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EFFECT OF FOREIGN AID ON DOMESTIC SAVINGS IN TANZANIA

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ABSTRACT

This study aimed to investigate the relevance of the classical view that foreign aid complements domestic savings, using Tanzania's time series data from 1966 to 2023. The empirical investigation was based on the Autoregressive Distributed Lag (ARDL) bounds cointegration technique. The results show that the long-run effect of aid on domestic savings is positive, whereas it is negative in the short run. Additionally, the results indicate a positive but statistically insignificant effect of government regimes on the economy's openness during the sample period. The study's findings underscore the long-term significance of aid and economic openness in Tanzania's development strategy. The importance of macroeconomic stability in both the short and long run periods is also emphasized by the findings.

Keywords: Foreign aid, domestic savings, ARDL

1.0 INTRODUCTION

The attainment of economic growth and development is central to the development programs and strategies of most developing countries, both within and outside sub-Saharan African (SSA) countries. The expectation is that achieving economic growth rates will reduce poverty, which affects the majority of the population in SSA and other developing countries. In the context of Classical economic theories, the attainment of economic growth and development in the SSA countries requires the mobilization of savings for capital formation (Arghion et al., 2006; Papanek, 1972).

Most developing countries, however, are characterized by low and even falling saving rates, which set a constraint on the mobilization of savings, investment, and the attainment of economic growth and development (Hossain, 2014; Aryeetey & Udry, 2000). In this regard, some development practitioners and policy experts have historically advocated aid, hereafter referred to as aid and elsewhere as assistance, as a critical requirement for attaining economic growth and development in developing countries (Sachs, 2005). The conviction of development experts and policymakers rested on the two-gap theory, which comprises the savings-investment gap and the foreign exchange gap, both rooted in the Harrod-Domar growth model (Basnet, 2013; Griffin & Enos, 1970; Chenery & Strout, 1966). In the context of Chenery & Strout (1966), aid is virtually a "separate factor of production" that accelerates the utilization of other factors of production, such as labour, natural resources, and specific types of productive capacity, which are constrained by inadequate savings (p. 679). Thus, based on the "two gaps' theories" and what Tarp (2006) refers to as optimistic expectations" from the success story of the Marshall Plan in Europe during the 1950s, the development technicians and policy makers considered aid critically important for setting the poor economies into a

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virtuous cycle of high rates of growth, saving, investment, and economic growth (Rotarou & Ueta, 2009; Chenery & Strout, 1966; Aghevli et al., 1990; Valedinah, 2014).

Some development technicians and policymakers, however, have maintained that the effect of aid on domestic savings in developing countries is adverse if not perverse (Easterly, 2006; Dichter, 2005; Bauer, 2000; Boone, 1996; Weisskopf, 1972; Griffin & Enos, 1970; Friedman, 1958). As maintained, aid encourages unproductive consumption and rent-seeking behaviour that adversely affects capital formation and its impact on economic growth (Kalyvitis & Philippopoulos, 2007; Moyo, 2009; Griffin & Enos, 1970). Moyo (2009), in particular, is convinced that aid has contributed to economic stagnation and political corruption in developing countries, among others, by a) engendering corruption mainly due to weak accountability mechanisms of the governments and aid organizations which allows mismanagement and abuse of funds; and, b) distortion of the incentive to save and invest in favour of "short-term goals, such as securing donor funding, instead of promoting long-term economic growth.

Whether aid matters, does not matter, or matters very little in explaining the saving behaviour in developing countries has been a question of research interest in several diverse empirical studies. Some empirical studies on Asia and the SSA countries attest to the existence of a positive effect of aid on domestic savings (Okore & Anthony, 2022; Hossain, 2014; Basnet, 2013; Baldé, 2011; Doucouliagos & Paldam, 2009; Shields, 2007; Irandoust & Ericsson, 2005; Burnside & Dollar, 2000). Specifically, such studies underscore the optimists' thesis that aid bridges the savings gap, thus setting the recipient developing economies on a virtuous cycle of economic growth and development. Nonetheless, some other empirical studies directly and/or indirectly support the view that the effect of aid on domestic savings in developing countries is either negative or nonexistent (Temsas, 2024; Bekele, 2020; Girma, 2017; Sabra & Eltalla, 2026; Zhu et al., 2009; Serieux, 2009; Easterly, 2003; Ranjan & Subramanian, 2008; Boone, 1996; Mosley et al., 1987). The only specific empirical study on Tanzania by Mjema (1994) found a negative relationship between aid and domestic savings, with causality running from domestic savings to foreign aid.

This paper aims to investigate the effect of aid on domestic savings in Tanzania. The testable null hypothesis is that aid substitutes for domestic savings, and the alternative hypothesis is that aid complements domestic savings in Tanzania. The value addition of this paper is three-fold. First, almost all previous studies on Tanzania focused on the effect of foreign aid on either investment and/or economic growth (Juselius et al., 2014; Rotarou & Ueta, 2009; Kayandabila, 2007; Hatemi-J & Irandoust, 2005; Nyoni, 1997; Danielson & Mjema, 1994; Mjema, 1994). In contrast, this study focuses specifically on the impact of aid on domestic savings. Second, the only previous study by Mjema (1994) covered the period 1961- 1990, a period in which the Self Reliance Policy of the Arusha Declaration guided the mobilization of domestic and foreign financial resources since 1967 up to the launch of the IMF and World Bank-sponsored Neo-Liberal (N-L) economic reforms in 1986. Furthermore, the sample period covered by Mjema (1994) overlooks the likely impact of economic reforms, particularly financial sector reforms and the economy's openness, on both domestic savings and aid inflows to Tanzania between 1991 and 2023. In this regard, unlike previous studies, this study spans the period from 1967 to 2023, encompassing data points for aid inflow into Tanzania both before and after the launch of economic reforms in 1986. In the same vein, a shift in "government's attitude" from quasi

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autarky between 1967 and 1986 to, among others, openness towards aid since 1986 is controlled for in the analysis. Third, the OLS (ordinary least squares) based results of the linear model estimated by Mjema (1994), without tests for stationarity and cointegration of the variables, are suspect because non-stationarity is known to characterize most time series data and is causally related to spurious parameter estimates. On this account, the analysis is based on a more frontier econometric method, specifically, the autoregressive distributed lag (ARDL) bound cointegration test approach. Fourth, the definition and measurement of aid vary across the previous studies on Tanzania. For example, unlike Rotarou & Ueta (2009), Mjema (1994) excluded loans in the commonly accepted definition of ODA, that is, "sum of grants and loans…" (Tarp, 2006). This standard measure of aid is used in the analysis to provide a comparison of the results with those generated by previous studies on Tanzania and beyond.

The rest of this paper is organized as follows. Section 2 focuses on the evolution of foreign aid and domestic savings in Tanzania during the sample period; Section 3 presents the methodology of the study; and, Section 4 presents and discusses the empirical findings. The last section concludes with a presentation of the main findings and related policy implications. A note on the areas for further research is also highlighted in the penultimate section.

2.0 FOREIGN AID AND DOMESTIC SAVINGS IN TANZANIA

Tanzania has been one of the major recipients of aid in SSA since it attained political independence from the British colonial government in 1961. Either because of what the World Bank (1989) and Tarp (2006) referred to as sympathy with her underdevelopment or political links (affiliation), altruistic reasons, congruence of policy, colonial history, or the need to expand its sphere of influence during the early 1960s, Tanzania received a substantial amount of bilateral foreign financial assistance at better terms relative the other African countries (Tarp, 2006; Wangwe, 1997; Mjema, 1994). Specifically, between 1961 and 1966, the total bilateral finance to Tanzania ranged from 3% to 9% of the total government expenditure (Mjema, 1994)[1]. Notably, the country also received foreign multilateral financial support from, among others, the International Development Assistance (IDA) of the World Bank and the United Nations Development Programme (UNDP).

The inflow of aid to Tanzania in the 1960s through the 1970s was primarily for funding development projects included in the development plans, hence what Wangwe (1997) refers to as "project aid," which was preferred by donors (Bigsten & Danielson, 2001). Second, the deterioration of diplomatic relations with the then-major donors, including the UK and the Federal Republic of Germany (FRG), also known as West Germany, had an adverse impact on the disbursement of aid to Tanzania during this period. Specifically, first, both planned and expected foreign assistance were canceled following Tanzania's severing of diplomatic relations with the UK due to Southern Rhodesia's (present Zimbabwe) Unilateral Declaration of Independence (UDI) from the United Kingdom in November 1965. Second, the FRG canceled its assistance to Tanzania in 1965 due to Tanzania's "establishment" of diplomatic relations with the German Democratic Republic (GDR), which was barred under the Hallstein doctrine of 1955. Thus, as Ndanshau & Mtui (2020) note, the expected amount of external

[1] The donor countries that were sympathetic to the "Ujamaa experiment" included Denmark, Finland, the Federal Republic of Germany, the German Democratic Republic (GDR), and Norway. Others donor countries were United Kingdom (UK) and the United States of America (USA) (Rotarou & Ueta, 2009).

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finance in the form of aid during the period (1961-1966) could not be raised due to political differences between Tanzania and the two donor countries (p.2). Consequently, the government suspended the execution of development projects included in the SFYP (1969 – 1974). This action may not have been devoid of a negative impact on achieving the planned rates of economic growth[2].

Notably, the cancellation of the aid disbursement only highlighted its unreliability in the economic growth and development process, as it did not impact the aggregate inflow of aid to Tanzania during the early 1960s. For, as Wangwe (1997) notes, "(b)oth bilateral and multilateral assistance to Tanzania increased in large proportions in the 1960s and during the 1970s" (p. 130). Nonetheless, the evident unreliability of aid prompted the government to launch the Arusha Declaration in 1967, whose self-reliance policy emphasized "willingness to exist without foreign aid… because of the alienation of three of the country's most important aid donors"(Coulson, 1982, p. 347). In the context of Wangwe (1997), the intention of the self-reliance policy was not realized. To cap it all, Mushi & Kjekshus (1982) state that the dependence on aid increased after the Arusha Declaration in 1967. Given the widespread poverty and a limited industrial base, which hindered domestic resource mobilization in Tanzania, the government opted to monetize budget deficits. To that effect, first, a central bank was established in 1965 and tasked with two conflicting roles: a) to promote and regulate economic growth and development. Second, following the promulgation of the Arusha Declaration in 1967, the government nationalized all private commercial banks and all, except one, non-bank financial institutions (NBFIs), to serve as a bridge for channeling cheap financial resources to the key sectors of the economy, which were also nationalized in 1967. Seemingly, the villagization drive which drove the predominantly rural population into what is better known as ujamaa (African Socialism) also offered the government an opportunity to keep to a minimal the volume of internal and external finance required to deliver basic public goods, namely, education, electricity, health, water, and transport.

Available evidence suggests that the soft-budget constraint the government enjoyed in financing fiscal deficits through the banking system failed to tame the country's dependence on aid. Among others, Wangwe (1997) informs that "(b)oth bilateral and multilateral assistance to Tanzania increased in large proportions in the late 1960s and during the 1970s" (p. 130). Similarly, Mushi (1982) shows that "(o)ver the 1970s the volume of gross aid disbursements (in current prices) rose almost ten-fold" (p. 18). It is suspect that the increase in the importance of aid during the 1970s was heightened by, first, both internal and external policy and non-policy shocks, among others, drought and floods (1973, 1974, 1975, 1981-1982), villagization drive (1974), oil crises (1975, 1979), the collapse of the East African Community (1977), and the war with the Idd Amin of Uganda (1978-1979). Attending to the internal and external shocks required an enormous use of foreign exchange, which was already constraining the import of consumables and intermediate inputs for the manufacturing sector, among others. The available anecdotal evidence suggests that demand for aid, specifically foreign exchange, increased during the macroeconomic crisis, driven by factors such as the adverse effects of inflation on budget deficits, deterioration of the balance of payments, and a decrease in real

[2] The diplomatic conflict between Tanzania and West Germany cost USD 32.5 million. https://thomasjkibwana.medium.com/tanzania-german-relations-a-history-of-conflict-and-cooperation-bcd09e9d113f#:

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interest rates from the 1970s to the 1990s. In tandem, the poor performance of the economy during the period rendered both internal and external debt cumulatively unserviceable, as the foreign exchange gap remained very binding (Mjema, 1995).

The macroeconomic crises of the 1970s through the early 1980s prompted the government to, first, implement two consecutive home-made stabilization programs: the National Economic Survival Program (NESP I & II) in 1980/81 and the Structural Adjustment Program (SAP) in 1982/83 to 1984/85 (Ndanshau & Mtui, 2020, p. 4). The failure of the two programs prompted the government to implement the IMF (International Monetary Fund) and the World Bank-sponsored Economic Recovery Programme (ERP) in mid-1986. Several Neoliberal (N-L) policies and strategies for addressing the macroeconomic crises were embedded in the ERP, which was implemented in two phases: ERP-I (1986-1989) and ERP-II (1989-1991), also known as the Economic Recovery and Social Action Program (ESAP).

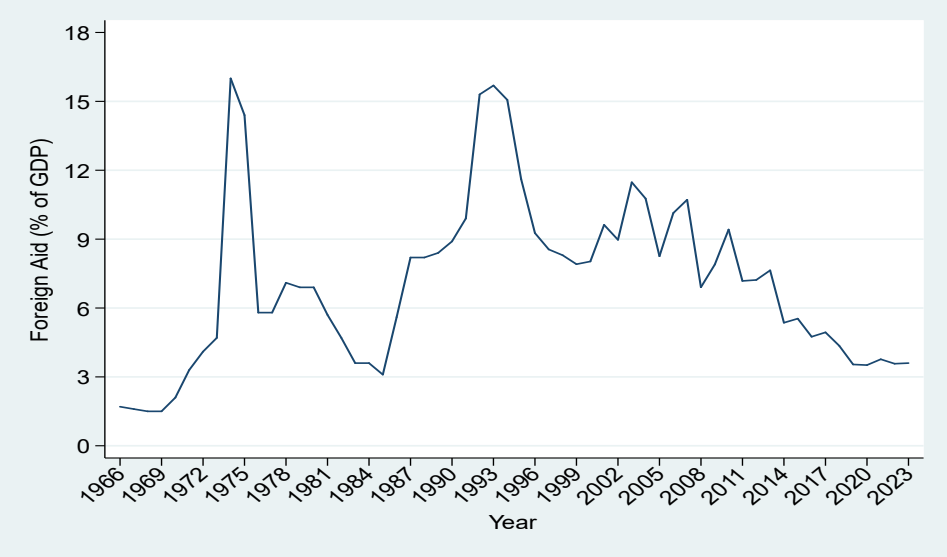

Figure 1: Flows of Foreign Aid (ODA) to Tanzania (in Millions USD), 1966-2023

Figure 1 shows that aid to Tanzania was small and constant during the period 1966-1972, which was characterized by the institutionalization of a public sector-led economy based on the Socialism and Self-Reliance Policy, as outlined in the Arusha Declaration, promulgated in 1967. The ODA, mostly from bilateral donors, rose between 1968 and 1974 but decreased sharply to a low in 1975, then rose to a peak in 1978, a period when Tanzania entered into war with President Idi Amin of Uganda. Once again, the inflow of aid to Tanzania decreased consistently between 1978 and 1985, a period when: a) the country was in severe macroeconomic crisis; b) President of the First government, the late Julius K. Nyerere, was in dispute with both the IMF and the World Bank over the country's macroeconomic policies routed in the Ujamaa and Self-Reliance Policy; and, the donor countries that were sympathetic to the "Ujamaa" and its egalitarian principle withdrew support mostly since 1983 (Bigsten & Danielson, 2001; Tarp, 2006).

The inflow of aid to Tanzania increased during the Second Phase Government (1985–1995), during which the late Ali Hassan Mwinyi (May 7, 1925 – February 29, 2024) agreed to

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implement the IMF (International Monetary Fund) and World Bank-sponsored Economic Reform Programme (ERP) starting in June 1986. As Bigsten & Danielson (2001) note, the agreement with the IMF and the World Bank "helped restore donor confidence (such that) (t)hey came back in force", leading to "a second aid boom which peaked in the early 1990s" (p. 20). Specifically, foreign aid rose from a low in 1985 to a peak in 1992. According to Lipumba and Mbelle (1993), aid accounted for almost 30 percent of total government expenditure in the early 1990s. However, its inflow tapered in 1992 to a low in 1995 (Figure 1). On the one hand, the rise in aid inflow since 1986 mainly resulted from "programme aid" and "adjustment loans" disbursed by donors to support implementation of the ERP in Tanzania, particularly the bridging of the foreign exchange gap which had constrained the import of key intermediate inputs for revamping capacity utilization in the manufacturing sector and, equally important, import of essential consumer goods that were in severe short supply (Kayandabila, 2007; Tarp, 2006). On the other hand, the decrease in aid in Tanzania between 1992 and 1995 was partly explained by a global decrease in total foreign aid to developing countries during and in the same context, donors' concern and doubts on aid effectiveness, rampant tax evasion, alleged corruption in the public sector, and build-up of inflationary pressure in Tanzania during the period (Kayandabila, 2007; Bigsten & Danielson, 2001). Notably, the inflow of aid rose since 1996, mainly due to the improvement of donor relations, which Bigsten and Danielson (2001) note was given high priority on the agenda of the Third Phase government (1995-2005), led by the late President Benjamin William Mkapa (Figure 1).

The plots in Figure 1 suggest, first, that the aid inflow was very unstable; and, second, its major upward and downward turns were specific to the phases of the ruling governments during the sample period. In particular, the inflow of aid rose almost consistently during the Third Phase Government regime (1995 – 2005) led by the late President Benjamin William Mkapa (November 12, 1938 – July 24, 2020). The increase, among other factors, resulted from the country's qualification for the enhanced HIPC initiative, having complied with the implementation of N-L economic reforms and achieved macroeconomic stability (Rotarou & Ueta, 2009; Kayandabila, 2007)[3]. It also appears continued compliance with the implementation of the N-L economic management policies and strategies, coupled with improvement in foreign policies and cultivation of good relationships with the donor community, sustained, and actually, increased the inflow of aid to Tanzania during the Fourth Phase Government regime (2005 – 2015) led by President Jakaya Mrisho Kikwete (October 7, 1950 -). Notably, however, aid to Tanzania decreased significantly during the Fifth Government regime (2015-2021), led by the late President John Pombe Magufuli (October 29, 1959 – March 17, 2021). By and large, the decline in aid resulted from the lukewarm commitment of the Fifth Government to implementing the N-L policies and strategies, on the one hand, and the donor community's response, on the other. Thus, as notable, aid started to rise during the Sixth Government regime period (March 17, 2021, to present) led by President Samia Suluhu Hassan (January 27, 1960, to present), mainly due to improvement in diplomatic relationships with both donors and other stakeholders. Generally, as a percentage of the GDP, gross domestic savings in Tanzania were the highest (34.3%) in 2021. Foreign aid was also at its lowest level during the

[3] In the same vein the IMF entered into agreement with the government to guarantee access to its enhanced structural adjustment facility worth USD 240 million (Bol, Luvanga & Shitundu, 1997).

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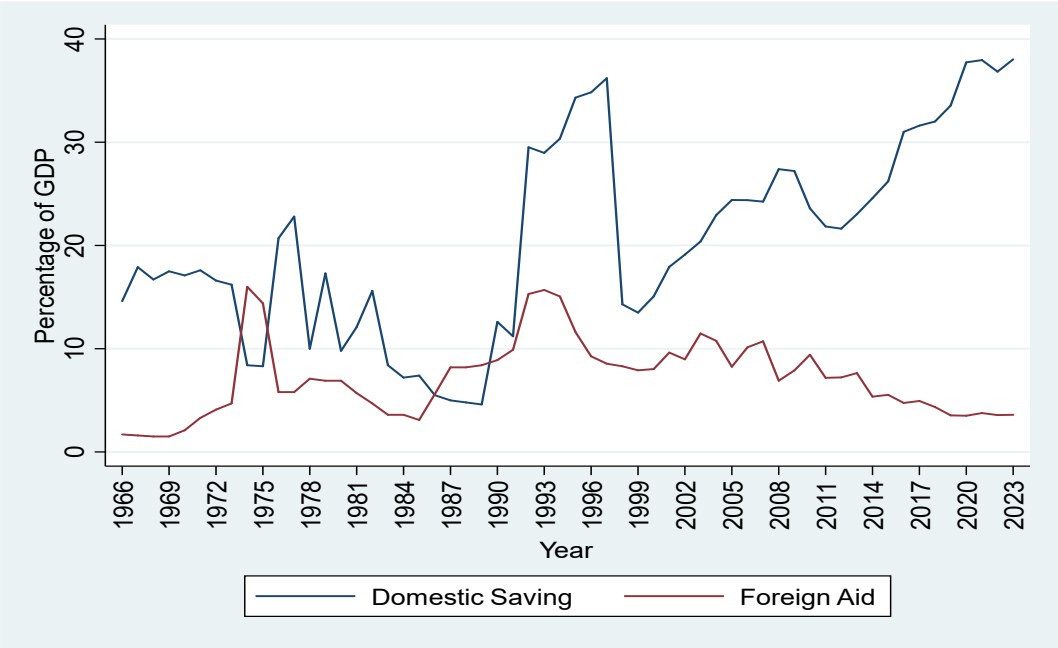

Figure 2: Trends of foreign aid and domestic savings (as % of GDP), 1966-2023.

Figure 2 suggests the existence of an inverse relationship between aid and domestic savings in Tanzania since the early 1990s through 2000. This, in the absence of causality tests, may imply that aid substituted for domestic savings in Tanzania since the 1990s. Instead, it is maintained here that the uncertainty of foreign aid occasioned by the lukewarm behaviour of the donor community revealed in the "aid effectiveness debate" explains the surge in domestic savings and its inverse relationship in Tanzania since the early 1990s.

3.0 METHODOLOGY

3.1 Data type and sources

The study utilised annual time series data for the period from 1967 to 2023. The data for all the variables were extracted from the World Development Indicators (WDI) database, the Bank of Tanzania (BoT), and the National Bureau of Statistics (NBS) in Tanzania. Notably, to fit the model, the official exchange rate was used to convert the data for foreign aid, obtained from the WDI, which was denominated in USD, into the domestic currency.

3.2 The estimation model

The estimation model used in the analysis is based on a linear model which reads as:

$$s_t = \beta_0 + \beta_1 fa_t + \beta_2 g_t^{ypc} + \beta_3 bc_t + \beta_4 R_t + \beta_5 \pi_t + \partial D_1 + \rho D_2 + \varepsilon_t \quad (1)$$

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where s is the gross domestic saving rate, fa is foreign aid[4], g^{ypc} growth rate of per capita income, bc is domestic bank credit to the private sector, R is nominal interest rate for domestic bank deposits, π is the inflation rate, D_{1} and D_{2} are dummy varaibles, t is time (in years), and ϵ is a stochastic error term. The first dummy variable (D_{1}) in (1) takes on value of 1 (unit) during the Second, Third and Sixth Phase Governments, respectively led by the late President Mwinyi (1985 – 1995), President William Mkapa (1995 – 2005), President Kikwete (2005-2015) and President Hassan (2016 – 2023) who implemented the N-L policies designed to stir the country to an open private sector led market economy; and takes values of 0 during the First and Fifth Phase Governments, respectively led by the late President Julius K. Nyerere and the late President John Pombe Magufuli, who were more in favour of non-liberal (inward looking) policies and strategies. The D_2 takes the value of 1 during the development of severe macroeconomic crisis in 1978- 1985 and the global financial crises in 2007- 2008 and 0 otherwise.

In theory, the marginal propensity to save (β_1) is positive; the marginal effect (β_2) aid (fa) and bank credit to the private sector (β_3) on domestic savings are positive;[5] and the elasticity of the real interest rate for domestic savings (β_4) is positive. Moreover, the effect of inflation (β_5) on domestic savings is negative. As regards the shift variables, the ∂ is expected to be positive mainly because of the commitment of the three government regimes to implementing the N-L policies, which favoured, among others, economic openness. In contrast, the ρ is expected to be negative, suggesting that the macroeconomic crises harmed domestic savings.

3.3 Estimation Methods

(a) Data Properties

A priori, the Augmented Dickey Fuller (ADF) method, with and without an intercept and a linear time trend, was used to establish the unit root properties of the variables, lest spurious regression results characterise the analysis. Since the ADF is known to be sensitive to structural breaks, the Philip-Perron unit root test was also used to validate the robustness of the ADF results.

(b) Cointegration Test

The Autoregressive Distributed Lag (ARDL) bounds cointegration approach was employed to investigate the existence of a long-run relationship between savings, aid, and other conditioning factors in the basic model (1). The ARDL, which is associated with Pesaran, Shin and Smith (2001), was preferred because of its major strengths: it is considered superior to Johansen and Joselius (1990) and Engle and Granger (1987) cointegration tests because it assumes all variables of the estimation model are endogenous and give unbiased long-run parameter estimates. Furthermore, even in cases of small samples, as is the case in this study, the ARDL approach yields robust and superior parameter estimates compared to other cointegration test techniques. Furthermore, the technique allows a capture of both long-run and short-run

[4] Foreign aid is defined here to include soft loans, grants, and technical assistance, also elsewhere referred to as Overseas Development Assistance (ODA).

[5] The official exchange rate, which was obtained from the publications of the Bank of Tanzania (BoT), was used to convert the ODA in USD values into Tanzanian currency, the shilling, hereafter TZS.

dynamics; and, it "has advantage of yielding consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are I(1) or I(0)" (Pesaran and Shin, 1997: 1). On only this account, the ADF technique was used to test variables for unit root, mainly to ensure they were not I(2) or a higher order.

The estimation model (1) was subjected to ARDL bounds cointegration test technique, first, by estimating an unrestricted conditional error correction model (ECM) which reads as:

$$\Delta s_t = \alpha_0 + \alpha_1 s_{t-1} + \alpha_2 fa_{t-1} + \alpha_3 g_{t-1}^{ypc} + \alpha_4 bc_{t-1} + \alpha_5 R_{t-1} + \alpha_6 \pi_{t-1} +$$

$$\sum_{i=1}^{p} \theta_i \Delta s_{t-i} + \sum_{i=0}^{p} \sigma_i \Delta fa_{t-i} + \sum_{i=0}^{p} \beta_i \Delta g^{ypc} + \sum_{i=0}^{p} \gamma_i \Delta bc_j + \sum_{i=0}^{p} \vartheta_i \Delta R_j + \sum_{i=0}^{p} \emptyset_i \Delta \pi_j +$$

$$\partial D_1 + \rho D_2 + u_t \qquad (2)$$

where Δ is a first difference operator, the θ_i, σ_i, β_i γ_i, ϑ_i, and $\emptyset_i$ are short-run impact multipliers, the $\alpha_i (i = 1,2, \dots 6)$ are long-run parameters; ∂ and ρ are parameters for structural change; p is lag length; and u_t is a well-behaved stochastic error term.

The F-test method, also known as the Wald test, was employed to test for cointegration among the variables. The null hypothesis tested is that the $\alpha_i (i = 1,2, \dots 5) = 0$ and, the alternative hypothesis is that $\alpha_i (i = 1,2, \dots 5) \neq 0$. Following Pesaran, Shin, and Smith (2001), a null hypothesis is rejected if the estimated F-statistic exceeds the upper bound critical value of (1,1). The null hypothesis is accepted if the estimated F-statistic is below the lower bound critical value, (1,0).

On the one hand, rejection of no cointegration, meaning existence of a long-run equilibrium in equation (3), provides for estimation in level of a conditional equilibrium long-run ARDL model that reads as:

$$s_t = \alpha + \sum_{i=1}^{k} \beta_i s_{t-i} + \sum_{i=0}^{p} \vartheta_i fa_{t-i} + \sum_{i=0}^{p} \beta_i g^{ypc} + \sum_{i=0}^{p} \gamma_i bc_j + \sum_{i=0}^{p} \vartheta_i R_j + \sum_{i=0}^{p} \emptyset_i \pi_j +$$

$$\partial D_1 + \rho D_2 + u_t \qquad (3)$$

On the other hand, it is likely for the F-statistics to lie between the upper and lower bound critical values such that cointegration is neither rejected nor accepted. On this account, evidence of the existence of a long-run relationship in equation (1) is conditioned on the establishment of a negative and statistically significant coefficient of the one-period lagged error term estimated in equation (4), included in the estimation of an error correction model (ECM) which reads as:

$$\Delta s_t = \emptyset + \sum_{i=1}^{k} \alpha_i \Delta s_{t-i} + \sum_{i=0}^{m} \vartheta_i \Delta fa_{t-i} + \sum_{i=0}^{p} \beta_i \Delta g^{ypc} + \sum_{i=0}^{p} \gamma_i \Delta bc_j + \sum_{i=0}^{p} \vartheta_i \Delta R_j +$$

$$\sum_{i=0}^{p} \rho_i \Delta \pi_j + \partial D_1 + \mu D_2 + \partial ec_{t-1} + \epsilon_t \qquad (4)$$

In theory, the one-period lagged coefficients of the error correction term (∂) measure the speed of adjustment from short-run disequilibrium to long-run equilibrium over the sample period. Accordingly, the ∂ should be negative and statistically significant to suggest reversion to equilibrium after a short-run shock.

3.4 Descriptive statistics and correlation analysis

A summary statistic of the variables used in the regressions is presented in Table 1. Foremost, the standard deviation of all variables is very small, actually less than unit deviation from the respective mean values. This suggests the variables were clustered around their mean values and were normally distributed.

Table 1: Descriptive Statistics

Variable	s	fa	g^{ypc}	bc	R	π
Observation	58	58	58	58	58	58
Mean	2.89	1.81	1.79	1.42	1.68	2.35
Std. Deviation	0.57	0.59	0.50	0.10	0.87	0.80
Minimum	1.53	0.41	0.02	-0.35	0.53	1.19
Maximum	3.64	2.77	2.61	2.80	3.30	3.59
Skewness	-0.76	-0.64	-1.55	-0.16	0.87	0.19
Kurtosis	2.81	3.01	5.41	1.52	2.31	1.61
Jarque-Bera	5.68	3.96	37.13	5.52	8.51	5.06
Probability	0.06	0.14	0.00	0.06	0.01	0.08

Note: All variables are in logarithms.

Source: Own computation using data extracted from WDI and BoT.

Furthermore, the correlation matrix in Table 2 suggests that savings are negatively correlated with aid, interest rates, and inflation. Additionally, domestic savings are positively correlated with the growth of GDP per capita and domestic credit to the private sector.

Table 2: Correlation Coefficients

Variable name	Acronym	s	fa	g^{ypc}	bc	R	π
Domestic savings	s	1					
Foreign aid	fa	-0.01	1				
Per capita GDP growth	g^{ypc}	0.15	-0.08	1			
Domestic Credit to the Private Sector	bc	0.65	0.16	0.40	1		
Interest rate	R	-0.37	0.40	-0.33	-0.31	1	
Inflation	π	-0.58	0.40	-0.43	-0.45	0.76	1

Source: Own computation using data extracted from WDI and BoT.

The negative correlation between domestic savings and aid is consistent with the theory that aid undermines domestic savings. The negative correlation between savings and both interest rates and inflation is consistent with the financial repression view, which posits that low and even negative real interest rates undermine savings. Notably, the correlation coefficient of saving and aid is unexpectedly negative. The correlation matrix in Table 2 suggests a lack of potential multicollinearity problems in estimating the savings function, as the correlation coefficients of the covariates are mostly below 0.8.

4.0 EMPIRICAL RESULTS

4.1 Stationarity test results

A test for the stationarity of the data series is not a mandatory requirement under the ARDL approach. Nonetheless, since the use of the ARDL is limited to variables with an order of integration less than two, that is, I(2), the Augmented Dickey-Fuller (ADF) test was used to establish that the variables in the estimation model were not I(3) or higher. To that end, the Schwarz Information Criterion (SIC) was employed to determine the optimal lag length for the ADF test.

Table 3: Augmented Dickey-Fuller Unit Root Test Results

Variables	Level		1st difference	
	Constant, no trend	Constant, trend	Constant, no trend	Constant and trend
s	-1.72	-2.62	-5.74***	-5.74***
fa	-2.90**			
g^{ypc}	-2.68*			
bc	-1.04	-2.67	-4.56***	-4.53***
R	-0.91	-1.30	-3.37**	-3.48**
π	-1.35	-1.78	-6.19***	-6.42***

Note: a) The Akaike Information Criteria (AIC) automatically determined the lag lengths.

b) The null hypothesis is that the series is non-stationary or contains a unit root. The rejection of the null hypothesis for the ADF test is based on the Mackinnon critical values *10%, **5%, and ***1% levels.

Source: Own computation using data extracted from WDI and BoT

The ADF stationarity test results presented in Table 3 show that aid and real per capita income are stationary in level, that is, are I(0). The other variables are first-difference stationary at the 1 percent level of significance. The results reveal that none of the variables in the estimation model was I(3) or more, precluding the use of the ARDL bound cointegration test.

4.2 Cointegration test results

The ARDL bounds cointegration test was used to estimate the fundamental equation (2), without the shift variables (Model 1), and thereafter estimated with the two shift variables (D_{1} and D_{2}) in turn, and respectively, in Models 2, 3, and 4. The results for Model 1,

ARDL (1,2,1,2,0,3), Model 2, ARDL (1,2,1.2,0,3,0), Model 3, ARDL (1,2,1,2,0,3,0), and Model 4, ARDL (1,2,1,2,0,3,0), suggest that the variables, with and without the shift variables, exhibit a long-run relationship.

Table 4: ARDL Bounds Test Results

Model	Estimated F-Statistic	10%		5%		1%	
		[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
Model 1	F = 11.10	2.26	3.35	2.62	3.79	3.41	4.68
	t= -7.87	-2.57	-3.86	-2.86	-4.19	-3.43	-4.79
Model 2	F= 9.64	2.12	3.23	2.45	3.61	3.15	4.43
	t= -7.88	-2.57	-4.04	-2.86	-4.38	-3.43	-4.99
Model 3	F= 9.72	2.12	3.23	2.45	3.61	3.15	4.43
	t= -7.95	2.57	-4.04	-2.86	-4.38	-3.43	-4.99
Model 4	F = 8.448	2.03	3.13	2.32	3.50	2.96	4.26
	t= -7.895	-2.57	-4.23	-2.86	-4.57	3.43	-5.19

Note: a) H0: no level relationship.

b) Test based on Pesaran /Shin/Smith (2001).

Source: Own computation using data extracted from WDI and BoT.

In particular, the estimated F-statistics for all four models are larger than the upper-hand critical value (1_1) and all are statistically significant at the 1% level of the Wald significance test. It follows that the null hypothesis of no cointegration is rejected for all four models in favour of the alternative hypothesis that the variables in model (1) exhibit a long-run equilibrium.

4.3 Long run results

Given the cointegration of the variables of the basic model (1), Table 5 presents ARDL results for the four models estimated. The long-run effect of foreign aid on domestic savings is positive and statistically significant at the 5 per cent test level or higher (Table 5). Moreover, the estimated coefficients for aid are less than one, ranging from 0.21 in Model 1 to 0.17 in Models 2 and 3 (Table 5). The estimated positive marginal effect of aid on savings supports the view maintained by Chenery and Strout (1966), more recently shared by Sachs (2005) and Hansen & Tarp (1990). However, the evidence is inconsistent with findings obtained by some studies on developing countries, among others, Arodoye et al. (2022) in a study on Nigeria, Joselius, Muller & Tarp (2014) in a study of 36 African countries, Basnet (2013) in a study covering several South Asian countries, Balde (2011) in a cross-country study of 37 SSA countries, Ahmad, Ahmed, & Qayyum (2003) in Pakistan, Arawomo, Badejo, & Oshota (2015) in WAEMU countries. and Awino & Kioko (2022) in a study on. Kenya. Furthermore, the result is also inconsistent with the adverse effect of aid on savings in Tanzania established, among others, by Mjema (1994), and Tang and Bundhoo (2017).

Table 5: Long Run Estimate Results for an ARDL Model

Variables	(1) ARDL(1,2,1,2,0,3)	(2) ARDL(1,2,1,2,0,3,0)	(3) ARDL(1,2,1,2,0,3,0)	(4) ARD(1,2,1,2,0,3,0)
ec_{t-1}	-0.89***	-0.92***	-0.915***	-0.930***
	(0.11)	(0.12)	(0.115)	(0.118)
fa	0.21***	0.17**	0.198***	0.172**
	(0.07)	(0.08)	(0.072)	(0.081)
g^{ypc}	-0.35***	-0.39***	-0.38***	-0.403***
	(0.09)	(0.10)	(0.09)	(0.095)
bc	0.34***	0.32***	0.32***	0.314***
	(0.04)	(0.04)	(0.04)	(0.045)
R	0.43***	0.42***	0.41***	0.415***
	(0.08)	(0.08)	(0.08)	(0.080)
π	-0.83***	-0.86***	-0.83***	-0.853***
	(0.11)	(0.11)	(0.11)	(0.110)
$D1$		0.10		0.074
		(0.10)		(0.105)
$D2$			-0.11	-0.087
			(0.10)	(0.105)
Observations	55	55	55	55
R-squared	0.77	0.77	0.77	0.776
Durbin-Watson d-statistic	2.33	2.35	2.43	2.431

Note: a) Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

b) All variables are in natural logarithms.

Source: Own computation based on data extracted from BoT and WDI.

The regression results for the conditioning factors reveal that the long-run effect of growth in per capita income on domestic savings is negative and statistically significant at the 1 per cent test level. Additionally, the estimated parameter for growth in per capita income is minimal, ranging from 0.35 to 0.39. According to the bank credit to the private sector, commonly used as a proxy for financial sector development, has the expected positive and statistically significant effect on domestic savings. Furthermore, the effect of interest rate on saving is positive and statistically significant at the 1% test level. The effect of inflation on domestic savings is adverse as expected and is statistically significant at the 1 per cent test level. The estimated coefficient of the inflation rate is unexplainably large (ranging from 0.83 and 0.85). Notably, the significant adverse effect of inflation on saving is similar to that observed in some previous studies, including Arodoye et al. (2022) in their study on Nigeria and Balde (2011) in their study covering several Sub-Saharan African (SSA) countries. The estimated coefficient of the dummy variable (D1) for "the openness of government regimes" is positive but statistically insignificant at the conventional test level. Moreover, the coefficient of the dummy variable (D2) for macroeconomic crises and the global financial crisis is negative as expected, but is very small and statistically insignificant. The finding suggests that the macroeconomic stabilization programmes and efforts by the Bank of Tanzania (BoT) to address the GFC served

to dampen their negative effect, among others, on domestic savings in Tanzania. The coefficients of the error correction terms in the estimated equations have the expected negative sign and are very statistically significant at the conventional test level. The estimated coefficients suggest that the adjustment of savings from the short-run disequilibrium is quite rapid: between 89% and 92% of short-run shocks would be cleared with a period of one year.

4.4 The short run estimation results

Table 6 presents the ECM results that represent the short-run and long-run dynamics between saving and aid, among others. The results show that the short-run effect of aid on domestic saving is unambiguously negative. The estimated elasticity of aid with respect to saving is less than one but larger than that estimated in the long-run saving function (Table 5). This finding suggests that aid substitutes for domestic savings in Tanzania over the short run. The finding is similar to that obtained by Ahmad, Ahmed, & Qayyum (2003) in a study on Pakistan.

The results show that the short-run effect of growth in per capita income on saving is positive as expected and is statistically significant at the 10% test level across all regimes of structural break. The results suggest every dollar of aid depresses domestic savings by about 0.50 in the short run. The negative relationship between aid cum foreign capital inflow and domestic savings in recipient countries is consistent with that established by, among others, Nafuna (2022), Basnet (2013), Serieux (2011), Ahmad, Ahmed, & Qayyum (2003), Razzaque & Ahmed (2000), Reinhart & Tavli (1998), Synder (1990), and Mosley (1980).

Furthermore, the coefficients of the contemporaneous and lagged domestic credit to the private sector for all four models are negative and statistically significant at the 1% level of significance test (Table 6). Notably, however, the one-period lagged effect of credit to the private sector on saving is about 50% smaller than its contemporaneous effect. The results in Table 6 also reveal that the effects of the contemporaneous and one-period lagged inflation rate on saving are unexpectedly positive and statistically significant at the 1% test level. Also, holding all other variables constant, all the constant terms are statistically significant at the 1% significance level (Table 6).

Table 6: The Short Run Estimated Results

Variable	Model (1) ARDL(1,2,1,2,0,3)	Model (2) ARDL(1,2,1,2,0,3,0)	Model (3) ARDL(1,2,1,2,0,3,0)	Model (4) ARD(1,2,1,2,0,3,0)
fa	-0.50***	-0.51***	-0.53***	-0.530***
	(0.10)	(0.10)	(0.11)	(0.109)
fa_{t-1}	-0.41***	-0.41***	-0.40***	-0.401***
	(0.12)	(0.12)	(0.12)	(0.125)
g^{ypc}	0.18**	0.19**	0.19**	0.200**
	(0.08)	(0.09)	(0.08)	(0.086)
bc	-0.54***	-0.56***	-0.55***	-0.559***
	(0.10)	(0.10)	(0.10)	(0.098)
bc_{t-1}	-0.24**	-0.26**	-0.26**	-0.275**
	(0.11)	(0.11)	(0.11)	(0.113)
π	0.51***	0.57***	0.56***	0.593***
	(0.14)	(0.15)	(0.14)	(0.149)

π_{t-1}	0.33***	0.37***	0.40***	0.411***
	(0.10)	(0.11)	(0.12)	(0.121)
π_{t-2}	0.28***	0.29***	0.32***	0.320***
	(0.08)	(0.08)	(0.09)	(0.090)
c	3.51***	3.77***	3.74***	3.884***
	(0.48)	(0.55)	(0.53)	(0.571)
	55	55	55	55
	0.77	0.77	0.77	0.776

Note: a) Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

b) All variables are in natural logarithms.

Source: Own computation based on data extracted from BoT and WDI.

4.5 Robustness test results

When an empirical analysis involves time-series data, the possibility of serial correlation is high—hence the importance of post-estimation tests presented in Table 7. The estimated coefficients of determination suggest the covariates of the model explain 77% of the dependent variable, that is, domestic savings. Moreover, the estimated F-statistics suggest the estimated long run models are robust (Table 7).

Table 7: Robustness Test Results

Variables	(1)	(2)	(3)
R-squared	0.77	0.77	0.77
Durbin-Watson d-statistic	2.33	2.35	2.43
Breusch-Godfrey LM test for autocorrelation	7.05	6.78	10.77*
White's test for Ho: homoskedasticity	55.00	55.00	55.00
LM test for autoregressive conditional heteroskedasticity (ARCH)	2.33	2.46	1.82
Durbin's alternative test for autocorrelation	1.99	2.21	2.49
F-statistics	11.11	9.64	9.72

Note: a) Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

The estimated Durbin-Watson (DW) statistic is approximately 2, meaning autocorrelation is absent. Furthermore, the test for homoscedasticity using White's test suggests that the data series is homoscedastic. Moreover, the LM test for autoregressive conditional heteroskedasticity (ARCH) suggests that there are no ARCH effects in the model. Besides, the Breusch-Godfrey LM and Durbin's alternative tests for autocorrelation reveal that there is no serial correlation problem in the model.

5.0 CONCLUSION

This paper has sought to examine the impact of aid on domestic savings in Tanzania from 1963 to 2023. The ARDL estimates suggest that aid has a significant and positive impact on domestic savings in Tanzania in the long run. Additionally, the results suggest that the contemporaneous and one-period-lagged effects of aid on domestic saving are adverse and statistically significant in the short run. Thus, the results suggest that aid would complement domestic savings over the long run and substitute for domestic savings over the short run. Inertia in the decrease in the adverse effect of aid on domestic saving is evidenced by the decreasing coefficients of both the contemporaneous and one-period lagged aid.

The results suggest that the government should weigh the short-term cost of aid, namely the displacement of domestic savings, against the long-term augmentation of domestic savings. The fact that the aid was used to finance fiscal budget deficits and, particularly, investment projects with low or no return over the short term, such as infrastructure, is not unfounded—it could be tolerated for a better tomorrow. Thus, the government should solicit aid to mobilize savings more effectively over the long run. Even though the government should establish the channels through which aid-financed investment would impact national income and ultimately domestic savings in Tanzania.

The results suggest that the positive long-run effect of aid would be better enhanced by government policies and strategies that favour private sector access to bank credit, high and positive nominal interest rates that can be positive in real terms, and prudent fiscal and monetary policies that guarantee macroeconomic stability, particularly low inflation. Government policies and strategies aimed at raising and sustaining economic growth would increase per capita income and domestic savings over the long run.

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