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The Effect of Property Tax on Income Redistribution in Selected African Countries

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Abstract: Tax plays an important role in the redistribution of income, and property tax is no exception. One key area that income redistribution curbs is the area of income inequality, and, statistically, most African countries have a high level of income inequality due to their high Gini coefficient. This study examines the effect of property tax on income redistribution in seven Africa countries from 1990 to 2019. The variables used in the study are property tax, Gini coefficient (proxy for income redistribution), income tax, employment rate, GDP per capita growth, and corruption. The panel autoregressive distributed lag (PARDL) was employed as the econometric technique approach. The findings of the study reveal that property taxes have a positive and significant relationship with income redistribution in the long run in the seven African countries studied. This study recommends the effective administration of property tax. If property tax is effectively administered, it can fulfil its redistributive role.

Keywords: property tax; income redistribution; panel autoregressive distributed lag; income inequality; Gini coefficient

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1. Introduction

Tax plays an important role in the redistribution of income, and property tax is no exception. Although other taxes such as income tax play a more effective role in redistributing income due to their high revenue intake, property tax is a supporting tax to better achieve this objective for African countries [1]. One key area that income redistribution curbs is the issue of income inequality, and, statistically, most African countries have a high level of income inequality due to their high Gini coefficient). As of 2019, South Africa had the highest inequality in Africa and the world. Namibia, Zambia, and Botswana are also among the countries with high inequality [2]. Taxation has an impact on poverty and economic disparity. Progressive taxation redistributes wealth from the wealthy and ultra-wealthy to marginalised and disadvantaged populations [3].

Fiscal policy is a critical tool that governments utilise to foster macroeconomic stability and redistribute income to the marginalised and disadvantaged. This study has observed that the continuous disparity between the rich and the poor remains a major concern of which there is a need to further curb it. A fiscal policy that is well-designed and implemented is critical for national progress, social stability, and economic growth. Factors such as taxation, government spending, and transfers are critical tools for accomplishing these goals. Since the 1980s, the distributive role of fiscal policy has been disregarded, with an increased emphasis on macroeconomic stability. However, with time, the redistributive functions of fiscal policy have been taking precedence [1]. Taxation and redistribution policies can have a considerable impact on the distribution of income. There is significant room for improvement for most African countries in this area, both in terms of fiscal space and tax progressivity.

Furthermore, Africa is home to most the world's poorest inhabitants, with 413 million individuals barely surviving on less than USD 1.90 per day across the continent. The African continent is also the world's second most unequal continent, with numerous

African nations ranking among the world's most unequal countries. Africa is home to ten of the world's top 19 most unequal countries [4,5]. The bulk of these nations are in Southern Africa, with South Africa being classified as the country with the most disparities. The world's most unequal countries are depicted in Figure 1.

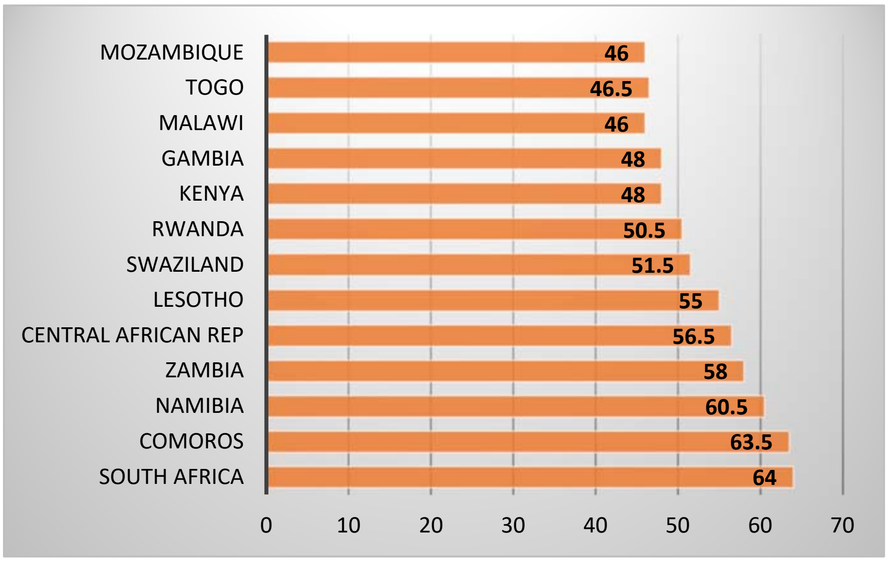

Figure 1. Topmost unequal countries in the world. This figure is expressed in the Gini coefficient index. Source: researchers' own compilation from the Sustainable Development Goals report (2017) [6].

Sub-Saharan Africa has an average Gini index of 0.46, while the rest of the world has an average of 0.38, according to United Nations data [4]. It is well known that unbiased distribution of income is crucial for poverty alleviation, particularly in emerging countries. Rural areas, where 70% of the developing world's extremely poor reside, are particularly vulnerable to the interplay between growth, poverty, and inequality. As a result, technological advancements in agriculture, as well as those in sub-Saharan Africa, are hindered by deep and pervasive poverty and inequality [7].

Income inequality is a concern that is affecting the lives of the vulnerable in society. This study considers seven African countries: Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia for the period of 1990 to 2019. These countries have the most significant revenue for property tax in the whole of Africa (OECD, 2019) [8]. Other countries, such as Egypt, have large revenue from property taxes, but data was insufficient. The panel autoregressive distributed lag is employed in this study. It should be noted that the study employs the Gini coefficient as a proxy variable for income redistribution.

The contribution of the study to the body of knowledge is that this research study is a panel study that is focused on Africa. The uniqueness of this research study is that property tax is factored as a key element in income redistribution of which there are limited studies within the African context. Furthermore, this article breaks boundaries by showcasing the significance of property tax on the alleviation of poverty, as property tax has little recognition as an effective fiscal tool for the redistribution of income. Most studies ignore the potential impact of property tax and its importance on poverty alleviation. The rest of the paper is organised as follows: Section 2 presents literature reviews of the study; Section 3 presents the theoretical review; Section 4 presents the methodology; Section 5 presents the data description; Section 6 presents the results and the discussion; and Section 7 presents the conclusion.

2. Literature Review

The relationship between taxation and income redistribution has attracted much attention from scholars. Studies have examined the nexus between taxation (direct or indirect) and redistribution of income.

The study by [9] examined taxation as an effective tool for income redistribution in Nigeria. The study used annual data from 1981 to 2014. The ordinary least squares (OLS) statistical tool was used to analyse the time series data gathered. The result suggests that taxation has not been able to fulfil its role as a standard tool of income redistribution in Nigeria. Overall, the article revealed that taxation has an insignificant impact on income inequality and income redistribution in Nigeria. However, the empirical result of [10] revealed that taxes play a major role in income redistribution in Nigeria. Appah and Omesi [10] investigated the effects of taxes on income inequality and income redistribution in Nigeria for the period of 1980 to 2018. The vector error correction model (VECM) was employed in the study. The study revealed that an increase in direct tax (wealth tax, personal income tax, and corporate tax) reduced income inequality, thereby increasing income redistribution in Nigeria. The article concluded that taxation (direct tax) has a negative and significant relationship with income inequality.

Balseven and Tugcu [11] discovered comparable results. Balseven and Tugcu [11] examined the effect of fiscal policy on income distribution in developed and developing countries. The study utilised 17 developing countries and 30 developed countries between 1990 and 2014 by using the random effect (RE) model. This article discovered that an increase in tax revenue increased income distribution in developing countries. Similarly, Hümbelin and Farys [12] investigated income redistribution through taxation in Switzerland. The article discussed specifically how a reduction in tax affects income redistribution. The study used tax data from the canton of Aargau for the period of 2001 to 2011. The findings of this article revealed that tax reduction drastically reduced the redistributive effect of taxes. Likewise, the findings of Causa et al. [13] suggests similar result. Causa et al. [13] investigated the drivers of income redistribution across the OECD countries. The study discussed the impact of changes in tax and the tax transfer system on income redistribution in working-age households. The study used the fixed effect (FE) method to analyse the data from 1990 to 2010. Findings revealed that changes in the size of tax and tax transfer systems can have a negative impact on income redistribution in the OECD countries, most especially on the working-age population.

While there are many studies of taxation and income redistribution, there are limited studies of property tax more specifically. Some articles interchange property tax with wealth tax. Halvorsen and Thoresen [14] analysed the Norwegian distributional effects of wealth tax under different income concepts. The study used the Norwegian administrative data for the period of 1993 to 2011. The fixed effects (FE) method was used as the econometric technique to analyse the subject matter. The findings of this study revealed that wealth tax is mostly borne by high-income taxpayers and it has a redistributive impact. Wealth tax has a positive relationship with income redistribution. However, according to [15] in an article that investigated wealth tax and wealth and tax compliance in Spain, wealth tax does not have a redistributive effect. This article focused on the distributive effect of the top one percent of the richest adult population in Spain. The study used a time series analysis for the period of 1983 to 2001. An autoregressive distributed lag (ARDL) model was employed in the study.

Furthermore, the study of [16,17] discussed the aspect of property tax in their study. This studies categorised property tax under direct tax, Karabulut [17] analysed the impact of indirect and direct taxes on income distribution in Turkey. In this article, the researcher classified property tax as a direct tax. The study used autoregressive distributed lag (ARDL) for the period of 1990 to 2017. The findings of this article revealed that direct taxes are more effective in the redistribution of income. On the other hand, indirect taxes are estimated to negatively affect income distribution. Overall, property tax/wealth tax has a positive impact on income redistribution. This result is similar to the findings of [16] who examined the effect of taxes on income distribution in Turkey. The study analysed the impact of direct and indirect taxes on income distribution. Autoregressive distributed lag was employed for the years from 1980 to 2014. The study's findings indicated that direct tax decreased the Gini coefficient, thereby increasing income redistribution. However, indirect tax increased the Gini coefficient, thereby reducing income redistribution. From these empirical studies, it is clear that property tax/wealth tax and income tax have a positive impact on income redistribution. On the one hand, Zandvakilli [18] and Yagi and Tachibanaki [19], discovered that property tax contributes little to no impact on income redistribution. However, Pei et al. [20] alluded that income tax and property tax have stronger effect on income redistribution. Additionally, based on the methods of previous studies, the autoregressive distributed lag (ARDL) will be employed in this article to investigate the effect of property tax on income redistribution.

3. Theoretical Review

Pareto Distribution Theory

Pareto distributions have historically been seen to be excellent for modelling income and wealth distributions. The Pareto distribution theory is named after economist Vilfredo Pareto. Pareto noticed that in many populations, the number of persons in the population who earned more than a certain level of income had greater control over the economy than the rest of the population [21]. Essentially, according to Pareto, the form in which income allocations were made was governed by some unstated law. These laws, according to Pareto, would be responsible for the tail behaviour (later known as Paretian tail behaviour) of income distribution survival functions [21,22].

Furthermore, the Pareto principle, derived from the Pareto distribution, is used to explain that not all resources are distributed evenly. It demonstrates that things are unequal and that the minority bears the brunt of the majority. According to the Pareto principle, 80% of outcomes result from 20% of causes, demonstrating an asymmetric relationship between inputs and outputs. This principle acts as a reminder to everyone that the relationship between input and output is not balanced. The Pareto principle, most referred to as the 80/20 rule or the Pareto rule, is a mathematical principle. The Pareto principle was initially recognised concerning the wealth-population relationship.

4. Methodology

This study employed the panel autoregressive distributed lag (PARDL) as the econometric technique for the period of 1990 to 2019. Panel ARDL allows for the estimate of long-run relationships. In cointegrating regressions, this approach corrects for endogeneity and serial correlation (Inagaki, 2010) [23]. Additionally, PARDL allows the use of I(1) and I(0) variables which is the case for this paper. The study used secondary data outsourced from the World Development Index, Global Economy database, and the OECD database.

Martinez-Vazquez et al.'s [24] study model is adapted and modified for this study. The study investigated the impact of tax and expenditure policies on income distribution on 150 developed, developing, and transition countries. The following is the model that was utilised in their research:

$$gini_{it} = agini_{it-1} + yF_{it} + \beta X_{it} + v_i + \varepsilon_{it} \quad (1)$$

where $gini_{it}$ is Gini coefficient (measurement of income distribution), yF_{it} represent fiscal variables such as personal income tax (PIT), corporate income tax (CIT), social security contributions (SSC) and payroll taxes, general sales tax (GST), and excise and customs duties. Furthermore, the equation caters for a set of control variables including population growth, age dependency, the level of globalisation, GDP per capita growth, unemployment, the extent of corruption, education level, and the size of government.

This study therefore modifies the model in Equation (1). The modification of the model is as follows:

$$GINI_{it} = PTAX_{it} + ITAX_{it} + EMP_{it} + GDPPC_{it} + CRPT_{it} + \mu_{it} \quad (2)$$

where *GINI* stands for Gini coefficient (measurement for income re-distribution), *PTAX* stands for property tax, *ITAX* stands for income tax, *EMP* stands for employment, *GDPPC* stands for GDP per capita growth, and *CRPT* stands for corruption. Additionally, it is worth highlighting that the Gini coefficient will be used as the measure of income redistribution in this article.

In a linear form, Equation (2) can be presented as:

$$GINI_{it} = \alpha + \beta_1 PTAX_{it} + \beta_2 ITAX_{it} + \beta_3 EMP_{it} + \beta_4 GDPPC_{it} + \beta_5 CRPT_{it} + \mu_t \quad (3)$$

where α = intercept β_s = slope coefficient with subscript s = 1, 2, 3, 4, 5, μ = error term.

In natural logarithms, Equation (3) can be presented as:

$$GINI_{it} = \alpha + \beta_1 InPTAX_{it} + \beta_2 InITAX_{it} + \beta_3 InEMP_{it} + \beta_4 InGDPPC_{it} + \beta_4 CRPT_{it} + \mu_{It} \quad (4)$$

where:
$InPTAX$ is logarithm of property tax;
$InITAX$ is logarithm of income tax;
$InEMP$ is logarithm of employment;
$InGDP$ is logarithm of GDP per capital growth.

From the logarithm equation in Equation (4), the Gini coefficient (*GINI*) and corruption (*CRPT*) are the two variables that are not in logarithm form. This is because both the Gini coefficient and corruption are variables that are in index form.

5. Data Description

This article utilises data sources from OECD, World Development Indicator (World Bank databases), and the Global Economy database. Annual data for the period of 1990 to 2019 is used. The variables used are the Gini coefficient (*GINI*), property tax (*PTAX*), income tax (*ITAX*), gross domestic product per capita growth (*GDPPC*), employment (*EMP*), and corruption (*CRPT*) as shown in Table 1.

Table 1. Dataset and measurement.

Variables	Measurement	Data Source
Gini coefficient	**Gini index**	**WDI (World Bank)**
Property tax	**Revenue in USD**	**OECD Statistics**
Personal income tax	**Percentage of revenue**	**WDI (World Bank)**
Employment	**Percentage of total employment**	**WDI (World Bank)**
GDP per capita growth	**Annual percentages**	**WDI (World Bank)**
Corruption	**Control of corruption index**	**Global Economy database**

6. Results and Discussions

This section discusses the findings of the study together with some relevant discussions. This section begins with descriptive statistics, stationarity test, optimal lag criteria, cointegration test, panel ARDL estimate, Granger causality, and the diagnostic test.

6.1. Descriptive Statistics

Descriptive statistics provides a high-level overview of a dataset, presenting a summary of the data. Table 2 shows individual descriptive statistics results for all the variables in the model.

Table 2. Individual descriptive statistics result.

	GINI	PTAX	ITAX	GDPPC	EMP	CRPT
Mean	45.17762	592.0514	1.51×10^{11}	1.634791	54.62876	−0.240091
Median	42.20000	55.80000	2.73×10^{10}	1.656180	69.32000	−0.195000
Maximum	65.90000	7189.500	1.43×10^{12}	17.49748	85.87000	0.730000
Minimum	28.40000	2.100000	1.50×10^{8}	−15.04219	9.340000	−1.330000
Std. Dev.	9.649906	1342.181	2.51×10^{11}	3.280302	27.41752	0.528387
Skewness	0.621902	2.993972	2.135483	−0.752199	−0.490326	−0.377513
Kurtosis	2.449033	11.42206	7.645186	9.4496381	1.573522	2.619783
Jarque-B	16.19288	934.3818	38.4154	389.0791	26.21953	6.253002
P(JB)	0.000305	0.000000	0.000000	0.000000	0.000002	0.043871
Sum	9487.300	124,330.8	3.17×10^{13}	343.3060	11,472.04	−50.41911
Sum Sq. Dev.	19,462.22	3.77×10^{8}	1.32×10^{25}	2248.919	11,472.04	58.35138

The findings of the descriptive statistics result suggest that income redistribution (GINI) has a positive skewness and a platykurtic kurtosis (kurtosis of less than 3). Property tax (PTAX) and income tax (ITAX) have a positive skewness and a kurtosis that is more than three (leptokurtic). In the case of employment (EMP) and corruption (CRPT), the skewness is negative and the kurtosis is platykurtic. Additionally, GDP per capita growth has a negative skewness and a kurtosis that is leptokurtic.

With respect to the mean values, some of the variables (GINI, PTAX, ITAX, and EMP) have mean values greater than their kurtosis. This means that higher values are observed below the sample mean for each of the variables. However, GDP-PC and CRPT have mean values that are less than their sample means.

6.2. Stationarity Result

The study used the Levin–Lin–Chu (LLC) unit root test to find the integration of the variables. The results are reported as follows.

A variable's stationarity has a significant impact on its behaviour and features. The regression model needs to be differenced *d* number of times before it is declared stationary, meaning that the regression model shows no evidence of unit roots. Therefore, the series will be written as I(d) and is considered to be integrated of order d. Using the difference operator to an I(d) more than d times, results in a stationary series. If a time series does not vary over time, it is said to be stationary. I(0) denotes a stationary series, whereas I(1) denotes a series with one stationarity result. When variables are differentiated twice for no unit root, the result is I(2), which means the variables have been differenced twice (Cryer, 1986) [25].

Non-stationary is a term that refers to a panel series with a unit root. That is, the variance and mean of a unit root series are not zero-centred. Variables with unit root evidence can lead to erroneous regressions. The unit root series must be changed from having a unit root to not having a unit root to avoid regression spurious problems that can occur while regressing data [26].

The LLC stationarity result in Table 3 shows that at level, the probability values of income redistribution (GINI), property tax (LPTAX), income tax (LITAX), employment (LEMP), and corruption (CRPT) are statistically insignificant at the ten percent significance level. Therefore, the null hypothesis fails to be rejected. In conclusion, GINI, LPTAX, LITAX, LEMP, and CRPT are not stationary at the level I(0). However, the probability value of GDP per capita growth is statistically significant at level. Therefore, we reject the null hypothesis and conclude that LGDP-PC is stationary at I(0).

Table 3. Panel unit root test Levin–Lin–Chu (LLC) result.

Levin–Lin–Chu (LLU)													
Variables	Level						1st Difference						Order of Integration
	t-Statistics			*p*-Value			t-Statistics			*p*-Value			
	Intercept	Trend	None	Intercept	Trend	None	Intercept	Trend	None	Intercept	Trend	None	
GINI	−0.798	−0.287	−0.198	0.2122	0.3869	0.4213	−4.964	−6.764	−6.959	0.000 ***	0.000 ***	0.000 ***	$I(1)$
LPTAX	−0.848	0.270	3.923	0.198	0.606	1.000	−5.949	−4.604	−8.342	0.000 ***	0.000 ***	0.000 ***	$I(1)$
LITAX	3.040	2.864	6.889	0.103	0.997	1.000	−5.131	−4.976	−4.431	0.000 ***	0.000 ***	0.000 ***	$I(1)$
LGDP-PC	−2.959	−2.198	−3.316	0.001 ***	0.013 **	0.000 ***							$I(0)$
LEMP	−1.027	−0.665	−0.637	0.152	0.258	0.2620	−4.746	−3.917	−5.432	0.000 ***	0.000 ***	0.000 ***	$I(1)$
CRPT	−1.420	−0.507	−1.307	0.777	0.306	0.295	−7.730	−6.632	−10.561	0.000 ***	0.000 ***	0.000 ***	$I(1)$

*** denotes 1% significance; ** denotes 5% significance. Source: researchers' own compilation utilising World Bank and OECD Stats data through EViews version 10 software.

On the other hand, at first difference, GINI, LPTAX, LITAX, LEMP, and CRPT are statistically significant at the ten percent significance level. Therefore, the null hypothesis is rejected, and we conclude that GINI, LPTAX, LITAX, LEMP, and CRPT are stationary at $I(1)$. Overall, GINI, LPTAX, LITAX, LEMP, and CRPT are stationary at the first difference, while LGDP-PC is stationary at the level.

6.3. Optimal Lag Selection Criteria Results

The optimal lag selection criteria are presented in Tables 4 and 5. Table 4 presents the lag information for the dependent variable, while Table 5 presents the lag information for the independent variable.

The optimal lag selection criteria result for the dependent variable in Table 4 depicts that the final prediction error (FPE), Akaike information criterion (AIC), Schwarz criterion, and Hannah Quinn information criterion all select lag one. Therefore, the lag criteria selection for income redistribution (GINI) is lag one.

Furthermore, the optimal lag selection criteria result for the independent variables in Table 5 reveals that most of the lag criteria (final prediction error (FPE), Akaike information criterion (AIC), Schwarz criterion, and Hannah Quinn information criterion) select either lag two or three as the best lag. Lag two and three have equal numbers of lags.

For this study, lag three will be used as the best lag for the independent variables. This is because lag three shows better coefficient results of the regression analysis. Therefore, the PARDL model to be evaluated is PARDL (1, 3, 3, 3, 3, 3).

Table 4. Optimal lag selection criteria for the dependent variable (income redistribution—GINI).

Lag	FPE	AIC	SC	HQ
0	87.39051	7.308264	7.325868	7.315400
1	2.346516 *	3.690808 *	3.726017 *	3.705081 *
2	2.372396	3.701775	3.754588	3.723184
3	2.398614	3.712761	3.783179	3.741308
4	2.424570	3.723517	3.811540	3.759200

* Refers to optimal lag length selected by the criterion.

Table 5. Optimal lag selection criteria for the explanatory variables.

Variables	Criterions	Lags				
		0	**1**	**2**	**3**	**4**
LPTAX	FPE	4.863998	0.054798	0.055337	0.053676	0.053203 *
	AIC	4.419738	−0.066220	−0.056433	−0.086921	−0.09571 *
	SC	4.437342	−0.03101 *	−0.003620	−0.016503	−0.007749
	HQ	4.426874	−0.051946	−0.035023	−0.058375	−0.06008 *
LITAX	FPE	5.430187	0.01972 *	0.019851	0.019876	0.019893
	AIC	4.529851	−1.08782 *	−1.081635	−1.080358	−1.079545
	SC	4.547455	−1.05261 *	−1.028822	−1.009940	−0.991523
	HQ	4.536987	−1.07355 *	−1.060226	−1.051811	−1.043862
LGDP_PC	FPE	0.758794	0.732435	0.648322	0.645350 *	0.652377
	AIC	2.561852	2.526495	2.404507	2.399908 *	2.410731
	SC	2.579457	2.561704	2.457320 *	2.470325	2.498753
	HQ	2.568989	2.561704	2.425917 *	2.428454	2.446414
LEMP	FPE	0.510669	0.000749	0.000611 *	0.000613	0.000614
	AIC	2.165844	−4.359539	−4.56318 *	−4.558835	−4.557097
	SC	2.183448	−4.324330	−4.51037 *	−4.488418	−4.469075
	HQ	2.172980	−4.345266	−4.54177 *	−4.530289	−4.521414
CRPT	FPE	0.268600	0.009999	0.009692	0.009514 *	0.009619
	AIC	1.523345	−1.767416	−1.798567	−1.81714 *	−1.806149
	SC	1.540949	−1.732208	−1.745754	−1.74666 *	−1.718127
	HQ	1.530481	−1.753143	−1.777157	−1.78858 *	−1.770466

* Refers to optimal lag length selected by the criterion. Source: researchers' own compilation utilising World Bank and OECD Stats data through EViews 10 software.

6.4. Kao Residual Cointegration Test Results

When the variables are integrated of the same order, the next step is run cointegration test. This section discusses cointegration test results. Table 6 shows Kao residual cointegration results.

Table 6. Kao residual cointegration test results.

Test Type	t-Statistic	*p*-Value	Decision
Kao cointegration test	−2.763345	0.0389 **	Reject H_0

** denotes 5% significance. Source: researchers' own compilation utilising World Bank and OECD Stats data through EViews version 10 software.

The Kao cointegration result in Table 6 reveals that the *p*-value is less than the five percent significance level. Therefore, the null hypothesis is rejected and, in conclusion, cointegration exists in the model, which implies that a long-run relationship exists between the dependent and independent variables. The next section discusses the Hausman test.

6.5. Hausman Test Results

The probability value of the Hausman test in Table 7 is not significant. Therefore, we do not reject the null hypothesis. In conclusion, the pooled mean group (PMG) is the most efficient estimation. The PMG allows for unfettered comparison of intercepts, short-run coefficients, and error variances between groups. By taking the basic average of individual unit coefficients, it generates trustworthy estimations of the mean of short-run coefficients.

Table 7. Hausman test results.

Test Summary	Chi-Sq. Statistics	Probability
Period random	8.010887	0.1556

Source: researchers' own compilation utilising World Bank and OECD Stats data through EViews 10 software.

6.6. Panel Auto Regression Distributed Lag Estimates of Long-Run Results

The long-run PARDL pooled mean group results for the seven African countries, i.e., Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia are estimated in Table 8 for the period of 1990 to 2019.

$$GINI_{it} = -8.136 + 3.421LPTAX_{it} + 2.529LITAX_{it} + 1.338LGDP_{it} + 13.560LEMP_{it} - 2.356CRPT_{it} + \mu_t$$

Table 8. Panel ARDL (1, 3, 3, 3, 3, 3) long-run results (dependent variable: income redistribution—GINI).

Variables	Coefficient	St. Error	t. Statistics	Probability
LPTAX	3.421513	0.711259	4.810505	0.0000 ***
LITAX	2.520939	0.948025	2.659147	0.0087 ***
LGDP-PC	1.338096	0.710443	−1.883466	0.0615 *
LEMP	13.56042	6.978062	1.943293	0.0538 *
CRPT	−2.356530	1.199404	−1.964751	0.0527 *
C	−8.136098	4.264571	−1.907835	0.0582 *

*** denotes 1% significance; * denotes 10% significance. Source: researchers' own compilation utilising World Bank and OECD Stats data through EViews 10 software.

The long-run result in Table 8 reveals that the probability values of property tax (LPTAX), income tax (LITAX), GDP per capita growth (LGDP-PC), employment (LEMP), and corruption (CRPT) are statistically significant at the ten percent level of significance. Therefore, in the long run, these variables have a statistically significant impact on income redistribution (GINI) in Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia.

Furthermore, property tax (LPTAX) and income tax (LITAX) have a positive relationship with income redistribution (GINI) in the long run at the values of 3.421513 and 2.520939, respectively. A one-unit rise in property tax (LPTAX) increases income redistribution (GINI) by 3.421 units. Likewise, a one-unit increase in income tax (LITAX) increases income redistribution (GINI) by 2.529 units in Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia. The implication of this is that wealth and income disparity in society reduces due to the reallocation of resources. Fiscal policy is among the best and most effective measures for reducing inequality and increasing income distribution. Furthermore, economically, an increase in property tax and income tax can positively affect the level of revenue earned from tax [27]. Additionally, Ambe [28] discovered similar results. The study of Ambe [28] examined tax regimes in Cameroon. Findings of the study showed that the tax system in Cameroon is faced by many challenges; however, taxation in Cameroon has a redistributive effect by relocating resources in the country. Furthermore, the findings of [29] suggest similar results. They investigated income taxes, inequality, and poverty in the United States. Findings from the study discovered that income taxes provide the greatest reduction in income disparity, which aids in the distribution of income.

Table 8 further reveals that employment (LEMP) has a positive association with income redistribution (GINI) in the long run at the value of 13.56042. A one-unit increase in employment will increase income redistribution by 13.56 units in the seven Africa countries under investigation. This simply means that when the employment rate increases, income redistribution improves. The implication of this is that an increase in employment increases wage dispersion among individuals, and therefore individuals have an opportunity for better living conditions [30].

The relationship between GDP per capita growth (GDP-PC) and income redistribution (GINI) is positive in the long run at a value of 1.338096. A rise in GDP per capita growth will result in a 1.338-unit increase in income redistribution (GINI) for Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia. An increase in GDP per capita has economic implications in that it promotes investor confidence, which allows businesses to recruit more employees, ultimately leading to an increase in consumer spending on products and services. As a result, a growth in gross domestic product (GDP) has a generally beneficial influence on the total economy of countries, which, in turn, affects the redistribution of income [31–34]. Yang and Greaney [35] investigated economic growth and income inequality in the Asia-Pacific region. The findings in the study suggest that GDP per capita growth has a redistributive effect through the reallocation of resources, which further helps to reduce inequality.

Additionally, this finding is supported by the result of [36]. Bilan et al. [36] analysed the effect of GDP per capita growth on income distribution in the European Union (EU) member states. Findings of the study show that the EU countries with the most stable and clear pattern of income distribution are as a result of the success in GDP growth.

Furthermore, the relationship between corruption (CRPT) and income redistribution (GINI) is negative in the long run at a value of −2.356530. The interpretation of this is that when corruption increases by one unit, income redistribution (GINI) will tend to decrease by 2.356 units on average in the seven African countries under investigation. Economically, African countries suffer from a lack of political transparency. The economies of many countries suffer as a result of the dishonest acts of many of its leaders. As a result, the development of the economy may be hampered, and the distribution of income may be adversely affected [37–40].

In addition, Alesina and Angeletos [41] discovered similar results. The study investigated corruption, inequality, and fairness in developing countries. Findings revealed that high degrees of corruption lower resource allocation, resulting in inequality and unfairness, and consequently income distribution is affected. In addition, Keneck-Massil et al. [42] analysed corruption and income inequality in 95 developed and 72 developing countries. The findings in the study suggested that corruption has a negative impact on income distribution because of uneven distribution of political power. As a result of the unequal distribution of political power, non-dominant groups are more likely to engage in corruption to get access to the public services to which they are entitled, or to obtain credits to support their income-generating activities.

6.7. Granger Causality Test Results

The results of the Granger causality test in Table 9 reveal that the probability values of property tax (LPTAX), income tax (LITAX), GDP per capita growth (GDP-PC), employment (LEMP), and corruption (CRPT), are statistically significant at the ten percent level of significance. Therefore, we reject the null hypothesis of no causality and conclude that property tax, income tax, GDP per capita growth, employment rate, and household income Granger-cause income redistribution. Additionally, the causality relationship between property tax and income redistribution is unidirectional. The same applies to the causal relationship between corruption and income distribution. On the other hand, the causal relationship between income tax and income redistribution is bi-directional. The causal relationship between GDP per capita growth and income redistribution is bi-directional. The same applies to the causal relationship between employment and income redistribution.

Table 9. Granger causality test results.

Direction of Causal Relationship →				
Variables	**Variables**	**Chi-square**	***p*-Value**	**Decision**
LPTAX	*GINI*	5.541398	0.0362 **	Causal Link
GINI	*LPTAX*	0.572339	0.9027	No Causal Link
LITAX	*GINI*	5.245555	0.0547 *	Causal Link
GINI	*LITAX*	9.229535	0.0264 **	Causal Link
GDP* − *PC	*GINI*	6.642933	0.0842 *	Causal Link
GINI	*GDP* − *PC*	5.446208	0.0419 **	Causal Link
LEMP	*GINI*	5.376207	0.0481 **	Causal Link
GINI	*LEMP*	4.284768	0.0323 **	Causal Link
CRPT	*GINI*	9.601413	0.0223 **	Causal Link
GINI	*CRPT*	0.152208	0.2455	No Causal Link

** denotes 5% significance; * denotes 10% significance. Source: researchers' own compilation utilising World Bank and OECD Stats data through EViews 10 software.

The implication of the Granger causality is that any change in income redistribution can be caused by changes in property tax, income tax, GDP per capita growth, employment, and corruption. Similarly, any change in income tax, GDP per capita growth, and employment can be caused by changes in the Gini coefficient.

Furthermore, the Granger causality relationship of property tax, income tax, GDP per capita growth, employment, and corruption can be traced to the findings of other studies. Lawless and Lynch [43] analysed the distributional implications of household wealth tax in Ireland. The findings of this study demonstrated that wealth tax (property tax) has a distributional impact. Gupta and Jalles [44] investigated tax revenue reforms and income distribution in developing countries. The study covered 45 emerging, low-income countries and sub-Saharan countries. The study revealed that income tax reduced income disparity in the population and the income distribution increased gradually. Biswas et al. [45] analysed how a reduction of income inequality through tax policy affects economic growth in all the states of the United States. The findings of the study revealed that income distribution has a positive impact on economic growth. In addition, Alesina and Angeletos [41] investigated corruption, inequality, and fairness in developing countries. Findings revealed that high degrees of corruption lower resource allocation resulting in inequality and unfairness. Consequently, income distribution is affected, and therefore, corruption Granger-causes income distribution.

6.8. Residuals Diagnostic Tests Results

The results of the residuals diagnostic in Table 10 reveal that the probability value of all the tests performed are statistically insignificant at the five percent level of significance. Therefore, we fail to reject the null hypothesis. In conclusion, the model is normally distributed, there is no cross-sectional dependence, and residuals are homoscedastic. Overall, the regression model meets the criteria of satisfaction.

Table 10. Results of the residuals diagnostic tests results.

Tests	Type of Test	t-Statistic	*p*-Value	Decision
Test of normality	J-Bera test	2.520820	0.2835	Fail to reject H_0
Cross-section dependence	Pesaran CD	−3.011828	0.3116	Fail to reject H_0
Heteroscedasticity	Likelihood ratio	10.18252	0.1785	Fail to reject H_0

Source: researchers' own compilation utilising World Bank and OECD Stats data through EViews 10 software.

7. Conclusions

The area of income redistribution is one that cannot be overlooked in Africa. Even though the African continent is among the poorest in the world, revenue from property tax has been a source of relief for governments. As such, this study had the primary aim of investigating the effect of property tax on income redistribution in selected African countries for the period of 1990 to 2019 using the panel ARDL estimation technique. The countries investigated are: Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia. The study used secondary data from the World Development Index, Global Economy database, and the OECD database.

This paper began with an overview of the overall perception of property tax, income redistribution, and poverty alleviation in Africa. The Gini coefficient index helped to further describe the inequality at play in Africa. Furthermore, the literature review discussed different studies, with studies describing the relationship between taxation and income redistribution. Other studies focusing on property tax and redistribution of income (though limited), are also explained. The methodology of the study adopted and modified the work of [24]. Overall, the study used the following variables: Gini coefficient index (proxy for income redistribution), property tax, income tax, employment rate, GDP per capita growth, and corruption.

The outcome of the descriptive statistics revealed that income redistribution, property tax, and income tax have positive skewness; while GDP per capita growth, employment, and corruption have a negative skewness. The stationarity test result indicated that income redistribution, property tax, income tax, employment, and corruption are integrated of order $I(1)$. GDP per capita growth is integrated of order $I(0)$. The lag selection of the dependent variable (income redistribution) was estimated to be lag one, while for the independent variables (property tax, income tax, GDP per capita growth, employment, and corruption) the lag criteria is lag three. The cointegration result showed that the regression model is cointegrated.

The panel ARDL estimate of the long-run was PARDL 1, 3, 3, 3, 3, 3. The long-run result revealed that the probability values of property tax (PTAX), income tax (ITAX), GDP per capita growth (GDP-PC), employment (EMP), and corruption (CRPT) are less than the 0.01, 0.05, and 0.10 percent significant level. This means that in the long-run, property tax, income tax, GDP per capita growth, employment, and corruption have a statistically significant impact on income redistribution (GINI) in Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia. Additionally, the coefficient signs of property tax, income tax, GDP per capital growth, and employment is positive at the values of 3.421513, 2.520939, 1.338096, and 13.56042, respectively. The coefficient of corruption, on the other hand, is negative at the value of −2.356530. These results are a summary of the long run result of the paper.

Overall, property tax, income tax, GDP per capita growth, and employment have a positive significant relationship with income redistribution in the long-run in Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia. A 1 unit rise in property tax increases income redistribution (GINI) by 3.421 units. A one-unit increase in income tax, increases income redistribution by 2.529 units. A one-unit increase in employment will increase income redistribution by 13.56 percent and a rise in GDP per capita growth will result in a 1.338-unit increase in income redistribution (GINI) for Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia.

The findings of the Granger causality result demonstrated that property tax, GDP per capita growth, and corruption Granger-cause income redistribution. Further, the joint Granger causality probability value is less than the five percent significant value. Therefore, all the independent variables (property tax, income tax, GDP per capita growth, employment, and corruption) Granger-cause income redistribution in Cameroon, Eswatini, Madagascar, Mauritius, Morocco, South Africa, and Tunisia. The diagnostic result revealed that residuals are normally distributed, there is no cross-sectional dependence, and residuals are homoscedastic.

This study recommends the effective administration of property tax. One of the issues confronting good property tax is inefficient and ineffective tax administration. Hence, if property tax is effectively administered, it can fulfil its redistributive role. Additionally, property tax rate can be increased to further reduce income inequality. Suggestion for areas of future research include a better measurement for income redistribution. It is worth highlighting that the Gini coefficient is an indicator of income distribution inequality. However, the study adopted the Gini coefficient as the measure for income redistribution.

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