

## **Empirical Analysis of the Adequacy of the Pension System in Mainland Tanzania**

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### **Abstract**

*This study assesses the adequacy of the pension system in Tanzania by using membership data of pension schemes. The analysis, which is based on the life cycle hypothesis, includes an assessment of pension system adequacy by using replacement rate, coverage rate, catchment rate, and demographic rates. The results of the study reveal several things. First, replacement rate is 29 percent, far below the international minimum standards of 40 percent due to generous commutation factors, and commutation being inversely related to monthly pension. Second, the lack of indexation diminishes adequacy of benefits. Third, actual contribution rate is 15 percent, lower than the statutory contribution rate of 20 percent of salary, which could lead to low density of contribution and cause depletion of assets by 2022 if no action is taken. Fourth, inadequacy of benefits was found to be caused by low catchment rate, which was found to be positively correlated with benefits payment. Fifth, the analysis establishes that the demographic structure would support increase in coverage of membership should the government institute appropriate policies.*

### **1. Introduction**

Benefits payment is one of the major functions of any pension scheme. The level of benefits paid to members must be adequate. In other words, when a person makes contributions to a pension scheme that provides benefits to cover the lack of income, there should be a reasonable relationship between earnings, remitted contributions, and the amount of benefits paid. The ILO contraptions state that social protection benefits should, at a minimum, guarantee effective access to at least essential health care and basic income security as defined at the national level (ILO, 2015).<sup>1</sup> In addition, international benchmarks acknowledge that, although the adequacy level of benefits is the entitlement of the state, it should take into account the needs of the population, as well as the capacity to finance and deliver benefits and services; and at least secure protection against poverty, vulnerability, and social exclusion; and enable a life in health and dignity (Isaka et al., 2019).

The UN estimates that by 2050 there will be almost 2bn people over age 60 worldwide, with almost 80 percent of them living in developing countries (Stewart & Yermo, 2009). According to the ILO (2018), about 68 percent of people above

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<sup>1</sup>ILO Social Security Floors ([Recommendation No. 202, para 4](#))

retirement age worldwide receive old age pension. However, this differs from one region to another. For instance: Europe and Asia have about 95.2 percent, Americas have 86.2 percent, while in Africa only 29.6 percent of the older population receives a pension (ibid.). Similarly, Help Age International (2006) has posited that the over 60s age cohort represents the fastest growing population in Africa. Unfortunately, this aging population is bound to lapse into poverty either due to the lack of properly institutionalized safety nets or inadequacies of the existing safety nets in the form of social security systems. In Asia, for example, it is reported that rapidly aging population with inadequate income support systems already suffers from poverty. Even in Europe, pension systems are faced with the dual challenge of being adequate and financially sustainable in the delivery of social security.

As a matter of principle, 'living longer is a virtue'. However, guaranteeing a sustained availability of good standards of living to pensionable and the elderly population is an insurmountable challenge for policy and development strategies, more so in developing countries where poverty is a real challenge than a myth. The main challenge facing social security systems in developing countries is how to finance and guarantee the adequacy of its benefits that enhance affordable decent standards of living to its members without imposing too big a burden on the youthful labour force in the country. In developing, as well as developed countries, the challenge of access and sustainability of pension benefits are aggravated by rising life expectancies caused by, among others, increasing access to better healthcare.

In Tanzania, the government has provided social security since the attainment of political independence in 1961. In tandem, has been the government's endeavour to widen outreach of social security, and ensure its adequacy and financial sustainability. However, while there are few studies on social security in Tanzania, none have assessed the achievements—and adequacy in particular—and related challenges of social security in Tanzania that would inform policy. Rather, studies that exist—for example, ILO (2006, 2008 and 2010), Maduga (2015), and Mchomvu et al. (2002)—only focus on the traditional social security systems.

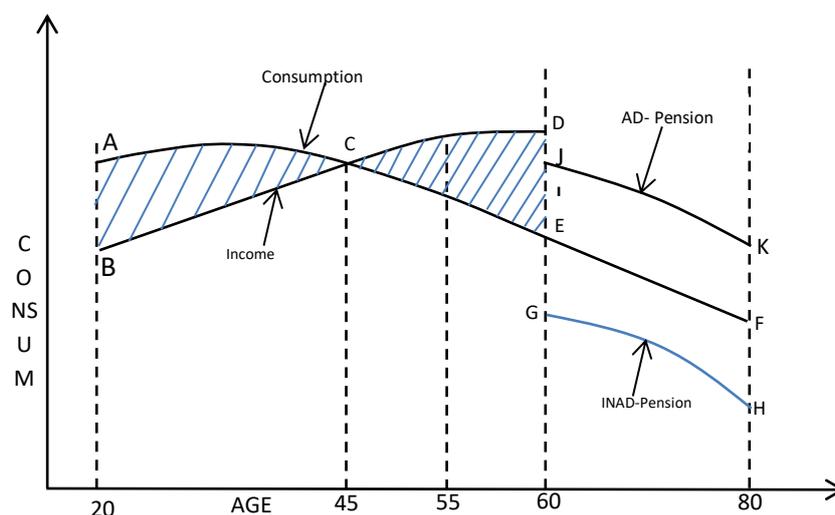
It is this existing gap in the scope of analysis that provides the *raison d'être* of this paper, which seeks to assess the adequacy of the pension system in Mainland Tanzania. Specifically, the study seeks to establish the extent to which pension benefits offer adequate protection of members' income at old age as measured by its positive effect on household welfare, development of human capital, better healthcare facilities, risk management (both covariate risks and idiosyncratic risks), economic resilience, poverty reduction, and social cohesion. It identifies specific areas that demand policy action to improve adequacy, and thereof minimize costly fiscal outcomes, including the magnitude of pension debt and its fiscal implications. In this context, we hope the findings of this study will contribute to the literature on social security in and outside Tanzania.

The rest of this paper is organized as follows. Section 2 reviews theoretical and empirical literature on the adequacy of social security. Section 3 analyses the evolvement of social security and the nature of its adequacy in Tanzania. Section 4 carries the methodology of the study; while section 5 presents empirical results on the adequacy of social security in Tanzania. Section 6 concludes the paper by presenting the main findings, their policy implications, and areas for further research.

**2. Literature Review**

**2.1 Theoretical Literature**

The theory of the adequacy of a social security scheme is explained by the life-cycle hypothesis (LCH), which is associated with Modigliani (1966, 1975), Modigliani and Bromberg (1954), and Ando and Modigliani (1963). In the context of Figure 1 that builds on the LCH, at the early stage of life-cycle an individual does not work and therefore does not save for retirement. Modigliani assumed that income earning starts at the age of 20 years, continues to grow during the working life, and reaches a maximum level at the retirement age, i.e., at *D*. Accordingly, an individual exhibits three stages of saving over the life cycle: borrowing at an early stage of working age (20-45 years), that is when consumption (*AC*) is larger than income (*BC*); at the middle age (45-60 years) income (*CD*) is greater than consumption (*CE*), hence, savings (*CDE*); and, finally, dis-saving occurs at (*EF*) after retirement, presumably after 60 years.



**Figure 1: Initial Negative Saving Ratio and Inadequate Retirement Pension**

Source: Based on the LCH Hypothesis (Baranzini, 2005)

In accordance to mainstream theory, saving for retirement is made in a financial intermediary, elsewhere referred to as a social security fund or a pension scheme. In practice, access to the ‘forced savings’ in the form of pension benefits by retirees is guided by rules and regulations set by social security institutions, and regulated

by government policy, and principles internationally agreed upon.<sup>2</sup> One of the social security principles is that of adequacy, which maintains that a stream of income to retirees should be adequate enough to enable them to live a decent life after retirement.

In the context of Figure 1, the level of consumption remains the same over the life cycle, i.e., it remains on the (*ACEF*) curve and, as assumed by Modigliani (1983), there lacks inheritance (bequest). In this respect, a pension scheme is adequate enough if it maintains at (*EF*). A retiree seems to have a good standard of living if pension payments are at (*JK*). This implies if the pension scheme is adequate, given the de facto cost of living, it would provide benefits extensively to beneficiaries throughout their life-cycles; and the benefits received should be adequate to smoothen expenditure and therefore reduce or avert poverty at old age. In relation, a pension benefit is inadequate if the retirees' consumption falls to (*GH*).

Maintaining a retiree's consumption patten at (*EF*) rather than (*GH*) primarily depends on the volume of savings cumulated by a pensioner in a pension scheme, the density of contributions, replacement rates, and catchment influences. Noteworthy, however, a system that uses a consolidated approach, whereby insurable income includes all allowances, tends to produce more adequate benefits (Feldstein, 1974; 1976; Crown, 2002). This is mainly because, in theory, consumption would not be continuous as expected from savings for retirement.

Suffice it to note, therefore, that the adequacy of a social security system is measured by the degree to which the payment of retirement benefits primarily serves a smoothy consumption and, therefore, prevents poverty or deprivation after retirement (Holzman et al., 2005). Adequacy presumes that the financing mechanism of a scheme is appropriate, such that it does not create any burden to its current or future members. Furthermore, an adequate pension system also enables its beneficiaries to obtain the right information about their scheme for planning their pattern of expenditure over the life cycle according to their expectations. Thus, the insufficiency of pension payments would adversely affect the social security principle of adequacy, which advocates that a stream of income to retirees should be adequate enough to enable them lead decent lives after retirement.

## **2.2 Empirical Literature.**

There exists in the literature several studies on the adequacy of pension schemes. Notable, however, most of such studies are on developed countries (Filip, 2012; La-Rochelle-Cote et al., 2010; Zaid, 2010; Mint, 2009; Borella et al., 2009; Hurd et al., 2006; Hermamesh, 1984).

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<sup>2</sup>There are diverse types of institutions in the social security industry. In some countries, for example, the US, UK and Canada, social security is provided by private institutions. In other countries, developing countries in particular, public institutions dominate the industry.

Some of the studies on developed countries found pension benefits to be adequate. These include two studies on the US by Hurd et al. (2006) and Hamermesh (1984). Both studies, which were based on the LCH, found expenditures on goods and related services of pensioners declined at retirement. In contrast, Filip (2012), in a study that used income method to analyse the adequacy of pension schemes in 26 European countries, found the pension systems in Luxemburg, the Netherlands, France, Germany and Austria were most adequate; while the schemes in Cyprus, Lithuania, Estonia, and Latvia were least adequate. Moreover, in a study on Canada, La Rochelle-Cote et al. (2010) found that some individuals had very low replacement rate (about 20 percent had replacement rate of 6 percent). On this account, they concluded that replacement rates during the retirement were inadequate, with a negative correlation with family income (ibid.).

Also, Zaid (2010) analysed pension benefits ratio based on gross replacement rate of earnings (GRR) and the financial sustainability of public finances in 13 countries in the European Union (EU) estimated for the period 2008–2060. The study found future pensioners of Estonia, Poland, Sweden, Austria, France and Portugal at high risk of lower pensions. In addition, six countries showed considerable decline in value of pension during the study period. Zaid (ibid.) concluded that pension reforms protected low earners in the UK, Belgium, Germany, France and Finland. In contrast, the study established that Portugal, Italy and Austria had experienced a decline in adequacy, while in other countries—such as Poland, Hungary and Slovakia—payments had strengthened.

In another study, Borella et al. (2009) investigated the adequacy of pension funds by analysing the comprehensive replacement (CORE) rate by using European Community Household Panel (ECHP) data. A comparison of the standards of living of an individual when at the work age and after retirement showed a decline in the replacement rate, suggesting a decrease in the adequacy of pensions. The study, for instance, found the CORE declined in France from 57 percent in 2020 to 47 percent in 2050. In other countries, the results revealed a decline of replacement rates in Spain and Germany. The study found that countries with more stable CORE rates were Luxemburg, Denmark, and the UK; and countries whose results suggested an increase in adequacy were Netherlands, Hungary, Latvia and Slovakia.

Empirical studies on adequacy in developing countries in general, and Africa in particular, that are of interest in this study are very few (Salodoye et al., 2015, Clune, 1999; Knoepfel et al., 2009; King et al., 2005; Brighthouse, 2009b; Barry et al., 2011. Most studies in Africa on adequacy have been on areas other than pension systems. This dearth of empirical studies on Africa is seemingly explained by the belated development of a working class in the formal sector, trade unionism, and the establishment of employment safety nets in developing countries.

In Tanzania, the only empirical study on adequacy is by Salema et al. (2016). However, the study only focused on the adequacy of resources and facilities to enhance learning-centred pedagogy in Tanzania's community secondary schools.

Notable as well, studies by Maduga (2015) and Mchomvu et al. (2002) focused on the traditional social security systems as a basis for establishing individual awareness and attitude towards modern social security schemes in Tanzania during the 1990s. Thus, the two studies also lack a rigorous empirical investigation of the adequacy of social security benefits in Tanzania.

A few other studies were carried out by the ILO (2006, 2008, 2010) during the period between 2008 and 2010. Such studies also applied a social protection model to study the adequacy of pension systems in Zanzibar, Mainland Tanzania, and Zambia. Specifically, the studies critically analysed expenditure on social protection interventions to establish funds needed to provide social security interventions. The ILO's studies found social security interventions were inadequate to prevent poverty at old age. Nonetheless, it should also be noted that, by design, the ILO studies were very broad; as such they did not analyse deeply the adequacy of the social security sector, especially the pension schemes (catchment rates, demographic rates, coverage rates and replacement rates) in the countries studied.

In general, the review of literature reveals that most studies analysed adequacy by employing both pension as well as other incomes (Borella et al., 2009; La Rochelle-Cote et al., 2010; Hurd et al., 2006; Zaid, 2010; Mintz, 2009; and Hamermesh, 1984). The approach used assumed that adequate pension benefits impact positively on the wellbeing of beneficiaries. Also, noteworthy, some studies used wealth in both working and retirement phases as a measure of adequacy, and found a negative correlation between replacement rates and family wealth. However, the use of wealth as a measure of adequacy is inappropriate when applied to economies with large informal sectors like Tanzania, where a large proportion of its income is not captured in official statistics. Also noteworthy from the literature survey, is the lack of a single study in LDCs that has applied ratio analysis (namely, demographic ratio, catchment ratio, or system replacement ratio) to measure adequacy. Instead, most of the studies used replacement rates. Thus, in assessing the adequacy of the social security system in Tanzania, this study has modified the approach used in the previous studies by employing demographic ratio, catchment ratio, and coverage ratios in the analysis.

### **3. Social Security Schemes in Tanzania**

The social security institutions in Tanzania were established to ensure that their members are protected from unforeseen contingencies such as death, old age, invalidity, sickness, maternity, and childcare (URT, 2003). Membership in the formal social security schemes is compulsory: the SSR Act, (Cap 135 R.E. 2015) requires every formal employer to register employees in mandatory social security institutions. Notable, therefore, the social security system in Tanzania cares only for the formal sectors of the economy.

According to Convention 102 of the ILO's (1952) Social Security Minimum Standards, a variety of social security institutions became established in Tanzania before and after independence in 1961. The first social security scheme, namely the

Government Employees Pension Fund (GEPF), was established by the British colonial government in then Tanganyika (now Mainland Tanzania) in 1942 to serve colonial workers (Bossert, 1987; Tungaraza, 2004). The scheme was later followed by the establishment of the Local Authority Provident Fund (LAPF) in 1944 for local government servants, and the Public Service Fund (PSPF) for workers in the central government in 1947 (ibid.).<sup>3</sup>

After the attainment of political independence in 1961, the government established the National Provident Fund (NPF) by Act No. 36 of 1964. Later, the Parastatal Pension Fund (PPF) was established by Act No.14 of 1978. The implementation of social security sector reforms since the early 1990s has led to the enactment of several legislations that either provided for the reorganization of the *de facto* social security institutions, and/or the establishment of new contributory schemes.<sup>4</sup>

The institutions that were established after the social security sector reforms in the 1990s include the National Social Security Fund (NSSF), which was established by Act No. 28 of 1997, following a restructuring of the NPF; and the Local Authority Pensions Fund (LAPF), which was established by Act No. 9 of 2006. Others are the GEPF Retirement Benefit Fund, which was established by Act No. 8 of 2013, which restructured the GEPF provident fund; the Workers Compensation Fund (WCF), which was established by Act No. 20 of 2008; and the National Health Insurance Fund (NHIF), which was established by Act No. 8 of 1999. Similarly, the government transformed its pay-as-you-go (PAYG) public service scheme from a non-contributory to a contributory Public Service Pensions Fund (PSPF), through Act No. 2 of 1999. The Workers Compensation Fund (WCF) was established in 2015 to provide compensation benefits for work-related injuries.

Table 1 shows that a majority of the seven social security institutions in Tanzania collect contributions from both workers and employers. Also, it shows that the Government Employees' Provident Fund (GEPF) had the highest total contribution rate of 25 percent. The Zanzibar National Social Security Fund is the lowest, with a total contribution rate of 15 percent when compared to other social security schemes, which collect total contribution of 20 percent. The NHIF charges total contribution rate of 6 percent, while the WCF collects contributions of 1 percent from employers. In addition, there are schemes that are non-contributory, for example, the Political Leaders Pension Scheme (PLPS), Senior State Leaders Pension Scheme (SSLPS), and the Armed Forces Scheme.

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<sup>3</sup> The social security schemes during the colonial period covered only a small proportion of people that were employed by the government. As a result, a large proportion of the population was excluded from the social security system in the country. In this regard, it is likely that a majority of the population in the country depended upon traditional social protection systems, hereafter referred to as informal social security schemes or institutions (URT, 2003).

<sup>4</sup> Notable, during the social sector reforms period in Tanzania, other schemes – i.e., supplementary social security schemes—were also established. Supplementary schemes are voluntary schemes established by trustee deeds. Such schemes are occupational-based, employer-based, or individual-based schemes. They are in the form of defined contribution schemes (DCSs); and while they are regulated by the government, they are not guaranteed by the government.

**Table 1: Social Security Schemes Before and After Independence**

	Name of Scheme	Year	Parent Ministry	EEs	ERs	Total
1	NPF**	1964	MoLE	10	10	20
2	PPF	1978	MoFEA	5	15	20
3	LAPF	1944	PO-RALG	5	15	20
4	PSPF	1999	MoFEA	5	15	20
5	NHIF	1999	MoHSW	3	3	6
6	GEPP***	1942	MoFEA	10	15	25
7	ZSSF	1998	MoFEA	5	10	15

Notes: \* EEs = employees' contributions rate; and, ERs = employers' contributions rate.

\*\* NPF is now known as the National Social Security Fund (NSSF).

\*\*\*GEPP is now known as GEPP Retirement Benefits Fund (GEPP).

Source: Social Security Schemes Legislations.

To ensure the protection of members' interests and the existence of fair competition among social security institutions and schemes, in 2010 the government established a Social Security Regulatory Authority (SSRA) through the Social Security (Regulatory) Act, Cap 135 R.E. 2015 in accordance with the social security policy of 2003 (SSP 2003). Among others, the SSRA, which was abolished in 2019 by merging its functions with the Department of Social Security under the PMO, was required to regulate and supervise the performance of all fund managers, custodians, administrators, and social security schemes; and also protect and safeguard the interests of members of the social security system in Tanzania who are mainly workers in public institutions, civil service, and the private sector.

It is worth noting that members of the social security funds increased with the establishment of new social security institutions. By 2015, total membership in the social security in the Mainland Tanzania stood at about 1.9m, a coverage equivalent to 8 percent of the total labour force in Tanzania. The age profile by gender of the members of the social security schemes in Table 2 shows that a majority of the members are young, aged between 28–38 years.

**Table 2: Age Profile of Members of Social Security Schemes in 2015**

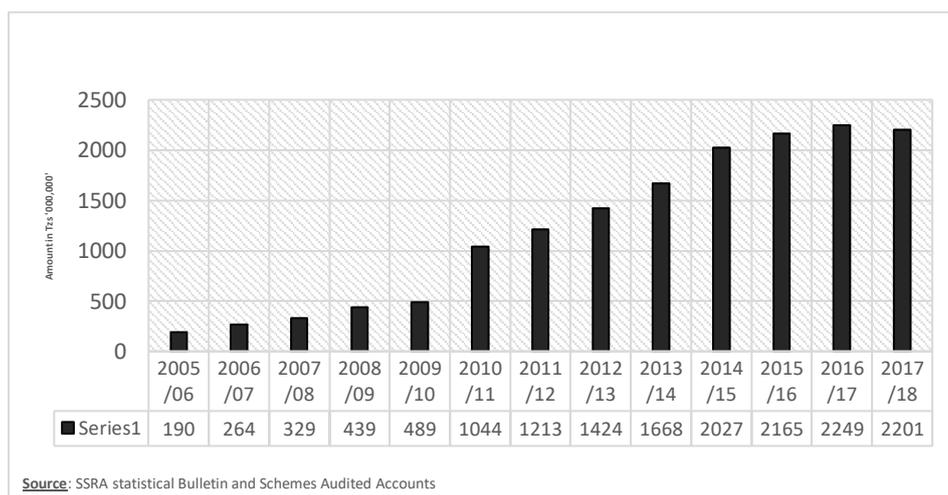
Age Group	Males		Female		Total	
	No.	%	No.	%	No.	%
17-27	158,994	8.43	125,569	6.65	284,563	15.08
28-38	477,249	25.29	294,181	15.59	771,430	40.88
39-49	296,868	15.73	193,638	10.26	490,506	25.99
50-60	227,162	12.04	113,339	6.01	340,501	18.04
<b>Total</b>	<b>1,160,273</b>	<b>61.49</b>	<b>726,727</b>	<b>38.51</b>	<b>1,887,000</b>	<b>100.00</b>

Source: SSRA Statistical Bulletin

Despite the recorded increase in membership in Tanzania, the size is still very low when compared with some Sub-Saharan African (SSA) countries: e.g., the Republic

of South Africa (RSA) (70%), Mauritius (85%) and Namibia (47%). Suffice it to note that the coverage in RSA, Mauritius, and Namibia is out of compulsion of workers themselves.

It is also noteworthy that at the commencement of the social security reforms in the 1990s, members' contributions were about TZS190m. However, after the reforms, members' contributions rose to TZS2.2tr during the 2017/2018 financial year! Figure 2 shows the increase in members' contributions was dramatic since 2010.



**Figure 2: Contributions 2005- 2017**

The increase in contributions, however, is primarily due to increases in salaries than to recruitment of new members. The implication of this is two-pronged. On the one hand, increase in salaries tends to increase retirement benefits; and on the other hand, it increases liability to schemes. The increase in liability would easily erode sustainability of the schemes in case of any actuarial imbalances, that is, when pension liabilities exceed pension assets. As the level of contribution increases, the schemes are challenged to ensure that they invest prudently to ensure adequate benefits are paid to members when due.

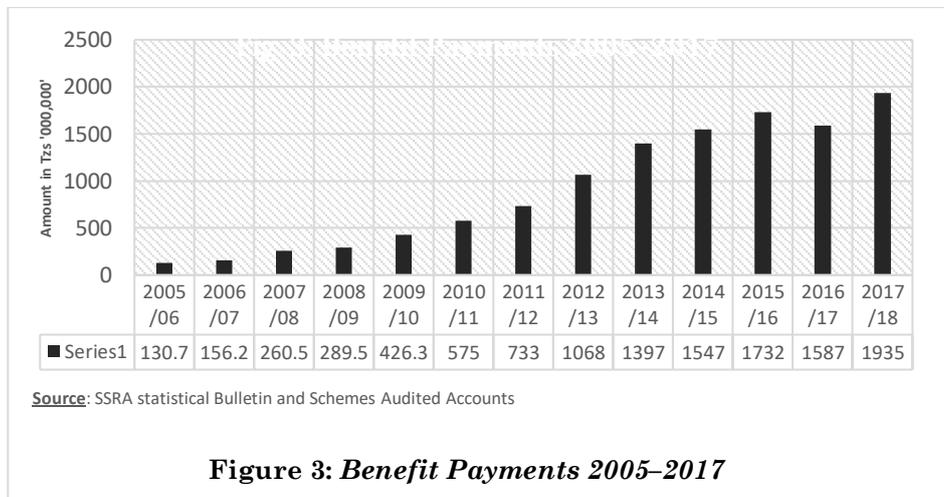
The first category of benefits entitlement to members of social security funds in Tanzania are short-term benefits, including healthcare, death gratuity, employment injury, education, maternity and withdrawals (Isaka, 2013). The second category constitutes long-term payments, including retirement pension, invalidity and survivors' benefits. Both categories have attracted complains from members.

The ILO Convention 102 set a minimum replacement rate of pension at 40 percent. The statutory replacement rates offered by the NSSF and PPF in Tanzania are similar to the ones offered by high-income OECD countries, for example, Sweden

(65 percent); Portugal (66.7 percent); and Netherlands (68.3 percent); while those offered by the PSPF, GEPF and LAPF are comparable to those offered by Austria (78 percent); Greece (84 percent); Italy (78.8 percent); Turkey (87.2 percent); and Spain (80 percent) (Whitehouse, 2007).

Payment of benefits in Tanzania is based on replacement rate, which is the rate of salary, paid as pension to a retiree. In Tanzania, despite the fragmentation of benefits (both short- and long-term), replacement rates have remained uniform across income groups.<sup>5</sup>

Figure 3 shows that the payment of benefits to members of social security schemes increased from TZS130bn in 2005/06 to TZS1.94tr in the financial year 2017/18. Nevertheless, the figure shows that payments of benefits rose more rapidly (to an average of 26.6 percent), as indicated by an upward kink in the trend line, which implies either an increase in the number of retirees or an increase of benefit payments to retirees due to a generous formula, or both.



Benefit payments differ across schemes, with some paying much more than others. In this regard, the complaints of members have been on fragmentation and the inadequacy of monthly pension. Since the statutory level of contributions of 20

<sup>5</sup> In evaluating the model of paying benefits to members (the replacement rates), Tanzania shares a similarity with the one used by the Middle East and North African countries, e.g., Algeria, Bahrain, Morocco, Djibouti, Egypt, Iran, Jordan, Libya and Yemen (Whitehouse, 2007). This model is risky in that a few high-income individuals can wipe out available funds at the expense of a large majority of low-income members, thereby eroding sustainability. Specifically, although replacement rates in Tanzania seem to be higher than those offered in other East African countries, which provide replacement rates ranging between 12–40 percent, in contrast to Tanzania's rates that range between 67–84 percent, this system is likely to be inadequate due to high commutation.

percent is the same across schemes, it appears unfair for some members to get more benefits. Such fragmentation of payment of benefits not only erodes equity among members in different cohorts and across schemes, but also seems to reduce schemes' affordability of benefits.

Social security assets are important in analysing adequacy because the largest part of asset is in investments. Hence, return on investments forms a critical part of inputs in determining accrual rates. The total assets of the social security schemes—excluding NHIF and WCF—have been consistently increasing from TZS1.37tr in 2005/06 to TZS9.9tr in 2017/18, indicating an average growth rate of 18 percent during the period. However, the increase was inadequate to cover the majority of Tanzanians.

The rate of growth of assets of the social security system in Tanzania is higher than in other East African countries. However, an encouraging growth in assets does not fully warrant that assets are adequate for improving benefits and sustainability of the systems because the size and growth of assets do not correspond with the benefits-payment formulas of some social security schemes. For instance, if a scheme is reaching maturity, it means that one should expect more payments of benefits (ILO, 2013). Hence, as a scheme pays more benefits, the amount remaining for investment decreases.

Here, it is worth noting that the reforms implemented by the government appear to have created an environment for increased adequacy of benefits, mainly due to the restructuring of the defined contribution schemes (provident funds) to pension funds (defined benefits). However, these reforms did not address sustainability issues. Pension funds apply insurance principles and ensure that benefits are more adequate.<sup>6</sup> The increase in adequacy has, nonetheless, exposed the social security systems to sustainability risks, which is implicit in the likelihood of failure of the social security schemes to meet maturing obligations, i.e., long-term payments of pensions.

Moreover, in spite of the reforms undertaken by the government, it is only workers in the formal sector in Tanzania that are covered by the formal social security systems as per the SSR Act Cap 135.<sup>7</sup> Implicitly, employees in the informal sector remain covered by unorganised informal social security arrangements. This implies that there lacks competition in the social security system in Tanzania because the system is dominated by oligopolistic public institutions, which contradicts the Social Security Policy (URT, 2003). Moreover, the legal and regulatory frameworks remain fragmented such that it affects adequacy. For

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<sup>6</sup> Noteworthy, the conversion from DC to DB enhanced adequacy due to the fact that risks of longevity and investments have been transferred from members to the schemes.

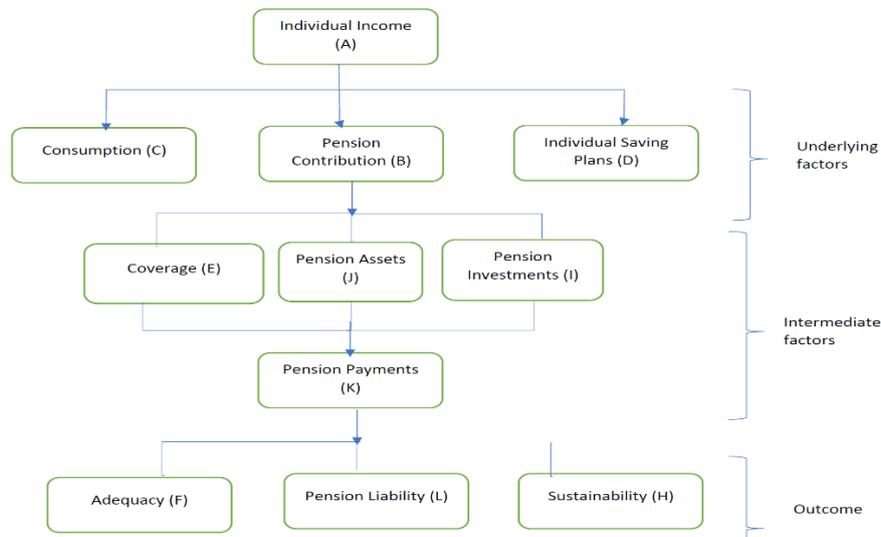
<sup>7</sup> The Act does not accommodate Section 30 of the SSR Act Cap 135. It also does not consider other Social Security Laws that provide health insurance. According to Section 26 of SSR Act, a member is required to choose one superior benefit. Consequently, if a member considers NSSF health insurance superior to NHIF, then his/her contributions to NHIF would remain unutilized.

instance, a member that contributes to NSSF is entitled to medical insurance (NSSF Act, 1997); but if this member is a public employee, s/he is also required to contribute to the NHIF for medical insurance (NHIF Act, 1999).

#### 4. Methodology

##### 4.1 Conceptual Framework

The conceptual framework on adequacy integrates factors specific to an individual pensioner and the economy at large (ILO, 1998; Cichon et al. 2002). As Figure 4 shows, factors specific to an individual pensioner include income (A), which is partly saved as remittance contributions to a social security scheme (B); and partly used to support consumption (C) and for saving (D). The level of contributions to a social security scheme depends on the coverage (E), which includes both the number of members and the amount contributed.



**Figure 4: Conceptual Framework on Social Security Benefits Adequacy**

Source: Authors' construction.

In Figure 4, adequacy determines both the pension payments after retirement (K), and sustainability of the social security system (H). Contributions remitted to social security schemes are invested (I) to build pension assets (J). Pension assets are normally used to pay benefits (K) when a member retires. These payments constitute what is known as a pension liability (L). When the liability created is equal to or less than pension assets, the system is adequate and sustainable. In this case, the pension debt is called pension implicit debt. However, when the assets are insufficient to meet matured pension payments, the debt created becomes pension explicit debt. A pension explicit debt has to be budgeted for and paid by the state because the pension schemes are unable to pay the pensions.

**4.2 The Estimation Model**

The analysis which flows from the conceptual framework is based on the ILO pension model which, by using works of Bagliano et al. (2010) and Cocco et al. (2005), has been modified for the analysis of social security system in Tanzania. The modified model, which included the analysis of accrual rates as stipulated in the legislations of social security schemes, and the life-cycle hypothesis as presented by Modigliani (1957), reads as:

$$\text{Log } Y_{it} = f(A, M_{it}) + u_{it} + d_{it} \tag{1}$$

where  $Y_{it_0}$  is the deterministic trend component of permanent labour income of an individual  $i$  ( $= 1, 2, \dots, N$ ) at a particular time  $t$  during the stage of working over the life-cycle;  $A$  is the age of an individual, which is such that  $t_0 \leq A \leq t_0 + K$ , where  $K$  is the employment period;  $M_{it}$  is a vector of individual characteristics, such as sex, marital status, education, household size;  $u_{it}$  is a stochastic error term that drives the permanent income; and  $n_{it}$  is a stochastic error term that drives transitory income.

According to Bagliano et al. (2013), available evidence attests that the  $u_{it}$  follows a random walk process that can be summarized as:

$$u_{it} = u_{it-1} + \epsilon_{it} \tag{2}$$

where  $\epsilon_{it}$  is  $N(0, \sigma_\epsilon^2)$  and, while  $d_{it}$  is also  $I(0, \sigma_d^2)$ , and  $Cor(u_{it}, d_{it}) = 0$ .

Following Bagliano et al. (2010), first, the  $\epsilon_{it}$  in equation (2), which is a permanent disturbance that applies to all members of a scheme, is made of an aggregate component of disturbance ( $\mathcal{E}_{it}$ ), which is  $N(0, \sigma_\mathcal{E}^2)$ ; and an idiosyncratic component disturbance  $\omega_{it} \sim N(0, \sigma_\omega^2)$  uncorrelated across members of the schemes, such that:

$$\epsilon_{it} = \mathcal{E}_t + \omega_{it} \tag{3}$$

Second, by assumption, the shock to permanent income is correlated ( $\mathcal{E}_{it}$ ) and risky to social security returns. Third, by assumption, in the defined benefits scheme (pension scheme), risk of assets and investments is borne by schemes, not members. Hence, during retirement members earn certain income which is equal to a fixed proportion ( $\delta$ ) of the permanent component of income during working life, which is:

$$\text{Log } Y_{it} = \log \delta + f(A_{(0+K)}, M_{it(0+K)}) + u_{it(0+K)} \tag{4}$$

where,  $A_{(0+g)} < A \leq T$ ; and the level of replacement rate ( $\delta$ ) captures a mandatory social security scheme (Campbell et al. 2001).

Depending on the level of adequacy, members maximize utility over the life-cycle by choosing the consumption and rules derived from their pension and asset returns.

### 4.3 Data and Reliability

The analysis is based on a sample data of 1,146,584 members of pension funds in Tanzania, of which the total pensioners were 48,581, with an average insurable wage of TZS5.8m per annum. Their total expenditure, including benefits payments, was TZS737m. The data used in the analysis were that of pension payments, wage of members (insurable wages), contributions, and investments undertaken in 2010. The data was obtained from audited annual financial reports of the social security and pension funds in Tanzania, including NSSF, PPF, PSPF, LAPF and GEPP. The data for population, inflation, and GDP growth was obtained from diverse publications of the Bank of Tanzania (BoT), and the National Bureau of Statistics (NBS). The NBS was also a source of demographic data used in the analysis.

### 4.4 Measurement of Variables

Usually, adequacy is closely linked with actuarially neutral concepts (Draxler et al., 2009). However, in this study the adequacy of the social security in Tanzania is based on accrual rates.<sup>8</sup> The measure is based on actuarial fairness, which relates to the degree to which the replacement of income matches the social security member's income before retirement.<sup>9</sup>

The insured population was generated thus: first, active labour force ( $LF_{it}$ ) was generated from the total population in Tanzania as:

$$LF_{it} = \gamma \left[ \sum_{t_0}^{T-1} (1 - IC_{it}) \right] \quad (5)$$

whereby  $\gamma$  is the proportion of the total active labour force ( $\gamma$ ), and  $IC_{it}$  is the inactive population.

Given (5), the ensured population ( $EP_{it}$ ) out of the total active labour force was calculated as:

$$EP_{it} = \beta \left[ \sum_{t_0}^{T-1} LF_{it} (1 - Un) \right] \quad (6)$$

And, given (6), the insurable wage ( $IW_{it}$ ) was calculated as:

$$IW_{it} = \alpha \left[ \beta \left[ \sum_{t_0}^{T-1} \left( \gamma \left[ \sum_{t_0}^{T-1} (1 - IC_{it}) \right] \right) x (1 - Un) \right] \right] \quad (7)$$

<sup>8</sup>Quality and turn-around time of payment are other measures of the adequacy of social security schemes. For details, among others, see Isaka (2017).

<sup>9</sup>In Tanzania the replacement rate ranges between 67 percent and 77 percent for a member who has contributed for a period of 35 years; and the contribution rate is 20 percent of insurable wage. At retirement, the value of wealth (that is, accumulated contributions during the working part of the life-cycle) is transformed to a riskless annuity or pension, which is paid throughout the remaining life of a member.

where  $\beta$  and  $(1 - Un)$  are proportions of unemployed population and labour force that was formally employed, respectively;  $Un$  is unemployed labour force;  $\alpha$  is the proportion of the employed labour force; and other variables are as already defined.

In its simplified form, equation (7) is restated to read as:

$$IW_{it} = \sum_{t=0}^{T-1} \alpha [EP_{it}] \quad (8)$$

The coverage rate (CR) of a social security scheme is measured as:

$$CR_{it} = \sum_{t=0}^{T-1} \frac{\beta [LF_{it} (1 - Un)]}{\gamma [(1 - IC_{it})]} \quad (9)$$

The system replacement rate (SRR) was established by using the benefits offered in relation to the wage used to calculate the pension. The derivation of the measure did not take into consideration other incomes accruing to pensioners because the rate used to calculate the pension was based on statutory contributions and benefit package with two components; commuted pension ( $CP_{it}$ ), and monthly pension ( $MP_{it}$ ); such that:

$$CP_{it} = \prod_{t=0}^{T-1} [\partial(P_{it})] * [(E_{it}) * (CF_{it})] + \varepsilon_{it} \quad (10)$$

where  $\partial$  is the accrual rate of a member;  $P_{it}$  is the number of months of contribution;  $CF_{it}$  is the commutation factor;  $E_{it}$  is the emoluments;  $CP_{it}$  is the rate of commuted pension; and  $\varepsilon_{it}$  captures some other lump-sum payments, such as penalty resulting from delays in processing payments that can be paid to members.

Monthly pension (MP) was obtained as:

$$MP_{it} = \prod_{t=0}^{T-1} [\partial(P_{it})][(E_{it}) * (1 - CF_{it})](1/12) \quad (11)$$

where all the variables are as already defined. Note that where pension funds did not allow for commutation, beneficiaries got full pension.

In such a situation,  $(1 - CF_{it}) = 1$ , such that total pension ( $S_{it}$ ) was calculated as:

$$S_{it} = CF_{it} + MP_{it} \quad (12)$$

In a more expanded form, total pension was expressed and calculated as:

$$S_{it} = \sum_{t=0}^{T-1} CP_{it} + MP_{it} + \varepsilon_{it} \quad (13)$$

System replacement rate (SRR) was measured as the fraction of the average with respect to  $S_{it}$  and the average of  $E_{it}$  was obtained as:

$$SRR = \sum_{t=0}^{T-1} \frac{(CP_{it} + MP_{it})}{(EM_{it})} \quad (14)$$

Given 14, the catchment rate (CatR) was calculated as:

$$CatR_{it} = \left\{ \frac{\sum_{t=0}^{T-1} \alpha [EP_{it}]}{TI_{it}} \right\} \quad (15)$$

where

$$TI_{it} = \sum_{t=0}^T (Sl_{it} + Ha_{it} + Ua_{it} + Ta_{it} + Ca_{it} + \varepsilon_{it}) \quad (16)$$

where  $Sl_{it}$  is salary,  $Ha_{it}$  is housing allowance,  $Ua_{it}$  is utility allowance,  $Ta_{it}$  is transport allowance, and  $Ca_{it}$  is communication allowance, and  $\varepsilon_{it}$  is the stochastic term that captures experience, promotions and special duties of beneficiaries.

The CatR measures the amount of earnings paid as contributions to the total amount of earnings received from employment by an insured person. Noteworthy, the ratio also assists policy makers to decide on the effective ways to enhance contributions, which would make the system adequate.

#### 4.5 Estimation Methods and Techniques

The estimation of the model was carried out using the Excel programme. This study assumed that the working life of a member starts at the age of 25 years, and s/he works for 35 years to reach a retirement age of 60. After retirement, his/her pension is determined by a constant proportion  $\theta = 0.67$ . The pension model was estimated by using several assumptions and factual information specific to Tanzania. Using the optimal rules, it was possible to simulate adequacy using the life-cycle hypothesis. All permanent and transitory shocks  $\varepsilon_{it}$  were not taken into consideration for being beyond the scope of this study.

### 5. Empirical Results

#### 5.1 Descriptive Statistics

Table 3 shows a very big range of the number of pensioners; whereby the variation could be explained by high increase over the sample period. The wide range, and therefore both standard deviation in membership, is also reflected in their contributions to the social security benefits. Since social security schemes depend on members' contributions for their investment, this fact is reflected also in the latter's variance. The Kurtosis statistic suggests that members, their contributions, and investments made by schemes were skewed, hence not normally distributed. Other variables included in the analysis were also not normally distributed.

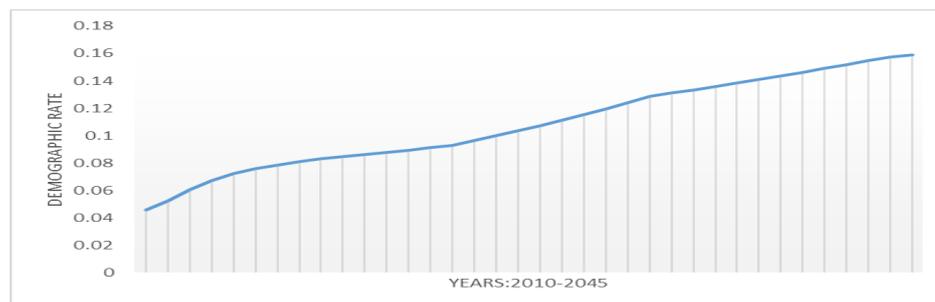
**Table 3: Descriptive Statistics.**

Description	Max	Min	Mean	Standard deviat	Kurtosis	Variance	Skewness	Median
Active contributors in '000,000'	2.86	1.15	2.04	0.55	(1.43)	0.31	-0.138387	2.09
Total Pensioners in '000'	2,202.80	48.58	632.67	613.35	0.27	376,193.75	1.139584	376.95
Avg Contribution in Tzs Mln	104.60	0.79	6.98	17.13	32.50	293.49	5.58132	2.85
Contribution Rate	0.20	0.20	0.20	0.00	(2.12)	0.00	-1.044014	0.20
Total Contr. In trn	11.00	1.19	5.95	3.12	(1.25)	9.73	0.05	5.90
Avg pension in Tzs Mln	16.28	1.67	6.43	4.28	(0.41)	18.31	0.83	5.10
Avg insurable wage in Tzs Mln	30.30	5.82	14.81	4.86	1.78	23.57	0.58	14.90
Total Pension in Tzs Trln	15.90	0.45	8.35	5.08	(1.41)	25.79	(0.21)	9.40
Investment in Tzs Trln	89.00	4.14	13.09	13.59	29.80	184.64	5.23	10.75
Investment Income in Tzs Trln	8.90	0.47	1.33	1.37	29.40	1.88	5.21	1.10
total contr in Tzs Trln	11.00	1.19	5.95	3.12	(1.25)	9.73	0.05	5.90
Total income in Tzs Trln	13.40	1.73	7.42	3.57	(1.24)	12.78	(0.00)	7.50
Admin. expenditure in Tzs Trln	1.65	0.19	0.91	0.46	(1.23)	0.21	0.03	0.90
Total expenditure in Trln	17.55	0.76	9.49	5.42	(1.35)	29.38	(0.23)	10.40

Source: Authors' Computation.

### 5.2 Demographic Ratio

The DR, which is a ratio of the insured population obtained by using equation (6) taken as a ratio of the number of pensioners during the sample period, suggests the pension system in Tanzania was very strong.



**Figure 5: Ratio of Pensioners to Members (Demographic Ratio)**

The simulation results of demographic ratio plotted in Figure 5 shows that the ratio rose from 5 percent in 2010 to 18 percent in 2045, which is still small when compared with the projected 83 percent of the uncovered workforce in 2045. This finding suggests the existence of an adequate room to increase members of the social security schemes if there are interventions to extend the coverage of the schemes. The result also shows that as of 2013, the actual and projected coverage of pension schemes was 8.4 percent (Figure 5). This coverage is deemed to be

inadequate and may, therefore, hinder growth in the payment of pension benefits; a development that would not only affect benefits but also lead to intergenerational transmission of poverty amongst beneficiaries.

### 5.3 Coverage Rates

Results for the coverage rate (CR), which is another measure of adequacy obtained by equation (9), suggests that there is room for improvement in the coverage if the government puts in place appropriate interventions. Specifically, the result suggests that given a small growth of 8 percent per annum, the coverage of pension can increase from the current level of 8.4 percent to about 70 percent in 35 years (Figure 6).

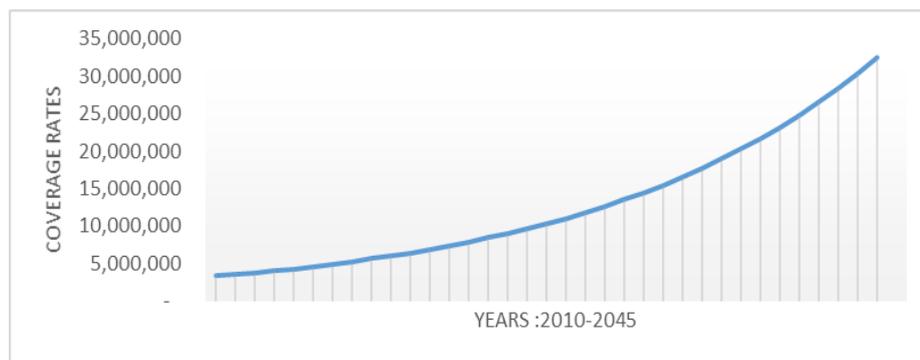


Figure 6: Level of Members to Workforce (System Coverage Levels)

### 5.4 Total Benefits

Equation (13) was used to compute total benefits paid in the form of commuted pension and monthly pension. The results show that when a member is paid a full amount (i.e., pension payments without commutation), benefits become adequate in line with the prescribed formula (Figure 7).

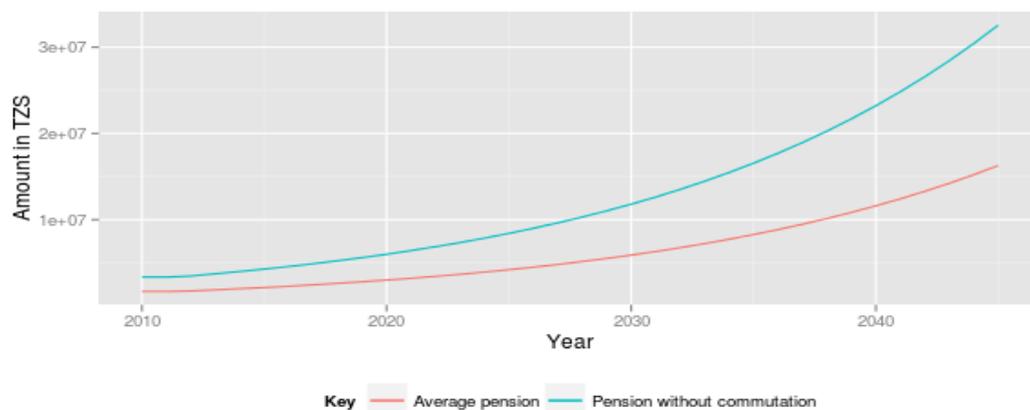
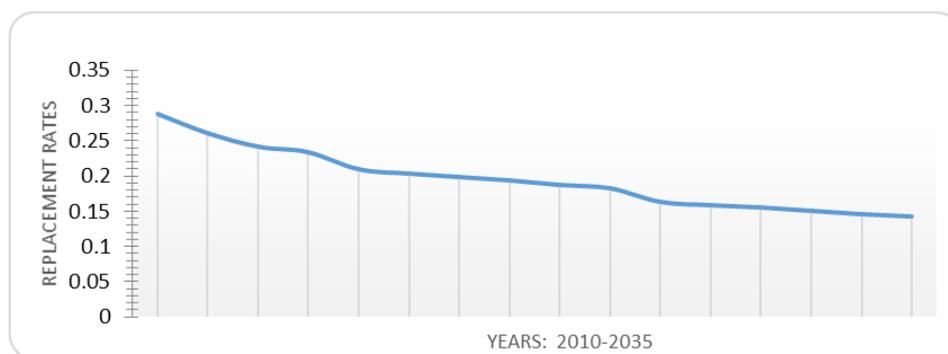


Figure 7: Total Benefits (Total Pension without Commutation).

According to the results, the removal of commutation would improve benefits adequacy, as replacement rate would rise from 29 percent to 54 percent. It is noteworthy that empirical results reveal the existence of a negative correlation between commutation and monthly pension.<sup>10</sup>

**5.5 System Replacement Rate**

Typically, each pension scheme in Tanzania has its own replacement rate. For this reason, the analysis used the average pension and average contribution rate to compute system replacement rate by using equation (14). The results show that the system replacement rate (SSR) starts from 29 percent in 2010, and decreases consistently during the projection period (Figure 8). This result suggests that the pension payment is quite inadequate, as it replaces only 29 percent of a salary.



**Figure 8: Actual System Replacement Rates.**

It is noteworthy that inadequacy of pensions has been one of the main complaints from pension members in Tanzania. The statutory replacement rate, which ranges between 67–77 percent, is what members were promised; and is an important factor in enticing members to join the schemes. However, the results reveals that monthly pension payment in Tanzania replaces only 29 percent of a salary, a rate which is lower than the statutory rate benchmarked on the social security laws. Also, noteworthy, the actual SRR of 29 percent is quite below the international standards of the ILO Convention 102 of 1952.

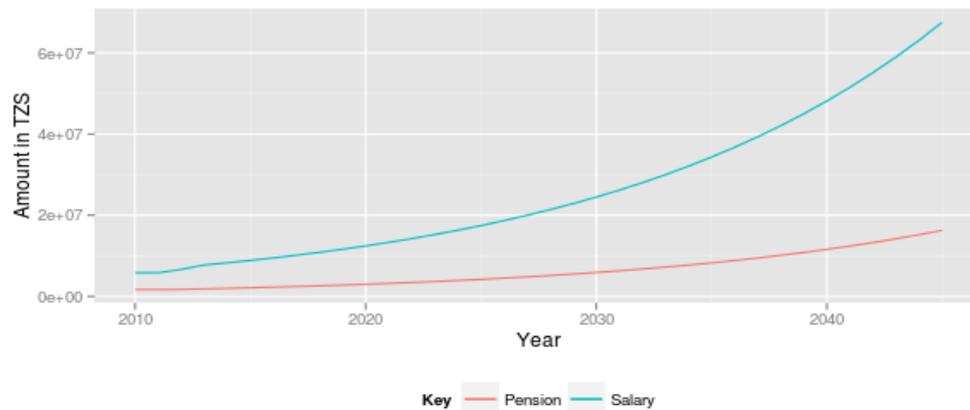
Furthermore, the results show that pension payments become inadequate when commutation is included in the analysis.

**5.6 Indexation of Benefits**

Indexation of benefits by factoring de facto inflation rate and wage growth is one of the approaches used to improve adequacy of pensions. The estimation results by

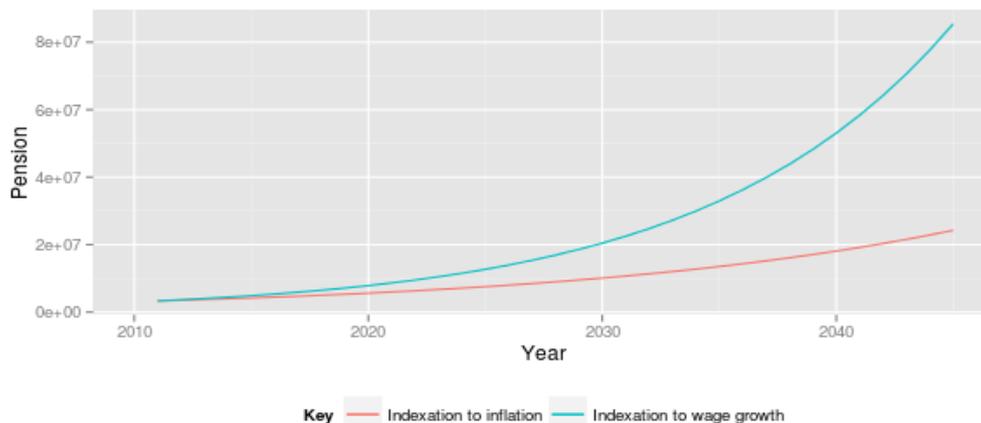
<sup>10</sup>Pension members in Tanzania have always preferred lump-sum payment to sort out their lifetime requirements, such as building houses, farming or starting a business so as to boost their incomes in the retirement period.

indexation of the pension benefits, reveals improvement of replacement rates.<sup>11</sup> Specifically, the plot in Figure 9 shows total benefits increases exponentially during the projections period. Nonetheless, notwithstanding the indexation, the associated replacement rate is still below the statutory rate (67–77 percent) in Tanzania.



**Figure 9: System Replacement Ratio (Ratio of pension to salary)**

Specifically, the SRR rose from 29 percent to 56 percent in 2010 and reached a 40 percent threshold in 10 years. Although the improvement is in line with best practices and international standards, the plot in Figure 10 shows that when pensions are indexed to inflation, the adequacy improves at a declining rate over time. However, results suggest that when pensions are indexed to wage growth, projected pension payments increase at an increasing rate, which indicates that wage is a better indexation factor than inflation (Figure 10). In general, the finding tends to confirm the inadequacy of pension payments in Tanzania.



**Figure 10: Pensions Indexation**

<sup>11</sup> The indexation factor based on the inflation rate of 6 percent, which was the average annual inflation rate during the period 2010/11–2015/16.

### **5.7 System Catchment Rate**

A catchment rate (CatR) is the rate that measures the amount of earnings paid as contributions to the total amount of earnings received by the registered person from the employment. The CatR results obtained by using equation (15) show the amount paid as contributions excludes other allowances, especially for public sector workers. The exclusion of allowances lowers the catchment rate to an average of 60 percent. The low catchment rate makes retirees worse-off after retirement because during retirement there are no allowances and, perhaps, any other income to top up pension benefits if a person does not have any other income-generating investment.

## **6. Conclusion**

This study has dwelt on the adequacy of the pension payment system in Tanzania. The analysis used demographic data and pension funds data for the period starting from 2010. First, the results suggest that despite high statutory replacement rates, the social security system in Tanzania is inadequate due to commutations. Thus, reducing or removing commutation may boost pension because commutations not only seem to reduce monthly pensions, but also distort the expenditure pattern of pensioners.

Second, the catchment rate is low, which affects the adequacy of pension. There is a need, therefore, to establish a policy measure that would ensure contributions are based on the consolidated income of members (contributions should include bonuses, per-diems, and allowances). Third, the results reveal that indexation increase pension payments. In relation, the results revealed indexation of pension by using wage growth is a better option for improving the adequacy of pension schemes. Fourth, there are big prospects for increasing members of the schemes. The demographic structure of the country supports increase in coverage. The government is advised to take advantage of demographic dividends by instituting policies that encourage people to join pension schemes, even those engaged in informal sector activities.

It is evident that parametric reforms implanted in Tanzania for over two decades have improved the social security system by establishing a strong legal, regulatory framework; enhancing scheme governance; safeguarding investment prudence; and reducing administrative expenses. Nonetheless, there are few critical challenges that remain unsolved. These include the deteriorating financial sustainability of some public pension schemes, low coverage of membership, lack of pension to the informal sector, and the lack of universal old age pension. Against this backdrop, a question arises: *for how long would it be before Tanzania finds herself in another major parametric / structural reforms that could address those challenges?*

Notable, there are several aspects on social security not covered by this study. More research work is called upon, for example, on fiscal implications of the social security schemes in Tanzania, and the affordable option; how to improve replacement rates after retirement; and whether the country could go back to a defined contribution system. Micro-survey studies in these areas could be very illuminating on the remaining challenges and potential policy options.

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