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**An assessment of adequacy of pre-retirement savings  
for sustainable retirement income under the Nigerian  
2014 pension scheme**

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**Abstract**

**Aim/purpose** – The main objectives of this article are to estimate percentage of pre-retirement savings that is needed, based on the current salary scale, to sustain academic and non-academic staff of Federal Universities in Nigeria in retirement using University of Lagos as a case study.

**Design/methodology/approach** – The methodology of the article was designed by modifying the life-cycle model of household behaviour combine with the target replacement ratio benchmarks for different income levels as used by Pension Commission 2004, expressed in 2013 earning terms.

**Finding** – The research findings show that the lowest income earner with entry age of 25 years and retirement age of 65 years should, without any interruption throughout the service years, contribute a minimum of pre-retirement savings of 28.01% on an annual

basis from his or her emolument to maintain the pre-retirement standard of living once he/she has ceased working.

**Research implications/limitations** – The scope of this research study is subjected to some limitations: (1) scarcity of pension financial data in Nigeria; (2) the academic and non-academic staff of Federal Universities in Nigerian using University of Lagos as a case study.

**Originality/value/contribution** – The study has established the minimum contribution rate into the Retirement Savings Account so as to meet the internationally acceptable replacement ratio for employees of the Nigerian Federal Universities.

**Keywords:** adequacy, replacement rates, actuarial assumptions, salary-scale and consumption smoothing.

**JEL Classification:** B26, C51, D15, D31, E12.

## 1. Introduction

For quite a long time, the Nigerian public sector pension system had been the ideal scheme designed to provide contingency benefits in Nigeria, in addition to gratuity and pension for life, to protect against the risk of poverty in old age and ensure consumption smoothing from one's work life into retirement (Holzmann & Hinz, 2005). Most countries have developed systems to provide pensions on retirement in old age, which may be sponsored by employers and/or the state, while in some cases, they may be sponsored by both employers and employees (Eme & Ugwu, 2011).

Some advanced countries have developed special types of national pension or benefits system such as the United States' Social Security system, to help supplement retirees' incomes. In many western countries, this right is embedded in the national constitution, while support for the old is still mainly provided through the extended family kinship system in many underdeveloped/developing countries. While there is a broad agreement among developed countries of the world that pension systems should aim to provide adequate retirement incomes, Nigeria is yet to tackle the challenges of poor administration of her pension scheme and inadequate pre-retirement savings for prospective retirees. Of recent, most countries adopted pension policies that are explicitly designed to provide an income which would ensure that the standard of living of an employee, after retirement, is commensurate with what it was shortly before retirement.

In the process of searching for a sustainable pension scheme, Nigeria emulated the Chilean 1981 pension system in 2004 by moving from a Defined Benefit to a Defined Contribution system. The rate of contribution stipulated by the

government was 7.5% of annual salary for each employee and an equal contribution by the employer. The fiscal impact of the transition dampened the enthusiasm of potential pension stakeholders who were already facing large fiscal deficits (Holzmann, 2012). This change did not eliminate the risk and responsibility of the plan; rather, they were shifted from the plan sponsor to plan participants who must now build an adequate retirement benefit, primarily through contributions while still working (Clacher, Hatchett, & Hurd, 2012).

The 2004 pension system was not appropriate for a country, such as Nigeria. It did not meet the aspirations of improving pension coverage or helping economic growth. The financial and economic crisis of the period hit the scheme in the same way it hit the stock values (Casey, 2011). Also, there were a number of challenges that Nigeria's pension policy makers did not consider as at the time of adopting the 1981 Chilean Pension System. As at the time of adopting the system, the Chilean system was still young, paying relatively few beneficiaries (Kritzer, 1996). The Nigerian pension policy makers did not make an adequate assessment of pension benefits at the time of retirement and consideration was not made for adequate provision of pension income for all income groups. Although, average benefits under the Chilean system are reportedly higher than those under the old system, this comparison may not be fair since current beneficiaries in one program may differ by age and income level from those in the other program (Casey & Dostal, 2008).

Moreover, the 2004 Pension Scheme problems seem to have been compounded by the issues of inadequate knowledge on the part of Nigerian employees of the contributory scheme, lack of competence and technical expertise in prudent management of the pension funds, coupled with the political manipulations in the investment practices of those responsible for the administration of the funds (Abdulazeez, 2014). There were also high and growing administrative costs, inadequate build-up of funds, coupled with the size of the fiscal guarantees involved in pension fund investment and saving strategy, in addition to the inability of potential retirees to meet their expectations of retirement due to poor savings towards retirement while still in service (Bassey, Etim, & Asinya, 2008). Many of the potential retirees were unaware of the fact that they needed 70-80 percent of their prior earnings to keep up their standards of living in retirement (Alford, Farnen, & Schacher, 2004; Palmer, DeStefano, Schachet, & Paciero, 2004; Reno & Lavery, 2007). All these reasons brought hardship; frustration and death to many retirees, thereby making workers dread the retirement phenomenon. The situation was so overwhelming that it discouraged some potential retir-

ees, from preparing for their retirement. The 2004 Pension Act was amended in 2014, due to some challenges, part of which was the need to broaden the base of the retirement contribution rate and enhance the benefits contributors would get from the scheme when they retire.

In the 2014 Pension Reform Act, the total minimum contribution rate of employee and employer was reviewed upward from 15% of the employee monthly emolument to 18%. Also the base of the monthly emolument was widened for the computation of the contributions to include the basic salary, housing allowance and transport allowance (Nigeria Pension Act, 2014). The overall effect of the increase in the contribution rate and the widening of the base of emolument in the 2014 Pension Act have not been tested within the framework of the economic reality in Nigeria. The 2014 Pension Reform contribution rate might have been based on wrong assumptions. This is because the 2004 Pension Reform Act, which was the bedrock of the amended 2014 Pension Reform Act, was suspected to have commenced with a problem at inception, due to lack of actuarial valuation to properly arrive at appropriate contribution rate (Ibiwoye & Adesona, 2012).

Additionally, the Federal Government commissioned studies in 2012 to determine the level of contribution that could meet anticipated pension benefits (Aborisade, 2012). Actuarial reports indicated that, for adequate funding of the public service scheme, 25% of gross emolument of all Government employees needed to be set aside annually to meet existing and maturing gratuity and pension liabilities (Federal Government of Nigeria, 2001, after: Aborisade, 2012). Yet, the Pension Reform Act initially stipulated a contribution rate of 15% of total emoluments, shared between the employee and the employer.

Despite the fact that various indicators have been developed and utilised in developed countries on sustainable pension, no single measure seems to have been taken in Nigeria to offer clear indication of the extent to which the reforms will impact, on the achievement of pension system goals among which is the adequacy of retirement benefits (Grech, 2013). Adequacy, that is: 'How much is enough?' 'How much will I receive?' is a controversial term because it is difficult to base it on one universally accepted measurement (Veit-Wilson, 1998). Public pension schemes, as components of larger welfare regimes, sometimes have roots in different objectives. In some cases, the original aim was simply to prevent people from falling into poverty. In others, pension schemes were intended to help individuals maintain their lifestyle and social position. Consequently, adequacy can be defined in the context of retirement income in two

ways. It can be defined as to what extent retirement income allows individuals to fulfill basic needs, or be defined as to what extent retirement income allows individuals to replicate the standards of living they had while in working life. If the first definition is preferred, poverty thresholds and minimum income standards are more appropriate to assess adequacy. If the second definition is preferred, replacement ratios may be more useful to assess adequacy.

Several indicators adopted in Nigeria appear ill-suited to study the effective impact of the pension reforms, particularly when the nature of the pension system was changed from Defined Benefit to Defined Contribution. If it is globally acceptable that an ideal pension system should have a broad coverage, be fully portable, avoid leakage from early withdrawals, provide inflation indexed benefits that last for life, continued benefits for spouses of deceased retirees and have low administration cost (Reno & Lavery, 2007); then the adequacy of the new stipulated contribution rate (18%) in the 2014 Nigeria Pension Reform Act for achieving a sustainable retirement income, needs to be investigated.

The challenge still remains as to the capacity of the earning power of Nigerian retirees in meeting their basic needs at retirement, since an objective appraisal of the implementation of both the 2004 and 2014 Pension Schemes has not indicated any convincing evidence that the Scheme is leading the country in the right direction, thereby casting a doubt on its chance to succeed (Anyim, Olusanya, & Okere, 2014). The aim of this study therefore, is to carry out an analysis of the adequacy of pre-retirement contribution rates vis-à-vis the current salary structure of the Nigerian potential retirees. The result of the study would guide the policymakers, pension-sponsors and employers in addressing deficiencies in the current pension systems, and ensure adequacy of the retirement benefits for a satisfactory standard of living for potential Nigerian retirees as set by the International Labour Organisation (ILO).

The paper was divided into six sections, section 1 introduces the subject matter, while section 2 presents a review of literature, section 3 describes the research methodology employed for the study, section 4 – the research findings and discussion of the findings, section 5 – conclusions, and section 6 provides the recommendation of the study.

## **2. Literature review**

There has been little or no formal research on estimating retirement benefit adequacy for Nigerian households. In fact, much of the current debate on the issue of pension reforms has focused mainly on general fiscal policy rather than

being concerned with individuals' retirement incomes. Recently, researchers have broadened their analysis beyond fiscal considerations of pension by delving more into the broader implications of those policy changes (Grech, 2013), finding a solution to the challenge of assessing the pre-retirement savings required to retire comfortably and how to achieve wealth adequacy in retirement (Montalto, 2001). The change in the direction of the research focus which was inspired by a shift in thinking on pension reforms in the international economic institution is for pension system to provide adequate, affordable, sustainable and robust benefit for the retiree (Grech, 2013).

Several surveys have been devoted in other countries of the world to identifying the main causes of retirement benefit inadequacy. The surveys suggested that pre-retired people are not saving adequately for their retirement, and thus need additional savings in order to maintain the preretirement level of living during retirement (Bernheim, 1996; Burns & Widdows, 1988; Duncan, Mitchell, & Morgan, 1984; Engen, Gale, & Uccello, 2000; Li, Montalto, & Geisteld, 1996; Mitchell & Moore, 1998; Moore & Mitchell, 2000).

A variety of techniques have been used in previous studies to estimate the amount needed to finance retirement consumption and to project the resources available for retirement. Yuh, Montalto, & Hanna (1998), used the household's level of preretirement consumption as a proxy for the household's desired level of retirement consumption. Some of the studies used needed information on the future rates of return, or growth rates, for assets to project the value of retirement benefit for pre-retired households at the point of retirement in the future. For example, Burns & Widdows (1988), used a common growth rate of 0% and 3% for all financial assets while Moore & Mitchell (1997), project individual components of net financial wealth assuming the growth rates are geometric averages of historical real returns. It is an improvement over the use of a common growth rate for all financial assets. It, however, ignores risks associated with investments due to changes in interest rates over time. Yuh et al. (1998), also project individual components of financial and non-financial wealth, but use both average and pessimistic growth rates generated from historical rates of return and a lognormal forecasting model. Also, Grech (2013), Moore, Robson, & Laurin (2010), MacDonald, Moore, Chen, & Brown (2011), Wolfson (2011), Brady (2010), OECD (2011), and Purcell (2012) used other several approaches to measure the adequacy of retirement income.

As cited in Li et al. (1996), two categories of empirical research on financial adequacy for retirement are relevant to this study. The first category of em-

irical studies uses savings adequacy as an indicator of how well an individual is preparing for retirement at the point of retirement. The second category of empirical studies focuses on developing an objective measure to directly estimate the amount of financial resources needed for retirement. Both categories of research assume consumption smoothing. This assumption implies that the level of consumption in any given period is a good proxy of the individual's desired level of consumption.

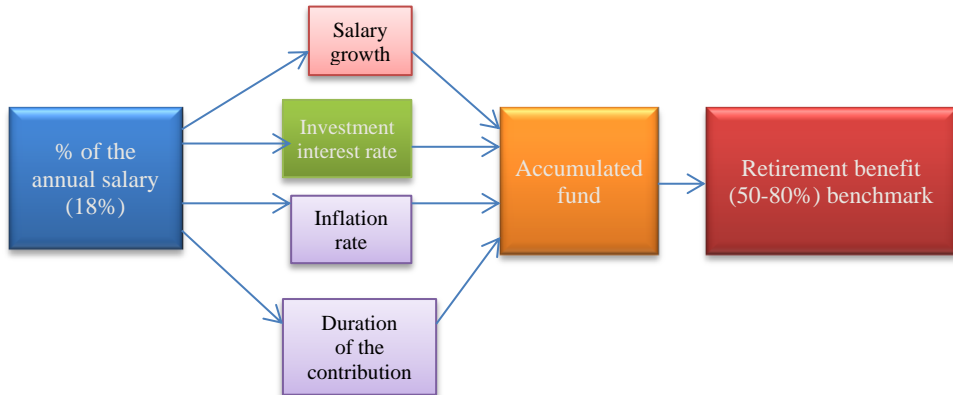
In order to measure the adequacy of the retirement income, a replacement ratio (the ratio of post-retirement to pre-retirement income) is most commonly used (Schulz & Leavitt, 1983). For example, Palmer (1989, 1992, 1994, 2008), Burns & Widdows (1990), Chia & Tsui (2003), Mitchell & Moore (1998), Moore & Mitchell (2000), Butrica, Iams, & Smith (2003), Haveman, Holden, Wolfe, & Sherlund (2005), Munnell & Soto (2005), Munnell, Webb, & Golub-Sass (2012), and Tudor (2012) have used replacement ratios for assessing pre-retirement savings targets for retirement wealth adequacy. The concept of replacement ratio is usually used to compare the starting pension to the earnings received prior to retirement. The underlying principle behind this measure is the assumption that the pensioner's needs and consumption level are linked to his/her pre-retirement income (Antler & Kahane, 1987).

In addition, economists have produced a number of estimates on readiness of retirees for retirement in the course of some of their research studies in the last decade using different research methods (Leonesio, 1996). For example, Bernheim, Forni, Gokhale, & Kotlikoff (2000) used ESPlanner calculator and Financial Planner respectively to estimate pre-retirement savings rates and realised that most household savings are too small for their retirement.

This study attempts to modify the standard life-cycle hypothesis (as used in (Li et al., 1996)) to build an actuarial pension and investment model, as described in the conceptual framework in Figure 1 below. The framework was developed based on the available information provided in the Nigeria 2014 Pension Act. This is combined with the optimal benchmark required percentage of pre-retirement income as defined by poverty and other threshold that is needed, to sustain a potential retiree's living standard at retirement. Individuals are assumed to know the date at which they will retire and how long they will live, and therefore accumulate financial resources prior to retirement so that they will have sufficient resources to satisfy the financial needs of retirement. At the planned date of retirement, if the accumulated financial resources are greater than or equal to the financial resources needed for retirement, the individual has

adequate financial resources for retirement. On the other hand, if the accumulated financial resources do not exceed the financial resources needed for retirement, the individual has inadequate financial resources for retirement.

**Figure 1.** Conceptual framework



Source: Authors (2018).

### 3. Research methodology

#### 3.1. Method of data analysis

The value of minimum needs as defined by poverty or other thresholds for future retirees is established, by calculating the adequate pre-retirement contributions needed to provide the reasonable amount of after-tax income in retirement, as that received prior to retirement, after adjusting for differences in savings, age, and work-related expenses. This study uses actuarial fundamental rules in practice, for calculating retirement contributions, from net income of the current annual salary on the basis of target replacement ratio benchmarks for different income levels as used by Pension Commission 2004, expressed in 2013 earning terms (Table 1).

The contributions are accumulated in an individual retirement savings account (RSA), which is used at retirement to obtain the pension income. No guarantee is naturally implied before retirement, unless ancillary benefits have been underwritten; after retirement, a 10-year guarantee is provided since the benefits stated in the 2014 Act consist of an immediate life annuity with a 10-year guarantee. The contribution receipt and anticipated benefit payments are actuarially



compared at the retirement date; accumulated values of contributions are obtained and the present value of benefits is obtained in order an equality of values. To make the discounting process valid, the analysis was carried out assuming an average rate of interest at which the contributions can be invested in future. This rate of interest, which represents the long-term yield expected to be obtained on new investments made, is used in the analysis.

The analysis was done using basic elements of the required functions stated over the years, by actuaries. They are used for developing tools and methods of computation, which are appropriate to the requirements of the framework-computation of the assessment of the contribution rates, required to support scheme of benefits of a proposed pension scheme as stated in Lee (1986, p. 200), and then implemented by R-Language Code, as follows:

- (i) Rate of probability of future events giving rise to benefit payments from the scheme. This rate, can also be used to arrive at the number of survivors as contributing members from time to time, out of an initial group; and hence at the pattern of contributions to the scheme.
- (ii) Rate of mortality of pensioners.
- (iii) Elements which will enable the amount of each future payment into and out of the scheme to be estimated.
- (iv) Compound interest functions.

To consider the basic elements of required functions and the construction of various functions from them, a single salary scale which is normally used for the pay projections of a large group of members was constructed, although this may represent a sweeping simplification of a complex situation (Lee, 1986).

The Net Income Target Replacement Ratio will provide an early insight to career individuals who want some idea about whether their projected savings may be reasonably on target. This will enable them to adjust their current living standards for a sustainable retirement life.

### **3.2. Actuarial assumptions for the analysis**

The contributions and benefits of most pension schemes are based on pensionable earnings. This requires some method of actuarial projections in line with Act No. 4 of the 2014 Nigeria Pension Act and guide lines issued by Nigeria Pension Commission, to estimate amounts of pensionable earnings from time to time in the future, and allow for equitable transfer of risk in many situations; hence the contribution rate is set using the following assumptions:

1. At least 50% of the accumulated contribution fund of the employee will be used at retirement age  $y$  to purchase a monthly single-life immediate annuity, with a guarantee of payment for at least 10-years at that time. This is in line with Act No 4, Part XII of the 2014 Nigeria Pension Act and guide lines issued by Nigeria Pension Commission.
2. The salary scale is  $s_x = 1.03^x$  for **CONUASS** and  $s_x = 1.04^x$  for **CONTISS**, where  $y$  is an integer (Actuarial projections to estimate amounts of pensionable earnings from time to time in the future). This based on recent empirical study of CONUASS and CONTISS salary structure (Sogunro, 2016).
3. The salary is assumed to increase continuously. This is for ease of analysis.
4. The contributions to the fund are made at the end of the each month within the year, based on the net income salary for that year. This is in line with Act No. 4, Part IV, 11(3b) of the 2014 Nigeria Pension Act.
5. Contributed funds invested, are assumed to earn 6% effective rate of interest. This the average of annual returns on pension funds invested over the period of 2014 to 2016 in Nigeria.
6. Annuities purchased at retirement are priced and computed assuming an interest rate of 4% per year based on PMA92C20 Mortality Table. This is the rate in use in the insurance industry in Nigeria.
7. Funds are invested and paid out in full upon withdrawal from the scheme. This is in line with Act No. 4, Part XII of the 2014 Nigeria Pension Act and guide lines issued by Nigeria Pension Commission.
8. Retirement age is  $y$  (Variable age at retirement).
9. The target replacement ratio (TRR) % is the benchmark suggested by pensions commission (2004), expressed in 2013 earning term, with the corresponding equivalent value in Naira of the net income (current) salary  $\mathbb{N}(SAL)$  of the participant.as shown in Table 1 below.

**Table 1.** Replacement ratio benchmarks for different income levels as used by the pension's commission 2004, expressed in 2013 earnings terms

Earnings	Target replacement rate	Target replacement income
Less than £12,136	80%	Less than £9,709
£12,136 – £22,354	70%	£8,495 – £15,647
£22,355 - £31,936	67%	£14,978 - £21,397
£31,937 – £51,098	60%	£19,162 – £30,659
Over £51,098	50%	Over £25,549

Source: Department of Work & Pension (2013).

### 3.3. Data analysis

If on the average, the age at entry of Nigerian employees is assumed to be 25 years, given an initial salary rate of  $(SAL)_x$  per annum and  $(1 + e)^x$  the inflation factor, where  $e$  is the assumed annual rate of future salary escalation. As everything is described in proportion to salary, the amount assumed does not matter. Then the annual salary rate (ASR) at age  $x > 25$ , can be defined as:

$$(ASR) = (SAL)_x(1 + e)^{x-25} \quad (1)$$

Let  $C$  be the proportion of salary contributed where salaries are paid  $m$ -times in a year. Therefore the contribution made at time  $t$ , where  $t = \frac{1}{m}, \frac{2}{m}, \frac{3}{m}, \dots, \frac{m(y-25)}{m}$  is:

$$\frac{C}{m}(SAL)_x(1 + e)^t \quad (2)$$

If  $C$  is the proportion of salary contributed each year, then accumulated amount of fund ( $\mathbb{N}F$ ) at retirement age  $y$  for the participant, where  $y$  is the retirement age is:

$$\mathbb{N}F = \frac{C}{m}(SAL)_x \left( \sum_{j=1}^{m(y-x)} (1 + e)^{\frac{j}{m}} (1 + i)^{y-x-\frac{j}{m}} \right) \quad (3a)$$

This can be evaluated as:

$$\mathbb{N}F = C(SAL)_x \left( \frac{(1+i)^{y-25} - (1+e)^{y-25}}{m \left( \left( \frac{1+i}{1+e} \right)^{\frac{1}{m}} - 1 \right)} \right) \quad (3b)$$

Where  $i$  is the rate of investment return per annum.

The salary received in the year prior to retirement under the assumptions is:

$$\frac{S_y}{S_x} = (SAL)_x(1 + e)^{y-x-1} \quad (4)$$

Using the target replacement ratio (TRR), which corresponds to the equivalent value in Naira of the net income (current) salary of the participant listed in Table 1, then the target retirement benefit (TRB) per year on retirement at age  $y$  is:

$$(TRB) = (TRR\%)(SAL)_x(1 + e)^{y-x-1} \quad (5)$$

The Expected Present Value (EPV) at retirement of the benefits of (TRB) per year to the member is:

$$(EPV) = (TRR\%)(SAL)_x(1 + e)^{y-x-1}(a_{y:\overline{10}|}) \tag{6}$$

where  $a_{y:\overline{10}|}$  is a discrete 10-year certain and life annuity immediate to a life aged  $y$ . That is, if the annuitant survives more than 10 years, payments will continue until his death.

The present value random variable for the benefit  $a_{y:\overline{10}|}$  is defined as:

$$Y_{y:\overline{10}|} = \begin{cases} a_{\overline{10}|}, & \text{if } K_y \leq 10 \\ a_{\overline{k}|}, & \text{if } K_y > 10 \end{cases} \tag{7}$$

and  $a_{y:\overline{10}|}$  is evaluated as:

$$a_{y:\overline{10}|} = a_{\overline{10}|} + {}_{10}E_y a_{y+10} \tag{8}$$

Where  $a_{\overline{10}|}$  is the present value of a temporary annuity-certain:

Similar results for the present value of a 10-year guaranteed  $m$ -thly payable whole life annuity-immediate  $a_{y:\overline{10}|}^{(m)}$  is evaluated as:

$$a_{y:\overline{10}|}^{(m)} = a_{\overline{10}|}^{(m)} + {}_{10}E_y a_{y+10}^{(m)} \tag{9}$$

Hence, the expected present value of the benefit at retirement is:

$$(EPV) = (TRR\%)(SAL)_x(1 + e)^{y-x-1} \left( \left( \frac{1-(1+i)^{-10}}{m \left( (1+i)^{\frac{1}{m}} - 1 \right)} \right) + {}_{10}E_y a_{y+10}^{(m)} \right) \tag{10}$$

For equity and soundness of the fund, it will be assumed that the fund accumulated at retirement ( $F$ ) should be equal to the expected present value ( $EPV$ ) of the retirement pension benefits at age  $y$ . This implies that:

Equation (3b) = Equation 10, that is:

$$C(SAL)_x \left( \frac{(1+i)^{y-25} - (1+e)^{y-25}}{m \left( \frac{1+i}{1+e} \right)^{\frac{1}{m}} - 1} \right) = (TRR\%)(SAL)_x(1 + e)^{y-x-1} \left( \left( \frac{1-(1+i)^{-10}}{m \left( (1+i)^{\frac{1}{m}} - 1 \right)} \right) + {}_{10}E_y a_{y+10}^{(m)} \right) \tag{11}$$

Assuming 50% of the fund in the Retirement Saving Account (RSA) is used to purchase guaranteed annuity at retirement according to the Pension Act, then the percentage contribution ( $C$ ) needed by the Nigerian employees for their targeted retirement benefit can be obtained by solving for ( $C$ ) in the equation 11.

$$C = \frac{2(TRR\%)(1+e)^{y-x-1} \left( \left( \frac{1-(1+i)^{-10}}{m \left( \frac{1}{(1+i)^m - 1} \right)} \right) + 10E_y a_{y+10}^{(m)} \right)}{\frac{(1+i)^{y-x} - (1+e)^{y-x}}{m \left( \frac{1}{(1+e)^m} - 1 \right)}} \quad (12)$$

Therefore, *total Annual Contribution is C (Annual salary)* and, the amount of monthly contribution ( $\frac{1}{mthly}$ ) is

$$\text{Monthly Contribution} = C \left( \frac{(SAL)_x}{m} \right) \quad (13)$$

### 3.4. Actuarial determination of adequate contribution from the employee's income

In order to estimate the required amount of pension earnings from time to time in the future and allow for equitable transfer of risk in many situations, the income in retirement is considered and determined using the following assumptions which are in line with Act No. 4 of the 2014 Nigeria Pension Act and guide lines issued by Nigeria Pension Commission.

1. Retirement income is measured from the year of reaching pension age  $y$ , and consists of government pension as stated in the pension Nigerian Pension Reform 2014 Act – Defined contribution and Annuities.
2. Potential income from other forms of wealth, particularly investment income, is not included. With this, adequacy of the stipulated contribution stated in the 2014 Act can be determined.
3. Income from sources other than government pension is excluded from the calculation of the retirement benefits. With this, adequacy of the stipulated contribution stated in the 2014 Act can be determined.
4. Salary is assumed to increase continuously for ease of analysis.
5. The 18% stipulated in the Pension Reform Act 2014, is not used directly since one of the objectives of this study is to question its adequacy
6. The estimates of the pre-retirement contribution or benefit are based on pension reform policies which are subject to change. This can include changes in both entry and exit ages. This is in line with Act No. 4 of the 2014 Nigeria Pension Act and guide lines issued by Nigeria Pension Commission. The estimates have not taken the employers' policy into consideration.

7. Inflation, earnings growth and the labour market are consistent with medium and long term assumptions taken into consideration in the present economic situation of the country. The investment rate  $i$  was determined by; (1) averaging returns of long-term bonds in the stock market in Nigeria during the period of this research and (2) allowing for expenses considered by the Pension Reform Act for pricing the annuity model (e.g. tax on the net premium, inflationary rate, NICOM levy, market fluctuation, initial expenses, renewal expenses, commission to agent, and profit margin).
8. The Pensioner Mortality Table, PMA92C20 used in United Kingdom was used in the computation of the life annuity-certain for the retirement benefits; this is because it is similar to the mortality pattern in Nigeria presently. The male pensioner mortality table is also used for both male and female participants.
9. The research study took into consideration the situation of the Nigerian labour market and pension incomes for qualified ages, as stipulated in the 2014 Reform Act.

#### **4. Research findings and discussion**

The Net Income Target Replacement Ratio and some important actuarial assumptions have been applied to investigate and assess the adequacy of the contribution rate stipulated in the 2014 Nigerian Pension Reform Act. The contributions are payable into the Retirement Savings Account (RSA) of the employees while in service. Also, the pre-retirement savings that can adequately fund the retirement consumption of potential Nigerian retirees has been estimated. The calculations were based on the target replacement rate/ratio benchmarks suggested by the Pension Commission UK (2004), expressed in 2013 earning terms. It ranged between 50% and 80% for both high and low income earner respectively. The replacement rates/ratios used by the authors for the analysis, are consistent with previous studies by Palmer (1989, 1994) and Duncan et al. (1984). They suggested replacement rates/ratios ranging from 65% to 85% and 70% to 90%, respectively, for calculating pre-retirement savings of potential retirees.

The results of the analysis show that, there is need for an increase of about 10.01% over the minimum contribution stipulated in 2014 Act. That is, the least income earner in Nigeria with entry age of 25 years and retirement age of 65years, need to contribute a minimum of 28.01%, instead of 18% prescribed in

the Act so as to maintain the consumption level and maintain the pre-retirement living standard during retirement. The income individuals will need to live comfortably in retirement can differ substantially across households, depending on individual retirement goals and accumulated personal savings and investments. This was not considered in the determination of the contribution rate in the 2014 Act. The plan sponsors are only concerned with the upward review of the contributions rate in the new act. They measure retirement readiness, by looking at the RSA accumulating savings only and not concerned with the effectiveness of such a system in providing a reliable means to smoothen lifetime consumption.

## **5. Conclusions**

### **5.1. Research contribution and implications**

This present study has attempted to fill a gap by determining whether in employees Nigeria are likely to achieve an acceptable standard of living in retirement, using actuarial assumptions and analysis, to measure the sufficiency of the Nigerian public pension plan at retirement. The study used the actuarial analytic principle, coupled with net income of employees, to assess the adequacy of wealth accumulation with a methodology derived from applications of replacement ratio targets. This change in the direction of the research focus was inspired by a shift in thinking on pension reforms among the International Economic Institutions for Pension System, to provide adequate, affordable, sustainable and robust benefits for retirees (Grech, 2013).

The study has established the minimum contribution rate into the Retirement Savings Account so as to meet the internationally acceptable replacement ratio for employees of the Nigerian Federal Universities. The study has also investigated the extent to which the capacity of retirement income is sufficient, to adequately replace a retiree's pre-retirement income. The previous studies have not tested the utility function of the Pension Act in the framework of economic reality to date. Researchers have not linked the minimum contribution of the new Nigeria scheme, to meeting the retiree's basic needs at retirement. Most of the current studies are focused on the issue of pension reforms, rather than on the concern with individual retirement outcomes, e.g. Eme, Uche, & Uche (2014), and Anyim et al. (2014).

Based on the results of the analysis of the study, hardly can Nigerian future retirees replicate their pre-retirement income less work related expenses, enjoy

a decent standard of living and economic independence, as stipulated by the International Labour Organization (ILO) or maintain a lifestyle comparable to their pre-retirement days. This is because of the inadequacy of the stipulated contribution rate in the new scheme. Also, the plan is not linked to products that yield retirement income streams that will last a lifetime. Furthermore, the consumption pattern of the individual is not put into consideration due to the contribution rate of 18%. This is not sufficient for an employee without a constant consumption pattern as postulated by Keynes (1936). Therefore, more needs to be done by the policy makers, the government, regulatory body, plan sponsor and individuals, in order to prevent old age poverty among potential retirees.

## **5.2. Research limitation and future works**

The study, as an appraisal of the current pension regulatory practice by the Nigeria Pension Commission (PENCOM), covers the determination of retirement benefits contribution rate that can provide a robust, adequate and sustainable benefit at retirement for the Nigerian pension system. This can be used by potential retirees to know the proportion of their current salaries to be saved towards retirement benefits in order to enjoy a standard of living acceptable by the International Labour Organisation. It also covers an actuarial computational framework for calculating retirement contributions in the Nigerian context for pre-retired employees by developing an estimating model for retirees' future benefits and income adequacy.

The scope of this research study has, however, been limited to the assessments of the current pensioners' inadequacy/the financial position of savers at retirement as carried out by Butler & Van Zyl (2012) because their retirement benefit contributions are not based on the recent contribution of the 2014 Pension Act. In addition, the goal has been interpreted in terms of total wealth requirements of a household at retirement, and not as an optimal goal for an occupational retirement fund or retirement annuity fund investment. Therefore, only active workers of both the Academic (CONUASS) and Non-teaching (CONTESS II) staff of the Federal Universities in Nigeria that were saving for retirement with a strategic financial planning and reliable investment strategy (all forecast for future living expenses), were considered. The study was, indeed, confined to Academic and Non-teaching staff of the University of Lagos only, due to convenient accessibility and proximity of data to the researcher. The study, in particular, was limited to the investigation of the adequacy of the minimum retire-



ment benefit contributions of employees enshrined in the 2014 Pension Reform Act, with concentration on monthly income needs or lump sum equivalents required to fund a future income stream that will meet the expected standard of living. In mitigating the limitation highlighted above, it is hoped that the findings from the University of Lagos will be applicable to other Federal Universities in Nigeria, since they operate in the same economic, political and legal environment with the University of Lagos. Furthermore, a similar study based on the same principles and ideology can be done on the other sectors of the Nigerian government workers to see if the outcomes of the study will be the same.

## 6. Recommendations

To prevent inadequacy of retirement benefits and guarantee a comparable employee's pre-retired income so as to ensure that older people are not placed at the risk of poverty, but enjoy a decent standard of living after retirement, it is necessary to boost the pre-retirement savings of individuals or groups by employing the following measures:

1. The employer should raise its contribution rate to enable the affected persons or groups meet the pre-retirement savings target.
2. The plan sponsor/employer should make use of incentives that can encourage workers to make voluntary savings above the stipulated rate into their Retirement Savings Account (RSA).
3. The plan sponsor/pension fund administrator (PFA) should widen the investment outlets to expand income and improve returns on investments.
4. The plan sponsor/employer should continuously educate potential retirees on how to get prepared socially, psychologically and financially for their retirement.

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