

Financial Deepening, Capital Inflows and Economic Growth Nexus in Tanzania: A Multivariate Model

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ABSTRACT In this study the dynamic causal relationship between financial deepening and economic growth is examined using a multivariate model. Unlike the majority of the previous studies, the current study includes foreign capital inflows as an intermittent variable between financial deepening and economic growth, thereby creating a simple trivariate model. Using the newly introduced ARDL-bounds testing procedure, the study finds a distinct unidirectional causal flow from economic growth to financial depth in Tanzania. This applies irrespective of whether the causality is estimated in the short run or in the long run. Other results show that there is a bi-directional causality between financial development and foreign capital inflows, and a prima-facie unidirectional causality from foreign capital inflows to economic growth. The study, therefore, concludes that financial development in Tanzania follows growth, irrespective of whether the causality is estimated in a static or dynamic formulation.

JEL: [E44, O11, O16]

1. INTRODUCTION

The relationship between financial development and economic growth has recently received emphasis from numerous theoretical and empirical studies in the last decades. Three groups exist in the literature regarding the causal relationship between financial development and economic growth (Odhiambo 2004). The first group argues that financial development leads to economic growth (supply-leading response). The second group maintains that it is economic growth which leads to the development of the financial sector (demand-following response). The third group, however, contends that both financial development and economic growth Granger-cause one another (bi-directional causal relationship).

Although this finance-growth relationship debate has attracted numerous empirical studies, the majority of these studies have concentrated mainly on Asia and Latin America, affording sub-Saharan African (SSA) countries either very little coverage or none at all. In particular, studies in countries such as Tanzania are almost non-existent. Even where such studies have been undertaken, the empirical findings on the direction of causality between financial development and economic growth and the mechanism through which this takes place have been largely inconclusive. In fact, the empirical evidence from pre-

vious studies on this subject suggests that the relationship between financial development and economic growth may be sensitive to the proxy used for the measurement of financial development. In addition, the evidence suggests that the outcome between the two sectors differs from country to country and over time (see Odhiambo 2008). Previous studies on this subject suffer from three major limitations. Firstly, many studies have over-relied on the cross-sectional data which cannot satisfactorily address the country-specific issues. The problem of using a cross-sectional method is that by grouping together countries that are at different stages of financial and economic development, it fails to address the country-specific effects of financial development on economic growth and *vice versa*. In particular, the method fails to explicitly address the potential biases induced by the existence of cross-country heterogeneity, which may lead to inconsistent and misleading estimates (see Ghirmay 2004; Quah 1993; Casselli and Esquivel 1996; Odhiambo 2008). Secondly, many empirical studies are mainly based on a bi-variate analysis. Yet, it is now known that the inference drawn from the bi-variate framework may be biased due to the omission of a third important variable. In other words, the introduction of a third variable affecting both financial development and economic growth in the bi-variate framework may not only alter the direction of causality between

the two variables, but also the magnitude of the estimate (see Loizides and Vamvoukas 2005; Odhiambo 2008). Thirdly, the majority of the previous studies have used either the residual-based co-integration test associated with Engle and Granger (1987) or the maximum likelihood test based on Johansen (1988) and Johansen and Juselius (1990), which may not be appropriate, especially when the sample size is too small (see Nerayan and Smyth 2005).

In an attempt to fill this lacuna, the current study investigates the inter-temporal causal relationship between financial development and economic growth in Tanzania by including foreign capital inflows as an intermittent variable in the finance-growth causality, thereby creating a simple tri-variate causality analysis. The rest of the paper is structured as follows: Section 2 discusses the trends of financial development and economic growth in Tanzania. Section 3 gives the theoretical and empirical underpinnings of the finance-growth nexus. Section 4 deals with the empirical model specification, estimation techniques and analysis of the empirical results. Section 5 concludes the study.

2. FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN TANZANIA

The financial sector in Tanzania is relatively small and less developed when compared to those of a number of sectors in the emerging economies. The sector is mainly bank-dominated, and financial deepening and widening have not reached the expected level. There is no significant development of leasing institutions, housing finance institutions, hire-purchase and retail credit companies. The long-term financial market still remains underdeveloped with small and weak contractual saving institutions and a relatively small stock exchange, which was only established in 1996 and became operational in 1998. As a result, money and capital intermediaries such as dealers, brokers, discount houses and merchant banks have not developed to the level expected.

A number of factors have contributed to the current underdevelopment of the Tanzanian banking sector. The main constraint, however, has been the financial repression policy – even though a weak and unclear institutional framework has also contributed somewhat to the under-development of the financial sector. How-

ever, since the 1990s, the government has implemented a number of policy and institutional reforms in order to strengthen the development of financial institutions in Tanzania. For example, the Banking and Financial Institutions Act of Tanzania was passed in 1991 in order to modernise the legal and regulatory framework so as to allow for competition in the delivery of financial services.

Although the government of Tanzania has implemented a number of reforms since early 1990, the trend of Tanzanian financial depth, as measured by M_2/GDP , remains mixed and is on average lower than the pre-reform depth. Analogously, this could mean that the Tanzanian real sector is growing faster than the monetary sector. For example, between 1969 and 1973 the average M_2/GDP ratio was about 0.260. Between 1974 and 1978, the average ratio increased to about 0.287. During 1979 and 1983 the ratio increased further to about 0.408. Between 1984 and 1988 the country suffered a sharp contraction of financial depth, and by 1988 the ratio reached a historic low ratio of about 0.174. The ratio later increased to about 0.184 in 1989 and 0.199 in 1990, but later declined slightly to 0.198. Immediately after interest rate liberalisation in 1992 and 1993, the M_2/GDP ratio rose considerably. The ratio rose to about 0.248 in 1994 and 0.251 in 1995 from about 0.244 in 1993. However, between 1996 and 1998, the ratio declined considerably. The ratio declined from about 0.251 in 1995 to about 0.218 in 1996 and later to 0.197 in 1997 and 0.184 in 1998. In 1999 and 2000, the ratio improved to about 0.189 and 0.193 respectively. Although the financial depth ratio has recently shown an upward trend, it is still lower than the average ratio recorded in the 1980s. Currently, there are about 22 commercial banks, 3 non-bank financial institutions and 102 foreign exchange bureaux, of which 80 are operating in the Tanzanian mainland, while 22 are operating in Zanzibar.

Unlike the financial sector development, the real sector development, as measured by the economic growth rate, has remained either high or modest throughout the post-reform period. For example, between 1991 and 2000 Tanzania recorded an average annual percentage GDP growth rate of about 3%. In 1991 and 1992 Tanzania recorded low annual GDP growth rates of about 2.1% and 0.6% respectively (see African Development Indicators 2002). However, in

1993 the rate increased to 1.2%. Following the liberalisation in 1992 and 1993, the real GDP growth rate increased phenomenally. The rate increased from 1.2% in 1993 to 1.6% in 1994 and thereafter to 3.6% in 1995. By 1996, the Tanzanian annual GDP growth rate reached 4.6%. Although the rate decreased to 3.5% in 1997, it later increased to 3.7% in 1998, before declining slightly to 3.6% in 1999. However, in 2000 the country's GDP growth rate increased significantly to about 5.1%, the highest GDP growth rate recorded in Tanzania in more than a decade. Table 1 shows the trends of financial indicators as well as economic growth in Tanzania during the period 1994-2005 as compared with 1980.

Table 1: Trends of financial indicators and economic growth in Tanzania

<i>Year</i>	<i>M2/GDP</i>	<i>M1/GDP</i>	<i>GDP per capita (Tshs)</i>
1980	0.415954	0.316952	2,233.53
1994	0.247835	0.143383	76,552.45
1995	0.250889	0.141791	97,656.00
1996	0.218041	0.119228	118,591.12
1997	0.197104	0.105001	144,455.16
1998	0.184335	0.097917	167,254.88
1999	0.189266	0.098333	188,980.90
2000	0.192297	0.095621	209,101.84
2001	0.197801	0.092575	233,153.28
2002	0.218683	0.102402	258,664.92
2003	0.223366	0.104145	289,610.51
2004	0.230318	0.106394	328,607.49
2005	0.276935	0.123781	370,704.15

Source: Author's own computations from the IFS Yearbook (various issues)

3. LITERATURE REVIEW

The relationship between financial development and economic growth has been examined extensively in the literature, but with conflicting results. For a long time the conventional wisdom has been in favour of the supply-leading response, where the development of the financial sector is expected to precede the development of the real sector. However, to date three views exist in the literature regarding the relationship between financial development and economic growth (Odhiambo 2008). The first view argues that financial development is important and leads to economic growth (that is, the supply-leading response). This view has recently been widely supported by McKinnon (1973), Shaw (1973), and King and Levine (1993), among others. The empirical work, which is associa-

ted with the supply-leading response in developing countries, includes studies by Jung (1986), Spears (1992), King and Levine (1993), De Gregoria and Guidotti (1995), Odedokun (1996), Rajan and Zingale (1998), Ahmed and Ansari (1998), Darrat (1999), Ghali (1999), Xu (2000), Jalilian and Kirkpatrick (2002), Calderon and Liu (2003), Bhattacharya and Sivasubramanian (2003), Suleiman and Abu-Qaun (2008), and more recently Habibullah and Eng (2006), amongst others. The second view maintains that it is economic growth that leads to the development of the financial sector (demand-following response). The empirical work, which is associated with this view includes studies by Agbetsiafa (2003), Waqabaca (2004) and Odhiambo (2004), amongst others. Despite the arguments in favour of the supply-leading response and demand-following response, the empirical results from a number of studies have shown that financial development and economic growth can Granger-cause one another. These include studies such as Wood (1993), Demetriades and Hussein (1996), Luintel and Khan (1999), Al-Yousif (2002) and Odhiambo (2005), among others.

4. ESTIMATION TECHNIQUES AND EMPIRICAL RESULTS

4.1 Empirical Model Specification

In this section, a dynamic Granger-causality test is used to examine the causality between financial development, foreign capital inflows and economic growth in Tanzania. The Granger-causality test method is chosen in this study over other techniques because of its favourable response to both large and small samples (see also Odhiambo 2008). Unfortunately, causality studies based on a bivariate framework have been found to be very unreliable as the introduction of a third important variable can change both the inference and the magnitude of the estimates (see Caporale and Pittis 1997; Caporale et al. 2004; Odhiambo 2008). Given this weakness, the proposed study uses a trivariate causality test to examine the linkage between financial development, economic growth and foreign capital inflows in Tanzania in a stepwise fashion. The choice of foreign capital inflows as an intermittent variable in the tri-variate causality framework has been influenced by the theoretical links between foreign capital inflows and eco-

economic growth, on the one hand, and foreign capital inflows and financial development on the other. The relationship between foreign capital inflow and economic growth, for example, has been contentiously debated since the 1960s. Griffin and Enos (1970), cited in Park (1987), for example, argue that foreign capital inflow is generally not associated with economic development and may even discourage it. Specifically, the authors argue that foreign capital inflows may supplement domestic savings and distort the composition of investment, thereby leading to a reduction in the rate of economic growth. However, Chenery and Straut (1966) argue that foreign capital has a positive effect on economic growth in developing countries. Likewise, Shabbir and Mahmood (1992) and Khan and Rahim (1993), find that foreign aid accelerates the growth rate of GDP.

4.1.1 Cointegration – ARDL-Bounds Testing Procedure

The ARDL model used in this study can be expressed as follows:

$$\Delta \ln y_t / N_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta \ln y_{t-i} / N_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta \ln M2 / GDP_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta \ln FCI_{t-i} + \alpha_4 \ln y_t / N_t + \alpha_5 \ln M2 / GDP_t + \alpha_6 \ln FCI_t + \mu_t \dots (1)$$

$$\Delta \ln M2 / GDP_t = \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta \ln M2 / GDP_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta \ln y_{t-i} / N_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta \ln FCI_{t-i} + \beta_4 \Delta \ln M2 / GDP_t + \beta_5 \ln y_{t-i} / N_{t-i} + \beta_6 \ln FCI_{t-i} + \mu_t \dots (2)$$

$$\Delta \ln FCI_t = \delta_0 + \sum_{i=1}^n \delta_{1i} \Delta \ln FCI_{t-i} + \sum_{i=0}^n \delta_{2i} \Delta \ln y_{t-i} / N_{t-i} + \sum_{i=0}^n \delta_{3i} \Delta \ln M2 / GDP_{t-i} + \delta_4 \ln FCI_{t-i} + \delta_5 \ln M2 / GDP_{t-i} + \delta_6 \ln y_{t-i} / N_{t-i} + \mu_t \dots (3)$$

where: ECT_{t-1} = error correction term lagged one period; y/N_{t-1} = real per capita income (y/N); FD_{t-1} = financial depth ($M2/GDP$); FCI_{t-1} = foreign capital inflows; Δ = first difference operator.

The ARDL modelling approach was originally introduced by Perasan and Shin (1999) and later extended by Perasan et al. (2001). Unlike other cointegration techniques, the ARDL does not impose a restrictive assumption that all the variables under study must be integrated of the same order. The ARDL approach can be applied regardless of whether the underlying regressors are integrated of order one $I(1)$, order zero $I(0)$ or fractionally integrated. Moreover, the ARDL

test is suitable even if the sample size is small. The ARDL-bounds testing procedure is based on the joint F-statistic (or Wald statistic) for cointegration analysis (see also Odhiambo 2010). The asymptotic distribution of the F-statistic is non-standard under the null hypothesis of no cointegration between examined variables. In all equations, the null hypothesis of no cointegration is tested against the alternative hypothesis that there is at least one cointegrating vector.

Pesaran et al. (2001) report two sets of critical values for a given significance level. One set of critical values assumes that all variables included in the ARDL model are $I(0)$, while the other is calculated on the assumption that the variables are $I(1)$. If the computed test statistic exceeds the upper critical bounds value, then the null hypothesis is rejected. If the F-statistic falls into the bounds then the cointegration test becomes inconclusive. If the F-statistic is lower than the lower bounds value, then the null hypothesis of no cointegration cannot be rejected.

4.1.2 Granger Non-causality Test

Once the long-run relationships have been identified in section 4.1.1, the next step is to examine the short-run and long-run Granger-causality between financial development, foreign capital inflows and economic growth using the following tri-variate model (see also Odhiambo 2010; Narayan and Smyth 2008):

$$y_t / N_t = \lambda_0 \sum_{i=1}^m \lambda_{1i} y_{t-i} / N_{t-i} + \sum_{i=1}^n \lambda_{2i} FD_{t-i} + \sum_{i=1}^n \lambda_{3i} FCI_{t-i} + \lambda_4 ECT_{t-1} + \mu_t \dots (4)$$

$$FD_t = \sum_{i=1}^m \phi_{1i} y_{t-i} / N_{t-i} + \sum_{i=1}^n \phi_{2i} FD_{t-i} + \sum_{i=1}^n \phi_{3i} FCI_{t-i} + \phi_4 ECT_{t-1} + \varepsilon_t \dots (5)$$

$$FCI_t = \delta_0 + \sum_{i=1}^m \delta_{1i} y_{t-i} / N_{t-i} + \sum_{i=1}^n \delta_{2i} FD_{t-i} + \sum_{i=1}^n \delta_{3i} FCI_{t-i} + \delta_4 ECT_{t-1} + v_t \dots (6)$$

where:

ECT_{t-1} = error correction term lagged one period

y/N_{t-1} = real per capita income (y/N)

FD_{t-1} = financial depth ($M3/GDP$)

FCI_{t-1} = foreign capital inflows

In addition to indicating the direction of causality amongst variables, the error-correction model also enables us to distinguish between the short-run and the long-run Granger-causality. For example, the F-test and the explanatory variables indicate the “short-run” causal effects, whereas the “long-run” causal relationship is implied through the significance of the t-test of the lagged error-correction term.

Table 2: Stationarity tests of all variables on differenced variables: DF-GLS Tests

Variable	No Trend	Trend	Stationarity status
<i>Stationarity Tests of all Variables on Differenced Variables - DF-GLS Tests</i>			
LM2/GDP	-4.966111***	-5.017579***	Stationary
Ly/N	-2.841814***	-3.261827**	Stationary
LFCI	-6.721144***	-6.781522***	Stationary
<i>Stationarity Tests of all Variables on Differenced Variables - PHILIP-PERRON (PP) TEST</i>			
LM2/GDP	-5.418581***	-5.325538***	Stationary
Ly/N	-5.292002***	-6.589157***	Stationary
LFCI	-6.646724***	-6.580126***	Stationary

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

*** denotes 1% level of significance.

It should, however, be noted that even though the error-correction term has been incorporated in all the equations (4) – (6), only equations where the null hypothesis of no cointegration is rejected will be estimated with an error-correction term (see also Narayan and Smyth 2006; Morley 2006; Odhiambo 2010).

4.2 Stationarity Tests

The results of the stationarity tests in levels (not presented here) show that all variables are non-stationary in levels. Having found that the variables are not stationary in levels, the next step is to difference the variables once in order to perform stationarity tests in difference form. The results of the stationarity tests in first differences based on the DF-DLS and the Phillips-Perron class of tests are presented in Table 2.

The results reported in Table 2 show that after differencing the variables once, all the variables were confirmed to be stationary. It is, therefore, worth concluding that all the variables are integrated of order one.

4.3 Cointegration Analysis

Having confirmed that all variables included in the causality test are integrated of order one,

the next step is to test for the existence of a cointegration relationship between financial depth (M2/GDP), foreign capital inflows (FCI) and economic growth (y/N). For this purpose, the study uses the ARDL-Bounds testing procedure. The ARDL-Bounds testing procedure involves two steps. In the first step, the order of lags on the first differenced variables in y/N, M2/GDP and FCI equations are obtained from the unrestricted models by using the Akaike Information Criterion (AIC) and the Schwartz Bayesian Criterion (SBC). The results of the AIC and SBC tests (not reported here) show that while in the case of y/N and FCI equations the optimal lag 3, in the M2/GDP equation, the optimal lag is 1. In the second step, we apply the bounds F-test to equations (1) – (3) in order to establish whether a long-run relationship exists between the variables under study. The results of the bounds test are reported in Table 3.

The results reported in Table 3 show that there is evidence of cointegration when M2/GDP and FCI are taken as dependent variables, but not when y/N is taken as a dependent variable. This is supported by the calculated F statistic, which is found to be statistically significant in both M2/GDP and FCI equations but not in the y/N equation.

Table 3: Bounds F-test for cointegration

Dependent variable	Function	F-test statistic
$\Delta \ln y/N_t$	y/N (M2/GDP, FCI)	2.1600
$\Delta \ln M2/GDP_t$	M2/GDP(y/N, FCI)	6.7873***
$\Delta \ln FCI_t$	FCI(y/N, M2/GDP)	4.7154**
<i>Asymptotic Critical Values</i>		
		1 %
		I(0) I(1)
		5%
		I(0) I(1)
		10%
		I(0) I(1)
Pesaran et al (2001), p. 300, Table CI(ii) Case II		4.94 5.58 3.62 4.16 3.02 3.51

Note: *** denotes statistical significance at the 1% level.

Table 4: Granger non-causality test

Dependent variable	F-statistics [P-value]			statistics
	$\Delta \ln y/N_t$	$\Delta \ln M2/GDP_t$	$\Delta \ln FCI_t$	ECM_{t-1}
$\Delta \ln y/N_t$	-	1.7102 (0.1885)	5.2726(0.0019)***	-
$\Delta \ln M2/GDP_t$	5.039 (0.0060)***	-	7.3441(0.0011)***	-0.34887** [-2.204]
$\Delta \ln FCI_t$	1.6589(0.2043)	4.11798(0.0218)**	-	-0.89645***[-4.988]

4.4 Analysis of Causality Test Based on Error-Correction Model

Having found that there is a long-run relationship between y/N , $M2/GDP$ and FCI , the next step is to test for the causality between the variables used by incorporating the lagged error-correction term into equations (5) and (6). The causality in this case is examined through the significance of the coefficient of the lagged error-correction term and joint significance of the lagged differences of the explanatory variables using the Wald test. The results of the Granger-causality test are reported in Table 4.

The results of the causality tests reported in Table 4 show that there is a distinct causal flow from economic growth to financial development. This applies irrespective of whether the causality is estimated in the short run or in the long run. The long run causality is supported by the lagged error-correction term in the real money balances ($M2/GDP$) equation, which is negative and statistically significant. The short-run causality, on the other hand, is supported by the F-statistic, which are both statistically significant in the $M2/GDP$ equation, but not in the y/N equation. This, therefore, shows that the causality between financial development and economic growth in Tanzania takes a demand-following response. Other results show that there is a bi-directional causality between financial development and foreign capital inflows, and a prima-facie unidirectional causality from foreign capital inflow to economic growth. The bi-directional causality between financial development and foreign capital inflow is supported by the coefficients of the lagged error-corrections term and the F-statistics in the $M2/GDP$ and FCI equations which are all statistically significant. The prima-facie (short-run) causal flow from foreign capital inflow to economic growth is supported by the corresponding F-statistics in the economic growth equation which is statistically significant.

5. CONCLUSION

This paper examines the causal relationship between financial depth, foreign capital inflows and economic growth in Tanzania. In an attempt to address the problem of the omission-of-variable bias, the study incorporates the foreign capital inflows variable as an intermittent variable between financial deepening and economic growth, thereby creating a simple trivariate model. Previous studies on this subject suffer from a number of limitations. For example, some studies are mainly based on the cross-sectional data analysis, which cannot satisfactorily address the country-specific issues. Others have used either the residual-based cointegration test associated with Engle and Granger (1987) or the maximum likelihood test based on Johansen (1988) and Johansen and Juselius (1990), which may not be appropriate, especially when the sample size is too small (see Narayan and Smyth 2005). Others have used a bivariate causality analysis, and may therefore suffer from the omission-of-variable bias. In other words, the introduction of a third variable affecting both financial development and economic growth in the bivariate setting may not only alter the direction of causality between the two variables, but also the magnitude of the estimate (see Loizides and Vamvoukas 2005; Odhiambo 2008). Using the newly developed ARDL-bounds testing procedure, we find that there is a distinct unidirectional causal flow from economic growth to financial depth in Tanzania. Other results show that there is a bi-directional causality between financial development and foreign capital inflows, and a prima-facie unidirectional causality from foreign capital inflow to economic growth.

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