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Determinants of domestic savings in Tanzania

Empirical evidence

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Abstract: This paper examines trends and determinants of gross domestic savings in Tanzania using data for the period 1990–2020. The autoregressive distributed lag approach is employed to empirically analyse the short-run and long-run relationships. There has been a fairly stable increase in the domestic savings as a ratio of gross domestic product, though with considerable fluctuations over time. The empirical results show that in the long run, per capita income, public saving, and the ratio of broad money to gross domestic product as a proxy for financial deepening are significant determinants of private savings. On the other hand, terms of trade deter private savings. With regard to gross domestic savings, the results show that increases in per capita income, real deposit rate, and broad money positively influence savings, while inflation has a negative impact. Based on the results, we conclude that development policies geared towards increasing per capita incomes and financial deepening are fundamental in promoting domestic savings in Tanzania.

Key words: domestic savings, public saving, Tanzania

JEL classification: E21, E29, E44, G51

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1 Introduction

Resource mobilization remains a key challenge to development in Africa. Domestic savings can play a crucial role in filling the gap and promoting investment and economic growth. Hence, understanding the fundamental drivers of domestic savings is of critical importance to policy formulation and development. Tanzania is one of the few African countries that have witnessed steady and favourable growth, with the real GDP growth rate averaging over 6 per cent over the last decade. Although the national saving rate is still relatively low by global standards, the country has registered a fairly stable growth in domestic savings in recent years, compared with other countries in the region. That notwithstanding, Tanzania is historically known to have been largely dependent on foreign aid. The ratio of domestic tax revenue to GDP is still relatively low, despite the rapid economic growth rate, although there are indications of notable improvement following the recent tax reforms. These characteristics not only make Tanzania an interesting case study but also raise the question as to what are the determinants of domestic savings in Tanzania, and hence the need for and focus of this paper.

The paper examines trends and determinants of gross domestic saving in Tanzania using annual time-series data over the period 1990–2020.[1] The autoregressive distributed lag (ARDL) approach is employed to analyse the short-run and long-run relationships among variables. Data are derived from the World Development Indicators (WDI) database.

The rest of the chapter is structured as follows: Section 2 presents the policy context, while Section 3 describes the patterns and trends of domestic savings in Tanzania. Section 4 analyses the determinants of domestic savings in Tanzania, and the last section provides the conclusion and policy implications.

2 The policy context

2.1 Macroeconomic policy

The economic paradigms in Tanzania can be broadly categorized into three phases. The first phase is the pre-Arusha Declaration era, under which Tanzania inherited a market economy from the British colonialists immediately upon gaining independence in 1961. Capitalism was practised for almost six years until 1967. During the period, the country was poor and dominated by subsistence agricultural economy. The actual growth rate was limited to only 5 per cent per year in the period 1961–66. The economy relied heavily on the agricultural sector, which sustained other minor sectors to produce survival output (Ngowi 2009). This period was followed by the Arusha Declaration in 1967. This paradigm shift was characterized by *ujamaa* socialism and an ideology of self-reliance as the grand development paradigm for nearly 20 years, until 1986. Per capita incomes grew by 0.7 per cent per year, and the government had a dominant role in the economy and a monopoly on the marketing of goods and services (Levin 2001).

During the period 1970–85, the economy was characterized by extensive administrative controls, as well as severe internal and external imbalances resulting largely from inappropriate pricing

[1] The sample is restricted to this period due to data challenges regarding domestic savings in the preceding period. Additionally, it is during this period that substantive structural reforms were undertaken.

policies, deep-rooted structural problems, and expansionary fiscal policies (Nord et al. 1993). This phase was characterized by an accelerating inflation rate, declining growth performance, falling savings, decreased per capita income and consumption, and general deterioration in social and physical infrastructure. GDP growth was 3 per cent on average per year. It declined to its lowest level of below 1 per cent during 1977–84. Inflation was high, averaging over 30 per cent per year. There was a severe shortage of foreign exchange reserves and, as a result, an accumulation of external payment arrears (Mered et al. 1993; Nord et al. 1993; Nord et al. 2009).

The third phase is the liberalization era which was adopted from the mid-1980s, starting with the infamous structural adjustment programmes (SAPs) of the Bretton Woods institutions—the International Monetary Fund (IMF) and the World Bank. By then, the country was facing multiple challenges: a bloated public sector, low economic growth, and mounting debt service amid low tax revenues and export earnings (Were and Mollel 2020). In reference to the period 1986–90 after the launch of the economic recovery programme in 1986, Agrawal et al. (1993) observe that although the SAPs were accompanied by a substantial increase in foreign aid, the increased aid dependency did not lead to a deterioration in domestic savings. They argue that most of the aid was for investment rather than consumption, though there was very little return on investment.

Substantive economic liberalization reforms were undertaken in earnest from the early 1990s, transforming the economy from state control to open market economy. The period from 1996 experienced macroeconomic stabilization whereby, after several years of government dissaving, government savings turned positive (Naschold and Fozzard 2002). The regime was characterized by restructuring of the financial sector, which included the licensing of numerous foreign banks and providing credit for private investment (Mwase and Ndulu 2008; Nord et al. 2009).

Private domestic and foreign investment fuelled economic growth, which in turn boosted tax revenues. Moreover, a large increase in foreign reserves was experienced. Tanzania also received notable debt relief under the Heavily Indebted Poor Countries (HIPC) initiative and the Multilateral Debt Relief Initiative (MDRI) in 2001 and 2006 respectively, which substantially relieved the country's debt burden. The total committed debt relief from both initiatives as at the end of August 2018 was over US$6 billion (Were and Mollel 2020). However, debt relief was pegged to commitment to the reform process, which entailed implementing a raft of macroeconomic and structural reforms, including developing a poverty reduction strategy named the National Strategy for Growth and Reduction of Poverty 2006–2010 (NSGRP). Generally, the reforms resulted in a higher GDP growth rate, a lower inflation rate, an increase in international reserves, and, from a financial sector perspective, the creation of an efficient and competitive banking system, coupled with increased credit to the productive sectors of the economy.

The macroeconomic environment has generally remained stable, with steady economic growth. GDP growth averaged 6.8 per cent over the period 2002–16 (Figure 1). This placed Tanzania among the fastest-growing African economies. However, in 2020 economic activity slowed down due to the COVID-19 pandemic, leading to a slowdown in economic growth to 4.8 per cent in 2020, from 7 per cent in 2019.[2] The slowdown was mainly due to the effect of the pandemic on tourism and external demand. However, since Tanzania did not put in place COVID-19 lockdown measures, it was among the few economies that avoided a negative growth rate.

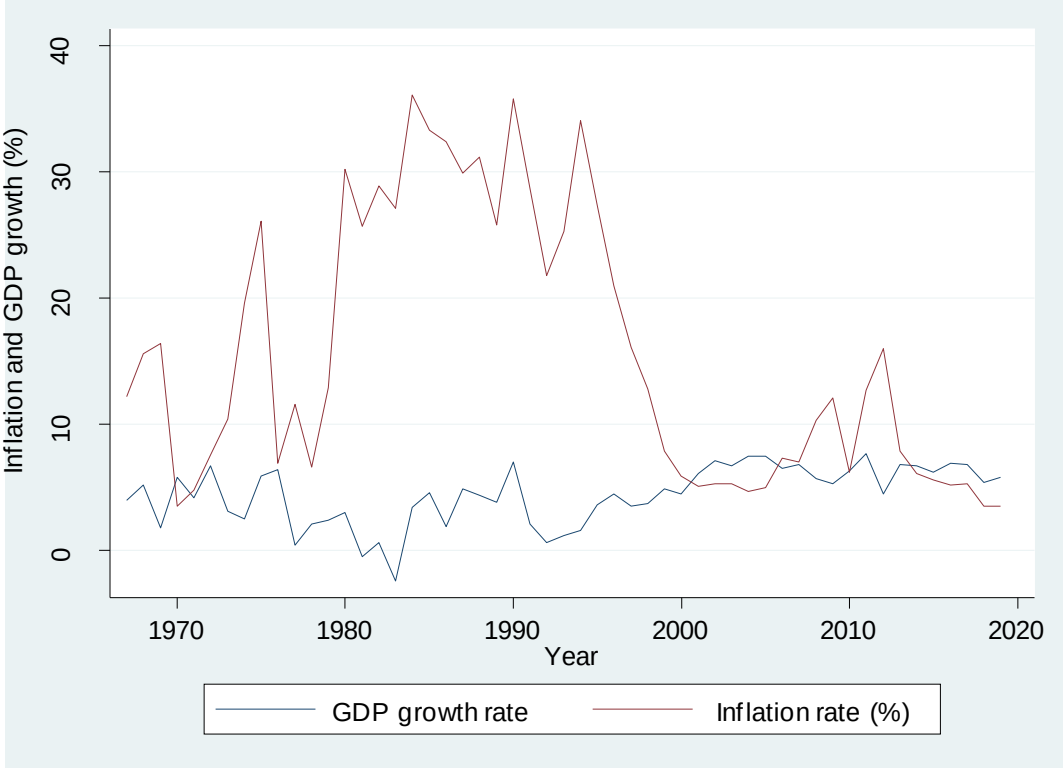
The fiscal deficit has remained relatively low, which could arguably be attributed to the fairly steady inflow of donor funding. However, the latter has been dwindling and the country is increasingly

[2] Based on data reported by Tanzania's National Bureau of Statistics. The GDP growth for 2020 based on WDI was relatively lower, at 2.1 per cent.

facing binding financing constraints, particularly in view of increased public investment demand.. The deficit increased slightly from 2.0 per cent of GDP in 2019 to 2.3 per cent in 2020. Tax revenue as a percentage of GDP averaged about 11 per cent over the period 2000–17.

Inflation remained stable over the 2001–20 period. In most cases, inflation rates remained below 10 per cent, with the exception of 2008/09 (11.2 per cent), 2011 (12.7 per cent), and 2012 (16 per cent). By the end of 2018, the inflation rate had fallen to less than 5 per cent, and it remained in single digits and below the medium-term target of 5.0 per cent in 2020 (Figure 1). It fell to 3.3 per cent in 2020 from 3.5 per cent in 2019, following a steady decline in food prices. Foreign exchange rates remained stable, partly due to the interventions of the Bank of Tanzania (BOT) to ensure stability.

Figure 1: Trend of inflation rate and GDP growth in Tanzania, 1967–2019



Source: authors' illustration based on data from Economic Surveys, various issues.

2.2 Financial sector reforms and policies

2.2.1 Overview of the financial sector in Tanzania

The financial sector is categorized under five subsectors, namely banking, capital markets, insurance, microfinance, and social security. The banking subsector dominates the financial system and plays a significant role in the economy. It accounts for about 70 per cent of the domestic financial system (BOT 2020). In 2019, banking sector total assets reached 33 trillion Tanzanian shillings (TZS); a growth of 9 per cent from TZS30 trillion in 2018. The profitability, capital adequacy, liquidity, and asset quality of the banking sector remained generally stable. In 2019/20, the branch network expanded to 960, from 878 in 2018/19.

The banking sector is governed by the Banking and Financial Institutions Act, National Payment System Act of 2015, Financial Leasing Act of 2008, Foreign Exchange Act of 1992, and BOT Act

of 2006. These Acts provide powers to BOT to supervise and regulate banking business, payment systems, and foreign exchange business. Financial service providers in the sector comprise commercial banks, community banks, deposit-taking microfinance banks, credit reference bureaus, bureaus de change, financial leasing companies, mortgage finance companies, and development finance institutions.

Bank mergers, closures, and restructuring have taken place in recent times and consequently the number of banking institutions decreased to 46 in 2020, from 51 reported in 2019. For instance, at the end of 2018, five community banks were closed due to their not having the amount of capital required by law.[3] The banking institutions comprised 35 commercial banks, four microfinance banks, five community banks, and two development banks in 2020 (Table 1).

Table 1: Number of banking, agent banking, and financial institutions, 2013–20

Categories of institution	2013	2014	2015	2016	2017	2018	2019	2020
Commercial banks	34	34	36	38	37	39	38	35
Development finance institutions	-	-	2	2	2	2	2	2
Microfinance banks	2	3	3	4	5	5	5	4
Community banks	12	12	12	12	11	6	6	5
Financial institutions	4	4	3	3	2	0	0	0
Mortgage institutions	-	-	-	-	-	2	2	2
Financial leasing companies	-	-	-	-	-	3	3	3
Credit reference bureaus	-	2	2	2	2	2	2	2
Forex bureaus de change	234	254	280	295	109	107	5	3
Agent banking	591	1,652	3,298	5,676	10,689	18,827	28,358	40,410

Source: authors' own computations based on data from BOT (2021b).

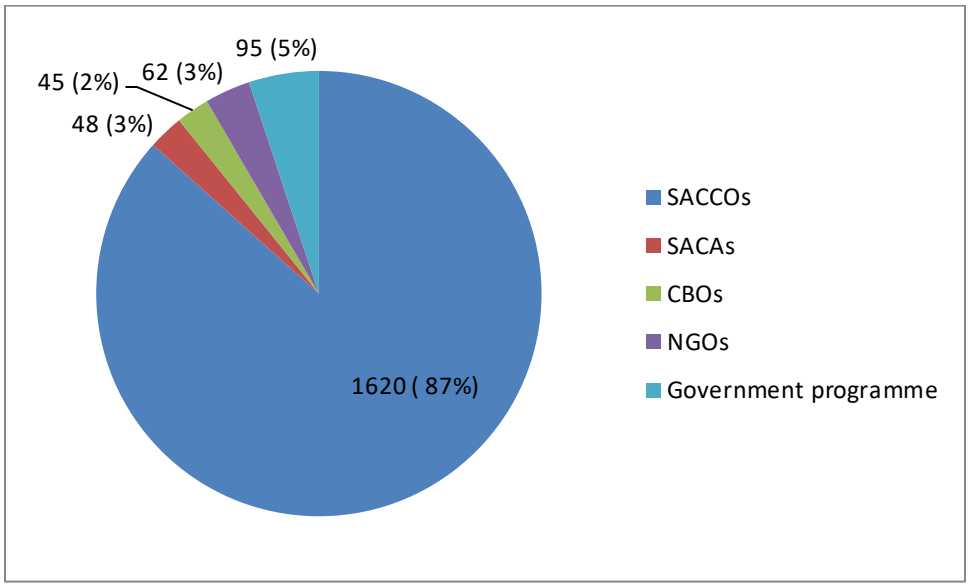
Given the potential role of microfinance in poverty reduction and promoting economic growth, BOT has played an instrumental role in the development of microfinance policy and regulations to promote a viable microfinance industry with wide outreach. The first National Microfinance Policy (NMP) was adopted in 2000. A review of the policy was undertaken in 2017, leading to the formulation of the NMP 2017 and its implementation strategy for a ten-year period, 2019/20–2029/30. The NMP 2017 is aimed at promoting financial inclusion by creating an enabling environment for an efficient and effective microfinance subsector that serves the needs of low-income individuals, households, and enterprises, thereby contributing to employment creation, poverty reduction, and economic growth.

In addition, the Microfinance Act of 2018 mandates BOT to license, supervise, and regulate microfinance businesses. Under the Act, microfinance service providers are categorized into four tiers: Tier 1 comprises deposit-taking microfinance service institutions; Tier 2 comprises non-deposit-taking microfinance service providers such as individual money lenders; Tier 3 consists of savings and credit co-operatives (SACCOs); and Tier 4 of community microfinance groups. However, in 2020, BOT continued to supervise and license microfinance service providers, while supervision of Tier 3 and Tier 4 was delegated to Tanzania Cooperative Development Commission (TCDC) and the President's Office Regional Administration and Local Government (PO-RALG).

[3] Two financial institutions, namely Twiga Bancorp and Tanzania Women's Bank Plc, were merged to form TPB Bank Plc, and one commercial bank, Bank M Tanzania Plc, was acquired by Azania Bank Limited.

respectively. Figure 2 indicates the number of microfinance service providers in 2020, with SACCOs accounting for the highest proportion.

Figure 2: Number of microfinance service providers in Tanzania, 2020



Note: SACAs = savings and credit associations; CBOs = community-based operations; NGOs = non-governmental organizations.

Source: authors' illustration based on data from BOT (2021a).

2.2.2 Financial sector reforms

Following the adoption of the *ujamaa* or African socialist model of development in 1967 in line with the Arusha Declaration, all private banks were nationalized, and the BOT was quickly subsumed as an instrument of the state-centred economic policy (BOT 2011). During the 1970s and 1980s, Tanzania's financial system was highly repressed and uncompetitive. The period was characterized by price controls (interest and exchange rates), monetary-financed government spending, closely managed credit rationing through selective and direct credit controls, and high operating costs. Commercial banking was highly concentrated in the public sector, state ownership, and restricted entry, leading to rampant inefficiency and a large number of non-performing assets (Epaphra 2014a). Credit was rationed and allocated to specific sectors at preferential interest rates. Moreover, the pursuit of multiple policy objectives and the lack of independence of the central bank curtailed the latter's ability to discharge traditional central banking functions.

By the late 1980s, the financial sector was in crisis owing to the multiple challenges, including non-performing loans, the inadequate and inefficient payment system, ineffective instruments of monetary policy, undercapitalization, an inappropriate regulatory system, and the absence of a legal framework for harmonizing the operations of financial institutions (Balele et al. 2018). To complement the economic reforms towards a market-based economy, the government set up a commission of enquiry (the Nyirabu Commission) to address the problems in the financial sector. It was on the basis of the recommendations of this commission that BOT embarked on a series of financial sector reforms, including the liberalization of the sector in the 1990s (BOT 2011). Various legislation was enacted, leading to the licensing of new banks and financial institutions and market-determined financial resource allocation.

Prior to the adoption of economic reforms in 1986, interest rates had been increased only twice, in 1979 and 1981. Following the commencement of comprehensive financial reforms in 1991, the

interest rates increased. The money markets were introduced in 1993/94, during which time the interest rates were completely liberalized. By the early 1990s, various reforms had been undertaken to open up the economy, including the lifting of price controls, the adoption of a floating exchange rate, trade liberalization, and privatization of some state-owned firms.

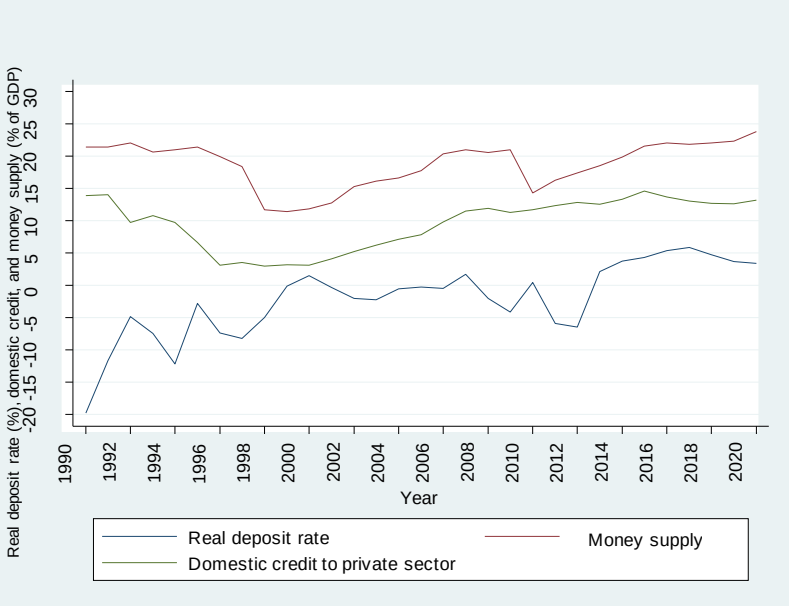
The financial reforms were implemented in two major phases: First Generation Financial Sector Reforms (FGFSR) took place between 1991 and 2003, and Second Generation Financial Sector Reforms (SGFSR) in 2003. The FGFSR targeted legal reforms with the aim of creating a competitive environment, modernizing national payment systems, and strengthening BOT's regulatory and supervisory capacity. They were also aimed at the restructuring and privatization of state-owned banks and financial institutions, and the establishment of a regulatory and supervisory framework. The SGFSR focused on the development of financial markets, strengthening the banking sector, providing long-term development finance, creating a credit registry, land reforms, strengthening micro- and rural finance, and developing a payment system infrastructure to facilitate retail payments.

Reforms in the financial sector were undertaken in tandem with promotion of financial innovations. Innovations in the banking sector include agent banking, which allows the provision of banking services by third parties to customers on behalf of a licensed banking institution. Introduced in 2013, agent banking plays an important role in fostering outreach to the unbanked, by addressing the distance barrier to banking services access combined with cost reduction. Additionally, innovations in digital finance revolutionized the delivery of and access to financial services, improved efficiency, created alternative payment instruments, lowered transaction costs, and reduced risks. Digital financial services (DFS), including credit, savings, insurance, transfers, and payments, provided through alternative delivery channels such as debit cards, e-vouchers, biometric readers, and point-of-sale devices made distribution more efficient. The adoption of DFS, particularly the introduction of mobile money services, has enabled the majority of Tanzanians to access formal financial services.

Figure 3 presents the trends of real deposit rate, extended broad money (M3), and domestic credit to the private sector over the 1990–2020 period. The real deposit rate has fluctuated over the years. There was a sharp increase in the 1990s following interest liberalization, though real deposit rates remained negative for a significant period, particularly before 2000.

Following the emergence of the COVID-19 global pandemic, the BOT undertook various liquidity-easing policy measures in 2019/20 to cushion the economy from adverse effects. For instance, the statutory minimum reserve (SMR) on private sector deposit liabilities was lowered from 8 per cent to 7 per cent, while the reserve averaging band was widened from 10 per cent to 20 per cent. Additional measures undertaken in the second half of 2019/20 included an additional cut of the SMR requirement ratio and the discount rate to 6 per cent and 5 per cent, respectively. There was also a reduction of haircuts on government securities pledged by banks for borrowing from the central bank windows. While total credit by the banking system increased modestly by 2.5 per cent in 2019/20 (compared with 17.4 per cent in 2018/19) owing to the decline in government borrowing from the banking system, the increase in credit to the private sector was fairly strong at an average of 8.1 per cent, compared with 6.8 per cent in the preceding year.

Figure 3: Real deposit rate, extended broad money (M3), and domestic credit to private sector, 1990–2020



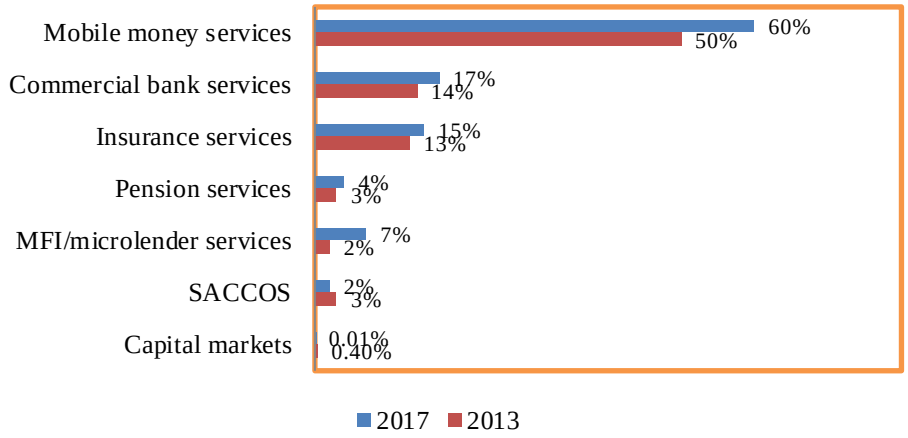
Source: authors' illustration based on WDI 2021 data.

Consistent with the accommodative monetary policy measures, there was a slight decline in deposit and lending rates, albeit at varying magnitudes across maturities. On average, the deposit rate declined from 7.58 per cent in 2018/19 to 6.98 per cent in 2019/20, while the overall lending rate averaged 16.82 per cent compared with 17.14 per cent over the same period. Following these developments, the interest rate spread between the one-year lending rate and the deposit rate narrowed to 7.62, from 9.28 percentage points in 2018/19. That notwithstanding, the relatively high interest rate spreads still remain a challenge.

2.2.3 The status of financial inclusion in Tanzania

Based on Tanzania's FinScope surveys, access to formal financial services increased from 58 per cent in 2013 to 65 per cent by 2017 (Were et al. 2021). In particular, there was an increased uptake of formal non-bank financial services, especially mobile money services, which increased from 50 per cent to 60 per cent between 2013 and 2017 (Figure 4). Consequently, the proportion of the adult population that rely on informal financial services declined from 16 per cent to 6.7 per cent over the same period. These achievements are a result of the rapid adoption and usage of development finance institutions (DFIs). A partnership between microfinance institutions (MFIs) and mobile money service providers also led an increase in the uptake of financial services via MFIs.

Figure 4: Uptake of formal financial services in Tanzania, 2013 and 2017



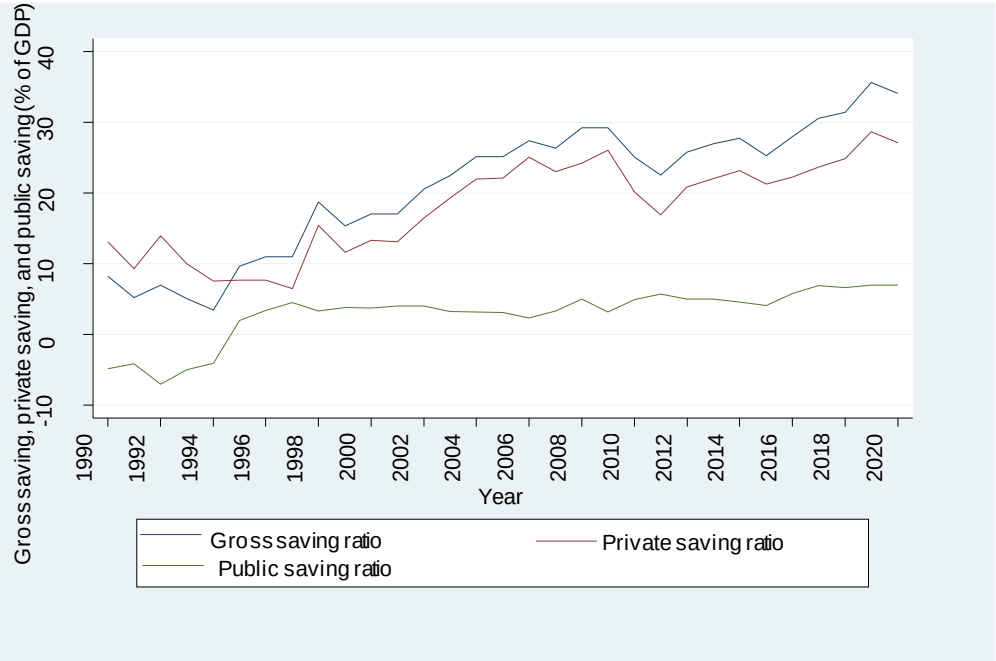
Source: authors' illustration based on FinScope Tanzania (2017).

3 Patterns and trends in domestic savings in Tanzania

Figure 5 provides trends of gross domestic and public savings in Tanzania over the period 1990–2019. Note that data for private savings as a percentage of GDP were computed as gross savings minus public savings, while public savings was obtained as government revenue minus government final consumption. There was a fairly steady increase in the domestic savings as a percentage of GDP over the reference period, albeit with considerable fluctuations over time (Figure 5). Over the 1990–94 period, gross domestic savings as a percentage of GDP was decreasing, with lowest value being 3.4 per cent in 1994. This could be due to the macroeconomic challenges and imbalances during that period, including low resource mobilization, a bloated public sector, weak competition in the financial market, and low and weak efficiency in credit allocation (Bigsten and Danielsson 1999; Kilindo 2001). However, the domestic savings ratio increased thereafter, from 9.6 per cent in 1995 to 29.2 per cent in 2009 following the various reforms including liberalization of interest rates. Though the gross domestic saving dropped to 22.5 per cent in 2011, it increased throughout the 2012–19 period and was 34.1 per cent in 2020.

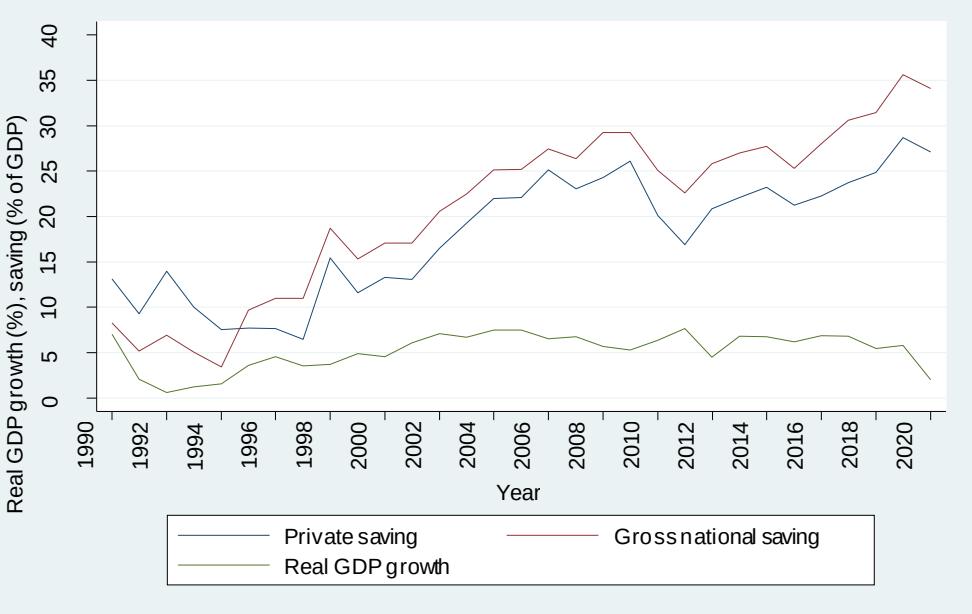
The increase in gross domestic savings ratio in the post-liberalization period could be attributable to Tanzania's stable macroeconomic environment and steady economic growth. Figure 6 shows trends of the domestic savings ratio and economic growth. It can be observed that periods of low saving ratios are associated with low economic growth and vice versa. The argument in the literature supports a positive relationship between domestic savings and economic growth. An increase in savings stimulates economic growth, which in turn stimulates the growth of domestic savings (Alguacil et al. 2004; Singh 2010). Financial sector developments including the liberalization of interest rates and financial innovations aimed at increasing access to financial services are also envisaged to have played a role in promoting savings in Tanzania.

Figure 5: Trends of domestic savings in Tanzania, 1990–2020



Source: authors' illustration based on WDI data (2021).

Figure 6: Trends of real GDP growth and domestic savings in Tanzania, 1990–2020



Source: authors' illustration based on WDI data (2021).

4 Determinants of domestic savings

4.1 Conceptual framework

The lifecycle hypothesis (LCH) developed by Ando and Modigliani (1963) provides the basic conceptual framework. LCH assumes that the prime motive for saving is accumulation for retirement. Since income tends to fluctuate over the course of one's life, the saving behaviour depends on a person's stage in the lifecycle. The model assumes that individuals smooth consumption over their lifetime, and hence, they are net savers during working years and dissavers during retirement (Modigliani 1986). In their late years, individuals spend out of the previously accumulated savings as income decreases (Ando and Modigliani 1963; Nagawa et al. 2020).

Based on the above, the LCH models the consumption/saving behaviour of a representative agent whose aim is to maximize the present value of lifetime utility subject to a budget constraint, where the latter is the current net worth plus the present value of expected labour income. Assuming perfect capital markets and perfect foresight about the income-generating process, the model predicts that consumption in a given period depends on expected lifetime income, as opposed to current income as postulated by the Keynesian model. Consequently, LCH predicts that saving is positively related to income growth, since a higher rate of income growth implies an increase in the income of active workers, which in turn expands their permanent income (Athukorala and Sen 2004).

Extending the model to the national level implies that the key determinants of the saving rate over time in a given country or across countries are the age structure of the population and the rate of growth of per capita income. An increase in the latter leads to a rise in the lifetime resources (and savings) of the younger working population relative to older age groups, which in turn increases the aggregate saving rate. Under the assumption of 'balanced population growth', a rise in the population growth rate brought about by an increase in age-specific fertility rates increases the number of savers relative to dissavers (Modigliani 1986). Therefore, assuming the saving profile of individual households in two given economies is the same, the economy with the faster population growth is bound to have a higher aggregate saving rate. The question is, does the balanced population growth assumption hold in reality, especially in the context of developing economies? Besides increasing the number of economically active individuals relative to the retired, a rise in population growth rate may lead to an increase in the proportion of the younger population. Given that both the young and the elderly consume more than they can earn, the net effect of population growth on aggregate saving is theoretically ambiguous (Athukorala and Sen 2004). For developing economies with relatively high dependency ratios, the net effect is likely to be negative.

The net impact of an interest rate increase in the LCH model is also ambiguous. On one hand, a higher interest rate increases the current price of consumption relative to the future price (the substitution effect) and therefore provides an incentive to increase savings. However, for net lenders, a higher interest rate also increases lifetime income, which leads to an increase in consumption and a decrease in savings (the income effect). Therefore, the net effect of an interest rate increase on savings is positive only if the substitution effect outweighs the income effect. Arguably, for a typical developing economy with underdeveloped money markets, the substitution effect is stronger (McKinnon 1973; Shaw 1973). In most developing countries, a relatively high proportion of household savings tend to be in the form of cash balances and quasi-monetary assets (mainly bank deposits).

4.1.1 Extensions and modifications

Athukorala and Sen (2004) provide a succinct description of extensions and modifications to the empirical application of the basic LCH based on the following arguments. The first concern is the absence of a link between current savings and current income. The premise that the saving rate is related to the growth of per capita income as opposed to per capita income is underpinned by the assumption that individuals are forward-looking and have a perfect foresight of lifetime income. However, the validity of this premise is highly questionable for low-income countries such as Tanzania.

The second addition relates to the role of key variables or indicators of macroeconomic stability such as inflation. In the basic LCH model, the impact of inflation on savings is captured only implicitly in determining the real interest rate. The model implicitly assumes inflation neutrality (the absence of money illusion) in saving behaviour and the absence of the real balance effect of inflation. However, inflation could influence saving via its impact on real wealth (Nwachukwu and Egwaikhide 2007). To maintain a target level of wealth or liquid assets relative to income, savings have to rise with inflation. Additionally, high inflation can lead to higher savings for precautionary purposes, since it is associated with uncertainty in future income streams (Aberu et al. 2010). This is likely true for households in developing countries, where income prospects are relatively more uncertain than in developed countries (Deaton 1989; Kimball 1990). However, high inflation rates can also deter saving.

The third argument relates to the impact of changes in the external terms of trade (TOT). The Harberger–Laursen–Metzler hypothesis suggests that a deterioration in TOT (a reduction in the price of domestically produced goods relative to that of imported goods) reduces real income and hence savings. Athukorala and Sen (2004) note that when the forward-looking behaviour of private agents who are faced with volatile and unpredictable changes in income is assumed, TOT changes could impact savings through consumption smoothing, over and above the impact operating via the growth or the level of real income. The effect on private savings depends on whether changes in TOT are perceived to be temporary or permanent (Obstfeld 1982). If the deterioration in TOT is perceived to be temporary, it may lead to increased absorption as consumers try to offset the decline in purchasing power of domestic goods so as to keep real expenditure constant. On the other hand, a TOT deterioration that is perceived to be permanent could induce an increase in savings so as to sustain real standards of living in the future.

The fourth consideration is related to the role of financial depth. The range and availability of different financial assets, as well as the improvement in accessibility of banking facilities and other financial services, is likely to motivate individuals to save. Financial depth is often measured by the degree of monetization of the economy as proxied by the ratio of broad money (M3) to GDP (Ozcan et al. 2003). However, credit to the private sector as a ratio of GDP is also used as a proxy for financial development. Evidence in developing countries generally shows that financial depth has a positive impact on saving mobilization.

Fifth is the role of fiscal policy in promoting the national saving rate (Loayza et al. 2000). While the government can choose the level of its own savings directly, a change in this variable need not imply a one-for-one change in household or national saving. This is because private agents may respond in such a way as to offset the government action, at least to some extent. Based on the Ricardian equivalence proposition of Barro (1974), the issuance of bonds to finance government dissaving results in an equal increase in private savings. This is because individuals save in anticipation of a future increase in taxes to service and repay the debt. However, the proposition is premised on the assumption of perfect capital markets and the absence of uncertainty impacting on saving behaviour. If either or both of these assumptions do not hold, then private and public

savings may not be perfect substitutes. Elbadawi and Mwega (1998) note that the impact of public savings on private savings depends on the assumption made—public savings may have some impact (Keynesian assumption) or it may be fully crowded out (Ricardo equivalence). The Keynesian model predicts that public savings may increase private saving when resources are assumed to be idle. Thus, the net impact can be negative or positive.

4.2 Empirical specification

Based on the above conceptual framework, the saving function to be empirically estimated is specified in two ways as follows: first, by using private savings (SPV) as the dependent variable:

$$SPV = f(GY, ADR1, ADR2, RID, W, LY, INF, SPB, TOT, FIN) \quad (1)$$

and second, by using gross national savings ($SNAT$) as the dependent variable expressed as a function of the following:

$$SNAT = f(GY, ADR1, ADR2, RID, W, LY, INF, TOT, FIN) \quad (2)$$

where SPV and $SNAT$ are the private and gross national savings expressed as a percentage of GDP. SPB is the public saving ratio. GY and LY are GDP growth rate and log of per capita income, W is broad money supply (M3)/GDP as a measure of financial deepening, RID is the real interest rate (bank deposit rate minus inflation), $ADR1$ is the old age dependency ratio measured as the ratio of older dependents (people older than 64) to the working-age population, while $ADR2$ is the young age dependency ratio measured as the ratio of younger dependents (people younger than 15) to the working-age population ($ADR1$ and $ADR2$ are depicted as a proportion of dependents per 100 working-age population). INF is the inflation rate, TOT is the terms of trade, and FIN is a measure of financial development (domestic credit to private sector). TOT is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000.

4.3 Estimation strategy and data

The estimation methodology employed is the ARDL approach, following Pesaran and Shin (1999) and Pesaran et al. (2001). ARDL is appealing since the method allows for a mixture of variables with different levels of integration—both I(0) and I(1) variables. For example, the growth rate of per capita income is typically stationary while its level tends to be non-stationary (first-differenced stationary). Additionally, ARDL can be utilized to estimate both the long-run and short-run dynamics of the model simultaneously. Finally, an ARDL model is more efficient for samples with small to moderate time-series properties.

The generalized ARDL (p,) model with k explanatory variables is specified as follows:

$$SPV_t = \gamma_0 + \beta_1 SPV_{t-1} + \cdots + \beta_p SPV_{t-p} + \alpha_0 X_t + \alpha_1 X_{t-1} + \cdots + \alpha_q X_{t-q} + \mu_t \quad (3)$$

Where SPV_t stands for private savings as a percentage of GDP, X_t is a $(k \times 1)$ matrix of independent variables (see Equation 1 above), γ is the constant term, and μ_t is the error term with standard $i.i.d$ properties. The dependent variable in Equation 3 is explained by lags of itself, as well as current and lagged values of the independent variables. The number of lags of the dependent variable (the autoregressive component) is included up to lag order p, while the number of lags of independent variables is included up to order q. Compressing Equation 3 yields:

$$SPV_t = \gamma_0 + \sum_{i=1}^{p} \beta_i SPV_{t-i} + \sum_{i=0}^{q} \alpha'_i X_{t-i} + \mu_t \quad (4)$$

where β and α are coefficients to be estimated. ARDL allows for the possibility of distinguishing between long-run and short-run effects through an unrestricted error correction model (ECM) of the form:

$$\Delta SPV_t = \gamma_0 + \sum_{i=1}^{p} \delta_i \Delta SPV_{t-i} + \sum_{i=0}^{q} \delta_i \Delta X_{t-i} + \lambda(Y_t - \theta X_t) + \mu_t \quad (5)$$

where λ=$(1-\sum_{i=1}^{p} \delta_i)$ is the speed of adjustment to equilibrium, the expression in brackets is the long-run relationship between variables, and $\theta = \frac{1-\sum_{i=0}^{q} \pi_i}{1-\sum_{i=1}^{p} \delta_i}$ is the long-run parameter. If $\lambda = 0$ then there is evidence of a long-run relationship between private savings and its determinants. The parameter is expected to be significantly negative under the prior assumption that following a deviation, the variables return to their long-run equilibrium (cointegration).

The equations are estimated using time-series data covering the period 1990–2020. Data were sourced from the WDI database, complemented with national data sources, namely the BOT and the National Bureau of Statistics (NBS).

4.4 Empirical results

4.4.1 Descriptive and correlation analysis

Summary statistics and correlation matrix are presented in Appendix Tables A1 and A2. The relatively small standard deviations depict minimal variations of variables from their mean values. The Jarque–Bera statistic rejects the null hypothesis of normal distribution for some variables, namely, the real deposit rate and public savings. The statistic for kurtosis shows that inflation and population growth rates are normally distributed. The correlation matrix suggests that the domestic savings variable is highly and positively correlated with public savings, per capita income, TOT, real deposit rate, and real GDP growth, and negatively correlated with inflation rate and the old age and young age dependency ratios (Table A2). The correlation matrix also shows that pair-wise correlations between some explanatory variables are quite high, indicating a high likelihood of multicollinearity. In particular, the age dependency variables were found to be highly correlated with nearly all the variables and were dropped from the final estimated equations. The reported empirical results are based on different variants of the specified model, obtained by including related or highly correlated explanatory variables separately.

To satisfy the bounds test assumption so that the ARDL model provides consistent and valid standard errors for inference, the variables are supposed to be integrated of the order zero I(0) or one I(1). Augmented Dickey–Fuller (ADF) was used to test for stationarity. The following variables were found to be I(1): private savings, public savings, gross savings, inflation rate, log per capita income, broad money, TOT, old age dependency ratio, young age dependency ratio, and domestic credit to private sector. The real deposit rate was found to be I(0).

The selection of appropriate lag length for the variables in the ARDL model is important in ensuring standard normal error terms that do not suffer from autocorrelation and heteroskedasticity (Nkoro and Uko 2016). The Schwarz Bayesian Information Criterion (SBIC) was used to determine optimal lag length for the respective variables. The SBIC model is more parsimonious and hence, saves degrees of freedom particularly in studies with small sample sizes (Pesaran and Smith 1998).

4.4.2 Long-run and short-run analysis

Prior to long-run and short-run analysis, a cointegration test based on the ARDL bounds test approach was conducted. The results are summarized in Appendix Table A3. The results for all of the four models with private savings as the dependent variable show that the calculated F-statistics are greater than the upper bound value at the 1 per cent level of significance. With regard to gross savings as the dependent variable, the calculated F-statistics are greater than the upper bound value at the 5 per cent and 10 per cent levels of significance for the respective models. Hence, the existence of long-run relationships is confirmed.

The results of the long-run analyses for the private savings and gross savings equations are reported in Tables 2 and 3, respectively.[4] The basic diagnostic test statistics are reported in both tables. The Durbin–Watson (DW) and Breusch–Godfrey Lagrange multiplier (LM) test statistics suggest absence of autocorrelation and serial correlation, respectively. Furthermore, the test for homoskedasticity using White's test indicates that the data series is homoscedastic. Structural stability tests of the long-run parameters were also performed using the CUSUM (cumulative sum chart) and CUSUMSQ (cumulative sum chart squared) tests to check the stability of the results. The plots of both the CUSUM and the CUSUMSQ are within the boundaries of the 5 per cent significance level, which confirms model stability (See Appendix Figure A2).

Table 2 shows that in the long run, per capita income, public savings, broad money (M3), TOT, and domestic credit to the private sector are robust determinants of private domestic savings in Tanzania. The results are consistent with the positive relationship between the respective variables and private savings as depicted by the scatterplots (Appendix Figure A1). The coefficient for per capita income is positive and statistically significant, which suggests that the Keynesian 'absolute income hypothesis' holds for saving behaviour in Tanzania. Moreover, in terms of the magnitude the variable has the biggest impact—a 1 per cent increase in per capita income leads to about a 9.5 per cent increase in the private saving rate (Table 2). The results corroborate similar findings by Athukorala and Sen (2004) for India and Larbi (2013) for Ghana, which indicate that savings rise with the level of income. Per capita income seems to play a more prominent role in developing economies like Tanzania, consistent with the Keynesian income hypothesis, compared with the rate of growth of income. Moreover, LCH assumes the perfect foresight of the economic agent's income-generating process—an assumption which may not hold in such economies. Grigoli et al. (2018) find that while private saving rates in advanced economies are relatively more responsive to income growth, the response of private savings to income growth in low-income developing countries is lower. The results are consistent with Tanzania's steady economic growth over the last two decades or so, following the extensive reforms undertaken in the early 1990s, supported by a stable macroeconomic environment and access to external aid inflows. Notwithstanding the population expansion, GDP per capita increased steadily from about US$174 in 1990 to $1,076.50 in 2020, ultimately enabling Tanzania's recent transition from low-income to lower-middle-income country status in 2020.

The coefficient of the public savings ratio is positive and statistically significant. Since public saving is highly correlated with per capita income, the two variables were included in the model separately. A 1 per cent increase in public savings leads to a 2.3 per cent increase in private savings. This finding suggests that public savings crowd in or complement rather than crowd out private savings. This could be attributed to the relatively low fiscal deficits witnessed in Tanzania, particularly following the fiscal reforms, and donor funding support, including debt relief, which provided the

[4] The error correction terms were found to be negative and statistically significant.

fiscal space to boost public investments and growth. However, the finding is in contrast with those of other studies, such as Athukorala and Sen (2004), Arok (2014), and Shawa (2016).

Table 2: Results of long-run analysis for private saving

Variables	(1)	(2)	(3)	(4)
LSPV	−1.080***	−0.990***	−1.074***	−0.905***
	(0.228)	(0.228)	(0.203)	(0.165)
SPB		0.566		2.300**
		(0.628)		(0.722)
LY	9.566**	9.318**	10.202***	
	(3.316)	(3.656)	(3.193)	
RID	0.372	0.493	0.234	1.056*
	(0.466)	(0.454)	(0.331)	(0.478)
W	0.723**	0.832***	0.814***	
	(0.292)	(0.217)	(0.190)	
TOT	−0.146**	−0.178**	−0.149**	−0.316***
	(0.054)	(0.066)	(0.053)	(0.066)
GY	−0.029 (0.472) −0.472			
INF	−0.132	0.017	-0.186	0.131
	(0.294)	(0.291)	(0.204)	(0.367)
FIN				1.807***
				(0.331)
R-squared	0.942	0.943	0.931	0.927
Durbin–Watson statistic	2.46	2.45	2.27	2.71
Breusch–Godfrey LM	2.37	3.32*	1.49	2.41
Breusch–Pagan/Cook–Weisberg test	0.3	0	0	1.29
Observations	27	27	27	27

Note: SPB is public saving, LSPV is the lagged private saving ratio, LY is log of per capita income, RID is real deposit rate, INF is inflation rate, FIN is domestic credit to private sector, TOT is terms of trade, GY is real GDP growth, and W is extended broad money(M3); standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: authors' own computations based on data from WDI.

Two measures of financial deepening were used interchangeably, namely broad money supply (M3) and domestic credit to the private sector as ratios of GDP. Both have a positive and statistically significant impact as expected; that is, financial deepening promotes private savings in the long run, since financial products such as mobile money and other modalities of saving are readily available. The results suggest that financial deepening has played a role in stimulating domestic resource mobilization in Tanzania. This could be attributed to the various financial reforms, including FGFSR and SGFSR, as well as the promotion of innovations such as agent banking and DFS, leading to increased delivery of financial services and outreach to previously excluded

segments of the population. Moreover, the growth of the economy has taken place in tandem with the growth in credit to the private sector. Additionally, the BOT has played an instrumental role in fostering the growth of the financial sector, improving access to financial services, and injecting liquidity into the economy through the various policy instruments as deemed appropriate with a view to supporting economic activities. Taken together, these measures appear to have boosted private savings. The results are consistent with the findings of Larbi (2013) in the case of Ghana, Pantaleo and Karamagi (2013) in Tanzania, and Shawa (2016) in SSA countries. As long argued by Mwega (1997), the positive effect of financial deepening on private savings suggests the significant potential benefits of reforms geared towards deepening the financial system.

The earlier Keynesian models predicted that an adverse shift in TOT would generate a decline in savings. In line with this prediction, the study finds negative effect of TOT on private savings. Athukorala and Sen (2004) reported similar findings for India. On the other hand, the impact of real rate of return on bank deposits is positive but not statistically significant when included with per capita income in the same model, which is not very surprising given the relatively high correlation between the two variables.

The short-run empirical results show that public savings and real deposit interest rate impacts private savings negatively in the short run, while TOT and inflation rate have a positive effect (see Appendix Table A4).

The long-run results for the gross savings equation are reported in Table 3. Gross domestic saving is positively determined by per capita income, real deposit rate, broad money (M3), and economic growth, and negatively impacted by inflation. Similar to the results obtained for private savings, income per capita has a statistically significant and substantive impact on gross domestic saving in Tanzania, consistent with the favourable economic performance witnessed. Similarly, Epaphra (2014b) finds that national savings in Tanzania are positively influenced by disposable income and real GDP growth rate. Arok (2014) and Keino and Kariuki (2016) report similar findings for Kenya and Uganda, respectively.

As regards the financial sector variables, real deposit rate, and broad money aggregate M3 as a ratio of GDP are significant determinants of gross private savings. The latter suggests that the availability and accessibility of a variety of financial assets acts as a motivation for saving. Girma (2017) and Nagawa et al. (2020) also find a positive effect of broad money on gross domestic savings for Ethiopia and Uganda, respectively. The positive impact of the real deposit interest rate contrasts with the general observation that in most low-income countries, savings do not respond to the real deposit rate (Grigoli et al. 2018). It is, however, consistent with the McKinnon-Shaw proposition that in economies where saving is largely in the form of money and near-money assets, the incentive effect of high real interest rates on savings (income effect) generally outweighs the substitution effect, i.e. the substitution of financial assets with other assets in response to changes in the interest rate. This implies that for economies characterized by financial repression, liberalization of interest rates can be expected to increase savings. This appears to be the case in Tanzania, following the liberalization of interest rates in the early 1990s. That notwithstanding, the liberalization period was characterized by high interest rate spreads (low deposit rates vis-à-viz high lending rates) compared with the period before, which according to Epaphra (2014a), is attributable to lack of competition and inefficiency in the financial system. Thus, policies aimed at increasing the deposit rate, besides effectively lowering the interest rate differential and enhancing financial intermediation, have the potential to promote domestic savings. It is sometimes argued that since most people in low-income and developing economies like Tanzania are net borrowers, increases in real deposit rates could increase the cost of borrowing, which may negatively affect access to credit. But this need not be necessarily the case if the financial system works efficiently,

since a rise in the rate of return on deposits provides an incentive to mobilize more savings, thus increasing the stock of funds.

The results further show that in the long run, high inflation discourages domestic savings. High inflation increases the opportunity cost of holding money or liquid assets in comparison with spending and thus, negatively affects gross savings. Generally, the inflation rate has remained in a single-digit range, at an average rate of about 4.4 per cent over the past decade. This seems to have promoted savings in the economy.

Table 3: Long-run results for gross saving (SNAT)

VARIABLES	(1)	(2)	(3)
L.SNAT	−0.764***	−0.651**	−0.499***
	(0.199)	(0.241)	(0.11)
LY	5.415***	12.814**	
	(1.735)	(5.468)	
W	0.704**		0.313
	(0.242)		(0.287)
TOT		−0.184	
		(0.118)	
GY	0.158		1.568*
	(0.548)		(0.767)
INF	−0.561**		
	(0.227)		
RID	−0.024	1.033**	1.065***
	(0.425)	(0.37)	(0.311)
FIN		0.574	
		(0.424)	
R-squared	0.794	0.817	0.607
Durbin–Watson d-statistic	2.65	2.50	2.65
Breusch–Godfrey LM test	10.9***	4.12***	6.72***
Breusch–Pagan/Cook–Weisberg test	0.69	0.61	0.6
Observations	28	28	28

Note: SNAT is gross saving ratio, L.SNAT is lagged gross saving ratio, LY is log of per capita income, RID is real deposit rate, INF is inflation rate, FIN is domestic credit to private sector, TOT is terms of trade; GY is real GDP growth, and W is extended broad money (M3); standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: authors' own computations based on data from WDI.

In the short run, with the exception of real deposit interest rate and real GDP growth rate, which have a negative short-run effect on gross national savings, the short-run impact of the other variables is not statistically significant (see Appendix 5). The negative short-run impact of the real deposit rate could be a reflection of the high interest rate spreads as depicted by the relatively low deposit rates that change minimally in the short run.

5 Conclusion and policy implications

This paper analyses the determinants of domestic savings in Tanzania using the ARDL approach to examine the long-run and short-run relationships. The analysis is conducted separately for private and gross domestic savings. The results show that in long run, per capita income, public savings, credit to the private sector, and broad money (M3) as a proxy for financial deepening are positive determinants of private domestic savings, while the impact of TOT on private savings is negative. The results for overall gross domestic savings are largely in line with those reported for private savings—income per capita, economic growth, and aggregate money supply have statistically significant positive impact on overall gross domestic savings. Additionally, an increase in the real rate of return on deposits promotes gross domestic savings, while inflation deters savings in the long run. The results suggest that public saving has a complementary effect on private savings, which arguably underscores the role of fiscal policy in promoting domestic savings. However, the short-run impact on private domestic savings of an increase in public savings is negative. Similarly, the impact of real deposit rate on both private and gross domestic savings in the short run was found to be negative. The latter is arguably a reflection of the interest rate structure, which is characterized by relatively higher lending rates and low deposit rates that change minimally in the short run, leading to high interest rate spreads.

The strong evidence regarding the positive impact of per capita income on domestic savings is consistent with the fairly robust economic performance of Tanzania witnessed particularly in the past decade or so. The findings are largely in line with the positive role of income in boosting savings, consistent with Keynes's absolute income hypothesis, especially in the context of low-income and developing economies. Tanzania's favourable economic outcomes can be attributed to various factors, including access to foreign aid that largely provided the needed fiscal space to enhance public investment, as well as the stable macroeconomic environment following the various reforms undertaken in the early 1990s. These developments appear to have played a critical role in promoting economic growth as well as domestic savings. In addition, the financial reforms, including liberalization of the sector, coupled with financial innovations leading to improved access to financial services seem to have enhanced financial deepening, thereby ultimately boosting domestic savings.

The results suggest that pursuing growth-enhancing policies and development strategies geared towards increasing incomes is likely to enhance domestic savings in Tanzania. Additionally, measures aimed at enhancing financial deepening and financial sector development are also bound to boost the mobilization of domestic savings. Such polices could include expansion of access to financial services to rural areas and measures to enhance financial intermediation, such as reducing market fragmentation and interest rate spreads, as well as the adoption of technology to improve the efficiency of the financial sector. Furthermore, a stable macroeconomic environment, including price stability, is equally crucial for promoting savings and the growth of the economy. Measures to reduce the adverse effects of TOT on domestic savings could also be helpful. These could include expanding exports through increased value addition to improve TOT.

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Appendices

Table A1: Descriptive statistics

Variable	Mean	Std dev.	Min	Max	Skewness	Kurtosis	Jarque–Bera
Gross saving	20.89	9.3	3.42	35.62	−0.465	2.014	2.373 (0.305)
Private saving	18.02	6.61	6.49	28.69	−0.301	1.814	2.288 (0.319)
Public saving	2.87	3.78	−7.04	6.95	−1.42	3.907	11.48 (0.003)
Real deposit rate	−2.18	5.85	−19.83	5.87	−0.965	3.951	5.984 (0.050)
Inflation	12.07	9.56	3.29	35.83	1.194	3.186	7.406 (0.025)
Credit to private sector	9.62	3.94	2.94	14.61	−0.564	1.82	3.442 (0.179)
Terms of trade	122.83	26.3	95.28	169.22	0.529	1.604	3.965 (0.138)
GDP growth	5.21	2.03	0.58	7.67	−0.842	2.58	3.891 (0.143)
Old age dependency ratio	4.89	0.11	4.713	5.09	0.243	1.873	1.948 (0.377)
Young age dependency ratio	85.4	1.76	80.953	88.541	−0.217	3.435	0.490 (0.783)
Broad money (M3)	18.8	3.54	11.4	23.84	−0.817	2.495	3.786 (0.151)
Log per capita income	6.17	0.66	5.06	6.99	−0.372	1.828	2.491 (0.288)

Source: authors' own computations based on data from WDI.

Table A2: Correlation matrix

	SNAT	SPV	SPB	RID	INF	FIN	TOT	GY	W	LY	ODA	ADR1	ADR2
SNAT	1												
SPV	0.94	1											
SPB	0.81	0.57	1										
RID	0.76	0.66	0.72	1									
INF	−0.83	−0.71	−0.80	−0.88	1								
FIN	0.37	0.53	−0.01	0.12	0.03	1							
TOT	0.70	0.67	0.55	0.52	−0.41	0.75	1						
GY	0.59	0.51	0.56	0.37	−0.56	0.11	0.27	1					
W	0.12	0.27	−0.18	0.00	0.26	0.69	0.41	−0.22	1				
LY	0.95	0.86	0.83	0.76	−0.80	0.45	0.82	0.55	0.06	1			
ADR1	−0.81	−0.75	−0.69	−0.58	0.69	−0.34	−0.56	−0.67	0.09	−0.82	0.70	1	
ADR2	−0.89	−0.76	−0.85	−0.80	0.84	−0.18	−0.65	−0.40	−0.05	−0.85	0.87	0.58	1

Note: SNAT is gross saving, SPV is private saving, SPB is public saving, LY is log of per capita income, RID is real deposit rate, INF is inflation rate, FIN is domestic credit to private sector, TOT is terms of trade, GY is real GDP growth, ODA is foreign aid, ADR1 is old dependency ratio, ADR2 is young dependency ratio, and W is extended broad money (M3).

Source: authors' own computations based on data from WDI.

Table A3: Bounds test for cointegration analysis

	Private saving					Gross saving			
	F-statistic	Critical value	1%	5%	10%	F-statistic	1%	5%	10%
1	11.01	Lower bound value	3.41	2.62	2.26	3.91	3.74	2.86	2.45
		Upper bound value	4.68	3.79	3.35		5.06	4.06	3.52
2	9.06	Lower bound value	3.15	2.45	2.12	5.145	4.29	3.23	2.72
		Upper bound value	4.43	3.61	3.23		5.61	4.35	3.77
3	5.558	Lower bound value	3.15	2.45	2.12	3.75	3.74	2.86	2.45
		Upper bound Value	4.43	3.61	3.23		5.06	4.01	3.52
4	7.516	Lower bound value	3.41	2.62	2.26				
		Upper bound value	4.68	3.79	3.35				

Note: H0 = no long-run relationship, H1 = there is a long-run relationship; H0 is rejected if F > critical value for I(1) regressors.

Source: authors' own computations based on data from WDI.

Table A4: Short-run analysis (private savings)

	(1)	(2)	(3)	(4)
D.SPB		−0.618		−2.022***
		(0.491)		(0.486)
D.LY	−2.370	−4.023	−3.736	
	(10.72)	(11.23)	(10.10)	
D.RID	0.206	0.280	0.263	0.157
	(0.413)	(0.372)	(0.323)	(0.291)
LD.RID	−0.354	−0.336	−0.340*	−0.497***
	(0.213)	(0.185)	(0.171)	(0.135)
L2D.RID	−0.588***	−0.531***	−0.506***	−0.580**
	(0.156)	(0.146)	(0.132)	(0.182)
D.W	−0.388	−0.480	−0.517	
	(0.429)	(0.437)	(0.389)	
D.TOT	0.189**	0.162**	0.150**	0.184**
	(0.072)	(0.067)	(0.062)	(0.074)
LD.TOT	−0.061	−0.040	−0.076	−0.010
	(0.089)	(0.089)	(0.082)	(0.087)
L2D.TOT	0.034	0.015	0.035	−0.095
	(0.078)	(0.067)	(0.058)	(0.066)
L3D.TOT	0.113	0.099	0.091	0.068
	(0.067)	(0.073)	(0.061)	(0.073)
D.GY	−0.334			
	(0.503)			
D.INF	0.731**	0.821**	0.778***	0.910**
	(0.273)	(0.314)	(0.217)	(0.288)
D.FIN				−1.357
				(0.763)
LD.FIN				−0.721
				(0.606)
Constant	−36.85	−33.49	−41.87*	31.14***
	(20.854)	(21.612)	(19.994)	(6.236)
R-squared	0.942	0.943	0.931	0.927
Observations	27	27	27	27

Note: D stands for first difference under the short-run analysis; standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: authors' own computations based on data from WDI.

Table A5: Short-run analysis (gross national savings)

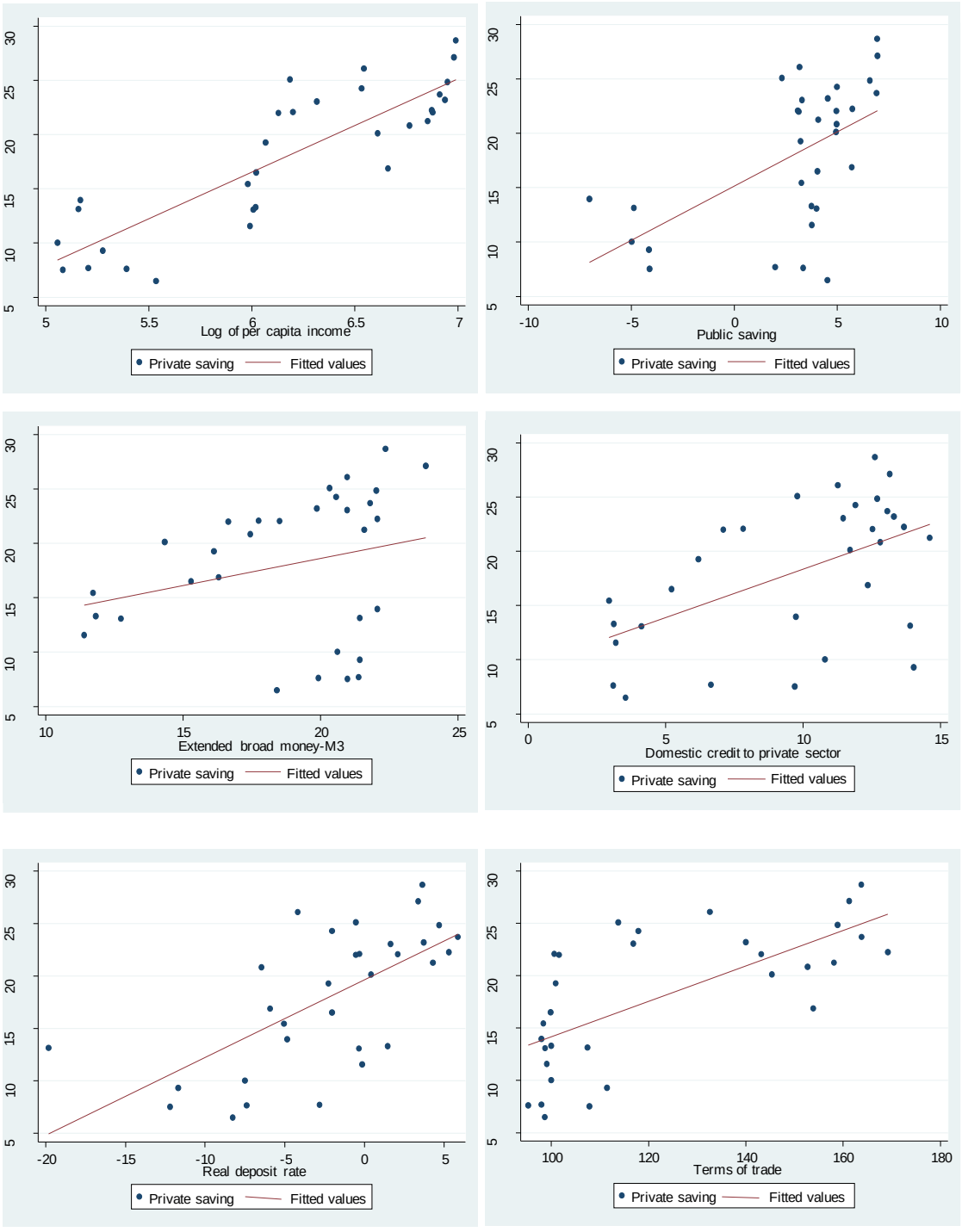
Variables	(1)	(2)	(3)
D.LY	17.5***	8.62	
	(5.05)	(6.47)	
D.W	0.200		−0.102
	(0.275)		(0.237)
D.TOT		0.062	
		(0.082)	
LD.TOT		−0.130	
		(0.105)	
L2D.TOT		0.045	
		(0.085)	
L3D.TOT		−0.058	
		(0.082)	
D.GY	0.259		−1.175**
	(0.329)		(0.490)
D.INF	0.171		
	(0.108)		
D.RID		−0.602**	−0.309
		(0.244)	(0.208)
LD.RID		−0.708***	−0.374**
		(0.178)	(0.147)
L2D.RID		−0.316	−0.434***
		(0.215)	(0.140)
D.FIN		−0.452	
		(0.616)	
LD.FIN		−0.105	
		(0.640)	
Constant	−14.14	−24.86	5.88
	(9.39)	(19.6)	(4.33)
Observations	30	28	28
R-squared	0.651	0.817	0.607

Note: D stands for first difference under the short-run analysis; standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

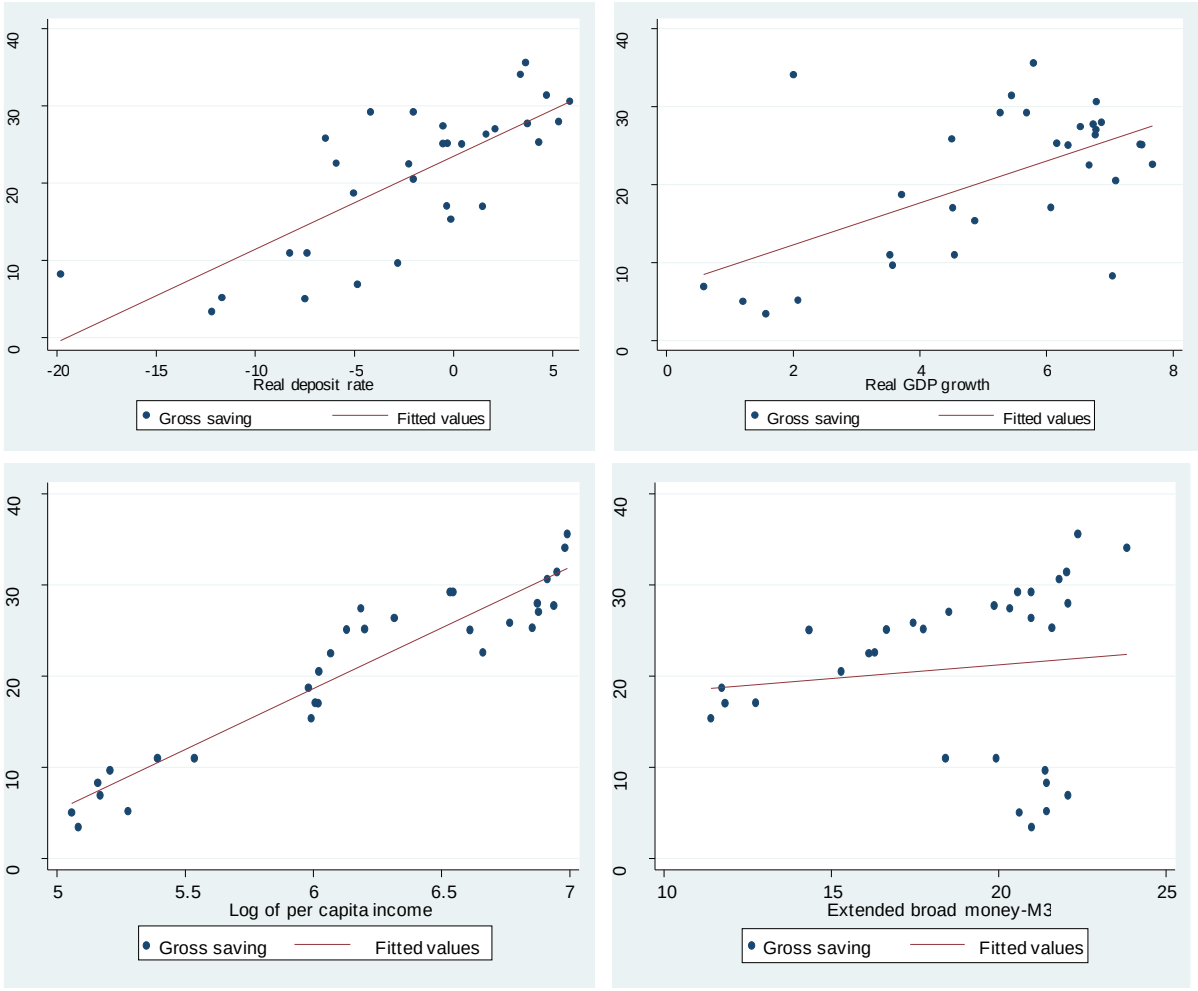
Source: authors' own computations based on data from WDI.

Figure A1: Scatterplots of dependent variables versus other variables

Private savings as dependent variable



Gross savings as dependent variable

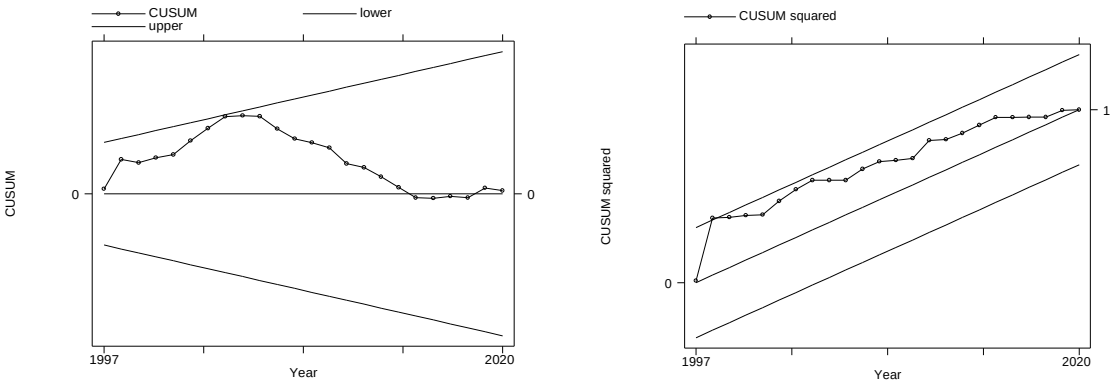


Source: authors' own illustrations based on data from WDI.

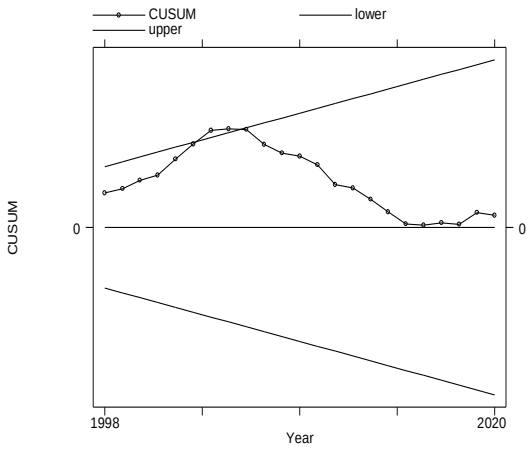
Figure A2: CUSUM and CUSUMsq control charts

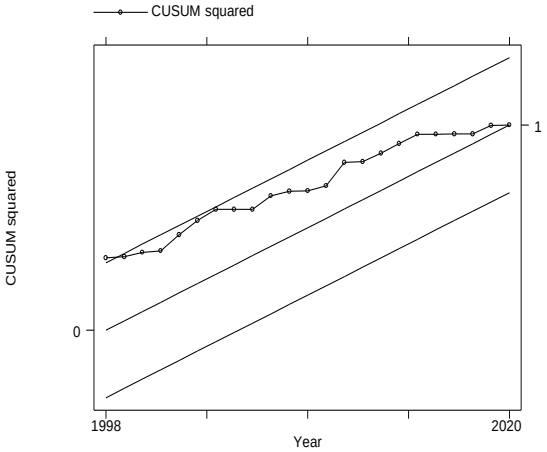
Private savings

Model 1

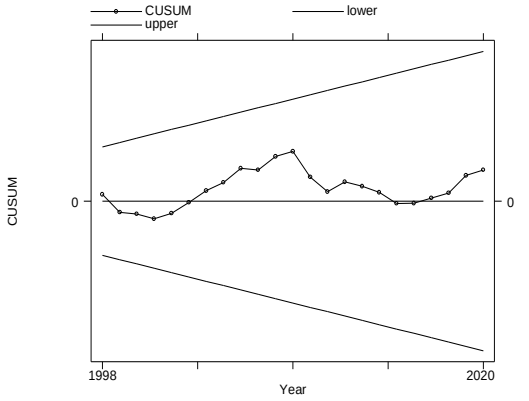


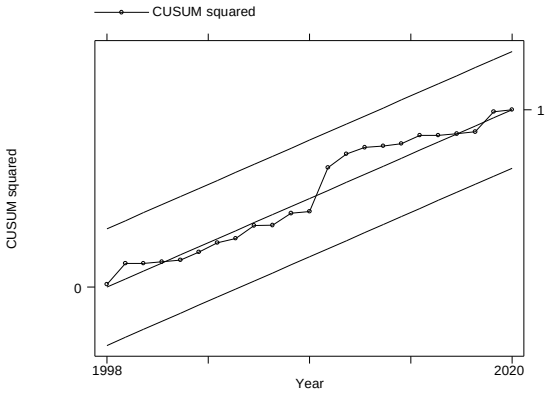
Model 2





Model 3





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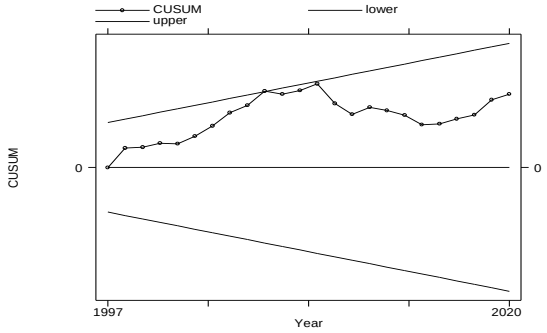
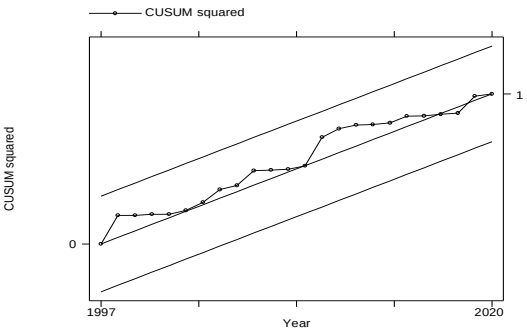
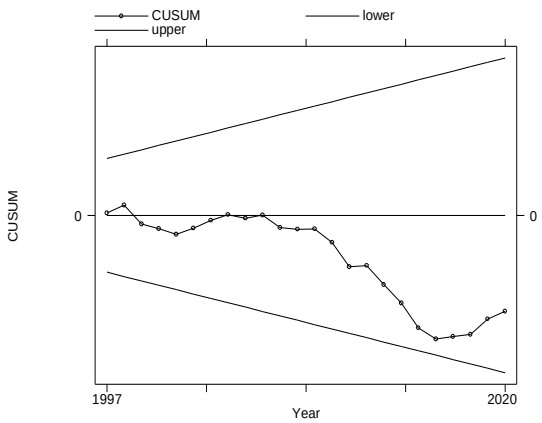
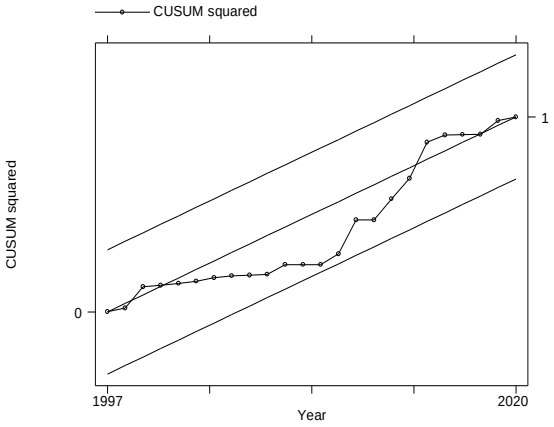




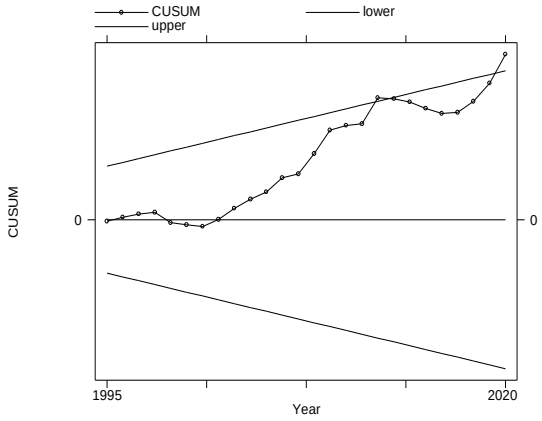
Gross savings

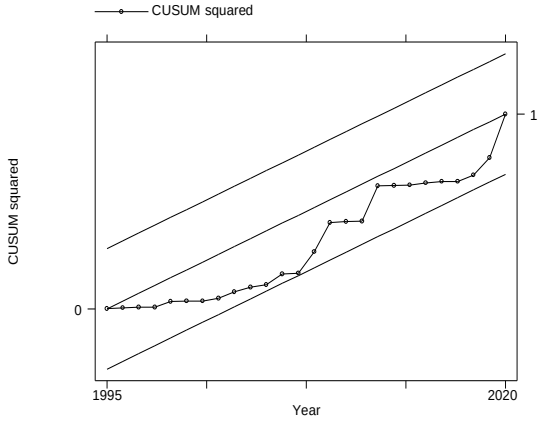
Model 1



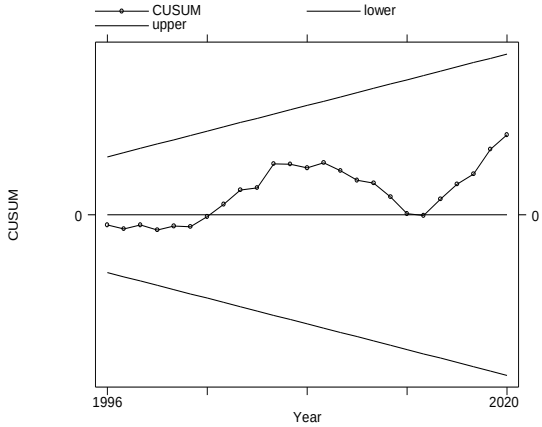


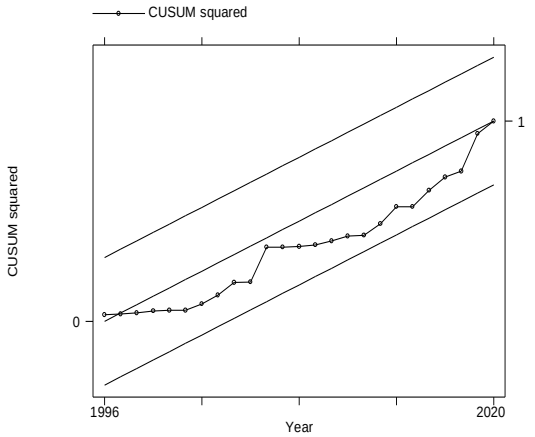
Model 2





Model 3





Source: authors' own illustrations based on data from WDI.