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## **Interest Rates and Financial Savings in Tanzania: 1967 - 2010**

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## Interest Rates and Financial Savings in Tanzania: 1967 - 2010

Michael O. A. Ndanshau and Ali A. L. Kilindo

### Abstract

*This paper investigates responsiveness of financial savings to real interest rate and other determinants in Tanzania during the period 1967-2010. Both OLS method and dynamic error correction model (ECM) approaches were employed in the time series data analysis. The regression results shows that real interest rate exerts a statistically significant and positive short-run and long-run effect on financial saving in Tanzania. Moreover, both contemporaneous and two-period lagged real interest rate has the expected significant positive effect on financial saving. Unexpectedly, the results show that the effect of both nominal interest rate and inflation on saving is positive as predicted in theory. Among other determinants of saving, the effect of real income per capita is significant and positive as expected but not that of financial development. Several robustness tests confirmed the estimated sign and sensitivity of financial savings to the real and nominal interest rates during the sample period. Among others, the results are in support of the interest rates liberalization policy and real interest rate strategy used to enhance saving in Tanzania.*

Key words: Financial liberalization, financial saving, real interest rate, financial deepening, interest rate spread, cointegration and error correction model.

JEL Classification: E2, E4, E5.



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# **On Interest Rates and Other Determinants of Financial Savings: An Empirical Investigation in Tanzania**

## **1. INTRODUCTION**

Liberalization of the financial sector is one of the policies in economic reform programmes implemented in a number of the sub-Sahara African (SSA) countries since the 1980s. In theory, the practice of financial sector liberalization encapsulated several measures, the main being deregulation of interest rates.<sup>1</sup> The liberalization of interest rate built on financial repression hypothesis (FRH) of McKinnon (1973) and Shaw (1973) in which the main argument is that positive real interest rates are crucially necessary for the increase in the volume of savings available for private investment that would elicit high and sustained rates of economic growth in financially repressed economic systems in developing countries (Athukorala and Sen, 2004; Reinhart and Tokatlidis, 2003; Bandiera *et al.*, 2000; World Bank, 1989; Lanyi and Saracoglu, 1983; Fry, 1978).

This paper presents empirical evidence on the effect of interest rates on financial savings in Tanzania. The study claims its significance from the role interest rates plays both in macroeconomic policy and, more so, dearth of empirical studies on the subject in Tanzania. In the theory and policy fronts interest rates elasticity of saving “bear on a number of central macroeconomic questions” (Rossi, 1988: 105). However, previous studies on saving in Tanzania only secondarily focused on interest rates; and, by and large, covered the period 1967-1990 that was characterized by setting and regulation of interest rates by the Government. For example, among others, Mduma (1999) used annual time series data for the period 1967-97; and, Nyagetera (1997) and Nyagetera, Osoro and Lipumba (1989) also used time series data for the period between 1966 and 1990. Furthermore, the previous studies on Tanzania did not focus on interest rate elasticity of financial savings or private savings but aggregate savings that has been found to be unresponsive to interest rate (Thirlwall, 2003; Arrieta, 1988; Giovannini, 1983). This study, therefore, complements the previous studies in several ways: a) uses more data points that cover regimes of interest rates ceilings and liberalisation in effect since August 1994; b) specifically explores responsiveness of financial savings to interest

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<sup>1</sup> For details, see Nyawata and Bird (2004) and Montiel (1995).

rates and other macroeconomic factors; and, c) complements the OLS (Ordinary Least Squares) long-run results, which is common in previous studies, with use both cointegration and error correction mechanism (ECM) that shed light on long-run and short-run dynamics of financial savings function in Tanzania.

The rest of the paper is organized as follows. Section 2 dwells on the evolution of interest rates and financial savings in Tanzania. Section 3 surveys the relevant literature on saving and interest rates. Methodology of the study is covered in Section 4; and, Section 5 presents and discusses the econometric results. Section 6 concludes by a presentation of the main findings, their policy implications and areas for further research.

## **2. EVOLUTION OF INTEREST RATES AND FINANCIAL SAVINGS IN TANZANIA**

At the attainment of political independence in 1961 the financial system inherited from the British colonial government was dominated by private banks and non-bank financial intermediaries (NBFIs) that operated under the East African Currency Board (EACB). The EACB was an apex monetary institution synonymous to a central bank. In the early post-colonial years (1961-66) the banks and the NBFIs operated under quite a liberal market economy regime that was marked by lack of government intervention in pricing of financial products and directed lending to potential clientele. In effect, to the extent that the banks and NBFIs were mostly branches of foreign banks, their deposit and lending interest rates in the domestic economy were determined in the foreign money markets, among others, that in London. Socio-political and economic developments in the early post-colonial period prompted the government to promulgate the Arusha Declaration of 1967 that, among others, carried the *Ujamaa and Self-Reliance Policy* and a vision towards the development of a Socialist state in Tanzania.

Following the Arusha Declaration promulgated in 1967, first, the government nationalized all, except one, (branch of) foreign commercial banks in mainland Tanzania. Instead, the government established a State-owned commercial bank, the National Bank of Commerce (NBC), which became operational in February 1967. Moreover, the government also nationalized the NBFIs that operated in the country, including insurance

companies, and established instead a state-owned National Insurance Company (NIC). In effect, therefore, the nationalization led to almost total government ownership and control of the financial system in the country.

The nationalizations aside, the government further instituted several other measures targeted to provide for effective financial support of the goal of building *Ujamaa and Self-Reliance* by the state owned financial intermediaries. Among others, between 1972 and 1975 the government: a) established three development finance institutions for serving agriculture and housing sectors, the Tanzania Housing Bank (THB), the Tanzania Rural Development Bank (TRDB), and Tanzania Investment Bank (TIB); and, b) innovated Annual Finance and Credit Plan (AFCP) that replaced the indirect monetary policy instruments enshrined in the Bank of Tanzania Act of 1965. On the basis of the AFCP the Government assumed the role of setting nominal interest rates; and, through the annual credit plan (allocations), guaranteed cheap lending to the state-owned enterprises (SOEs) in the key sectors of the economy—agriculture, industry, trade, mining, etc. To guarantee access to credit by the SOEs the government dictated upon the establishment of branches by the banks and the NBFIs.

The interest rate ceiling set for lending by financial intermediaries led to very low nominal deposit rates that remained virtually constant for an extended period. It is on record that prior to the launch of economic reforms in mid-1986 the Government had only increased interest rates two times, in 1979 and in 1981. Thus, while government control of commodity prices may have underestimated official inflation, both lending and deposit rates prior to the launch of economic reforms in 1986 turned out to be very negative in real terms for a prolonged period (Figure 1). In theory, and as established by some studies in Tanzania the negative deposit interest rates during the period 1967-1988 taxed depositors and, as a result, undermined saving in general and financial savings in particular.<sup>2</sup> On this account and an appreciation of growth implications of poor saving, the government brokered with the IMF (International Monetary Fund) and the World Bank implementation of an economic reforms programme (ERP) that encapsulated liberalization of the financial sector since the mid-1986.

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<sup>2</sup> Among others, see Bagachwa (1995), World Bank (1994), Nissanke (1990), Tanzania (1990), and Nyagetera, Osoro and Lipumba (1989).



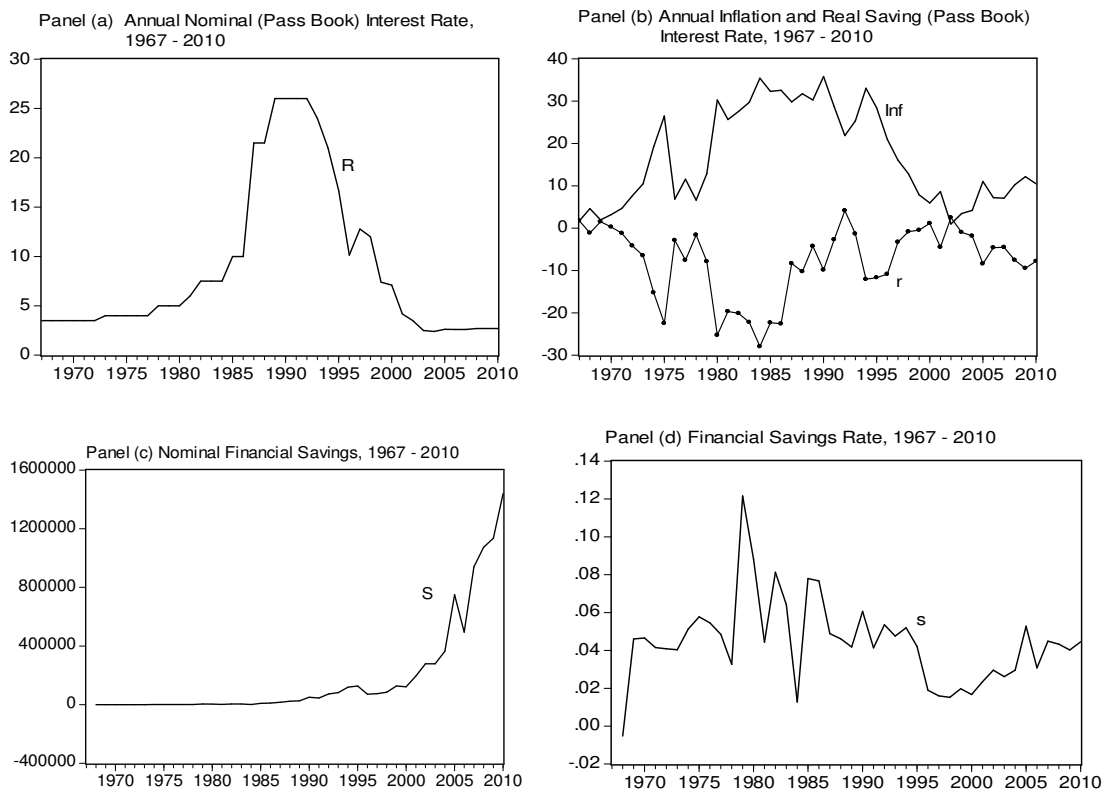
Like most other SSA countries, the liberalization of the financial sector in Tanzania was guided by policy prescription of the financial repression hypothesis (FRH) innovated by McKinnon (1973) and Shaw (1973) which maintains that positive real interest rates are a prerequisite for capital formation, quality investment, and attainment of both economic growth and development (Agénor and Montiel, 2008: 73; Collier and Mayer, 1983). Accordingly, the Government initiated deregulation of interest rates in order to encourage savings and reduce excess demand for loanable funds (Tanzania, 1986:14-15). In addition, in 1991 the government liberalised the financial sector by enacting a Banking and Financial Institutions Act (BFIA) No. 12 that allowed entry (and exit) of private institutions in the financial sector.

The deregulation of interest rates was gradually managed upward by the Bank of Tanzania (BoT) between 1986 and 1994 when they became fully liberalised. In practice, at the commencement of the reforms in 1986 BoT determined an official structure of multiple fixed interest rates and fixed differentials, namely 10 deposit rates and 30 lending rates (Tuni, 1997). Since 1991 the BoT allowed banks to set own interest rates subject to a maximum lending rate of 31 percent and a 12-month savings deposit rate above the expected inflation rate (Mduma and Kazi, 2005). Restriction was set, however: only a single annual change of interest rates was allowed, a restriction that made the financial intermediaries to match changes in asset rates in a timely manner (*Ibid.*). In July 1991 the BoT set a uniform primary discount rate of 27 percent to support interest rate liberalization. In 1992 the interest rates were deregulated to make them "realistic" by being at least "above the level of the rate of inflation" (Bank of Tanzania, 1996b: 2). In 1994 all interest rates were deregulated fully. As a result, commercial banks and other financial institutions became empowered to set own interest rates, but on the basis of the discount rates out-turn in the Treasury Bills (TBs) markets introduced by the BoT in August 1993 as one of the monetary policy instruments for mopping up of excess liquidity in the economy.

Figure 1 shows that prior to the launch of economic reforms in 1986 the pre-tax nominal (pass book) interest rate (R) was almost constant as was administratively set by

the Government.<sup>3</sup> Thereafter, it rose rapidly to a peak in 1991 when the financial sector was liberalised but then took on a sharp downward trend marked by a brief break in 1995, a period when the Bank of Tanzania started to use indirect instruments of monetary policy in macroeconomic management. Like most other SSA countries that reformed their financial sectors since the 1980s, the real pass book interest rate in Tanzania remained negative during most of the sample period (Figure 1, panel b). This was notwithstanding successful judicious monetary policy drives to tame inflation—which fell from 35 percent in 1995 to 2% in 2004 (Figure 1, panel b). Apparently, in spite of the upward adjustment of interest rates between 1986-1991, inflation decisively accounted for the negative real interest rate during and beyond the period.

Figure 1: Interest Rate and Inflation in Tanzania, 1967 - 2010



<sup>3</sup> Several studies of developed economies point to negative effect of tax on interest rates on saving, for example Boadway and Wildasin (1994) and Tease *et al.* (1991). The underlying theory is supported by the Bank of Tanzania ([www.tanzania.go.tz/economic\\_survey1/2002](http://www.tanzania.go.tz/economic_survey1/2002)). However, in Tanzania there lacks consistent data on tax and other charges on interest income for a rigorous and explicit test of the theory in this study.

The persistence of negative real interest rates on savings in Tanzania since the launch of economic reforms is consistent with experience elsewhere in SSA, among others, Ghana, Malawi and Nigeria (Aryeetey *et al.*, 1997; Soyibo, 1997; Soyibo and Adekanye, 1992).<sup>4</sup> And, due to high inflation rates that existed the outcome remained inconsistent with policy ideal of providing real interest rates that would elicit an increase in financial savings.

The plots in Figure 1 (panel c) appear to suggest that nominal financial savings increased after liberalisation of interest rates; and, serve for some quirks, the increase was more pronounced since 2000. The plots also show that the ratio of the nominal financial saving to the nominal Gross Domestic Product (GDP) rose appreciably since the BoT started to use indirect instruments of monetary policy. However, it is difficult to precisely attribute the trend and behaviour of financial savings to interest rates liberalisation alone, given its other determinants in the literature. For example, financial deepening and rapid economic growth could be conducive to higher saving and thereby reduce the need for higher real interest rate (Tease *et al.*, 1991: 124). In this regard it is prudent to establish empirically the sensitivity of financial savings to real interest rates and other factors in Tanzania.

### **3. REVIEW OF RELEVANT LITERATURE**

#### *3.1 Analytical Framework*

The theoretical model for the study of saving behaviour in developing countries basically nests several hypotheses: the Keynesian absolute income hypothesis (AIH), and life-cycle-permanent income hypothesis (LCH-PIH) of Ando Modigliani (1963) and Friedman (1957). In more recent times models estimated have included a test of financial repression hypothesis (FRH). In this regard, the estimated saving function have traditionally included income based variables, including either measured income, permanent income, wealth, transitory income, rate of economic growth, and demographic factors (Chandarvarkar, 1990). In a developing country like Tanzania an investigation of the the AIH and LC-PIH based factors in explaining saving is pertinent.

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<sup>4</sup> Among others, see Nyawata and Bird (2004) in the case of countries in the Southern African Development Community (SADC).

However, there features in the literature several other hypotheses of interest for nesting in this study on financial saving in Tanzania.<sup>5</sup>

First, on account of the financial repression hypothesis (FRH) and the LCH real interest rate features as one of the determinants of saving. In the context of the LCH saving is an increasing function of the real interest rate. Similarly, in accordance with the LCH saving is an increasing function of the real interest rate provided economic growing is high (Sheshinsk and Tanzi, 1989: 12). Second, is inclusion in a saving function of a measure of financial development, which is a multi-faced concept.<sup>6</sup> Among others, easing of borrowing constraint from financial development is expected to impact positively on saving; and, in relation, the possibility that depositors at a financial intermediary may obtain loans from the financial intermediary coupled with reduced transaction costs or sheer access to financial services are expected to impact positively on saving (Vogel and Burkett, 1986; Jappelli, and Pagano, 1994).<sup>7</sup> In the context of credit channel theory the effect of the financial intermediation should be positive. In the context of the borrowing constraint hypothesis the effect of the financial intermediation is positive if borrowing constraint is binding as in repressed financial systems; and, it is negative in non-repressed financial systems where access to credit substitutes for saving (Nwachukwu and Egwaikhide, 2007; Mavrotas and Kelly, 2001; Loayza and Shankar, 2000; Bayoumi, 1993; Deaton, 1991). Third, macroeconomic instability is considered to bear influence on saving behaviour.<sup>8</sup> The argument, as put by Hadjimichael and Ghura (1995), among others, is that saving is an increasing function of macroeconomic stability. Fourth, Tanzania and many other developing economies experienced distortion in the exchange rate market leading to parallel foreign exchange market during the between the 1970s and

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<sup>5</sup> For details, among others, see Masson, Bayoumi and Samiei (1998) and Schmidt-Hebbel, Servén, and Solimano (1996).

<sup>6</sup> It is used in the literature to refer to several development in the financial sector, including: lift of credit and interest rate ceilings, removal of quantitative and rationing of credit, liberalization of interest rates, removal of entry restrictions on private sector, innovation of capital markets, and improvement regulatory and supervisory framework of the financial system.

<sup>7</sup> Montiel (1995) suggests several other indicators of financial development: ratio of M1 and M2 to GDP, and also volume of private lending to GDP. According to Loayza, Schmidt-Hebbel, and Serve (2000) the effect of financial development can be direct and negative over the short-run and it is indirect and positive over the long-run.

<sup>8</sup> Among others, Athukorala and Sen (2004) and Skinner (1988) and Zeldes (1989) observe uncertainty and thus unpredictability of inflation over the long-run period that may engender precautionary savings. Inflation may also impact on real wealth.

the mid-1990s (Malyamkono and Bagachwa, 1990). As maintained here and elsewhere, parallel foreign exchange markets adversely impact on financial saving in the domestic economy in favour of capital flight.

### 3.2 *Review of Empirical Literature*

There are several empirical studies on determinants of saving behaviour in LDCs.<sup>9</sup> The focus is diverse: some studies are on determinants of private savings while others are on determinants of either national, aggregate savings or financial savings. The hypotheses tested are also varied as well as the methodologies put to use. Studies prior to the 1980s mainly tested relevance of either AIH or LCH and PIH in the LDCs. Subsequent studies motivated by FRH, among others, focused on the nature of interest rate elasticity of saving.

The empirical evidence on the responsiveness of saving to interest rate is mixed. On the one hand, some studies have established a significant positive interest rate elasticity of saving in LDCs. Study by Elbadawi and Mwege (2000) established a significant positive effect of ex-post interest rate on private saving in sub-Saharan African (SSA) countries and in other regions. A study by Villagómez (1994) found the positive real interest effect on saving only obtained in low inflation developing countries. This evidence is strongly supported by some country specific studies, for example, Kendall (2000) established a significant positive effect of positive interest rates on national savings ratio in the Guyana; Hussein and Mohieldin (1997) in a study on Egypt found a one-period lagged real interest rate was an important determinant of financial savings during the period 1966-90. Ogaki, Reinhart and Ostry (1995) also established a positive significant influence of real interest rate on saving behavior in some low and middle income developing countries. Furthermore, Warman and Thirlwall (1994) established sensitivity of financial savings to the real interest rate in Mexico during the period 1960-1990. Similar results are documented in Odhiambo (2009), Azam (1996) and Oshikoya (1992) in studies on Kenya; and, Seck and Nil (1993) in a study that covered

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<sup>9</sup> For a review of empirical studies in and outside SSA prior to the 1990s, among others, see Clarke (1996), Thornton (1991), Arrieta (1988) and Khatkhate (1988).

nine African countries. Notable, however, a study on Nigeria Soyibo and Adekanye (1992) found the effect of real interest rate on saving was weak.

Other studies carry evidence not supportive to the real interest rate policy. Among others, a monument study by Loayza, Schmidt-Hebbel and Servén (2000) which sought to establish drivers of saving across the world found the effect of real interest rate on saving was negative. Also in a comparative study in Asia by Cho and Khatkhate (1990) found interest rate was not an important determinant of saving. Similarly, a study Bandiera *et al.* (2000), which covered Ghana and Zimbabwe and other six countries outside the SSA bloc established existence of a negative influence of real interest rate on saving—specifically in Ghana and Indonesia. Furthermore, in a study which covered 62 countries Hussein and Thirlwall (1999) found real interest rate was not an important determinant of saving. Lack of empirical evidence in support of the hypothesized positive effect of real rates of interest on saving emerged also from some of the previous studies, for example, a study on Nigeria by Nwachuku and Egwaikhide (2007) and one on Ghana by Ziorkhui and Barbee Jr (2003). Moreover, studies on Kenya by Kariuki (1995) and Mweya, Ngola and Mwangi (1990) failed to establish existence of a positive effect of real interest rates on financial savings in Kenya.

In general empirical literature suggests three value addition aspects for this study. First, cross-country studies dominate the literature on saving behavior in LDCs. Thus, there is a dearth of country specific studies on saving in LDCs. In Tanzania there have only been very few empirical studies on saving by, among others, Mduma (1999), Nyagetera, (1997), Nyagetera, Lipumba and Osoro (1997) and Rutayisire (1990). Second, albeit of the differing methodologies in previous studies, the evidence weighs more in favour of a conclusion from literature survey by Reinhart and Ostry (1995) as well as Clarke (1996) that “there does not appear to be any systematic relationship between rates of return and consumption/saving behavior in LDCs; and, regional variations exist on interest rate elasticity of saving” (p. 2).<sup>10</sup> Incidentally, only few studies in Tanzania have focused on the sensitivity of financial saving to interest rates per se and the real interest

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<sup>10</sup> The difference in empirical results could also be attributed to several factors: data problems—quality of data; lack of sophistication and depth of financial markets—no true market determination of interest rates; direct regulation of financial systems; subsistence consumption; liquidity constraint—such that current income matters the most. Even more significant is diversity of the measures of savings used in previous studies. Some use either or a combination of financial savings, private, or aggregate savings.

rates in particular. Suffice it to note, however, that the evidence on the interest rate elasticity of financial saving in Tanzania may not be credibly defended because estimation mostly covered the period of interest rates regulation; and, this was not modeled in estimation. Third, most previous studies cover the period of economic crises and early economic reforms, including the financial sector reforms. Granted, outcomes from the effects on the financial sector from both shift in policy regime and structural change is yet to be established. It is on account of this and preceding issues from literature that this study claims its value addition. It fills the gap that exists in the literature in Tanzania by using a larger and more recent data points to undertake a “quasi postmortem” of the positive real interest rate policy with respect to financial savings in Tanzania. More rigorous methods are used to analyse the data. These include explicit modeling of the financial repression hypothesis in the estimation model, investigation of the relative importance of nominal and real interest rates in explaining saving, and an analysis of the long-run and short run dynamics of financial saving in Tanzania by using an error correction model (ECM).

#### 4. METHODOLOGY OF THE STUDY

##### 4.1 *The Model*

On account of the diverse hypotheses in the conceptual framework are nested here in a variant of the most common saving function estimated in previous studies, among others, by Ziorklui and Barbee Jr. (2003), Mwega (1997), de Melo and Tybout (1986), and Warman and Thirlwall (1994). The estimation model reads as follows:

$$s_t = -\beta_0 + \beta_1 r_t - \beta_2 y_t^{pc} + \beta_3 fd_t + \beta_4 expr_t + \beta_5 vol_t + u_t \quad (1)$$

The dependent variable ( $s$ ) in equation (1) is the ratio of private financial savings ( $S$ ) to the Gross Domestic Product (GDP).<sup>11</sup> Following Warman and Thirlwall (1994) and Arrieta (1988), the  $S$  is measured as the first difference of broad money supply ( $M2$ ) that

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<sup>11</sup> While the focus on financial saving in this study is of specific interest, McKinnon (1991) has also noted that aggregate savings are not very sensitive to real interest rates.

in Tanzania sums the traditional narrow money ( $M1$ ) and both saving ( $SD$ ) and time ( $TD$ ) deposits of the commercial banks denominated in domestic currency.<sup>12</sup>

The real rate of interest ( $r$ ) in equation (1) is measured as nominal interest rate ( $R$ ) net of the expected rate of inflation ( $\pi^e$ ). As in Mwega, Ngola and Mwangi (1990) and Azam (1996) it is assumed that inflationary formation in Tanzania was static such that the  $\pi^e$  is measured as a one-period lagged inflation rate ( $\pi_{t-1}$ ). As in previous studies on Tanzania inflation ( $\pi$ ) is measured as the first difference of the natural logarithm of the Consumer Price Index ( $CPI$ ). Consistent with the FRH real interest rate is expected to impact positively on financial saving, given negligible income effect (Gibson and Tsakalotos, 1994).

The other determinants of saving in equation (1) include real income per capita ( $y^{pc}$ ), which is nominal GDP deflated by the  $CPI$  and population ( $N$ ) in Tanzania; and, its effect is expected to be positive.<sup>13</sup> The share of private sector credit in total credit of the commercial banks taken as a ratio of nominal GDP ( $fd$ ) is used as a measure of financial deepening. The effect of  $fd$  on financial saving is ambiguous: it is negative if credit substitute for saving; and, it is positive if access to financial services promotes saving (Bayoumi, 1993). The exchange rate premium ( $expr$ ) is measured as the difference between the purchase price of a unit of the dollar of United States of America (US\$) in the parallel and the official foreign exchange market. The effect of  $expr$  on financial saving is expected to be negative. Macroeconomic instability ( $vol$ ) is measured as the standard deviation of the rate of inflation ( $\pi$ ); and, its effect on financial saving is expected to be negative. The stochastic error term ( $u_t$ ) is, by assumption, a white noised process with zero mean and a constant variance.

It should be noted that interest rates in Tanzania, first, were pegged in a larger part of the sample period but became fully liberalized since 1994. This known shift in

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<sup>12</sup> According to Goldsmith (1969) and Gurley and Shaw (1955), the definition of financial savings should be comprehensive to cover all financial savings that exists in the country. The  $M2$  is narrow but has been used because it is the only broadest financial aggregate for which consistent and reliable data were available for the sample period. Thus,  $M2$  does not capture other forms in the informal financial sector and also that in the modern (formal) financial sector, for example, savings in foreign currency, stock, treasury bills, currency hoards. As a result, the marginal propensity to save could be inflated since only a small proportion of the population in the high income strata operates in the formal financial sector. For this observation I am grateful to Prof. Ameron Kidane, of the University of Dar es Salaam.

<sup>13</sup> Some commentators, for example Thirlwall (2003) and Fry (1978) maintain that the savings function, especially in LDCs, is not linear in real income per capita. This hypothesis is not investigated.



interest rate policy regime is represented by a dummy variable (*DUM*) with a value of 1 for the period 1967-1993 that was characterized by interest rates regulation; and, zero was assigned for the period 1994-2010 that was marked by market based interest rate policy regime. *Ceteris paribus*, the structural change and shift in policy regime are expected to impact positively on financial saving.<sup>14</sup> Second, the real interest rates were very low and even negative in most of the sample period. Granted, following Azam (1996) the most important determinant of saving with the formal financial sector would not be the explicit but implicit interest rate that included “valuable services” offered that prompted the households to “accept willingly to hold” deposits “which paid negative real rate of interest” (p. 34). While such an implicit interest rate in Tanzania may have included entitlement to loan, safety and convenience as claimed by Azam (1996), two additional factors may have accounted for saving with banks at low and negative real interest rates that existed before they became liberalized in 1994.<sup>15</sup> First, were government directives to public and private enterprises to pay wages and salaries through the banks; second, is the use of depository services of banks by multifarious rural and urban based micro-finance institutions (MFIs) in the country either for safety reasons or purpose of leveraging funds; and, third, the increase in the number of SOEs that banked with the sole state owned bank, that is, the National Bank of Commerce (NBC) since the launch of Arusha Declaration in 1967 until the launch of privatization policy in 1992.<sup>16</sup> In this regard, therefore, by following an approach by Azam (1996) originally used by Roubini and Sala-i-Martin (1992), a dummy variable (*FR*) is secondarily introduced in the estimation of equation (1) to capture severity of financial repression. The *FR* is assigned three values, viz, 1 for positive real interest rates, 2 for real interest rate between 0 and -5 percent, and, 3 for real interest rate below 5 percent. By this approach equation (1) is first estimated with the real interest rate  $r_t$  and *FR* and then with *FR* and an

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<sup>14</sup> This builds on the thesis that thinness of financial markets in Africa and other LDCs caused by financial repression render saving less responsive to interest rate. See World Bank (1994).

<sup>15</sup> However, in appreciation of the level of financial sector development and socio-economic and cultural factors particular to Tanzania, the Bank of Tanzania observed that: “Interest rates alone are not as effective in mobilising and allocating resources in Tanzania as in countries with more developed financial markets. Other factors such as the availability of banking services, the level of education and cash income are also important” (Tanzania 1986, p. 18).

<sup>16</sup> The number of SOEs rose from 43 in 1966 to 73 in 1967 and 380 in 1979. The number of SOEs had rose to 425 in 1984; and, included the only two commercial banks, namely, the National Bank of Commerce (NBC) and Cooperative and Rural Development Bank (CRDB) Ltd. See Moshi (1996, 1994).

interaction term ( $rFR$ ), which is a non-linear way of capturing shift in real interest rate regime.<sup>17</sup>

#### 4.2 *Data Type, Sources and Properties*

The analysis is based on annual time series data for the period 1967-2010. The data for monetary aggregates, price level (CPI) and interest rates were obtained from two main sources, the *Economic and Operation Reports* (various) and quarterly *Economic Bulletin* (various) of the BoT. The data for parallel market exchange rate premium is based on parallel exchange rate market in Mwinyimvua (1996) and the official exchange rate of the bureau d'change, on the assumption that it was synonymous to the exchange rate in the parallel market. The other source is a CD-Rom of November 2008 of International Financial Statistics (IFS) of the International Monetary Fund (IMF), a source of annual data for the nominal Gross Domestic Product (GDP).

#### 4.3 *The Estimation Methods*

Ordinary least squares (OLS) method was used to estimate the basic long-run equation (1). It should be noted, however, that the series of the data points was too short for an explicit estimation of equation (1) for the post-interest rates liberalization period (1994-2010). For this reason equation (1) was estimated for both pre-and post interest rates liberalization period (1967-2010) but with a shift variable (DUM) for the shift in interest rate policy regime in 1994.

Following Odhiambo (2005), Ikhide (1992) and Gupta (1987) equation (1) was estimated by explicitly modeling as regressors the nominal interest rate and inflation rate so as to allay a fear that the latter rather than the former was a more important determinant of financial saving during the period 1967-1993. However, the long-run regression results could be spurious when the data in level are not stationary (Granger and Newbold, 1974). Thus, to test the robustness of the long-run results the Augmented Dickey Fuller (ADF) method was first used to establish the order of integration of the

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<sup>17</sup> According to Azam (1996) the use of these approaches rests on the intuitive idea that “the absolute value of a negative real rate of interest is a natural indicator of the intensity of financial repression” (p. 36).

data in levels.<sup>18</sup> The ADF test equation was estimated with and without a deterministic trend ( $t$ ); and, its lag length was determined by Schwartz's Bayesian Information Criteria (BIC). Second, cointegration of the variables of the estimation model was explored by using Engle and Granger (1987) two step procedure.<sup>19</sup> Lack of cointegration is the null hypothesis tested; and disproof of the null hypothesis suggested results from estimation of (1) would indeed not be spurious.

By Engle and Granger (1987) Representation Theorem, the long-run properties and short-run dynamics of financial saving are estimated by using an unrestricted error correction model (ECM) that reads as follows:

$$\Delta s_t = \beta_0 + \sum_{i=0}^p \beta_{1i} \Delta r_{t-i} + \sum_{i=0}^p \beta_{2i} \Delta y_{t-i} + \sum_{i=0}^p \beta_{3i} \Delta f d_{t-i} + \sum_{i=0}^p \beta_{4i} \Delta \text{expr}_{t-i} + \sum_{i=0}^p \beta_{5i} \Delta m i_{t-i} + \sum_{i=1}^p \beta_{6i} \Delta s_{t-i} + \theta e c_{t-1} + e_t \quad (3)$$

where  $\Delta$  is a first difference operator,  $ec_{t-1}$  is a one period lagged error term estimated for the cointegrating equation (1),  $p$  is the optimal lag length selected by Schwartz's BIC,  $u_t$  is the usual white noise error, and other variables are as already defined. The coefficient ( $\theta$ ) of the one-period lagged error terms ( $ec_{t-1}$ ) is expected to be negative and statistically significant to imply that the error correction work to push back to the long-run equilibrium the adjustment between the regressand and the regressors of the estimation model. Third, the equations estimated were subjected to stability test by using CUSUM and CUSUMSQ methods.

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<sup>18</sup> According to Thomas (1997) the ADF results should be interpreted with care because the method quite frequently fails to reject the non-stationarity hypothesis even in cases where the variables are cointegrated.

<sup>19</sup> There are several other Cointegration test procedures but the Engle-Granger approach was used because it is the simplest and efficient. The other common test in the literature is that associated with Johansen and Juselius (1990) and Johansen (1991). For details, see Cheung and Lai (1993), among others. Pesaran, Shin and Smith (2001) have also innovated a cointegration test based on unbound autoregressive distributed lag (ARDL) schema. The procedure has not been tried here because it also requires a relatively larger sample of observations.

## 5. ECONOMETRIC RESULTS

### 5.1 Descriptive Statistics and Reliability of the Data

Following Mukherjee, White and Wuyts (1998) exploratory data analysis (EDA) by using graphs and both mean and order based tests for normal distribution in variables (in level) were employed. The prerequisite for a normal distribution include zero skew and kurtosis equal to 3 (Mukherjee, White and Wuyts, 1998: 6).

Table 1. Descriptive Statistics of the Variables Used in the Analysis, 1967 – 2010

Variables	<i>s</i>	$r_t$	<i>R</i>	$\pi$	<i>vol</i>	<i>exr_pre</i>	$y^{pc}$	<i>fd</i>
Mean	0.05	-8.22	9.15	15.57	3.27	77.61	7.74	5.06
Median	0.04	-7.00	5.00	12.08	2.38	36.45	7.73	4.64
Maximum	0.12	4.15	26.00	30.62	13.87	510.90	8.25	12.64
Minimum	0.01	-27.92	2.40	1.00	0.07	-6.40	7.16	1.62
Std. Dev.	0.02	8.38	7.99	9.52	2.74	107.10	0.25	2.63
Skewness	1.15	-0.80	1.17	0.14	2.21	1.95	-0.03	0.82
Kurtosis	5.36	2.62	2.85	1.49	8.89	7.55	3.41	3.06
Jarque-Bera	19.00	4.68	9.58	4.15	94.91	62.69	0.30	4.71
Probability	0.00	0.10	0.01	0.13	0.00	0.00	0.86	0.10
Observation	42	42	42	42	42	42	42	42

Note: *s*=saving to GDP ratio;  $r_t$ =real interest rate (nominal less inflation rate); *R*=nominal interest rate;  $\pi$ =inflation rate; *mi*=macroeconomic volatility; *exr\_pre*=parallel market exchange rate premium;  $y^{pc}$ =natural logarithm of real per capita income; *fd*=ratio of real private investment to the real GDP.

This requirement is satisfactorily met by most variables of the estimation model: while they are not skewed, they do not have a kurtosis equal to 3. However, the p-value of the Jarque-Bera statistics suggests that all the variables of the estimation model have very significant kurtosis, that is, larger than normal tails. It should be noted that transformation of data by a natural logarithm operator eliminates the kurtosis problem in some of the variables, notably the *fd* and *R* but not the *s*.

### 5.2 Unit Root and Cointegration Test Results

The Augmented Dickey Fuller (ADF) unit root tests results with and without a trend (*t*), suggests that all variables, except the nominal interest rate (*R*), are  $I(1)$  in level and are

first difference stationary ( $I(0)$ ) at the conventional test levels (Table 2). Serve for the rate  $R$ , which is a secondary variable of interest in the analysis, the primary variables of the estimation model are integrated of order one; and, this suggests that they are potentially cointegrated.

Table 2. Unit Root Test Results Based on Augmented Dickey-Fuller Approach

Variables	ADF							
	With a Constant				Level with constant and a trend			
	Level	Critical value (1% & 5%)	First difference	Critical values (1% & 5%)	Level	Critical values (1% & 5%)	First difference	Critical values (1% & 5%)
$s$	-4.137*	-3.597 -2.604	-8.132*	3.605 -2.606	-4.087*	-4.192 -3.191	-8.099*	-4.205 -3.194
$R$	-1.809	-3.601 -2.935	-2.730	-3.601 -2.935	-0.869	-4.186 -3.518	-2.815	-4.198-3.524
$r$	-2.840	-3.592 -2.931	-7.657*	-3.597 -2.933	-2.919	-4.186 -3.518	-7.581*	-4.192 -3.521
$\pi$	-1.903	-3.597 -2.933	-6.996*	-3.601 -2.935	-1.972	-4.192 -3.521	-7.106*	-4.198 -3.524
$vol$	-1.971	-3.615 -2.941	-7.113*	-3.615 -2.941	-4.895*	-4.273 -3.558	-7.198*	-4.219 -3.533
$ln y$	0.478	-3.592 -2.603	-4.910*	-3.597 -2.933	-1.951	-4.192 -3.521	-4.959*	-4.192 -3.521
$g^y$	-4.910*	-3.597 -2.933	-8.576*	-3.601 -2.935	-4.959*	-4.192 -3.521	-8.466*	-4.198 -3.524
$fd$	-0.809	-3.592 -2.604	-4.669*	-3.597 -2.604	-2.430	-4.192 -3.191	-4.804*	-4.192 -3.191
$exr\_pre$	-1.225	-3.592 -2.931	-5.930*	-3.597 -2.933	-1.906	-4.186 -3.518	-5.855*	-4.192 -3.521

Cointegration test results based on Engle-Granger two step method suggested existence of an equilibrium between the estimating equation (1): the ADF test applied to the error term of the cointegrating equation is also  $I(0)$ .<sup>20</sup> This confirms existence of a long-run relationship amongst the variables of the estimating equations (1). This result suggests that estimation of equation (1) in levels by ordinary least square (OLS) method would not yield spurious regression results; and, by virtue of Engel and Granger (1987) Representation Theorem, an error correction model (ECM) that captures short-run and long-run dynamics between savings and its determinants can be estimated by using error term estimated for the cointegrating equation in (1).

<sup>20</sup> The estimated value is -6.848 against a critical value of -3.605 (1%).

## 5.2 Long-run Regression Results

Table 3 presents results of the long-run saving function estimated by using OLS method in GRETL. *A priori*, the results show that the equations estimated are of good fit and very powerful. The estimated coefficients of determination ( $R^2$ ) suggests that 61.7 percent and 63.7 percent of the long-run variation in financial saving rates is explained by factors included in the two estimation models (Table 3). The estimated F-statistics are also very high and statistically significant at 1 percent test level in the case of model 2. This suggests that modeling of both nominal interest rates and inflation improved significantly the overall performance of the estimation model. Notable, however, is that the estimated p-values for RESET (Regression Errors Specification Test) in model 2 is statistically significant. This suggests that there still existed in Model 2 omission of important determinants of financial savings in Tanzania during the sample period.

Table 3: Regression Results for Long-run Equation, 1969 - 2010

Variables	Model 1	Model 2
$c$	-50.147 (-3.803)***	-40.755 (-2.728)**
$r$	0.207 (3.989)***	
$R$		0.151 (2.244)**
$\pi$		-0.215 (-4.153)***
$fd$	0.067 (0.419)	0.064 (0.408)
$y^{pc}$	6.616 (3.889)***	5.478 (2.883)***
$exr_{pre}$	0.007 (1.398)	0.004 (0.835)
$vol$	-0.117 (-0.985)	-0.118 (-1.007)
$DUM$	1.553 (1.925)*	1.974 (2.288)**
$R^2$	0.619	0.637
RESET, p-value	0.184	0.082
ARCH (1), p.value	0.945	0.768
D-W.	2.083	2.195

- Note:**
- a) \*, \*\*, and \*\*\*, respectively, are 10%, 5% and 1% test significance test levels.
  - b) Figures in parentheses are t-statistics.
  - c) The F-test statistics for Model 1 is thus:  $F(2, 33) = 1.7846$ , with p-value =  $P(F(2, 33) > 1.7846) = 0.183685$ ; and, that for Model 2 is  $F(2, 32) = 2.70051$ , with p-value =  $P(F(2, 32) > 2.70051) = 0.0824638$

Results in Table 3 show that the estimated coefficients of real interest rate ( $r$ ) in Model 1 is positive as expected and is statistically significant at the 10 percent traditional test level. In Model 2, the results show that the coefficient of the nominal interest rate is positive as expected and statistically significant at the 5 percent test level. The estimated real and nominal interest rate elasticities suggest the substitution effect was larger than income effect; and, that complementarity exist between saving and accumulation of money balances. It is further notable in Table 3 that the estimated coefficient of inflation in Model 2 is negative and statistically significant at the 10 percent level. This finding is consistent with the theory that inflation penalizes financial saving in favour of saving in physical assets.

The results in Table 3 also show that the estimated coefficients on the measure of financial deepening ( $fd$ ) are positive as expected but are statistically insignificant at the conventional test levels.<sup>21</sup> Moreover, the coefficients of income per capita are positive as expected and both are statistically significant at the 1 percent test level. It should be noted that the estimated income elasticity coefficients are large as in most other LDCs, probably because of an existence of uncertainty and/or borrowing constraint in the economy. On the one hand, the finding is consistent with the Keynesian absolute income hypothesis and theories that emphasizes buffer stock precautionary saving and borrowing constraint as determinants of saving in LDCs. The fact that the estimated constant terms in Table 3 are statistically significant does also suggest that saving depends on the level of income as in Keynesian theory. On the other hand, the result is not unexpected in view of the dominance of the bank clientele by the SOEs and their employees during the period of interest rates regulation. The results show, however, that the coefficients of the other determinants of financial saving are not statistically significant at the conventional test levels, probably because they have not been correctly measured.

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<sup>21</sup> According to Schmidt-Hebbel and Serven (2002) “The international evidence suggests a positive association between financial development and saving across countries. However, empirical studies controlling for other determinants of saving reveal that the effect of financial development on saving is, if anything, negative”.

### 5.3 Financial Repression and Financial Saving

Table 4 presents regression results based on the method used by Azam (1996) and Roubini and Sala-i-Martin (1992) to test for the effect of financial repression on saving. The estimated  $R^2$  suggests that the explanatory variables the two models respectively accounted for 60 percent and about 58 percent of the variation in financial saving rates during the sample period. The estimated F-statistics for the two equations are statistically significant at the 1 percent test level; and, they thus suggest that the overall estimated models were quite powerful and robust.

Table 4: Regression Results, 1969 – 2010

	Model 1	Model 2
<i>constant</i>	-36.231 (-2.657)**	-36.682 (-2.605)**
<i>r</i>	0.305 (3.559)***	
<i>FR</i>	1.117 (0.825) 1.354	0.802 (0.985)
<i>r * FR</i>		0.091 (3.197)***
<i>y<sup>pc</sup></i>	4.647 (2.490)**	4.782 (2.485)**
<i>fd</i>	0.090 (0.536)	0.072 (0.418)
<i>exr_pre</i>	0.011 (2.154)**	0.009 (1.908)*
<i>vol</i>	-0.111 (-0.914)	-0.104 (-0.834)
$R^2$	0.60	0.578
RESET, p-value	0.102	0.682
ARCH (1), p.value	0.891	0.804
D-W.	1.740	1.804

Note: a) \*, \*\*, and \*\*\*, respectively, are 10%, 5% and 1% test significance test levels.  
b) Figures in parentheses are t-statistics.  
c) The F-test statistic for model 3 is thus:  $F(2, 33) = 2.44945$  with  $p\text{-value} = P(F(2, 33) > 2.44945) = 0.101892$ ; and, that for Model 4 is  $F(2, 33) = 2.91582$ , with  $p\text{-value} = P(F(2, 33) > 2.91582) = 0.0682205$ .

The DW statistics and White's heteroskedasticity test suggest lack of autocorrelation in the estimated model. And, according to RESET test the models are free from specification error. The CUSUM test for stability of parameters shows the estimated model is very stable (Appendix2: Figure 2). Notable, however, the CUSUMSQ plot,



which indicates a value outside of 95% confidence band, shows existence of a break in 1986 and a reversion to stability at the end of the 1990s.

The regression results of Model 3 show that the coefficient of real interest rate when entered linearly in the function is positive and statistically significant at the 1 percent test level (Table 4). The coefficient of the measure of financial repression (*FR*) is positive signed but is statistically insignificant at the conventional test levels. This finding is consistent with that obtained by, among others, Azam (1996) in a study on Kenya; and also Roubini and Sala-i-Martin (1992). It suggests that increase in financial repression was compensated for by implicit interest rate such that “savings did not fall conformably with measured real rate” (Azam, 1996: 39). Instead, “when the real interest rate is positive, the Roubin and Sala-i-Martin repression variable is equal to one, and we get a straightforward positive impact of the real interest rate (Azam, 1996: 39). The estimation results for Model 4 in which real interest rate enters non-linearly shows a decrease in goodness of fit: the estimated ( $R^2$ ) is lower but the overall explanatory power of the model, as shown by the F-statistic, improved to become stronger. If compared with results of Model 1, the results of Model 2 in table 4 shows lack of a significant difference in the size of the parameter estimated.

As before, the estimated coefficient of real income per capita is statistically significant. The coefficient of the exchange rate premium is also statistically significant at the 5 percent test level. Other factors included in the estimation model, namely, measure of financial deepening, and macroeconomic volatility are statistically insignificant at the conventional test level (Table 4). Furthermore, the results for the model estimated with both the measure of financial repression and interaction terms shows that the coefficient of the latter is statistically insignificant at the 1 percent test levels. Other determinants of financial saving in the estimated model, including real income per capita and the exchange rate premium are statistically significant at the 5 percent and 10 percent test level, respectively.

#### 5.4 Error Correction Model Results

Table 5 present results of the parsimonious ECM estimated by using GRETLL.<sup>22</sup> The results show that the regressors explain about 91 percent of the variation in financial savings rate. The estimated F-statistics is statistically significant at the 1 percent test level. This suggests that the estimated ECM is of good fit.

Table 5: Regression Results of the Parsimonious ECM, 1967 – 2010

Variables	Coefficient	Std. Error	t-ratio	p-value	
$c$	-0.155	0.329	-0.471	0.642	
$\Delta r$	0.175	0.039	4.492	0.000	***
$\Delta r_{t-3}$	0.203	0.037	5.503	0.000	***
$\Delta fd_{t-2}$	-0.350	0.164	-2.129	0.045	**
$\Delta y^{pc}$	10.346	2.671	3.874	0.001	***
$\Delta y_{t-2}^{pc}$	0.066	2.381	0.028	0.978	
$\Delta exr\_pre$	0.015	0.003	4.339	0.000	***
$\Delta exp\_pre_{t-3}$	0.002	0.003	0.548	0.589	
$\Delta vol$	-0.230	0.075	-3.065	0.006	***
$\Delta vol_{t-1}$	0.036	0.087	0.410	0.686	
$\Delta vol_{t-2}$	0.239	0.087	2.742	0.012	**
$\Delta vol_{t-3}$	-0.193	0.082	-2.354	0.028	**
$DUM$	0.225	0.411	0.548	0.589	
$ec_{t-1}$	-0.543	0.161	-3.381	0.003	***
$\Delta s_{t-1}$	0.223	0.125	1.781	0.089	*
$\Delta s_{t-2}$	-0.268	0.110	-2.447	0.023	**
$R^2$	0.934				
RESET, PF(2,20)	14.625	0.00012			
ARCH, P(Chi-square (1))	1.460	0.227			
F(15, 22)	20.726	P-value(F)	0.000		
SIC	151.177				
Durbin's h	1.260				

Note: a) \*, \*\*, and \*\*\*, respectively, are 10%, 5% and 1% test significance test levels.

<sup>22</sup> Both SIC and  $R^2$  statistics were used to guide the trimming down of the over-parameterised model estimated whose results have not been reported here to serve space.

The estimated RESET statistic suggests lack of specification error in the model estimated; and, the DW statistics and White's test suggests lack of autocorrelation in the model estimated. The CUSUM and CUSUMS-q plots suggest that the estimated function is also very stable (Appendix 1, Figure 3).

The coefficient of the error correction term ( $ec_{t-1}$ ) has a negative, as expected, but is statistically insignificant at the conventional significance test levels. The size of the coefficient on the error correction term (-0.09) is also very small; and, this suggests that adjustment of financial saving from dis-equilibrium to equilibrium in one year is insignificant and less than 10 percent. This appears to be consistent with poor potentials for mobilizing financial savings that existed in Tanzania in a larger part of the sample period covered by this study.

The ECM results suggests existence of very statistically significant (at 1 percent test level) contemporaneous effect of real interest rate on financial saving during the sample period. The effect of three years lagged real interest rate is also positive and statistically significant at the 1 percent test level. The results show that the effect of the contemporaneous real income per capita is, as expected, positive and statistically significant at the 5 percent test level. Besides, while the effect on financial savings of the one year lagged real income per capita is positive and statistically significant at the 5 percent test level, that of two years lagged period is negative and statistically significant at the 5 percent test level. This suggests shocks in real per capita income and/or myopic bear alternating effect on financial savings, probably because households in Tanzania were "less perfectly able to distinguish between temporary and permanent income shocks, meaning that they consumed more out of current shocks than predicted by consumption smoothing models" (Mavrotas and Kelly, 2001: 48; Campbell and Deaton, 1989). The results also show that the effect of the other determinants of financial saving included in the estimation model, including black market exchange rate premium, macroeconomic instability, and lagged saving are statistically significant.

Generally, the estimated short-run and long-run real interest rate elasticity of financial saving are positive and statistically significant as predicted by the FRH. Surprisingly, however, the estimated long-run elasticity of saving with respect to nominal interest rate and inflation also turned out to be correctly signed and statistically significant. This

finding is consistent with evidence in some of the previous studies, for example, Odhiambo (2008) in a study in Tanzania; Oshikoya (1992) in the case of Kenya; and, Leite and Makonnen (1986) in a study covering six West African member countries in Banque Centrale des Etats de l’Afrique de l’Ouest (BCEAO).<sup>23</sup> The evidence of this study is inconsistent with that obtained by more recent studies, especially studies on national or aggregate savings, among others, Mwega (1997), Kariuki (1995) in the case of Kenya and Ziorklui and Barbee Jr. (2003) in a study in Ghana. In fact, some other studies have found a negative effect of real interest rates on saving, for example, Bandiera *et al.* (2000) in the case of Korea and Mexico. It is worth noting that results of positive real interest rate elasticity in the case of Tanzania can be defended credibly for one main: the results have shown that both nominal interest rate and inflation are statistically significant determinants of financial saving over the long-run period. Besides, the real interest rate policy targets financial rather than national or aggregate saving that could be insensitive to changes in interest rates (Arrieta, 1998: 597).

On other determinants of financial saving, the effect of income per capita over the short-run and long-run period is consistently positive as expected and established by most other previous studies, among others, Edwards (1995) and Ziorklui and Barbee Jr (2003), Schmidt-Hebbel, Webb and Corsetti (1992), Nyagetera, Osoro and Lipumba (1989). Moreover, the negative short-run and long-run negative effect of inflation on financial savings established by this study is consistent with theory and evidence from some previous studies, among others, Ziorklui and Barbee Jr (2003). Some studies, for example, Soyibo and Adekanye (1992) in Nigeria and Seck and Nil (1993) established a positive albeit weak impact of financial liberalisation on saving in Nigeria; and, Seck and Nil (1993) established a positive impact of financial liberalisation on saving in nine African countries. However, the lack of significant effect of financial development on financial saving established by this study is consistent with increasing empirical evidence tends to suggest lack of a significant long-run effect of financial sector development on saving in developing countries both before and after the liberalization of the financial sector (Arrieta, 1988). The finding is also consistent with empirical results of some of the

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<sup>23</sup> The six BCEAO countries covered by the study are Benin, Ivory Coast, Niger, Senegal, Togo, and Upper Volta.

studies on either aggregate or private savings in and outside Tanzania that covered data set for pre financial sector reform period, for example, Nyagetera, Osoro and Lipumba (1989) and empirical evidence of some previous studies in and outside Tanzania, for example, Odhiambo (2005) in the case of Tanzania and Mweha, Ngola and Mwangi (1990) in a study on Kenya. The results of this study shows, however, existence of short-run effect on saving from access to finance, development in foreign exchange market, and macroeconomic volatility only exerted significant short-run effect on financial savings in Tanzania during the sample period.

## **6. CONCLUSION**

This paper has investigated the long-run and short-run responsiveness of financial savings to real interest rate and other determinants in Tanzania. The analysis was based on annual time series data for the period 1967-2010 fitted by OLS and an ECM. The empirical evidence has shown that real interest rate exerted statistically significant and positive short-run and long-run effect on financial saving in Tanzania during the sample period. The results also showed both contemporaneous and two-period lagged real interest rate exerted a significant positive effect on financial saving. Both long-run and short run results points to importance of sustained real interest rate policy to augment financial saving in Tanzania. The results have also shown that real income per capita is an important determinant of financial saving over the long-run and short-run periods. This emphasizes importance of policies targeted to the increase of saving capacities in the economy, for example, the on-going implementation of strategies to the achievement of millennium development goals (MDGs).

The study has only explored the effect of real interest rate and other factors on financial savings, a measure that did not include savings, among others in stocks, treasury bills, bonds, and foreign exchange deposits due to data problems. Notable also prior to the liberalisation of the financial sector financial savings were dominated by parastatal sector savings which, by no doubt, were more responsive to other factors but not the interest rates. Therefore, the results and conclusions from this study as regards interest rate elasticity of saving in Tanzania are more indicative than conclusive, mainly due to

data limitations, among others, that of financial savings. Besides, while focus on financial saving is informative, it is narrow. A focus on aggregate domestic savings rather than financial savings only may help better design of policy targeted to domestic resources mobilization and economic growth. Else purely micro studies on saving behaviour are equally important. Also notable several hypotheses on savings were not investigated, among others, the hypothesized the link between saving and dependency rates, capital flight, and economic growth. Moreover, transmission mechanism in the link between real interest rate policy, saving, investment and economic growth still also stands out as a potential area of policy oriented study in Tanzania.

## REFERENCES

- Agénor, P. and P. J. Montiel (2008), *Development Macroeconomics*. 3<sup>rd</sup> Edition. Princeton, Oxford: Princeton University Press.
- Ando, A. and F. Modigliani (1963), "The "Life Cycle" Hypothesis of Saving: Aggregate Implications and Tests," *The American Economic Review*, Vol. 53, No. 1, Part 1, pp. 55-84.
- Ando, A. and F. Modigliani (1957), "Test of the Life Cycle Hypothesis of Saving," *Bull. Oxford Univ. Inst. Stat.*, 19, pp. 99-124.
- Arrieta, G. M. G. (1988), 'Interest Rates, Savings, and Growth in LDCs: An Assessment of Recent Empirical Research,' *World Development*, 16(5): 589-605.
- Aryeetey, E., H. Hettige, M. Nissanke and W. Steel (1997) 'Financial Market Fragmentation and Reforms in Ghana, Malawi, Nigeria, and Tanzania', *World Bank Economic Review*, 11, No. 2, pp. 195-218.
- Athukorala, P. and K. Sen (2004), "The determinants of private saving in India," *World Development*, 32, No. 3, pp. 491-503.
- Azam, J. (1996), 'Savings and Interest Rate: The Case of Kenya', *Savings and Development*, XX, No. 1, pp. 33-44.
- Bagachwa, M. S. D. (1995), "Financial Integration and Development in Sub-Saharan Africa: A Study of Informal Finance in Tanzania." Working Paper 79. Overseas Development Institute, London.
- Bandiera, O. G., G. Caprio Jr., P. Honohan, and F. Schiantarelli (2000), 'Does Financial Reform Increase or Reduce Savings?', *Review of Economics and Statistics*, 82, No. 2, pp. 239-63.
- Bank of Tanzania (1996a), "Review of 1996/97 Monetary Policy Stance and Its Impact on the Financial Sector." Unpublished Paper presented at the Tanzania Postal Bank's Board Seminar, December 10-11.
- Bank of Tanzania (1996b), "Financial sector reforms in Tanzania." Mimeo, September 12.
- Bayoumi, T. (1993) 'Financial Deregulation and Household Saving', *Economic Journal*, 103, pp. 1432-43.
- Boadway, R. and D. Wildasin (1994), "Taxation and savings: a survey," *Fiscal Studies*, (Institute for Fiscal Studies), 15, No. 3, pp. 19-63.
- Campbell, J. and A. Deaton (1989), "Why is consumption so smooth?," *The Review of Economic Studies*, 56, No. 3, pp. 357-73.
- Carroll, C. D. (1996), Buffer-Stock Saving and the Life Cycle/Permanent Income Hypothesis," NBER Working Papers, No. 5788, October.
- Chandavarkar, A. G. (1990), "Macroeconomic aspects, foreign flows and domestic savings performance in developing countries: A state of art," OECD, February.
- Cheung, Y. W. and K. Lai (1993), "Long-Run Purchasing Power Parity during the Recent Float," *Journal of International Economics*, 34, pp. 181-192.
- Cho, Y. C. and D. Khatkhate (1990), "Financial liberalisation: Issues and evidence," *Economic and Political Weekly*, May.
- Clarke, R. (1996), "Equilibrium interest rates and financial liberalization in developing countries," *Journal of Development Studies*, 32, No. 3, pp. 391-413.

- Collier, P. and C. Mayer (1989), "Financial Liberalization, Financial Systems, and Economic Growth: the Assessment," *Oxford Review of Economic Policy*, 5, No. 4, pp. 1-12.
- Collins, S. M. (1991), "Saving Behavior in Ten Developing Countries," in B. Douglas Bernheim and John B. Shoven, eds., *National Saving and Economic Performance*, University of Chicago Press, pp. 349 – 376.
- De Melo, J. and J. Tybout (1986), 'The Effects of Financial Liberalization on Savings and Investment in Uruguay', *Economic Development and Cultural Change*, 34, No. 3, pp. 561-87.
- Deaton, A. S. (1992), "Saving and Income Smoothing in Côte d'Ivoire," *Journal of African Economies*, 1(1): 1-24.
- Deaton, A. (1991), "Saving and Liquidity Constraint," *Econometrica*, 59, No. 5, pp. 1221-48.
- Deaton, A. S. (1989), "Saving in Developing Countries: Theory and Review," Proceedings of the World Bank Annual Conference on Development Economics, Supplement to *The World Bank Economic Review*, pp. 61-96.
- Edwards, S. (1995), "Why are saving rates so different across countries?: An international comparative analysis," NBER Working Paper 5097.
- Elbadawi, I. A. and F. M. Mwega (2000), "Can Africa's saving collapse be reversed?," *The World Bank Economic Review*, 14, No. 3, pp. 415-43.
- Engle, R. F. and C. W. J. Granger (1987), "Co-integration and Error Correction: Representation, Estimation and Testing," *Econometrica*, 55, No.2, pp. 251-76.
- Friedman, M. (1957), *A Theory of the Consumption Function*. Princeton: Princeton University Press.
- Fry, M. J. (1978), 'Money and Capital or Financial Deepening in Economic Development', *Journal of Money, Credit and Banking*, 10, pp. 464-75.
- Giovannini, A. (1983), 'The Interest Elasticity of Savings in Developing Countries: The Existing Evidence', *World Development*, 11, pp. 601-607.
- Goldsmith, R. W. (1969), *Financial Structure and Development*. New Haven: Yale University Press.
- Gupta, K. L. (1987), Aggregate Savings, Financial Intermediation and Interest Rates, *Review of Economics and Statistics*, 69, No. 2, pp. 303-11
- Gurley, J. E. and E. S. Shaw (1955), 'Financial Aspects of Economic Development', *American Economic Review*, 45, No. 4, pp. 515-38.
- Hadjimichael, M. and D. Ghura (1995), "Public policies and private saving and investment in sub-Saharan Africa: An empirical investigation," IMF Working Paper, WP/95/19.
- Hussein, K. A. and A. P. Thirlwall (1999), "Explaining differences in the savings ratio across countries: A panel data study," *The Journal of Development Studies*, 36, No. 1, pp. 31-52.
- Hussein, K. A. and M. Mohieldin (1997), Interest rates, saving, investment and growth under financial repression: The Egyptian example," *Arab Economic Journal*, No.9.



- Ikhide, S. (1992), "Financial deepening, credit availability and the efficiency of investment: Evidence from selected African countries." Research paper no. 2, United Nations Economic Commission for Africa (UNECA), October.
- Jappelli, T. and M. Pagano (1994), 'Saving, Growth and Liquidity Constraint', *Journal of Economic Literature*, 109, No. 1, pp. 83-109.
- Johansen, S. (1991), "Estimation and hypothesis testing of Cointegration vectors in Gaussian vector autoregressive models," *Econometrica*, 59, pp. 1551-80.
- Johansen, S. and K. Juselius (1990), "Maximum likelihood estimation and inference on cointegration — with applications to the demand for money," *Oxford Bulletin of Economics and Statistics*, Vol. 52, pp. 169-210.
- Kariuki, P. W. (1995), 'The Impact of Interest Rate Liberalisation on Financial Savings: The Case of Kenya', *African Review of Money, Finance and Banking*, 95, No. 1&2, pp. 5-22.
- Kendahl, P. (2000), "Interest rates, savings and growth in Guyana. Mimeo.
- Khatkhate, D. R. (1988), 'Assessing the impact of Interest Rates in Less Developed Countries', *World Development*, 16, No. 5, pp. 577-88.
- Lanyi, A. and R. Saracoglu (1983), "Interest rate policies in developing countries," Occasional Paper No. 22. Washington D.C.: IMF.
- Leite, S. P. and D. Makonnen (1986), "Saving and interest rates in the BCEO countries: An empirical analysis," *Savings and Development*, 10, No. 3, pp. 219-232.
- Loayza, N., K. Schmidt-Hebbel, and L. Servén (2000), 'Saving in Developing Countries: An Overview', *The World Bank Economic Review*, 14, pp. 393-414.
- Loayza, N. and R. Shankar (2000), "Private saving in India," *The World Bank Economic Review*, 14, No. 3, pp. 571-94.
- Maliyamkono, T. L. and M. S. D. Bagachwa (1990), *The Second Economy in Tanzania*. London: James Currey and Ohio University Press.
- Masson, P., T. Bayoumi and H. Samiei (1998) 'International Evidence on The Determinants of Private Saving', *The World Bank Economic Review*, 12(3): 483-501.
- Mavrotas, G. and R. Kelly (2001), "Savings mobilisation and financial sector development: The nexus," *Savings and Development*, XXV, No. 1, pp. 33-65.
- McKinnon, R.I. (1973), *Money and Capital in Economic Development*. Washington D.C: Brookings Institution.
- Mduma, J. K. (1999), 'The Impact of Interest Rate Policies on Financial Savings in Tanzania'. MA Dissertation, University of Dar es Salaam.
- Mduma, J. K. and M. I. Kazi (2005), "The implication of low inflation rate on interest rate in Tanzania," *The African Journal of Finance and Management*, 13, No. 2, pp. 21-28.
- Montiel, P. J. (1995), 'Financial Policies and Economic Growth: Theory, Evidence and Country-Specific Experience from Sub-Saharan Africa'. AERC Special Paper, No. 18, Nairobi.
- Moshi, H. P. B. (1996), "Fiscal impact of commercialization and privatization of public enterprises in Tanzania," mimeo.
- Moshi, H. P. B. (1994), "The limits of privatization in Africa; Some preliminary observations," University of Dar es Salaam, ERB (Economic Research Bureau) Seminar Paper, November, mimeo.

- Mukherjee, C, H. White and M. Wuyts (1998), *Econometrics and Data Analysis for Developing Countries*. London, New York: Routledge.
- Mwega, F. M. (1997), "Saving in sub-Saharan Africa: A comparative analysis," *Journal of African Economies* (Supplement), 6, No. 3, pp. 199-228.
- Mwega, F. M., S. M. Ngola and N. Mwangi (1990), 'Real Interest Rates and the Mobilisation of Private Savings in Africa: A Case Study of Kenya', AERC Research Paper, No. 2, November.
- Mwinyimvua, H. (1996), "The impact of macroeconomic policies on the level of taxation in developing countries: The case of Tanzania". Unpublished Ph.D Thesis, University of Dar es Salaam.
- Nissanke, M. (1990), 'Mobilising Domestic Resources for African Development and Diversification: Structural Impediments in the Formal Financial System'. Paper prepared for the World Bank Conference on African Economic Issues, Nairobi, June.
- Nwachukwu, T. and F. O. Egwaikhide (2007), "An error-correction model of the determinants of private saving in Nigeria." Paper presented at the African Economic Society (AES) Conference, Cape Town, South Africa, July.
- Nyagetera, B. M. (1997), 'Financial Repression in Tanzania: Its Impact on Savings, Investment, Credit and Growth'. Ph.D Thesis, University of Dar es Salaam.
- Nyagetera, B. M., N. E. Osoro, and N. H. I. Lipumba (1989), 'Determinants of Financial Savings in Tanzania.' Paper presented at the AERC meeting, Nairobi, May 27-31.
- Nyawata, O. and G. Bird (2004), 'Financial liberalisation in Southern Africa: An assessment', *Development Policy Review*, 22, No. 3, pp. 287-307.
- Odhiambo, N. M. (2009), "Interest Rate Reforms, Financial Deepening and Economic Growth in Kenya: An Empirical Investigation," *The Journal of Developing Areas*, 43, No. 1, pp. 295-313.
- Odhiambo, N. M. (2008), "Interest rate reforms, financial depth and savings in Tanzania: A dynamic linkage," *Savings and Development*, 32, No. 2, pp. pp. 141-158.
- Odhiambo, N. M. (2005), "Financial Liberalisation And Financial Deepening: Evidence From Three Sub-Saharan African (SSA) Countries," *African Review of Money, Finance and Banking*, pp. 5-23.
- Ogaki, M., J. D. Ostry and C. M. Reinhart (1996) 'Saving Behaviour in Low-Income Developing Countries', *IMF Staff Papers*, 43, No. 1, pp. 38-71.
- Oshikoya, T. W. (1992), 'Interest Rate Liberalization, Savings, Investment and Growth: The Case of Kenya," *Savings and Development*, XVI, pp. 305-320.
- Pesaran, H. M., Y. Shin, R. J. Smith (2001), "Bounds testing approaches to the analysis of level Relationships," *Journal of Applied Econometrics*, 16, pp. 289-326.
- Reinhart, C. M. and I. Tokatlidis (2003), 'Financial liberalisation: The African experience,' *Journal of African Economies*, 12, pp. ii53 - ii88.
- Reinhart, C. M. and J. D. Ostry (1995) 'Saving and the real interest rate in developing countries,' *Finance & Development*, 32, December, pp. 16-18.
- Rossi, N. (1988), "Government spending, the real interest rate, and the behavior of liquidity-constrained consumer in developing countries," *IMF staff Papers*, 35, No. 1, pp. 104-40.
- Roubini, N. and X. Sala-i-Martin (1992), 'Financial Repression and Economic Growth', *Journal of Development Economics*, 39, No. 1, pp. 5-30.

- Seck, D. and Y. H. El Nil (1993), "Financial liberalization in Africa," *World Development*, 21, No. 11, pp. 1867-81.
- Shaw, E. S. (1973), *Financial Deepening in Economic Development*. Oxford University Press.
- Schmidt-Hebbel, K. and L. Servén (2002), "Financial Liberalization, Saving, and Growth," Paper presented at the Banco de México Conference on "Macroeconomic Stability, Financial Markets, and Economic Development", Mexico, November 12-13.
- Schmidt-Hebbel, K., L. Servén, and A. Solimano (1996), "Saving and investment: Paradigms, puzzles, policies," *World Bank Research Observer*, 11, pp. 87-117.
- Schmidt-Hebbel, K., S. B. Webb and G. Corsetti (1992), "Household saving in developing countries: First cross-country evidence," *The World Bank Economic Review*, 6, No. 3, pp. 529-547.
- Sheshinski, E. and V. Tanzi (1989), 'An Explanation of the Behaviour of Savings in the United States in Recent Years', NBER Working Paper No. 3040, July.
- Skinner, J. (1988), "Risky income, life cycle consumption, and precautionary savings," *Journal of Monetary Economics*, 22, pp. 237-55.
- Soyibo, A. (1997), "Financial liberalization and bank restructuring in sub-Saharan Africa," *Journal of African Economies*, Supplement, 6, No. 1, pp. 100-150.
- Soyibo, A. and F. Adekanye (1992), 'The Nigerian Banking System in The Context of Policies of Financial Regulation and Deregulation', AERC Research Paper, No. 17, Nairobi.
- Tanzania, United Republic of (1990), "Financial Sector Restructuring in Tanzania: The Report and Recommendations of the Presidential Commission of Enquiry into the Monetary and Banking System in Tanzania," Dar es Salaam, July 19.
- Tanzania, United Republic of (1986), Economic Recovery Programme. Mimeo.
- Tease, W., A. Dean, J. Elmeskov and P. Holler (1991), "Real interest rate trends: The influence of saving, investment and other factors," OECD Economic Studies No. 17, Autumn.
- Thirlwall, A. P. (2003), "Mobilisation of Savings for Growth and Development in Developing Countries," *Universidad de Kent, Reino Unido*, Santo Domingo, R.D., February.
- Thomas, R. L. (1993), *Introductory Econometrics: Theory and Applications*. 2<sup>nd</sup> Edition. London, New York: Longman.
- Thornton, J. (1991), "The Financial Repression Paradigm: A Survey of Empirical Research," *Savings and Development*, XV, No. 1, pp. 5-17.
- Tuni, A. A. (1997), 'Financial Sector Reform and Interest Rate Determination in Tanzania: A Dynamic Specification', MA Dissertation, University of Dar es Salaam.
- Villagómez, A. (1994), "Aggregate consumption, interest rates and inflation in LDCs: An error correction model," *Journal of Development Studies*, 31, No. 1, pp. 157-178.
- Vogel, R. C., and P. Burkett (1986), "Deposit mobilization in developing countries: The importance of reciprocity in lending," *The Journal of Developing Area*, 20, pp. 425-437.

- Warman, F. and A. P. Thirlwall (1994), 'Interest Rates, Saving, Investment and Growth in Mexico 1960-90: Test of the Financial Liberalization Hypothesis,' *Journal of Development Studies*, 30, No. 3, pp. 629-49.
- World Bank (1994), *Adjustment in Africa: Reforms, Results, and the Road Ahead*, World Bank Policy Research Report. New York: Oxford University Press.
- World Bank (1989), *World Development Report 1989*. New York: Oxford University Press.
- Zeldes, S. P. (1989), "Consumption and liquidity constraints: An empirical investigation," *Journal of Political Economy*, 97, pp. 305-46.
- Ziorklui, S. Q. and W. Barbee Jr. (2003) 'Financial Sector Reform and Financial Savings in Sub-Saharan Africa: The Case of Ghana,' *Savings and Development*, XXVII, No. 1, pp. 63-78.

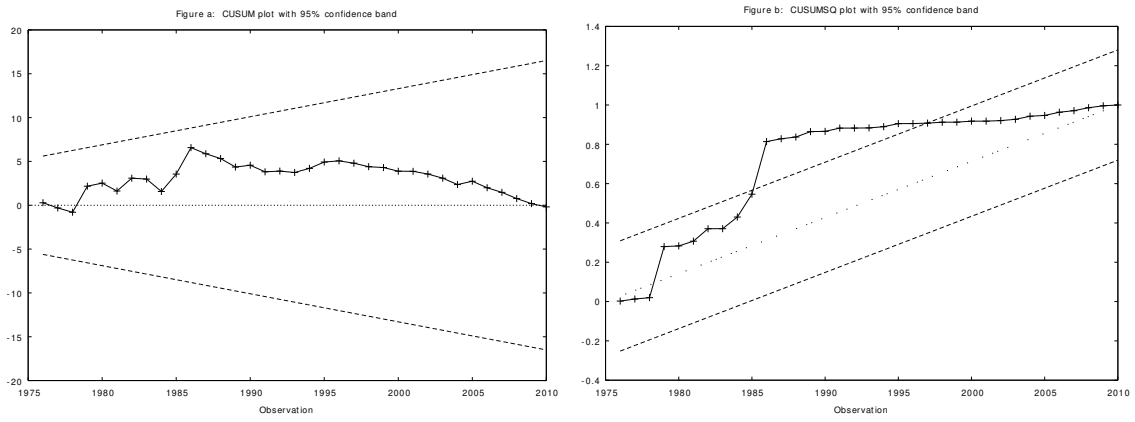
Appendix I

Correlation Matrix

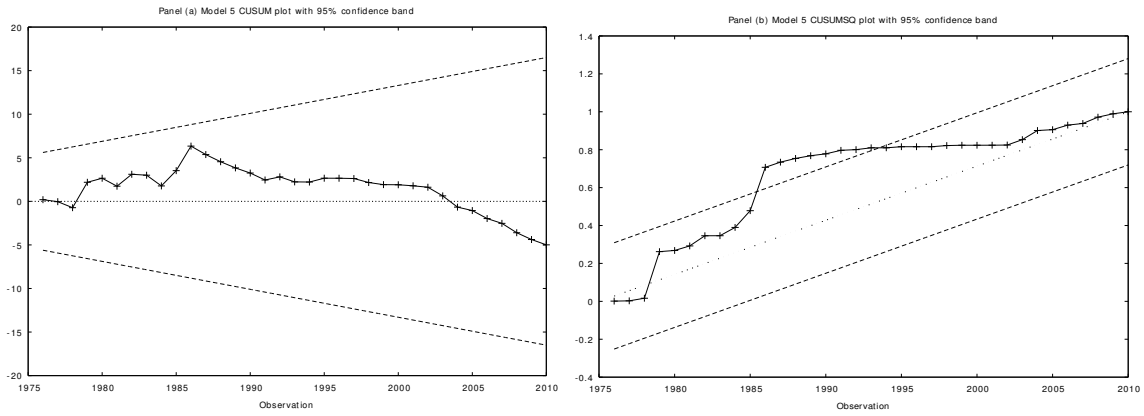
Variable	$s$	$r$	$R$	$\pi$	$mi$	$exr\_pre$	$y^{pc}$	$fd$
$s$	1.00	0.64	-0.22	-0.63	-0.13	0.23	0.62	0.43
$r$	0.64	1.00	0.06	-0.70	-0.11	0.53	0.49	0.48
$R$	-0.22	0.06	1.00	0.67	-0.04	0.41	-0.41	-0.16
$\pi$	-0.63	-0.70	0.67	1.00	0.06	-0.10	-0.65	-0.48
$mi$	-0.13	-0.11	-0.04	0.06	1.00	-0.27	-0.10	-0.22
$exr\_pre$	0.23	0.53	0.41	-0.10	-0.27	1.00	0.41	0.62
$y^{pc}$	0.62	0.49	-0.41	-0.65	-0.10	0.41	1.00	0.59
$fd$	0.43	0.48	-0.16	-0.48	-0.22	0.62	0.59	1.00

## Appendix 2

### Figure 1: Long-run Financial Saving Equation



### Figure 2: The Financial Repression Model



### Figure 3: The ECM Model

