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The Determinants of Interest Rate Spreads in Developing Countries: Evidence on Tanzania, 1991 – 2009

by

Francisco. M. P. Mugizi, Michael O. A. Ndanshau and Jehovaness Aikaeli

Abstract

The now market based financial system in Tanzania is characterized by relatively high interest rate spreads. This paper sought to establish relative importance of macroeconomic and regulatory factors in explaining persistence of interest rate spread in Tanzania during the period 1991:I - 2009:IV. A Cointegration and Error Correction Model (ECM) was used to fit the data for Tanzania. The results revealed the interest rate spreads in Tanzania were strongly influenced by net government borrowing from commercial banks, development of the banking sector, statutory minimum reserve requirement and the discount rate. Among others, the results suggest the importance of low discount rate and reduced or total dispense with reserve requirement as a monetary policy strategy to reduce interest rate spreads in Tanzania. Importance of price stability in financial deepening is also underscored by the results.

JEL Classification: E44, E58, O16

Keywords: Interest Rate Spread, Bank Efficiency, Monetary Policy, Tanzania

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The Authors

Francisco. M. P. Mugizi is an Assistant Lecturer at Mkwawa University College of Education; Michael O. A. Ndanshau is Senior Lecture in the Department of Economics, University of Dar es Salaam; Jehovaness Aikaeli is a Lecturer in the Department of Economics, University of Dar-es-Salaam

Corresponding Author: ndanshau@udsm.ac.tz

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1. Introduction

Since the mid-1986 Tanzania has been implementing economic reforms that have included a package for the liberalization of the financial sector. The Government started in 1986, with a managed upward interest rate adjustment that climaxed to a total liberalization of interest rates from Government control in 1994. In tandem, the Banking and Financial Institutions Act (BFIA) enacted by the Government in 1991 lifted restrictions to free entry (and exit) of domestic and foreign financial institutions in the financial sector. Accordingly, local and foreign financial institutions started to operate in the country; and, the Government liberalization of the foreign exchange market by enactment of the Foreign Exchange Act of 1992 a) lifted legal restrictions to holding and owning of foreign currency and foreign currency deposits (FCD) by the domestic non-bank public; and, b) introduced bureaux de change to trade in foreign currency; and, c) launched the inter-Bank Foreign Exchange Market (IFEM) for monetary policy purpose. In addition, since 1991 included institution of deposit insurance fund (DIF) entrusted to effectively contribute to financial stability in the country; launch of a treasury bills (TBs) market in August 1993 that serves as an anchor of interest rate determination and a basis for the use by the central bank as an indirect monetary policy instrument in macroeconomic management; the enactment of central bank charter, *viz* Bank of Tanzania Act of 1995, which legally designated price stability as the prime objective of monetary policy, brought to an end the use of direct instruments of monetary policy sub-summed by the Government under the Annual Finance and Credit Plans in 1971, and underscored the use of indirect monetary policy instruments. Later in 2006 the Government repealed the Bank of Tanzania (BoT) Act of 1995 in favour of a new charter that better anchored the supervisory role of the central bank in order to foster financial and macroeconomic stability in the country. Furthermore, in order to enhance regulation of the financial system the central bank has been issuing several prudential management regulations since 1991: Banking and Financial Institutions Regulations (1997), Management of Risk Assets Regulation and Liquid Asset Ratio regulation (2001) (Epaphra, 2004:12).

In Tanzania and most other developing countries the liberalization of the financial sector was partly informed by the Neo-Liberal view on the financial repression hypothesis (FRH) associated with McKinnon (1973) and Shaw (1973) and partly, by the findings and policy recommendation of the Presidential Banking Commission, also referred to as the Nyirabu Commission, instituted in 1988 to study and recommend to the

Government ways of modernizing the financial sector in the country (Tanzania, 1990). As expected, the liberalization of the financial sector led to an increase in the number of local and foreign private banks and non-bank financial institutions (NBFIs) operating in the country. Between June 1991 and August 2010 the number of commercial banks increased from only 2 to 28; and, while the number of regional unit banks rose from zero to 6, the number of non-commercial banks increased from 3 to 5, insurance companies increased from one to 21 and 200 and bureaux de change became operational. Furthermore, the menu of financial instruments increase significantly to include diverse type of deposits with diverse maturities, treasury bills (TBs), stocks, loans of diverse maturities and diverse type of payment instruments: paper, card, and electronic transfer based instruments.[1] The increase in the menu of financial intermediaries and instruments may suggest development in the country of a fairly competitive financial system that, among others, would reduce interest rate spread by reducing lending rates and/or increasing interest rate on saving deposits. To the contrary, since the launch of financial sector reforms the nominal interest rate spread in Tanzania remained considerably large (Odhiambo, 2010; Epaphra, 2004; Tuni, (1997).

The experience of Tanzania is not unique. The major causes of the existence of wide and persistent interest rate spreads in the country since interest rate liberalization policy became effective is yet to be exactly established, at least empirically. On this account, the main objective in this paper is to examine the bahaviour and determinants of interest rate spreads in Tanzania. The analysis in this paper is considered important for several reasons: one is theoretical importance of interest rate in monetary policy. Second, is argument in some academic and policy quarters that Government should reduce the lending rates because they are prohibitively high and economically distortionary. Third, is paucity of empirical studies on interest rate spread in Tanzania. Only one study by Epaphra (2004) has analysed the impact of both market and macroeconomic factors on interest rate spread in Tanzania for the period 1986-2002. The value addition of this paper over the previous study is from two related areas: a) use in the analysis of a larger sample of quarterly data for the period 1991-2009; and, b) use of event dating approach

1 Paper based included more use of cheques; card based transaction include automatic teller machines (ATM), point of sale debit card, prepaid card (for telephone, water, electricity, etc). The electronic money transfer instruments include telegraphic transfer (TTs), VSAT based interbank transactions, money order, GIRO, and SWIFT for some banks.

to analyse the behaviour of interest rate spread in the context of developments in financial markets and the overall macroeconomic environment.

The rest of this paper is organized as follows: after this introductory section, Section 2 critically reviews both theoretical and empirical literature but also gives a synthesis of the main issues and emerging research gaps. Section 3 presents the methodology of the study; and, Section 4 presents, discusses and compares the results with those obtained by previous studies on Tanzania and other less developing countries (LDCs). Section 5 concludes with a presentation of the main findings, policy implications and areas for further research.

2. Related Literature

2.1 Theoretical Literature

The literature on interest rate spreads is characterized by a number of arguments on determinants of interest rate spread. The factors can be clustered in four broad categories: a) bank specific factors, including size, capital structure, management efficiency, ownership pattern, quality of loan portfolio, overhead costs, profit maximization motive, and shares of liquid and fixed assets (Moore and Graigwell, 2006; Folawewo and Tennant, 2008; Demirgüc-Kunt and Huizinga, 2000); b) the market structure of the banking sector, including number of players and diversity of assets, market share (power) of players, and level of development of the banking system, ownership structure and control policy regime, adequacy of the legal and regulatory framework (Falowewo and Tennant, 2008; Ngugi, 2001; Ndung'u and Ngugi, 2000; Leite and Sandararajan, 1990; Fry, 1995; Chamley and Honohan, 1993); c) financial regulation by the central bank by reserve requirements, discount rates, deposit insurance funds, capital adequacy controls, and interest rate ceilings; d) macroeconomic environment reflected by bahaviour of inflation, exchange rate, economic activity, and government borrowing from the banking system (Samuel and Valderrama, 2006); and, c) a web of various risks.

The determinants of interest rate spreads not specific to the pricing behaviour of the banks are the most relevant in the analysis hereafter.2 An unstable macroeconomic environment impacts positively on the interest rate spreads in several ways: poor economic performance is likely to reduce the ability of bank debtors to honour their debt obligations. Specifically, a weak economy exposes banks to credit risk as low economic

2 For detailed treatment on how the bank specific factors impact upon interest rate spread, among others, see, Demirguc-Kunt Huizinga (2000) and Brock and Franken (2002)

growth promotes deterioration of credit quality and increases the probability of loan defaults (Flamini, McDonald and Schumacher, 2009:3). Elsewhere, it is argued that the effect of economic activity on interest rate spread could be positive because economic growth would increase demand for loans and bid up lending rates (Afanasieff, Lhacer, and Nakane, 2002; and Crowley, 2007). Furthermore, high and volatile inflation reduce rapidly and unpredictably the ability of the private sector to fulfil their planned financial obligations, including debt obligations. Banks' would hedge against the risks of high and volatile inflation by including in lending rates a risk premium that may increase the interest rate spread (Samuel and Valderrama, 2006). Also hedging by banks against the risk and uncertainty of foreign exchange from the volatility of exchange rate would raise the lending rates and, as a result, increase the interest rate spread.

Furthermore, lack of or weak supervisory and regulatory framework exposes banks to asymmetric information problems: a) moral hazard; and b) adverse selection problems. Endeavour by banks to screen and subsequently monitor and enforce loan repayment by borrowers has costs of a formidable adverse effect on the profitability addressed by banks through increasing lending rates. Alternatively, banks would accommodate *a priori* the risk arising from asymmetric information problem by imposing on clientele a risk premium for bad and doubtful debts that increase the lending rate and consequently the interest rate spread. Existence of a good legal framework for enforcing debt contract would serve to reduce interest rate spread and expand the outreach of financial services. Implicitly, a weak or faulty legal framework would cause banks to build a premium on lending rates that increase the interest rate spread because of an increase in credit and/or liquidity risks (Bloem and Gorter, 2001),). In relation, poor legal system for property rights demand for a risk premium for underlying unpredictable poor foreclosures to enforce debt contracts. Lack of poor and effective legal framework, including commercial laws for enforcing financial and business contracts would also create credit management problems that would culminate in a charge of a premium over the cost of borrowed funds.

Commercial banks are usually subjected to diverse types of taxes: withholding taxes, license fees, stamp duties, and value added tax (VAT), usually dubbed explicit taxes. Assuming an average cost pricing regime such explicit taxes would be costed in lending rates and translate into high interest rate spreads. In the modern literature banks are said to suffer from unduly high implicit taxes in the form of reserve requirement imposed on banks by central banks through: a) reduction of liquidity in the

economy through the reduction of the capacity of the banks to lend; and, b) provision of safety and soundness of the depository institutions and the financial system at large (Hein and Stewart, 2002:41; Demirgüc-Kunt and Huizinga, 1998). The argument here is that the reserves held with central banks earn little or no interest income; and, the reserve requirement cut on the capacity of the banks to take advantage of profitable investment opportunities, including lending.3 Implicitly, banks may increase the interest rate spread by passing to clientele the implicit tax effect of statutory reserve requirement, and vice versa. Interest rate and credit ceilings imposed on monopolistic financial intermediaries undermine best practices in financial intermediation likely to cause inefficiency in the banking system that may be reflected by the high spreads. Thus, Ngugi (2001), for example, notes that interest rate ceilings set by government constrain banks' ability to charge the most appropriate interest rates on loans and offer minimum interest rate for deposits as their only optimal policy option.

It is also note worthy that banks in financial difficulties may borrow from the central bank at a cost, that is, discount rate. In a world of rules rather the discretion banks have a consistent view of the prevailing and expected monetary policy regime, an occurrence that may prompt premium in lending rates to have a buffer stock for attending liquidity or financial problems by recoursing to the central bank. In this context, the interest rate would be positively correlated with the discount rate spread. If the discount rate is not an active instrument of monetary policy, the bank would engage in precautionary saving of reserves by including a risk element in the lending rate. Banks may also offer higher deposit rates, as argued by Ngugi (2001). However, the impact of high deposit rates would be positive if macroeconomic environment is supportive, saving is sensitive to interest rates and/or banks are not awash excess liquidity.

2.2 Empirical Literature

Empirical evidence on determinants of interest rate spread in and outside LDCs can be partitioned into two parts: bank and non-bank specific type of studies. The literature survey hereafter only covers studies with empirical evidence on non-bank determinants

3 It depends, however, on the interest rate elasticity of the demand for loans. See Ngugi (2001) and Fry (1995).

of interest rate spread in LDCs.4 In general, the studies that exist underscore the importance of the macroeconomic environment, financial policy, and the existence of a legal and supervisory framework in the determination of interest rate spread in LDCs. Several studies have established a positive and significant effect of inflation on the interest spread: Folawewo and Tennant (2008) in a panel data study covering 33 countries in SSA for the period 1988-2005; Aboagye et al. (2008) in Ghana; Tennant and Folawewo (n.d) in a study on low and middle income countries in LDCs and also Europe; Robinson (2002) in a study on Jamaica; Brock and Rojas-Suarez (2000) in a study on Latin America; Mlachila and Chirwa (2002) in the case of Malawi. In contrast, however, Crowley's (2007) study on English-Speaking African countries found inflation was negatively related to interest rate spread. Some studies have also established a positive effect of economic growth on interest rate spread, for example, Chirwa and Mlachila (2204) in a study on Malawi; and, a study by Franken (2002) found existence of a positive effect of interest rate uncertainty and exchange rate volatility on interest rate spread.

Moreover, a cross-country study by Tennant and Folawewo (2008) found statutory reserve requirement, discount rate and level of money supply determined by the central bank exerted a significant positive effect on interest rate spread in SSA during the period 1988-2005. The same evidence was obtained by Tennant and Folawewo (n.d) in a panel data study that covered 33 low and middle income counties in Latin America, SSA, Europe and Asia for the period 1988-2005. Several studies on the Latin America also have found existence of a positive relationship between statutory reserve requirement of the central banks and the interest rate spread, among others, Gelos (2006), Samuel and Valderrma (2006), Saunder and Schumacher (2000) and Barajas, Steiner, and Salazar (1999). Studies by Chirwa and Mlachila (2004) and Mlachila and Chirwa (2002) also established a positive effect of the reserve requirement and discount rate of the central bank on interest rate spread in Malawi. And, a bank-specific type of study by Mugume, Apaa and Ojwiya (2009) found cash reserve requirement was one of the important determinants of interest rate spread in Uganda. Also, in a time series type of study, Epaphra (2004) found the discount rate was an important determinant of interest rate spread in Tanzania. However, in a bank level study Demirgüc-Kunt and Huizinga (1998)

4 Bank specific studies on SSA are also very few: they include studies on Uganda by Mugume *et al.* (2007), Ngugi (2004) in the case of Kenya, and Flamini, McDonald and Schumacher (2009) in a study which covered 389 banks in 41 SSA countries.

found a negative effect of reserve requirement on interest rate spread in developing countries, an outcome attributed to high opportunity cost of holding reserves in such countries.

A majority of the studies show that the degree of development of the banking sector is not an important determinant of interest rate spread.[5] A few studies show, however, that the development of the banking sector in low income countries in Asia, Europe, Latin America and SSA has a significant negative effect on interest rate spread (Tennant and Folawewo, n.d.). The contradictory result on the effect of banking sector development on interest rate spread is seemingly surprising-- they contradict findings obtained by some important studies in the area, for example, Crowley (2007), Moore and Craigwell (2000) and Demirgüc-Kunt and Huizinga (1998). Other macroeconomic factors found to impact positively on interest rate spread include: degree of government borrowing from the commercial banking sector (Tennant and Folawewo, n.d.); b) interest rate uncertainty (Brock and Franken, 2003); deposit insurance (Carapella and Giorgio (2003); and high real interest rates (Demirgüc-Kunt and Huizinga, 1998).

The survey of empirical literature suggests existence of several statistically significant non-bank determinants of interest rate spread in LDCs: inflation, economic growth, exchange rate volatility, degree of banking development, regulation by the central bank, especially the statutory reserve requirement, discount rate of the central bank and crowding out of the private sector by the public sector in commercial banking lending operations. These factors are included in the model estimated for the banking industry in Tanzania.6 While there are differences in most hypotheses tested, this study is similar to that by Epaphra (2004) in one area: it is industry specific, is based on quarterly time series data and used Cointegration and Error Correction Model (ECM). In this regard, the study complement the study by Epaphra (2004) in two ways: a) uses a larger sample with more data points in the period of financial sector reforms spanning from the period 1991-2009, compared to the period 1991-2002 covered by Epaphra (2004); and b) include in the analysis more macroeconomic factors established in the literature to determine interest rate spread, namely economic growth, statutory reserve

5 Among others, see Folawewo and Tennant (2008).

6 Banks specific study would be better carried out by using survey data on financial variables and other determinants of interest rate spread in Tanzania. Brock and Franken (2002) maintains, however, that bank specific factors are not connected with bank spreads and are more at industry level.

Afanasieff, Lhacer and Nakane (2002) also emphasized the importance of macroeconomic factors over the bank specific factors.

requirement, discount rate, exchange rate volatility, and development of the financial sector. The study motivates econometric analysis with a descriptive analysis of interest rate spread. The econometric analysis put into use is similar to that used in some of the previous studies, for example, Folawewo and Tennant (2008).

3. Methodology of the Study

3.1. Model Specification

The estimation model reads as follows;

$$(1) \qquad IRS_T = \alpha_0 + BD_t + \alpha_2 yGr_t + \alpha_3 \pi_t + \alpha_4 RERv_t + \alpha_5 CO_t + \alpha_6 SRR_t + \alpha_7 DR_t + u_t$$

In the model, IRS is the interest rate spread. It should be noted, however, that there exists in the literature a distinction between *ex ante* and *ex post* interest rate spreads.[7] Following Demirgüc-Kunt and Huizinga (1998:6) and also Folawewo and Tennant (2008:3) *ex ante* spread is defined as the difference between the interest revenues (income) and the actual interest rates expense.[8] In this study IRS is the difference between actual average short-term lending rate and the interest rate on pass book savings deposits. This measure is consistent with the approach used by the central bank (BoT) per which defines the IRS as the difference between the actual average 12-month short-term lending rate and the deposits rate of the commercial banks in Tanzania.[9]

The regressors of the estimation model are: the degree of development of the banking sector (BD). Following Demirgüc-Kunt and Huizinga (1998) and also Folawewo and Tennant (2008) BD is the ratio of total assets of commercial banks to the current nominal Gross Domestic Product (GDP). A negative effect of BD on IRS is hypothesized. The argument is that development of the banking system and competition that ensues reduces interest rate spread. yGr is the real rate of economic growth; and, is measured as the rate of change of the real GDP. The effect of yGr on

7 Demirgüc-Kunt and Huizinga (1998) acknowledge inadequacy of the proxies used to measure interest rate spread in banks. That inadequacy is also noted by Brock and Franken (2003).

8 Either or both measures of IRS have been used in some of the previous studies, among others, Crowley (2007), Demirgüc-Kunt and Huizinga (1998) and Nannyonjo (2001).

9 There did not exist in Tanzania 12-month deposits rates prior to 199. For this reason 3-6 month deposit rates are used instead.

IRS is expected to be negative: the argument is that economic growth reduces risks of loan default and this in turn reduces interest rate spread by reducing lending rate. Alternatively, growth in real income could suggest existence of potential for increasing demand for financial services, as per Patrick's (1966) demand-following phenomenon, that would increase interest rate spread by increasing lending rates. The statutory reserve requirement (SSR) prescribed by the central bank taxes the lending ability of the banks; and, as a burden in banking business it is expected to bear a positive effect on IRS because banks would tend to shift it to customers (Chirwa and Malachila, 2004).

Inflation (π), which is measured as the rate of change of the consumer price index (CPI), captures the cost of doing business in an economy (Demirgüc-Kunt and Huizinga, 1998; Tennant and Folawewo, n.d.). Thus, the effect of π on IRS is expected to be positive. Like previous studies, volatility of real exchange rare (RERv) is used as a proxy for macroeconomic instability; and, following Folawewo and Tennant (2008) and Vergil (2002), the RERv is measured as percentage change in the standard deviation of the real official real exchange rate of the dollar (USD) of the United States of America (USA) to the domestic currency in Tanzania, the Tanzanian shilling (TZS). The effect of RERv on IRS is expected to be positive. Also, a degree of private sector crowding out (CO) by excessive government dependence on loans from the commercial banking sector is expected to be positively correlated with the IRS. The CO is measured as percentage of net government commercial bank debt to total loans of the commercial banks. The discount rate (DR) of the central bank, used in Tanzania as an instrument of monetary policy, is expected to be positively related to the IRS. The u in equation (1) is the usual stochastic error term which is assumed to have white noise properties.

3.2 Data Type, Sources and Estimation Methods

The analysis is based on secondary quarterly time series data for the period 1991-2009, a period that was characterized by financial sector reforms started in Tanzania since 1991. The data for interest rate spread (IRS), statutory minimum reserves ratio (SRR), and the discount rate (DR) were directly obtained from the reports and publications of the Bank of Tanzania (various; a, b). The BoT was also the source of data for the CPI, net government debt, deposits and assets of the commercial banks,

respectively used to generate the inflation rate (π), and the crowding-out effect (CO). Volatility of the real exchange rate (RERv) was generated by using official nominal exchange rate data from the BoT and CPI data of USA that was obtained from the International Financial Statistics (IFS) and the USA Department of Labour-Bureau of Labour Statistics. The data for nominal GDP was obtained from World Economic Outlook data published by the International Monetary Fund (IMF). The CPI was used to deflate the nominal GDP used to generate yGr.

Ordinary Least Squares (OLS) method has been used to estimate equation (1) due to its simplicity, convenience and its successful use in similar and most other previous econometric studies (Gujarati, 2004). Estimation of the model was preceded by exploration of time series properties of the data by using a battery of methods: graphical and descriptive statistics; unit root tests, and order of cointegration of the variables in the model. Both Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) methods have been used to test for stationarity in variables. The two methods have been used because they use different methods to control for higher-order serial correlation in the series: the ADF test makes a parametric correlation for higher-order by assuming that the series follow the autoregressive process and adjusting the test methodology; and, nonparametric statistical method is used in the Phillip-Perron method in order to take care of serial correlation in the error terms without adding the lagged difference terms (Gujarat, 2004). Cointegration test was carried out by using the now very popular Engle-Granger method and also Johansen test. Ultimately an error correction model (ECM) was estimated using one-period-lagged residual (ec_{t-1}) obtained from the estimation of equation (1).

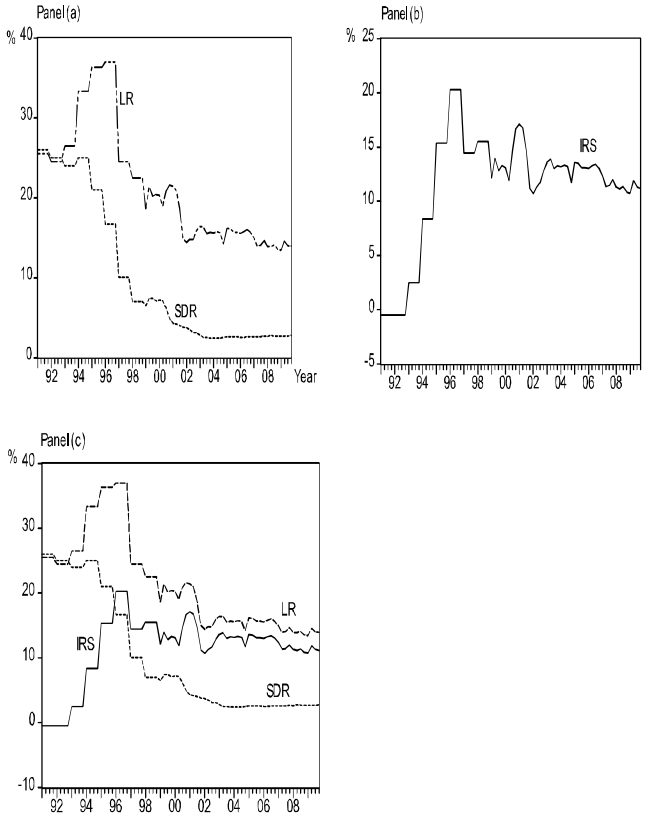
4. Empirical Results

4.1 Exploratory Data Analysis

Figure 1 plots quarter-to-quarter behaviour of nominal lending (LR) and saving (SDR) interest rates during the period 1991:I – 2009:IV. The plot in panel (a) shows that both LR and SDR were virtually constant during the period 1991:I - 1993:IV. If anything both rates experienced a downward kink in 1991:III, that is, just after the Government had enacted the Banking and Financial Institutions Act that liberalized the financial sector in June 1991. Apparently, between 1991:I and 1993:IV the SDR

decreased as the LR rose (Figure 1, Panel a). Following the total liberalization of interest rates in 1994, the LR rose dramatically from 26.5% in 1993:IV to an unprecedented peak of 33.4% in 1994, 36.4% in 1995 and 37% in 1996:IV. In 1996:IV the LR fell dramatically to 24.%% in 1997:I and since then fell gradually but remained larger than the SDR (Figure 1, Panel a). The SDR, however, rose from 24% in 1993:IV to 25% in 1994 period but then fell constantly in the remaining sample period (Figure 1, Panel a).

Figure 1: Nominal Interest Rates for Lending and Savings Deposits and the Spread



The differing behaviour of SDR and LR translated to varied sizes of interest rate spread (IRS) during the sample period. Prior to the liberalization of interest rates in 1994 the IRS was relatively small if compared with that existed during the post-liberalisation period (Figure 1, Panel a). The small IRS prior to 1994 could be attributed to mild financial repression occasioned by existence in the county of a managed interest rates regime since the launch of economic reforms in 1986. As notable in Figure 1 (Panel a), the IRS widened in the immediate period after the deregulation of interest rates from government controls in 1994:IV but mostly due to

the increase in the LR rather than the SDR that took on a downward trend. More generally, the plots suggest the behaviour of IRS was influenced more the lending than the deposits rate of interest (Figure 1, Panel c).

It should be notable that similar increase in IRS after financial sector liberalization has been noted to exist in other economies, for example, Bangladesh, Mauritius, Malawi, Colombia and Uganda (Hossain, 2010; Barajas, Steiner and Salazar, 1999; Seetanah *et al.*, n.d.; Beck and Hesse, 2009; Chirwa and Mlachila, 2004; Nannyonjo, 2001). However, it is notable in the case of Tanzania that the increase in IRS subsequently decreased first significantly from 20.3% in 1996:IV to 14.5% in 1997:I and remained below 15% for the rest of the sample period. Moreover, the very notable lack of convergence of the quarterly lending and deposit rates leading to high and persistent IRS in Tanzania after the liberalization of the financial sector is also similar to that in other countries forming the East African Countries (EAC) (Table 1). The inconsistent decrease of the IRS in Tanzania is also similar to that evidenced in the rest of the EAC countries; and, more notable the IRS appear to converge to the level of IRS, particularly Kenya – a country known to have had a relatively better established financial system over a longer period (Table 1). And, if IRS is used as a proxy measure of banking efficiency, Tanzania and other EAC countries has been experiencing gradual development of efficiency in the banking sector since the early 2000s but the level attained is far from that already attained by the Republic of South Africa (RSA), a major trading partner in the region since the adoption of economic reforms in the 1980s (Table 1).

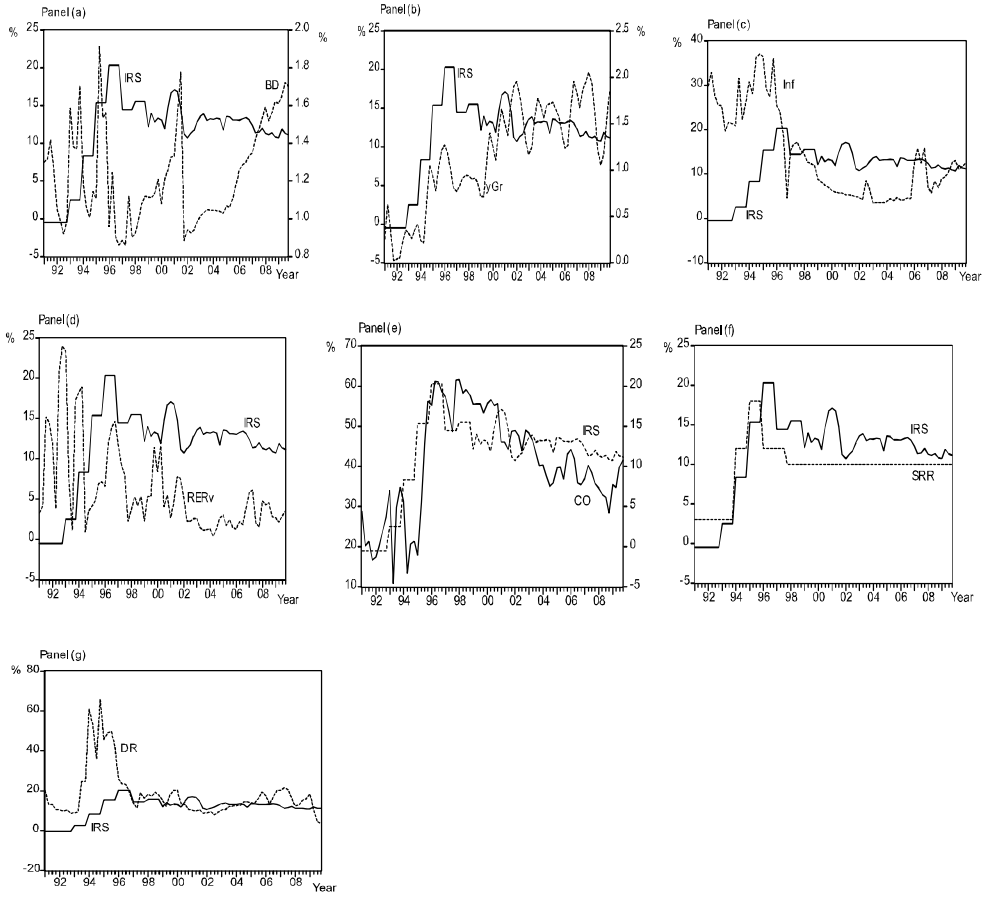
Table 1: Interest Rate Spread in Each Africa and the RSA (%)

Year	Tanzania	Rwanda	Uganda	Kenya	RSA
1995	18.2	na	12.6	15.2	4.4
1996	20.4	7.4	9.7	16.2	4.6
1997	18.4	8.0	9.5	13.5	4.6
1998	15.1	9.4	9.5	11.1	5.3
1999	14.1	8.1	12.8	12.8	5.8
2000	14.2	6.9	13.1	14.2	5.3
2001	15.2	7.1	14.2	13.0	4.4
2002	13.1	7.4	13.5	13.0	5.0
2003	11.5	7.6	9.1	12.4	5.2
2004	9.9	7.1	12.9	10.1	4.7
2005	10.5	8.1	10.9	7.8	4.6
2006	8.9	7.8	9.6	8.5	4.0
2007	7.4	9.3	9.8	8.2	4.0
2008	6.9	na	na	8.7	3.5

Source: http://www.nationmaster.com/

Note: No data was available for Burundi.

Figure 2: Plots of the Spreads Against Variables of the Estimation Model



Plots of the quarter-to-quarter IRS against the key variables of the estimation model suggests that: statutory reserve requirement ratio (SRR) and the discount rate (DR) of the central bank in Tanzania exerted a positive influence on the IRS during the sample period, especially during the early period of financial sector reforms in Tanzania (Figure 2, Panels f and g). Similarly, exchange rate volatility (RERv) exerted a positive influence on the IRS but prior to 1998 (Figure 2, Panel d); and, crowding out (CO) of private sector by public sector caused IRS to increase during the period 1996-2009 (Figure 2, Panel e). Other factors, including the rate of economic growth (yGr) and the 90-day treasury bills rate (TBR) appear to have lacked a positive effect on the IRS during the sample period. In general, and subject to further empirical unit root tests it suffices to note that the time trend plots in Figure 2 do not suggest the variables of the estimation model were stationary, that is,

exhibited a long-run relationship. This may, subject to a more formal test, suggest existence of unit root in the variables of the estimation model.

The correlation matrix of the variables of the estimation model suggests that the IRS was strongly positively and more strongly correlated with statutory reserve requirement (0.80) imposed by the central bank and the crowding out of the private sector by the public sector (0.74) (Table 2). The correlation between inflation and IRS appear to have been positive but less than 50%. The correlation between IRS and the rest of the variables, including RERv, yGr, and DR appear to have been weak (Table 2).

Table 2: Correlation Matrix of the Variables

Variables	IRS	BD	yGR	π	RERV	CO	SRR	DR
IRS	1							
BD	-0.11	1						
yGr	0.58	0.12	1					
π	-0.44	0.15	-0.68	1				
RERv	-0.36	-0.04	-0.57	0.38	1			
CO	0.74	-0.27	0.34	-0.49	-0.13	1		
SRR	0.8	0.02	0.43	-0.07	-0.3	0.42	1	
DR	0.1	0.09	-0.25	0.62	0.14	-0.2	0.51	1

Table 3: Descriptive Statistics

Variable	IRS	BD	yGR	π	RERv	CO	SRR	DR
Mean	11.38	1.22	1.16	14.15	6.18	40.93	9.61	18.28
Median	13.04	1.14	1.22	11.77	4.15	40.32	10	14.4
Maximum	20.31	1.91	2.05	36.99	23.99	61.65	18	65.88
Minimum	-0.5	0.86	0.02	3.43	0.37	10.88	3	3.7
Std. Dev.	5.37	0.26	0.56	10.01	5.57	13.13	3.42	12.36
Skewness	-1.05	0.62	-0.38	0.81	1.53	-0.3	-0.32	2.19
Kurtosis	3.52	2.39	2.12	2.43	4.65	2.29	4.26	7.53
Jarque-Bera	14.92	6.09	4.23	9.27	38.37	2.73	6.32	125.84
Prob.	0	0.05	0.12	0.01	0	0.26	0.04	0
Number of Observations	76	76	76	76	76	76	76	76

Source: Calculated from the data base used.

Table 3 caries key descriptive statistics of the variables of the estimation model. The descriptive statistics suggests that none of the variables were normally distributed. However, a p-value of 0.23 (way over the usual 0.05 threshold) obtained by using Shapiro-Wilk test failed to reject the null hypothesis that the variable were normally distributed, hence, led to a conclusion that the residuals are normally distributed. The failure of the normality test was addressed by transforming all variables, except the inflation rate, by using a log (natural logarithm) operator (Stock and Watson, 2003; Murkhejee, White and Wuyts, 2003).

4.2 Unit Root and Cointegration Tests

Estimation of an error correction model (ECM) based on equation (1) was preceded by tests for unit root and cointegration of the variables. The unit root test results obtained by using Dickey-Fuller (DF) and Augmented-Dickey Fuller (ADF) approaches are presented in Table 4.

Table 4: Unit Root Results (Level Variables)

Dickey – Fuller				Augmented Dickey Fuller		
Variable	Test Statistics	5% Critical value	MacKinnon p-value	Test statistics	5% Critical value	MacKinnon p-value
IRS	-1.85	-2.91	0.35	-1.96	-2.91	0.3
BD	-3.51	-2.91	0.01	-2.63	-2.91	0.09
YGr	-2.37	-2.91	0.15	-3.08	-3.48	0.11
SRR	-2.33	-2.91	0.16	-2.8	-2.91	0.06
π	-1.75	-2.91	0.4	-1.54	-2.91	0.51
RERv	-4.3	-2.91	0	-1.94	-2.91	0.31
CO	-2.91	-2.91	0.04	-2.17	-2.91	0.22
DR	-0.88	-2.91	0.79	-0.83	-2.91	0.81

Note: Critical values were rounded to two decimal places.

The results in Table 4 suggests existence of unit root in all variables in level up to a lag length of three, serve for yGr which was subjected to four lag lengths and a trend.

Transformation of the variables by a difference operator followed by further DF, ADF and PP unit root tests was thus applied to all variables. The unit root test results in Table 5 rejects the null hypothesis that all variables were first difference

stationary at the conventional test levels. This implies that all the variables are integrated of order one, [1, (1)] such that a linear combination between then could be integrated of order zero, I(0), implying existence of a long-run relationship among them such that simple regression would not give spurious results.

Table 5: Unit Root Results (First Difference)

Dickey – Fuller				Augmented Dickey Fuller			Phillip-Perron		
Variable	Test Statistics	Critical value 5%	MacKinnon p-value	Test statistics	Critical value at 5%	MacKinnon p-value	Test statistics	Critical value 5%	MacKinnon p-value
IRS	-8.63	-2.91	0	-5.66	-2.91	0	-8.63	-2.91	0
BD	-11.34	-2.91	0	-5.46	-2.91	0	-11.36	-2.91	0
YGr	-7.69	-2.91	0	-5.495	-2.91	0	-7.7	-2.91	0
SRR	-10.13	-2.91	0	-3.56	-2.91	0	-10.01	-2.91	0
π	-10.74	-2.91	0	-4.42	-2.91	0	-10.32	-2.91	0
RERv	-10.84	-2.91	0	-7.1	-2.91	0	-11.32	-2.91	0
CO	-11.74	-2.91	0	-4.64	-2.91	0	-12.38	-2.91	0
DR	-8.24	-2.91	0	-3.55	-2.91	0	-8.23	-2.91	0

Note: Critical values -11.34 were rounded to two decimal places.

Table 6 carries cointegration test results obtained by using the Johansen procedure. The Johansen test results show existence of two Cointegration equations.[10] A use of two-stage Engle-Granger procedure confirmed the hypothesis that the variables were indeed cointegrated.

Table 6: Johansen Tests for Cointegration: Results

Maximum rank	Eigen value	Trace statistic	5% critical value
0		186.3913	156
1	0.54406	127.4872	124.24
2	0.43304	84.9275*	94.15
3	0.36427	50.954	68.52
4	0.26229	28.1382	47.21
5	0.15685	15.3422	29.68
6	0.11341	6.3139	15.41
7	0.07482	0.4818	3.76
Number of observation = 75			Lags = 1

Note: *The first significant value with a trace statistics less than the critical value at 5% level.

10 This is because the first significant value, where trace statistic is less than critical value at 5% level, was found at maximum rank of two.

A one period lagged error term (ec_{t-1}) obtained from the regression of equation (1) with level variables transformed by a log operator was used in an estimation of a general to specific Error Correction Model (ECM).[11] To obtain a parsimonious model Akaike Information Criterion (AIC) and both R^2 and F-statistics were used to guide elimination from regression of the insignificant lags. Table 7 presents results of the step-to-step reduction of the general model to a parsimonious one. Most noteworthy in the procedure is elimination of yGr from the estimated model: the variable and its lags were very statistically insignificant over each round of estimation.

Table 7: Reduction of General to Parsimonious Model

Maximum rank	Eigen value	Trace statistic	5% crucial value
0		186.3913	156
1	0.54406	127.4872	124.24
2	0.43304	84.9275*	94.15
3	0.36427	50.954	68.52
4	0.26229	28.1382	47.21
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7	0.07482	0.4818	3.76
Number of observation = 75			Lags = 1

Note: *Indicates the first significant value with a trace statistics less than the critical value at 5% level.

The results of the parsimonious model presented in Table 8 suggest that the model is free from any bias or inconsistencies. The coefficient of determination (R^2) suggest good fit of the model: about 57% of the variation in interest rate spread is explained by the right-hand variables. The Durbin Watson (DW) statistic is less than 2, which suggests absence of an autocorrelation problem in the estimated model. The overall mean of a Variance of Inflation Factor (VIF) of 1.41 is lower than the threshold level of 10. This suggests multicollinearity was not a problem in the estimated model. Moreover, the p-value of F-statistic from Ramsey RESET test suggests some variables were omitted from the model estimated. However, this finding may not be unexpected given exclusion from the analysis of bank specific determinants of interest rate spread.

Table 8: Regression Results of the Parsimonious Model

11 ADF and PP tests showed the residual was first difference stationary.

Variable	Coefficient	Standard Error	t-value	Prob. T-value
ΔIRS_2	0.071	0.089	1.91	0.061
ΔBD	0.377	0.123	3.07	0.003
ΔSRR	0.280	0.152	1.84	0.070
$\Delta \pi$_3	-0.018	0.009	-1.98	0.052
ΔRERv	-0.045	0.027	-1.68	0.099
ΔCO_4	0.456	0.086	5.33	0.000
ΔDR_2	0.268	0.097	2.76	0.008
ec_{t-1}	-0.385	0.075	-5.14	0.000
Constant	0.008	0.020	0.42	0.679
R	0.57			
DW	1.84			
VIF	1.14			

Table 8 shows that the coefficient of the error correction term (ec_{t-1}) is negative, which implies that over time the interest rate spread converges to its long-run trend.

The results in Table 8 show that development of the banking sector (DB) is positive and statistically significant at 1% test level. On the one hand, this finding is inconsistent with theory but similar to that obtained by some of the previous studies, including Epaphra (2004) in a study on Tanzania and Dermigüc-Kunt and Huizinga (1997) in a cross-country study that covered developed and developing countries. Theoretically consistent results have been obtained by some studies on Africa, for example, studies by Crowley (2007), Tennant and Falowewo (not dated) and Samuel and Valderrama (2006). The positive effect of the development of banking on interest rate spread in Tanzania is, albeit very small, could be attributed to both rapid increase in the number of banks and non-bank financial institutions (NBFI) and increase in credit to private sector but in an environment of high and increasing lending rates seemingly explained by inadequate development of competition (concentration) in the financial system.[12]

12 The number of commercial banks increase from 3 in 1991 to 29 in 2011 (http://www.bot-tz.org/BankingSupervision/RegisteredBanks.asp). However, Simpasa (2011) notes that the commercial banking sector is concentrated as five banks each accounts for more than two-third of assets, and deposits (p. 90); Aikaeli (2006) informs that 50% of the total assets of banks is held by large domestic banks, 40% is held by major foreign banks, and small banks holds the remaining 10% (p.2).

As expected, the coefficient of statutory reserve ratio (SRR) is positive and statistically significant at the 10% test level. Similar evidence was obtained by, among others, Chirwa and Mlachila (2004), Samuel and Velderrama (2006), Crowley (2007) and Tenant and Folawewo (2007), and Tenant and Folawewo (n.d). The result differs, however, with that obtained by Grenada (2007) in a study that covered countries of the Eastern Caribbean Currency Union (ECCU). The effect of the change in SRR on interest rate spread is small (0.28), a not surprising empirical evidence. This confirms the well-known assertion that statutory minimum reserve requirements are implicit taxes that increase interest rate spread because banks tend to shift them to customers either by increasing the lending rate or reducing the deposit rate or both.

The results in Table 8 suggest that the effect of inflation on interest rate spread is negative and statistically significant but after three quarter (three lags). This finding is unexpected but consistent with results from some previous studies, for example, Epaphra (2204), Crowley (2007), and Tennant and Folawewo (2007). Suffice it to note, however, some studies have established a positive effect of inflation on interest rate spread, for example, Ikhide, S. (not dated), Hess 2007), Dermigüc-Kunt and Huizinga (1997), Boyd *et al.* (2001), Chirwa and Mlachila (2004). Following Crowley (2007) the theoretically inconsistent negative effect of inflation on bank spread obtained by this and some other studies could be attributed to the conduct of monetary policy in Tanzania: lending rates typically vary more than deposit rates such that a loose monetary policy that leads to higher inflation would be associated with lower lending rates and, as a result, lower the interest spread. Also, "if banks charge a lower spread this would be associated with lower lending rates, faster credit expansion, and higher inflation" (Crowley, 2007). Besides, the seemingly theoretically inconsistent results for inflation could be adduced to its factoring by banks into the lending and/or saving rates in order to achieve a "true cost of funds." Factoring of the exchange rate volatility in lending rates could also explain its negative effect on interest rate spread.

The effect of real exchange rate volatility (RERv) on interest rate spread also is unexpectedly negative but statistically significant at the 10% test level. The effect of the RERv on interest rate spread is less than proportionate: a 1% rise in real exchange rate (RER) would reduce interest rate spread by 0.05%. This finding, first, is somewhat counterintuitive: uncertainty from increase in RERv should lead to an

increase in uncertainty, which in turn should induce banks to charge higher risk premiums that would increase interest rate spreads. Second, the evidence is inconsistent with that obtained by some of the previous studies: positive effect was obtained by Tenant and Folawewo (2008) and inconclusive results were obtained by Crowley (2007) and Tenant and Folawewo (n.d.). The finding of this study could be attributed to the use in the analysis of the interest rates on domestic assets and liabilities of the commercial banks not directly exposed to exchange rate risk. Implicitly, if lending and deposit rates on foreign currencies (international lending) were considered perhaps the result would be different.

The coefficient of net government borrowing from commercial banks (DC) has the expected positive sign and is statistically significant at the conventional 5% test level but after four lags, that is, one year. This evidence is consistent with that obtained by some previous studies, for example, Epaphra (2004), Chirwa and Mlachila (2004), Tenant and Folawewo (2008), and Tenant and Folawewo (n.d). The magnitude of the coefficient of DC suggests that a unit increase in government borrowing would increase interest rate spread by 0.46 but after four quarters. The effect of the discount rate (DR) is positive as expected; and, is statistically significant at the conventional 5% test level. The result is also similar to that obtained by some previous studies, among others, Tenant and Folawewo (n.d.). It is notable, however, that the effect of DR on interest rate spread is rather small: a unit change in DR would cause interest rate spread to increase by only 0.27.

The empirical results presented in Table 6 shows existence of unexpected positive inertia in interest rate spread: the coefficient of two period lagged interest rate spread is positive and statistically significant at the 10% test level. The positive inertia effect on interest rate spread is small (0.17). The finding is inconsistent with that obtained by previous studies, for example, a two period lagged negative inertia effect on interest spread obtained by Tenant Folawewo (2008) in their study on some countries in SSA. Moreover, the coefficient of the one-period lagged error term (ec_{t-1}) is negative as expected. The evidence is also similar to that obtained by most previous studies, for example, Epaphra (2004). It suggests revision of the interest rate to long-run equilibrium during the period.

5. Conclusion

The main purpose of this paper was to examine the determinants of the interest rate spreads in Tanzania. The analysis followed a general-to-specific estimation of an Error Correction Model (ECM) by using quarterly data for the period 1991:I - 2009:IV. The results revealed that interest rate spread in Tanzania was most significantly determined by net government borrowing from commercial banks and the discount rate. The effect on interest rate spread from inflation and real exchange rate volatility was found to be inconsistent with theory. Moreover, the regression results suggested that development of the banking sector was positively related to interest rate spread; the statutory minimum reserve requirement by the central bank was positively and statistically significant related to the interest rates spread during the sample period; and, the discount rate impacted positively on interest rate spread during the sample period.

Several policy implications follow from the empirical findings: a) policy measures that would lead to a decrease in government borrowing from the commercial banks and decrease in discount rate of the central bank have potentials for reducing the interest rate spread in Tanzania, and b) reduced statutory reserve requirement ratio prescribed by the central banks would also serve to reduce the interest rate spread. An extreme policy approach in contemporary literature would be central bank elimination in monetary policy programming of the statutory reserve requirement, an implicit tax in bank operations; c) lack of a negative effect of the level of development of the banking sector on interest rate spread in Tanzania suggest the financial system is yet to be vibrant; and, therefore, more efforts should be directed to development of a competitive financial system, as already earmarked in the second Generation Financial Sector Reforms Programme (SGFSRP) for Tanzania (Banks of Tanzania, 2007). Measures by the central bank to maintain low inflation, which is factored in pricing of financial assets, would also help reduce interest rate spreads in the commercial banking sector in Tanzania.

The finding and arising policy implication are not fool-proof. The data used were from diverse sources; and, in one case proxy measures were used to fill gaps in data points. Both factors may have biased econometric results. Moreover, the concept of interest rate spread used in the analysis is based on industry (aggregated) data. The findings and policy implications may not apply to specific banks. In spite of these limitations, the results of the study help to shed light on the evaluation and determinants of interest rate spread after the liberalization of the financial sector in

1991. Future research effort could be directed to the study of interest rate spread by using bank specific data, and a comparison of interest rate spread between foreign and indigenous banks.

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