
DLIRR_2	-0.004021	-0.218458
DLIRR_3	0.004924	0.268957
DLM2Y	0.100392	2.579031**

Contd...

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Table A.6: Estimation of Equation (A.2) for DLGY by OLS 1970: I-2002: IV Contd...

Variable	Coefficient	t-Statistic
DLM2Y_1	0.016549	0.348403
DLM2Y_2	-0.012917	-0.287883
DLM2Y_3	-0.002980	-0.066126
DLMEX	0.063151	1.047786
DLMEX_1	0.009328	0.175665
DLMEX_2	-0.011157	-0.218623
DLMEX_3	0.038478	0.819920
DLPOP	-2.367870	-0.343505
DLPOP_1	1.654594	0.738790
DLPOP_2	-0.690538	-0.306759
DLPOP_3	1.646420	0.973760
DLTCR	0.027708	0.951208
DLTCR_1	-0.084498	-2.609780**
DLTCR_2	0.000340	0.009960
DLTCR_3	-0.008816	-0.263015
DLTEX	0.140356	2.150104**
DLTEX_1	-0.085935	-1.167874
DLTEX_2	-0.051340	-0.677354
DLTEX_3	0.085126	1.299895
DP	0.002317	0.125054
DE	0.023058	1.502053
ECT_1	-0.067738	-2.097493**

R^2 = 0.837, Adj.R^2 = 0.744, F (43, 85) = 9.0485 (0.00000), DW =1.94.
S.E of regression = 0.0439 and n = 128., Information Criteria: AIC = -3.1373, and SBC = -2.09
The asterisks * and ** indicate significance at the 1 and 5% levels.

parameters restrictions starting with those with 't' values between less than one and zero in absolute terms equal to zero.

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. The model is also assessed in terms of the diagnostic tests such as residual autocorrelation, normality and heteroscedasticity, in Addition to the Information Criterion (AIC), Adams (1997). The objective is to ensure data admissibility, and then, consider whether the dynamic responses of the variables conform to theory.

Appendix B

Derivation of the Neoclassical Model

Contd...

This study is based on the neoclassical growth model used by King and Levine (1993). The formulation begins with the aggregate production function:

$$Q = F(K, L) \quad ...(B.1)$$

Where: Q = Output, K = Capital, L = Labor The production function is homogeneous of the first degree; put differently, it exhibits constant returns to scale. This implies that if all inputs are changed proportionately, output will change by the same proportion. In other words, the production function can be written as;

$$\alpha Q = F(\alpha K, \alpha L) \quad ...(B.2)$$

If K and L are doubled $(\alpha = 2)$, output will double. With this assumption, we can rewrite the production function in a very handy percapita form. If we let $\alpha = 1/L$, we can then have:

$$q \equiv \frac{Q}{L} = F\left(\frac{K}{L}, 1\right) = F\left(\frac{K}{L}\right) = f(k) \quad ...(B.3)$$

The marginal productivity to increasing the *K/L* ratio is positive but diminishing. That is,

$$f'(k) > 0; f''(k) < 0$$

Given a Cobb-Douglas production function with constant returns to scale and diminishing marginal productivity;

$$Q = AK^{\alpha} L^{1-\alpha} \quad ...(B.4)$$

In this context, homogeneity of degree one is ensured by making the exponents of K and L sum up to unity. When written in per capita terms, the production function takes the form:

$$q = \frac{Q}{L} = \frac{AK^{\alpha} L^{1-\alpha}}{L} = \frac{AK^{\alpha}}{L^{\alpha}} = A\left(\frac{K}{L}\right)^{\alpha} = Ak^{\alpha} \quad ...(B.5)$$

The marginal productivity of k can be computed as:

$$MPk = \frac{\partial q}{\partial k} = A\alpha k^{\alpha-1} > 0 \quad ...(B.6)$$

$$\frac{\partial MPk}{\partial k} = \frac{\partial^2 q}{\partial k^2} = A\alpha(\alpha - 1)k^{\alpha-2} < 0 \quad ...(B.7)$$

Contd...

Derivation of the Neoclassical Model

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The production function is therefore concave in shape.

King and Levine (1993) modified the above neoclassical growth model in an attempt to measure growth. Consequently, they decomposed growth into two components: the rate of physical capital accumulation and everything else that determines real per capita GDP growth. Specifically, they let y = real per capita GDP growth, k = real per capita physical capital stock, x = other determinants of per capita growth and α a production function parameter. Formally;

$$y \quad k^{\alpha} x \qquad \text{...(B.8)}$$

Where: $y \quad y_t, k \quad k_t, x \quad x_t$. Taking logs of equation (4.8) and differentiating yields,

$$GYP \quad \alpha GK \quad EFF \qquad \text{...(B.9)}$$

Where: GK = growth rate of real per capita physical capital stock, EFF = growth rate of everything else that determines per capita GDP growth, GYP =average long-run per capita GDP growth. Rearranging equation (B.9) and taking GK on the left hand side gives EFF to be defined as:

$$GYP \quad \alpha GK \qquad \text{...(B.10)}$$

EFF may consist of many factors for example technology, human capital accumulation, increase in the number of hours per worker and improvements in the employment of factor inputs. EFF was constructed as a measure of the residual of real per capita GDP growth after accounting for the rate of physical capita accumulation, put simply; EFF is referred to as improvements in "efficiency". King and Levine (1993) in their cross-sectional study of 77 countries on the relationship between financial development and economic growth from 1960-1989, specified the following model:

$$G_j \quad \alpha \quad \beta F_i \quad \gamma X \quad \varepsilon \qquad \text{...(B.11)}$$

Where: G(j) represents the value of the jth growth indicator (per capita GDP growth, per capita capital stock growth or productivity growth) averaged over the period 1960-1989. F(i) represents the value of the ith indicator of financial development (DEPTH, BANK, and PRIVY, PRIVATE) averaged over the period 1960-1989. Where: DEPTH = Ratio of liquid liabilities to GDP, BANK = Deposit money bank domestic credit divided by deposit money bank plus central bank domestic credit, PRIVY = Ratio of claims on the nonfinancial private sector to GDP, PRIVATE = Ratio of claims on the nonfinancial private sector to total domestic credit.

X represents a matrix of conditioning information to control for other factors associated with economic growth (e.g., income per capita, education, political stability, fiscal and monetary policy, etc.). α, β, γ, are parameters and ε = the error term. A few modifications are made in order for the King and Levine (1993) model to suit the Ugandan environment in which the study is conducted. The current study includes two dummy variables to account for the policy change and political instability, which the author feels, had a significant impact on real GDP growth. Thus, the base growth equation employed in the study is specified as follows:

Contd...

Derivation of the Neoclassical Model *Contd...*

$$GY_t = \beta_0 + \beta_1 FI_{it} + \beta_2 X_{it} + \varepsilon_t \quad ...(B.12)$$

Where: *GY*= economic growth, defined as the log of real GDP, *FI* = represents the i^{th} indicator of financial development, (*M2Y* and *TCR*) to be tested, *X* is a matrix of conditioning variables, $\beta_0, \beta_1, \beta_2$ are parameters to be estimated, and ε_t is the white noise error term which is independently and identically distributed.

The variables are defined as follows: *M2Y* = Broad money stock as a ratio of GDP, TCR = Total credit to the economy. Specifically, equation (B.12) can be stated as follows:

$$GY_t = \beta_0 + \beta_1 M2Y_t + \beta_2 TCR_t + \varepsilon_t \quad ...(B.13)$$

However, as emphasized by King and Levine (1993), there are other factors associated with economic growth e.g., Education, Political stability, Fiscal and Monetary policy among others. In line with this argument, the following variables are included in the model: *IRR* = Real interest rate, *INF* = Inflation rate, *DEF* = Fiscal deficit, EXR= Exchange rates, POP = Population, *MEX* = Manufactured exports, *TEX* = Total exports, a dummy for political instability, DP and DE for structural change are included in the base equation as control variables.

Dropping the time series subscripts, the underlying relationship between financial development and economic growth in Uganda is empirically established using the following growth equation:

$$GY = \beta_0 + \beta_1 M2Y + \beta_2 IRR + \beta_3 TCR + \beta_4 INF + \beta_5 DEF + \beta_6 EXR + \beta_7 MEX + \beta_8 POP + \beta_9 TEX + \beta_{10} DP + \beta_{11} DE + \varepsilon \quad ...(B.14)$$

All variables and parameters are as defined above.