

Abstracts

The research investigates horizontal equity i.e., extent to which persons with similar income are treated equally, of personal income tax liabilities of nine (9) federal government MDA's and institutions employees on the Consolidated and Unified Salaries Structure scheme in terms of; the minimum and progressive tax liabilities. Secondary data which includes the grade level, steps, statutory deduction and allowance, emolument is collected from the National Salaries, Income and Wages Commission (NSIWC) and FIRS. The data is analysed using multi-level linear modelling techniques i.e., MLM (due to the hierarchical nature of the data, large variance and within MDA's sample dependency) to extract the residuals inputs used to compute the coefficient of residual variation ratio (CRVR). Dis-aggregating the data into minimum or progressive tax rate payments, it was found that: employee charge on the minimum tax rate of 1% are generally horizontally equal, but the rate varied at lower- or upper-income class employee appear more horizontally equal relative to middle-income class employee, employee charged on the progressive tax rate of 7%-33% are however less horizontally equal relative to those with minimum tax rate with the lower and upper income class performing better than those at the middle income class. Overall, the lower- and middle-income earners are found to be less treated equally relative to a specific income group at the upper echelon where a lower horizontal inequality is found.

1. Introduction

In a society filled with distrust and sceptics of government action, equitability and fairness is essential as a tool to right the ills of the society. Tax ensure equality and fairness by redistributing wealth from the have to don't have. The extent to which individual with equals income (or capital, or consumption) class are treated equally in allocating tax burden (i.e. horizontal equity) is a burning issue which has challenge the fairness and equality of the tax system at individual taxpayers' level across the world. This explain the reason why the role of taxation as a veritable tool for revenue generation across the world, is yet to be optimised in Nigeria.

The amendment to the 2004 personal income tax act (PITA 2004), with the introduction of the amended personal income tax act of 2011 (i.e. PITAM) is aimed at increasing government revenue while reducing individual tax payer tax burden. Relevant tax authority aim to achieve equitable tax system by focussing on the income level, tax structure and degree of compliance. Degree of compliance is based on individual perception about how the tax system has been able to meet their needs. In addition, degree of compliance may also be influenced by the level of income individual received. Unfortunately, Nigeria suffers from significant weaknesses in its tax structure which has been reported to be biased downward where high and middle income earners relative to low income earners. Tax compliance had also been at its lowest due to a perceived unequal treatment of the poor by successive Nigerian government in addition to weak implementation of tax reforms.

PIT administration in Nigeria has been designed to follow a progressive tax rate system of between 7%-24% which as expected should at least help to achieve the horizontal equity for the low income, middle- and high-income earners classification. As rightly pointed out by Adekanola (2012) the gap between the PIT provision and the reality on ground with respect to weak tax structure, income level and compliance level of tax payers has defeated the

redistributive goal of a tax structure as an instrument of economic policy thereby increasing inequality rather than achieving equality. Previous studies in Nigeria have explore linkage between culture and tax evasion practice and the impact of PIT reform and tax structure on economic growth, tax management, enforcement and revenue generation capacity of the governments. With respect to equitability of PIT in Nigeria, focused has been on comparing progressivity or verticality of salary and self-employed tax payers and the tax system in general. What elude tax theorist and scholars in Nigeria, is the extent to which the Dual PITAM 2011 provision of 1% minimum income tax for income earners below N300,000 as and 7% to 24% graduated rates for income earners who earn N300,000 is fair or horizontally equitable to justified its utility.

The paper is therefore an empirical investigation of the horizontal equity of PITAM 2011 with a specialised focus on the 1% minimum tax rate and 7%-24% progressive tax rate. The paper review existing knowledge to provide a conceptual as well as theoretical framework for the paper. Previous empirical studies on horizontal equity are then review in terms of their focus, coverage and methodological prevalence. The approach to the present paper is reported next after which the result, discussion of the result, limitation and suggestion for future research is enunciated.

2. Literature Review

2.1 Personal Income Tax Act in Nigeria: An Overview

It is worthy to note that Nigeria as country based on Sorenson explication do not practice a dual income tax system that separate between Labor Tax (Earned Income) and Capital Tax (Unearned Income) since both are inferred to be included under the gross income which is a combination of Gross Emolument plus Unearned Income. The country income tax system can however be argued to be modelled after the global tax system with two (2) tax rate system i.e. the Minimum and the Marginal or Graduated Tax Rate.

2.1.1 Gross Income and Emoluments

Gross emolument according to (KPMG, 2012) includes; “wages, salaries, allowances (including Benefits In kind (BIKs), gratuities, superannuation and any other incomes derived solely by reason of employment”. Gross income as we can infer from the direction of the act according to section 3(1a-1f) of PITA 1993 and section 33 of PITA 2011 (as amendment) include both earned income and unearned incomes. So therefore, gross income equals gross emolument plus unearned incomes. Unearned income (i.e. benefit in cash or kind that are not as a result of; personal efforts or work done for another person) are indicated in sec 3 subsection(1c-1f) of the PITAM to includes; premium on occupation and use of property, dividends, interest or discount forbear; Pension, Charge and Annuity. Gross income therefore includes, but not restricted to ; gains or profit from any business, trading, vocation; salaries and wages; fees, allowance, gains or profits from employment and compensation, bonuses, premium, benefit received or granted by employers; dividends, interest or discount forbear; Pension, Charge or Annuity; as well as other income that may be identified by the Tax Authority in their absolute value without removing any expenses incurred in arriving at such Incomes.

Prior to PITAM 2011, the PIT 1993 did not includes all benefits and pre-requisite receive from employers as part of the gross emolument but from the introduction of PITAM 2011, Section 3 of the PITAM, 2011 includes it as part of the gross emoluments (KPMG, 2012, p. 2). Just like the confusion inherent in the PITAM 2011 it was reported by a PriceWaterCooper Staff that “It is not clear whether benefit in kind to be included in gross emolument should be limited to the taxable portion only or the actual value of such benefits” (Oyedele, 2012). A review of available articles, report suggest that benefit in kind may include 5% of; (i.) entry cost of Official car owned by employer but been used by employee, (ii.) hiring cost of an official car owned by a third party, and (iii.) annual rate or total rent value of

apartment and accommodation provided to employees (Opanubi & Monye, 2013, p. 2). Meal served generally in a canteen, non-transferable lunch voucher, protective clothing and any other expenses are reasonably excluded in arriving at the Benefit in kind value (KPMG, 2012). With regards to the question of equity the inclusion of Benefit in Kind (BIK) is a step in the right direction, but succeeded in reducing the un-taxable portion of middle- and high-income earners since they are the one that will enjoy BIK most.

2.1.2 Minimum and Progressive Tax Structure in PITAM 2011

The concept of minimum tax not only a misnomer, but also an instrument that contradicts both income redistribution and tax equity, and also an instrument used for inflicting double punishment on the poor (Egbon & Mgbame 2015). The current minimum tax is 1% of gross income, which arises when after tax assessment, the taxpayer has no taxable income (S.37 of the Act). Minimum tax means that when an individual taxable income (after all allowable deductions) is zero or lower than the required percentage of his total income, such a person will be required to pay a minimum tax. In PITA 2004, Minimum tax rate was at 0.5%, this rate was however doubled under S.37 of PITAM 2011 to 1%. Although the aim is to achieve tax efficiency objective which provide room for increasing tax and income bound and tax revenue generation ability of government (Akhidime & Abusonwan, 2013). The ripple effect of which result into; expansion of tax scope to includes contract workers, youth coppers and interns, and an increase of tax liability for low income earner relative to middle- and high-income earners with escape route.

The progressive tax structure is provided for in the sixth schedule of PITAM 2011. According to the act income band is increase from N30,000 in PITA 2004 to N300,000 and the tax band increase and reduced from between 5% and 25% to between 7% and 24%. A comparison of three Tax regimes is presented in Table 1.

Table 1: Personal Income Tax Rates (PITA 1993, 2004 and PITAM, 2011)

Level	PITA 1993	PITA 2004	PITAM 2011 6th Schedule
First	N 20,000 at 5%	N 30,000 at 5%	N 300,000 at 7%
Next	N 20,000 at 10%	N 30,000 at 10%	N 300,000 at 11%
Next	N 40,000 at 15%	N 50,000 at 15%	N 500,000 at 15%
Next	N 40,000 at 20%	N 50,000 at 20%	N 500,000 at 19%
Next	N 1,600,000 at 21%		
Above	N 120,000 at 25%	N 160,000 at 25%	N 3,200,000 at 24%

Sources: Oyedele (2012); WIPO (1993); Personal Income Tax (Amendment) Act (2011); CISLAC (2012, pp. 130–131); FIRS (2012) 373-486

Apparently, table 1 shows that; income band increases by 50% in PITA 2004 using PITA 1993 as a base and by 900% in PITAM 2011 using PITA 2004 as a base. The observed percentage increase may be due to many reasons. One rationale may be the need to increase government revenue from Personal Income Tax since over the years personal income tax have been reported to contribute lesser than other type of tax to Federation Account. Another reason is the need to include more tax payers and reduced any perceived inequality in tax payments. Additionally, foreign exchange impact on the naira with its consequent loss of values and devaluation may also necessitated the percentage increase to reflect today's economic conditions.

2.1.3 Reliefs, Deduction and Tax-Free Allowance

The reliefs, allowable deductions, and /tax free allowance considered includes; Consolidated Relief Allowance, Reimbursements, National Housing Fund, National Health Insurance Scheme, Life Insurance Premium and National Pension Scheme.

Tax Free Allowance

Prior to the Amendment of PITA 1993 by both the PITA 2004 and PITAM 2011, the tax legislation i.e. Section 3(1) of PITA 1993 required that specific tax-free allowances e.g. Leave, entertainment, meal, dependent relative, children, transport, personal relief and utility allowance which amount to a total of N210,000 Plus 10% of basic pay and 20% of earned income deducted to be from Gross Emolument as leave and transport allowance respectively (ICAN, 2014; Muhyideen, 2013). The dynamic and fixed allowance are depicted in table 2

Table 2 - Pre 2004 Allowances

Tax Free Allowance Type	Amount (N)
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Fixed Component

Dependent Relative	N4,000
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Children allowance	<=N10,000
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Entertainment	N6,000
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Meal	N5,000
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Utility	N10,000
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Personal allowance	N5,000
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Housing	N150,000
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Transport	N20,000
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Total	N 210, 000
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Dynamic Components:

Leave	10% of basic pay
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Personal allowance 20% of earned income

Source: Introduction to Taxation, Skills Level Taxation (ICAN, 2014, p. 77)

As a result of perceive computational workload by tax consultants and auditors, the multiple allowances were integrated into a generic allowance known as the “Consolidated Relief Tax Allowance (CRTA)” in PITA 2004. In addition to the provision of PITA 1993, PITA 2004 introduce Personal Relief of N5,000 plus 20% of Earned Income (Akhidime & Abusonwan, 2013). This was later amended in section 33(1) of PITA 2011 by Consolidate Relief Tax Allowance (CRTA). The purpose of CRTA is to simplify the complex process of computing and deducting reliefs and allowance. According to Section 33(1) of the new 2011 PITA, all allowable reliefs and allowances has been integrated into the CRTA and is computed as “higher of N200,000 or 1% of gross income plus 20% of gross income (ICAN, 2014), paragraph 1 of the new sixth schedule in PITAM 2011 however, specifies that the CRA be granted on income at a flat rate of N200,000 plus 20% of gross income. Two issues however crop in both the amended version and the Main act. Firstly, tax free allowance for children and dependent relative was rename as sub-section 3 & 4 under the PITAM 2011, rather been deleted to make way for the CRTA. The ambiguity in the issue of CRA and children allowances that was not deleted created more confusion than the complexity it intends to reduce. This issue generates two opinion polls, those advocating inclusion since it’s not deleted and those that advocate ignoring sec 33(3-4) of PITAM since it will go against the purpose of CRTA aimed at simplifying tax free allowance computation. However, since section 33(1) of PITAM was specific about the aspect of deducting CRTA only and subjecting the residue to Tax, there is no need to give attention to the section 3&4 of the act (Oyedele, 2012; SIAO, 2012).

Another issue according to Olugbenro (2013) is the contradiction between section 5(a) of PITAM 2011 and Paragraph 1 & 3 of the Sixth schedule in PITAM 2011 on how the CRTA

should be computed. Paragraph 1 & 3 of the sixth schedule exclude the aspect of 1% of gross income as indicated in sec 5 (a) of the act and includes only N200,000 plus 20% of gross income. The high income earners with income above N20m will definitely prefer the sec 5(a) provision of N200,000 plus 1% of gross income to be retained since they will have option to choose the higher of 21% of gross income rather than N200,000 plus 20% of Gross Income (Paragraph 3 & 4 of schedule 6).

For example, an employee that receive N23m will have option of choosing N4,830,000 (1% +20% = 21% of gross income) or N4,800,000 (i.e. N200,000 +20% of N23m = 4,600,000 +N200,000). Since the law suggest higher of the two computation an employee that receive high income will prefer to stick with the 1%+20% option in section 5(a) of PITA 2011 to continue enjoying higher relief and reducing income. Similarly employee that receive N19m will have option of choosing the higher of; N3,990,000 (1% +20% = 21% of gross income) or N4,000,000 (i.e. N200,000 +20% of N19m = 3,800,000 +N200,000). In the same vein the higher of the two is the N200,000+20% of gross income i.e. N19m. Income earners below N20m will prefer Paragraph 1 & 3 of the sixth schedule. As such high-income earners above N20m either way will definitely benefit more from CTRA than those below N20m as depicted in hypothetical analysis above combined with additional relief such as Insurance, Housing Fund, Pension Fund, Reimbursements which is mostly enjoyed by high income earners. This may lead to implementation issues for taxpayers whose annual taxable incomes are lower or more than N20m (Alpheaus & Ihendinihu, 2016).

Insurance, and Pension Deduction

In Nigeria, Life Assurance policy and National Health Insurance Scheme (NHIS) is exempted from tax. These policies are patronized mostly by the privilege few that is rich. Section 34(2) of PITAM 2011 allows NHIS as an allowable deduction. In addition to the statutory pension contribution scheme the law also allowed employees voluntary savings or contribution to

Pension Scheme. In addition to the statutory contribution by an employer, voluntary contribution to Pension Scheme by employee is an allowable deduction under (sec 34(2) of PITAM 2011). Looking at the contribution to National Housing Funds which is an allowable deduction under PITAM 2011 and the propensity of the rich to dominate the contribution also gives another benefit to the high-income earners.

Reimbursements

Under the Act any expenses incurred by an employee in the process of carrying out an assignment or duty, provided that he is not incurring such expenses to make profit will be deducted Kabir (2017, p. 25). In essence if an employee incurs expenses such as; Hotel bills, Recharge Card Expenses, Fuel Expenses, and Stationary, Transport to site or any other possible expenses, the law allow such expenses to be deducted from the Total Emoluments. If, however it was discovered that such expenses are not wholly, reasonably, exclusively and necessarily incurred for the purpose of performing duties assigned but was for personal activities or activities that are aimed at generating profit, Then the law forbids deducting this allowance. These allowances are expected to be deducted from Gross Emolument before arriving at Taxable Income. High and very high-income earners in the Federal Government employments enjoy these allowances more than other moderate- or low-income earners since they do most of the travelling. Even within the same income class some individual may have more privileged to travel and incurred expenses on behalf of the government than others. In such situation the equal tax burden may not be justify in such a disparity situation and as such there will be horizontal Executive employee of Federal Government are known to possibly enjoy this kind of benefit or relief.

National Housing Fund (NHF) Contribution Deduction

According to the National Housing Fund (NHF) Act of 1992, individuals who earned N300,000 and above annually as income or wages are required to contribute 2.5% of monthly basic salary. Sec 34 (2) of the sixth schedule in PITAM 2011 is silent on where the deduction

should be made from for the National Housing project. The NHF includes both the private and public sector employees. The deduction shall be made by the employers from monthly salary of the employee and remitted to Federal Mortgage Bank of Nigeria (FMBN) within one month following the month when such deduction is affected on employee's gross income. "The Act mandates the Federal Mortgage Bank of Nigeria to collect, manage and administer the fund (ICAN, 2014)". Contributions made NHF fund are allowable expenses.

Gratuities

Gratuity is a lump sum paid to an employee who is leaving an Organization after serving for a statutory period. Gratuity as part of gross emolument and at same time as tax exempt income give rooms for double advantage as it will increase the gross income use in computing CTRA i.e. Higher CTRA and a deduction from taxable income (Alpheaus, Ihendinihu, & Akpu, 2016, p. 231).

2.2 Theoretical Framework

This section covers the review of theories that are relevant to the research. Considering the importance of the concept, different theories have been suggested to deal effectively and efficiently in a tax system. The theories include; ability to pay theory, utility or benefit theory, equal distribution theory and the sacrifice theory. However, because the interest of the paper is to gauge how equals on the basis of income or benefit derived from a state are treated equally by the tax system i.e. horizontal equity. The Benefit theory appear as the most appropriate theoretical framework for the paper. The aim of the study is not to look at the ability of the individual to pay based on its consumption pattern, but to investigate how those with similar income and benefit derived from a state are treated equally by the tax system.

Benefit Theory

According to utility of benefit theory, individuals should be asked to pay their taxes in proportion to the utility or benefit they enjoyed from the welfare provided by the government.

The assumption is that, there should be an interchange exchange of obligation and welfare services between the taxpayer and the government. Government is expected to provide some social and essential services to the taxpayers by providing electricity, road, education, social amenities, adequate care, security and so on. Moreover, the theory advocate for equity or fairness in taxation by stressing that an individuals would be encouraged to pay tax in proportion to the benefits or welfares enjoyed from the services provided by the government. Despite the fact that theory is viewed as statutory exchange of obligation and services between an individul and the government, some issues was identified in applying the theory. The most common argument on principle of utility or benefit teory is how to measure, value or quantify the welfare or benefits enjoyed by taxpayer from the services or amenities provided by the government. For example, how do value or quantify services enjoyed by taxpayer on education, national security, social infrastructure, maintaining law and order provided by government. In addition, various government expenditures on providing welfare services for the citizen are indivisible, which makes it impossible for the expenditure to be divided. This could only prove that citizens are encouraged to pay taxes to the government for the development of the community or nation. Further more, the theory can only be applied in a circumstance of situation where the beneficiaries are easily traceable and identified. For example, it can be used to determine the road taxes paid or collected from road users and owners of vehicles. The utility or benefit theory can also be applied to the labours and workers who have a network of social security program. Therefore, this theory can only provide restricted solution to the issue of fairness and equity in income tax system.

2.4 Review of Related Empirical Studies

Around the world, many studies have been carried out on horizontal equity of income tax depending on the terminology used to describe the title of the studies but in Nigeria, to the best of the researcher knowledge none or few studies have investigated the Horizontal Equity

of Personal Income Tax. With respect to determining equality of a personal income tax, international evidence abound. Berliant and Strauss (1985) investigate equity of US Federal Income Tax from the aspect of horizontal and vertical equity using a time series data. They applied different index measure of inequity that can be sources from extant literature as at that time and found that horizontal inequity is generally high over the period of 1966-1977. Anderson (1985) investigate the equality of economic equals among US Tax payer based on the Minimum Tax provision of 1969, 1976 and 1978 and Fiscal responsibility act of 1982. Using CV and Weighted Average Methodology, the author found out that only the Minimum Tax provision of 1996 best help achieved horizontal equity. Grasso and Frischman (1992) on measuring horizontal equity: a regression approach compared the CV of tax liability as frequently used and CRV as a proposed new measure of horizontal equity. They suggested that the CV increased the amount of horizontal inequity in tax system to level that variation within groups is due to income level. They proposed an alternative measure of HE, the CRV from a regression approach. The CRV adjusts for progressivity and the results was compared with empirical properties of the CV and CRV using 1979 and 1986 tax returns. Westort (2001) investigate the inequity in tax liability of economic equals by comparing CRV based on expanded income variable only and an expanded model that includes other variable. He found that the existing CV and CRV underestimate the level of inequity. Lambert and Thoresen (2011) examined horizontal equity of two tax rate regime of Norway using the coupla function on micro data between 2000 – 2008 and found out that horizontal inequity is reduced in Norway after the 2006 reforms. Rhame and Walsh (2011) looks at the response of common horizontal equity measure to a situation of omitted income. They compared Coefficient of Variation (CV) with Coefficient of Residual Variation (CRV) and found that both approaches are susceptible to omitted income and allowable expenses. Finally, John (2018) assessed the taxation of superannuation under horizontal and vertical equity to ascertain whether the current Australia

's superannuation is equitable. The research was conducted to have a better of understanding of three major components of Australia's superannuation system, being taxation on contributions, benefits and fund income. The study observed that the high-income earners with high marginal tax rates benefit most from the exception policy in taxation of superannuation. These findings support the globally view held that the superannuation system is inequitable given that high income earners receive the highest tax allowable compared to low income earners, who receive little or no concession.

In Nigeria, Ilaboya and Ohonba (2013) examined the effect of direct and indirect tax on income inequality using tax information from 1980 to 2011. They used multivariate econometric method to determine the effect taxation of on income inequality in Nigeria. Their study found a significant negative relationship between total tax revenue to GDP and income inequality in Nigeria, and insignificant positive impact for other variables. Egbon and Mgbame (2015) explore the question of how progressive (or vertically equal) is the PIT in Nigeria by conducting a systematic review of existing literature and found that the rich are favor the rich at the expenses of the poor. They however provide no empirical data or claim to justify their claim but rely on secondary sources which are well known to be prone to bias and subjectivity issues. Finally, in a related study, Alpheaus and Ihendinihu (2016) compared tax burden of self-employed individual to salaries based tax payers under two regime of tax law i.e. the PITA 2004 and PITAM 2011 using Unified Salary Structure of University of 259 staff of Federal University and 60 self-employed individuals in Abia State. Using analytical techniques that looks at the differences in tax regime and in tax group, the study founds PITA 2004 to be more equitable for self-employed than salaries tax payers. For a period of seven years (2011 to 2018) when the amendments were affected on PITA 2004 in Nigeria, To the best of researcher's knowledge no or few research effort has used income and domestic information of individual or taxpayers to assess how horizontally equitable is the Personal Income Tax in Nigeria.

3. Methods

3.1 Data Source and Sample

Gross emolument data for the study was sourced from the National Salaries Income and Wages Commission (NSIWC) offline archived database. The data consist of unified salary structure for Grade Level 1 to Grade Level 17. Meanwhile, data on Income Tax Liability, Total Allowances and Minimum Tax Assessment were estimated or computed using the Federal Inland Revenue Service (FIRS) Personal Income Tax Liability Calculator (Excel Spread Sheet) as attached in the Appendix. The NSIWC data consist of 1,315 (One Thousand Three Hundred and Fifteen) hypothetical employees from different Federal Government MDAs belonging to a specific grade level of 01-17 and steps 01-15. Simply put there is at least, 1 employee from a grade level-step combination from each Federal Government MDAs population in the study.

Because of issues of few data from some federal government MDA's, One Thousand, Two Hundred and Thirty-Five (1,235) employees-Grade-steps from Nine (9) Federal Government MDAs and Public Institutions were included as final sample for the study. The breakdown of number of employee-grade level-step per each MDA's or institution is listed Table 1 below:

Table 1 Summary of Employees of Nine (9) Federal Government MDAs and Institutions

S/N	MINISTRIES DEPARTMENT AND AGENCIES AND INSTITUTIONS	NO OF EMPLOYEES
1.	The Consolidated Top Federal Public Office Holders' Salary Structure (CONTOPSAL) effective from 1 st July, 2010.	20
2.	The Consolidated Public Service Salary Structure (CONPSS) effective from 23 rd March, 2011.	210

3.	The Consolidated Polytechnics and Colleges of Education Academic Staff Salary Structure (CONPCASS) effective from 23 rd March, 2011.	99
4.	The Consolidated Tertiary Educational Institutions Salary Structure (CONTEDISS) effective from 23 rd March, 2011.	195
5.	The Consolidated Tertiary Institutions Salary Structure II (CONTISS II) effective from 23 rd March, 2011.	196
6.	The Consolidated University Academic Staff Salary Structure (CONUASS II) effective from 23 rd March, 2011.	64
7.	The Consolidated Health Salary Structure (CONHESS) effective from 23 rd March, 2011.	195
8.	The Consolidated Research and Allied Institutions Salary Structure (CONRAISS) effective from 23 rd March, 2011.	195
9.	The Consolidated Medical Salary Structure (CONMESS) effective from 1 st January, 2014.	61
Total		1,235

The method of sampling techniques was based on convenient Non-Probabilistic Sampling Techniques. The study opted for convenience based sampling with regards to the extent of dataset that are available from the Tax Authority, various MDAs and Public Institutions and also because the convenience sampling has been adopted by prior study in

Nigeria that investigate equity issue of Personal Income Tax Act of 2004 and 2011 (Alpheaus & Ihendinihu, 2016).

3.2 Analytical Technique and Justification

The study uses a descriptive, diagnostic and predictive methods of data analysis. The descriptive analysis focus on describing the basic features of data such as the mean, variance and standard deviation of the data. The diagnostic analysis includes the analysis of sample independence, normality and design using both graphical and statistical techniques (e.g. by giving summaries about sample and measures of data. For predictive analysis, Westort (2001) ratio approach to coefficient of residual variation estimation (i.e. CRV Ratio techniques) is adopted. The CRV Ratio is estimated by dividing the difference between coefficient of simple CRV and full CRV by coefficient of simple CRV. The CRV (simple or full) is estimated using the multilevel linear regression model (MLM). The simple CRV regressed total income (TI) on tax liability and the full CRV is estimated as the simple CRV plus several explanatory variables e.g. consolidated relief allowance.

$$CRVs = \frac{SDETI}{MDV} * 100$$

$$CRVf = \frac{SDEPV}{MDV} * 100$$

Where

SDETI = the Standard Deviation of the Expanded Taxable Income

MDV = the Mean of the Dependent Variables

SDEPV = the Standard Deviation of Expanded Taxable Income plus Explanatory variables

CRVs = the Coefficient of Residual Variation for the Simple Model

CRVf = the Coefficient of Residual Variation for the Full Model

Horizontal Equity will therefore be;

$$HE = \frac{CRV_S - CRV_F}{CRV_S} * 100$$

Sources: Westort (2008)

The choice of CRV ratio is based on the fact that both Coefficient of Variation (CV) and Coefficients of residual variation (CRV) using the expanded income model have been criticized for overstating Horizontal inequity by not decomposing the variation that is due to tax system from that due to specification error (Westort, 2001, 171, 175). Moreso, the choice of a multilevel linear modelling framework is to capture the nested level variability effect on the model at the employee, steps, grade and institutional level. This is because most theoretical perspective are predicated on the believe that micro level variables will vary across macro – social, political and cultural level that may be different in each grade level and each MDA’s (Johnson, 2009, p. 5).

3.3 Robustness Analysis

To test reliability of our approach, the result of a multilevel linear model is compared to the result of a disaggregated classical linear regression model on each income group class as implemented in Westort (2001) on the basis of optimal statistical fit to the data.

4. Result

4.1 Descriptive Analysis

Table 3 is a summary estimate of the whole sample consisting of 1,235 individual taxpayers. The Average ETI was N1.77m out of which N151,949, N555,249, N133,218 and N44,406.1 was paid, allowed and deducted as Tax, Consolidated Relief Tax Allowance, National Pension Scheme and National Housing Funds respectively. Sequel to the descriptive statistics of all other sample, National Housing Fund allowable deduction still have the lowest variance while the largest

belong to the ETI.

Table 3: Descriptive Statistics (PITAM 2011)

	<i>Tax Payable</i>	<i>CRTA</i>	<i>Pension</i>	<i>NHF</i>	<i>U-ETI</i>
Count	1235	1235	1235	1235	1235
Average	151949.	555249.	133218.	44406.1	1.77555E6
Standard deviation	214129.	322511.	120942.	40313.8	1.61293E6
Coeff. of variation	140.922%	58.084%	90.7845%	90.7845%	90.8412%
Minimum	336.7	206734.	2525.25	841.75	33670.0
Maximum	1.8838E6	2.74738E6	955267.	318422.	1.27369E7
Range	1.88346E6	2.54064E6	952742.	317581.	1.27032E7
Std. Skewness	41.1858	28.0947	28.0947	28.0947	28.0873
Std. Kurtosis	87.7747	42.9593	42.9593	42.9593	42.9251

Authors Computation, 2019

4.2 Diagnostic Analysis

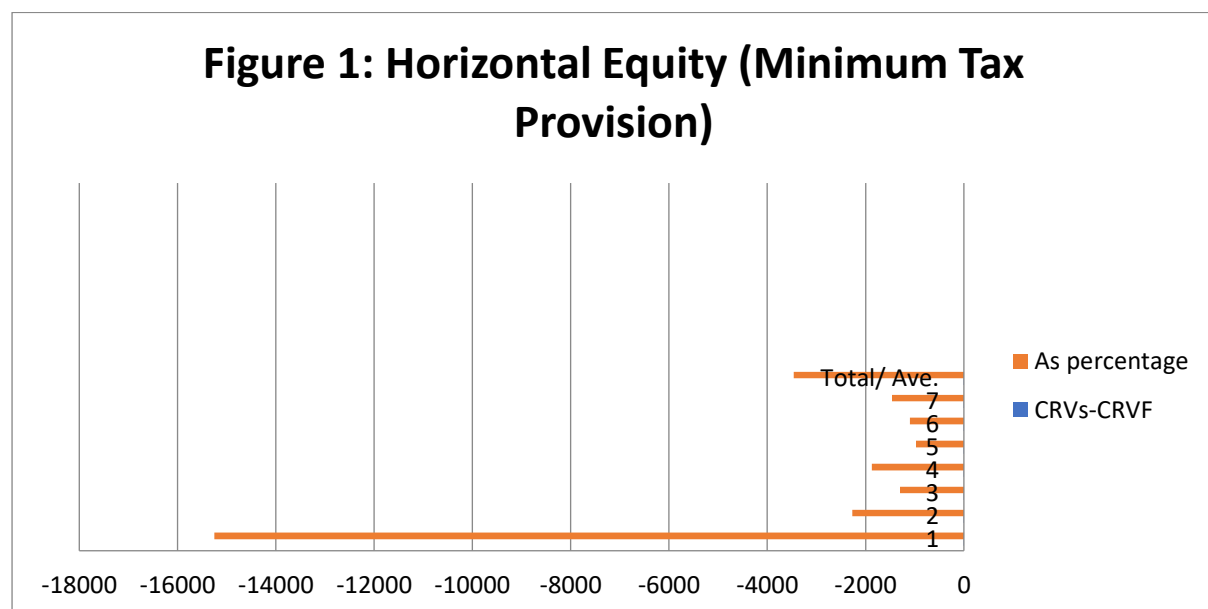
The diagnostic test explore those concern that are more general to validity of a parametric test and those that are dealing with the specific assumptions of multilevel modelling. The test for normality and heteroskedastic assumption of the data are the generic diagnostic test, while the test for design effects (DE), variance partition coefficients (VPC) and the intra-class/unit correlation coefficients (ICC) are test specific to the appropriateness of multilevel modelling. The normality test investigates whether the data at each level of the data follow a Gaussian or bell shape like distribution or have its data points very close to a 45-degree line. The heteroskedastic test check whether the variance is constants at all hierarchical level of the data. The test for normality and heteroskedastic is conducted using; quantile-quantile (Q-Q) plot and caterpillar plot for normality and scatter plot of the of the residual against a randomly generated normal score or normal rank score for normality, and against the predicted value or fixed components at each hierarchical level of the data for heteroskedastic. The result of the Q-Q and caterpillar plots for normality shows that the assumption of normality only hold at level 1 and 3 of the data, violated at level 2. Furthermore, the result of the scatter plot also show that the variance is fairly constant at level 1, but not at level 2 and 3. The statistical result of the ICC, VPC and DE shows that; for robust of the model against DE, the sample size needs to be adjusted at a higher rate when using untransformed data relative to a transformed data.

Similarly, the VPC appear to be high at level 3 for untransformed data and smaller for transformed data for a moderate sample size, and becomes high at level 2 and low at level 3 when the data increase in size. The result of the ICC also reveals that the data transformed or not violate the independence assumption and as such there is a need for a multilevel modelling framework.

4.3 Empirical Result

4.3.1 Minimum Tax Provision Horizontal Equity

The empirical result investigates whether individual subject under the minimum tax provision of 1% for income below or equals N300,000 are treated equally (although the rate is applied to income of up to N2,357,407 in the dataset). The sample dataset used for testing this hypothesis consists of 153 grade level-steps distributed across five (5) institutions. The inference that can be drawn from Figure 1 is that, the degree of horizontal equity achieved by tax payer in a particular income band or class subject to the 1% minimum tax is asymmetric and change in intensity downward as income increase.

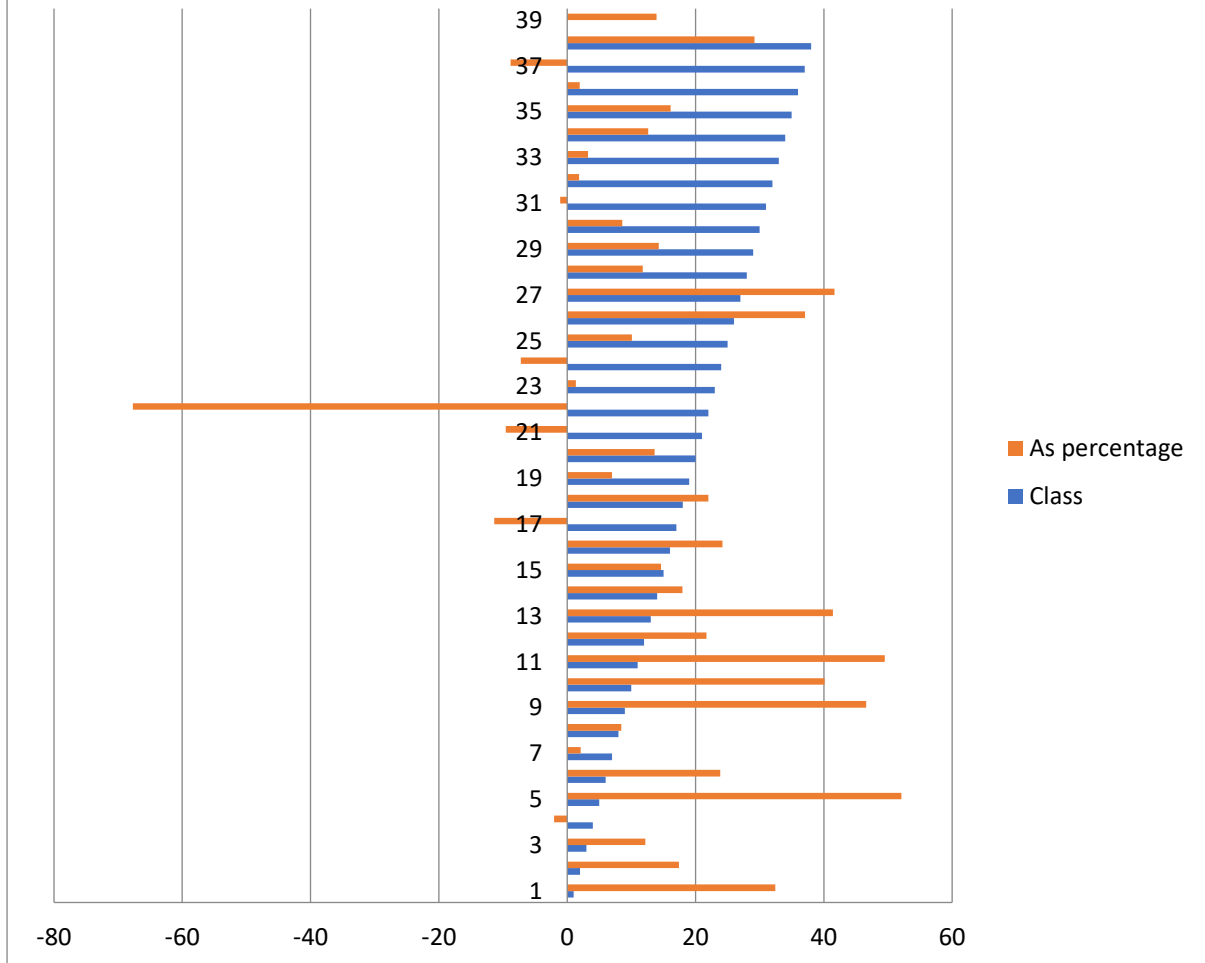


4.3.2 Progressive Tax Provision Horizontal Equity

The second hypothesis focus on horizontal equity of employee under the progressive tax rate structure i.e. 7% to 24%. The objective here is to determine the extent to which this tax

rate structure achieves horizontal equity. Similar to procedure adopted in hypothesis one, individual taxpayers were grouped under income band but with varying width. A total sample of 1,082 observations is used. Relevant CRV difference, Ratio and Percentage statistics is presented in Table 4 (See Appendix). The volume and dynamic nature of the result prompt a graphical visualization of result through a clustered bar chart to ease interpretation. The result figure 2 reveals that, Horizontal inequity is predominantly visible for employee at the lower half of the income class group or cluster i.e. (class 1-19). More specifically, employee in the income class 5, 9, 11 and 13 (N700,000-N800,000, N1.1m-N1.2m, N1.3m-N1.4 and N1.5m-N1.6m) are more likely to be treated unequally under the progressive tax system. This is because the percentage CRVR is farther away from zero – (using 0.50 as the midpoint boundary to determine the closeness of a CRVR to 0). The upper half of the income class i.e. (class 20-38) indicate that employee in income class 27 (N2.9m-N3m) are more likely to be treated unequally with a CRVR very close 0.50. The highest horizontal equity achieved belongs to employee in the upper half of the income clusters i.e. class 22 (N2.4m -N2.5m) with a CRVR of -150%.

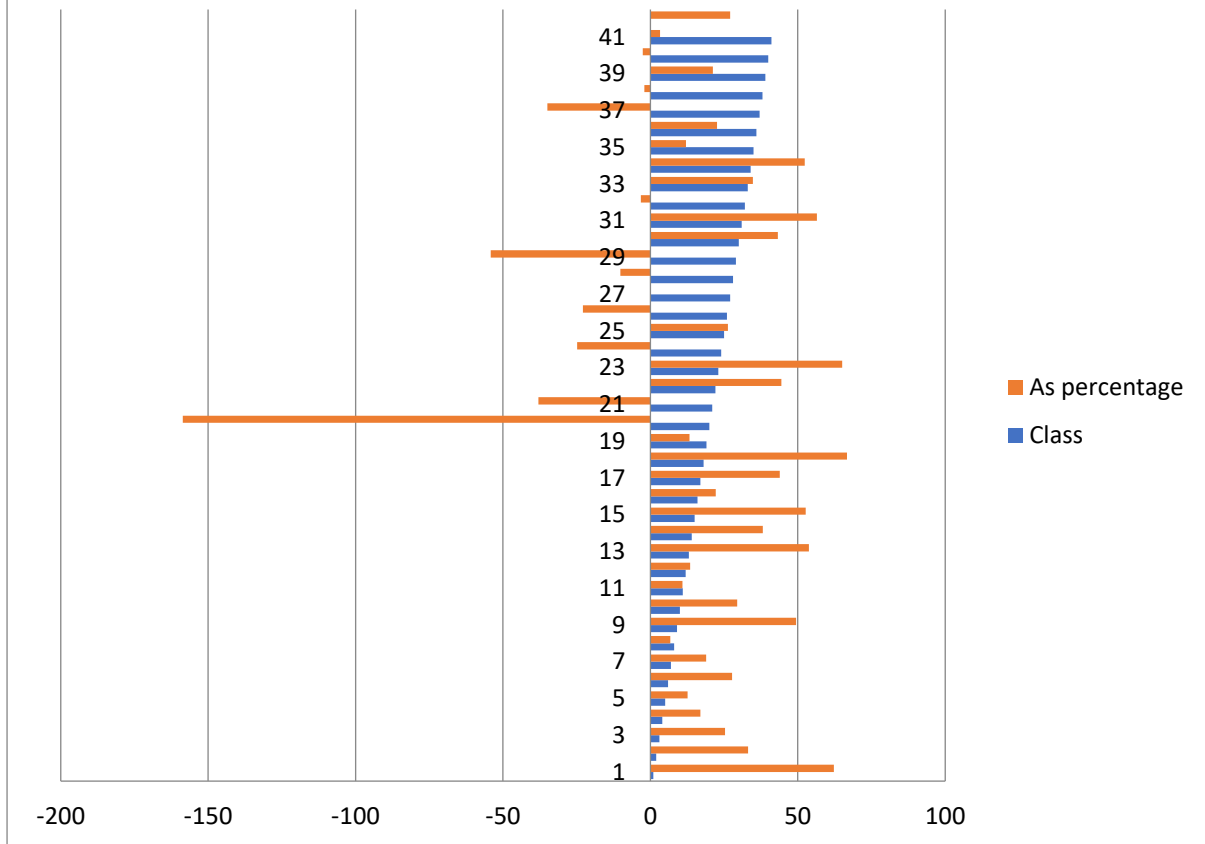
Figure 2: Horizontal Equity of Progressive Tax Rate by Income Group (Percentage)



4.3.3 PITAM 2011 Horizontal Equity

This result in this section explored whether various tax reforms under the PITAM 2011 overall have been able to aid in achieving horizontal equity. The estimated CRVR difference, ratio and percentage is presented in table 5 (See Appendix). To ease interpretation, table 4 is plotted on a cluster bar chart and presented as figure 3.

**Figure 3: Horizontal Equity of PITAM 2011
(Minimum and Progressive**



The result shows that horizontal equity tends to be achieved most by middle income earners especially those at income class 20 i.e. The Taxpayers between income class 1-19 and 31-34 are treated less equally. Specifically, taxpayers at the lowest echelon of the income class i.e. class 1, near middle income class i.e. 13, 15, 18 and 23 and those at the upper half of upper income class (class 31 and 34) are treated less equally. This is because the CRVR is far from the zero point and above the 0.50 midpoint. Horizontal inequity cannot be said to belong to any income clusters – higher or low- since there are cases of horizontal inequity for low income earner as well as higher income earners. Consistent with result of hypothesis one and two, the behaviour of horizontal equity cannot be said to favour the poor or the rich. Rather specific income class or group exhibit horizontal inequity while some other class exhibit horizontal equity.

4.4 Robustness Analysis

The section focusses on re-estimating seven income class from a portion of dataset used in estimating MLM for hypothesis three. The goal is to show that under hierarchically structure dataset with contextual effect and within group dependency, the MLM is more superior to other approach. For comparison purpose the MCMC MLM estimators is adopted and reported rather than IGLS or RIGLS. Table 5 present the summary of CRVR estimate in ratio and percentage for the three conditions.

Table 4.7:
CRVR Estimates Under 3 Condition

Class	Income Range	Westort		MLM Piece		MLM Stacked	
		Ratio	%	Ratio	%	Ratio	%
17	1.5m -1.6m	-1553.2	-155318	0.9214	92.1392	0.4389	43.89348
18	1.6m-1,7m	-99.723	-9972.29	0.9977	99.7711	0.6672	66.72405
19	1.7m-1.8m	-1664.4	-166440	0.8725	87.2499	0.1324	13.24178
20	1.8m-1.9m	-4.0908	-409.082	0.9553	95.5318	-1.5856	-158.5584
21	1.9m-2m	-1.1447	-114.468	0.9381	93.8129	-0.3802	-38.02195

Authors Computation, 2019

From the table it could be inferred in line with the objective of the robustness test that;

- i. The Piecewise based OLS CRV (Columns 3 and 4) understate horizontal inequity or overstate horizontal equity by producing a negative CRVR between -114.468% to -116,440%.
- ii. An alternative piecewise MLM based CRV estimate (column 5 and 6) excessively overstate horizontal inequity or understate horizontal equity by producing CRVR between 87.25% and 99.77%.
- iii. An MLM based CRV (Column 7 and 8) is more likely to produce an optimal solution i.e. falls between the Piecewise OLS and Piecewise MLM approach with a CRVR between -158.55% and 66.72%.

5. Discussion and Conclusion

The paper explores three horizontal equity scenarios of PITAM 2011 tax rate provision. More specifically the paper investigates the horizontal equity of the; 1% minimum tax provision, 7%-24% progressive tax provision, and the aggregate tax rate provision of PITAM 2011. With the exception of the minimum tax rate, horizontal equity or inequity is found to be distributed across all income class instead of a specific half of the income class. The result implies that, in consistent with horizontal equity supports. The surprising excessive horizontal equity of the minimum tax provision of 1% in this paper may be true for sample under consideration, but the generalisation of the result beyond the sample may not be appropriate given the seemingly small sample size in terms of number of institutions considered or the observation size.

6. Limitation and Future Direction

As earlier discussed, the validity of the result for minimum may suffer generalisation issues due to the small sample size, as such there is need to expand the population of studies or the number of employees under each grade-level step combination of each federal government MDA's. The finding of the study is likely to be context dependent because of the restriction on its applicability beyond federal government civil servants. The PITAM 2011 also covers private institution employees, entrepreneurs and self-employed individuals. Theses population are likely to provide additional insight. Finally, the superiority of the CV ratio versus the CRV ratio is demonstrated in Westort (2008) paper. It would be interesting to extend the CV ratio estimation techniques in a comparative analysis framework to the assessment of PITAM 2011 horizontal equity.