African Scientific Journal
ISSN : 2658-9311
Vol : 3, Numéro 19, Août 2023

Influence of tax structures on income inequality in WAEMU countries

Influences des structures fiscales sur l'inégalité de revenus dans les pays de l'UEMOA

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Déclaration de divulgation : L'auteur n'a pas connaissance de quelconque financement qui pourrait affecter l'objectivité de cette étude.

Conflit d'intérêts : L'auteur ne signale aucun conflit d'intérêts.

Pour citer cet article : ZABSONRE .Z & OUEDRAOGO.B.(2023) « Influence of tax structures on income inequality in WAEMU countries », African Scientific Journal « Volume 03, Numéro 19 » pp: 408-444.

Date de soumission : Juillet 2023

Date de publication : Août 2023

DOI : 10.5281/zenodo.8276335

African Scientific Journal
ISSN : 2658-9311
Vol : 3, Numéro 19, Août 2023

Abstract

Extreme inequalities often engender the kind of poverty that has major implications for the enjoyment of civil and political rights (Alston, 2019). Left unchecked, it can lead to oligarchy, socio-political unrest, political instability, insecurity crises (Miller, 2021; Tanzi, 2018; Karen, 2017). Yet all citizens are legitimately entitled to a share of income generated by the state because they agree to obey the legitimacy of the state and the prosperity of its members (Hemel, 2019). Income distribution before tax may change due to changes in tax regimes (Bourguignon, 2015). The present research therefore aims to analyze the influence of the tax structure on income inequality in WAEMU over the period 2000-2020. To do this, the technique of least squares in two stages is used. The results show that progressive and regressive taxation positively affect income inequality in the WAEMU area. The overall level of taxation and proportional taxes do not have a significant effect on income inequality in WAEMU countries. Therefore, to reduce income inequality, WAEMU countries have an interest in reducing both regressive taxes, and progressive taxes. But the decline of the former must be greater than the latter.

Keywords: Income inequality; Progressive taxes; Regressive taxation; WAEMU; Taxation

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ISSN : 2658-9311
Vol : 3, Numéro 19, Août 2023

Résumé

Les inégalités extrêmes engendrent souvent le genre de pauvreté qui a des implications majeures pour la jouissance des droits civils et politiques (Alston, 2019). Laissée sans contrôle, elle peut conduire à l'oligarchie, aux troubles socio-politiques, à l'instabilité politique, aux crises d'insécurité (Miller, 2021 ; Tanzi, 2018 ; Karen, 2017). Pourtant, tous les citoyens ont légitimement droit à une part de revenus généré par l'Etat du fait qu'ils acceptent obéir à la légitimité de l'État et à la prospérité de ses membres (Hemel, 2019). La répartition du revenu avant impôt peuvent changer suite à des modifications des régimes fiscaux (Bourguignon, 2015). Le présent travail de recherche vise donc à analyser l'influence de la structure fiscale sur l'inégalité de revenu dans l'UEMOA au cours de la période 2000-2020. Pour ce faire, la technique des moindres carrés en deux étapes est utilisée. Les resultats prouvent que l'imposition progressive et celle régressive affectent positivement l'inégalité de revenus dans la zone UEMOA. Le niveau global de la fiscalité ainsi que les impôts proportionnels n'ont pas d'effet significatif sur l'inégalité de revenu dans les pays de l'UEMOA. Par conséquent, pour réduire l'inégalité de revenu, les pays de l'UEMOA ont intérêt à réduire et les impôts régressifs, et les impôts progressifs. Mais la baisse des premiers doit être plus importante que les derniers.

Mots clés : Inégalité de revenus ; Impôts progressifs ; Imposition régressive ; UEMOA ; Fiscalité.

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ISSN : 2658-9311
Vol : 3, Numéro 19, Août 2023

Introduction

Inequality is a serious economic problem for a variety of reasons. First, it often generates the kind of poverty that has major implications for the enjoyment of civil and political rights (Alston, 2019). Indeed, the evidence that some people have too much while others have nothing or very little, inevitably creates unwanted and antisocial attitudes and problems (Tanzi, 2018). Inequality pushes the richest to exercise a form of domination and/or power over the poor and the less fortunate (Alston, 2019; Horwitz, 2021; Holcombe, 2021; Manish & Miller, 2021). It can therefore lead to oligarchy, socio-political unrest, political instability, insecurity crises (Miller, 2021; Tanzi, 2018; Karen, 2017). Inequality is multidimensional (Greve, 2021). At once very simple and complex (Sen, 1973), it can be seen from different angles (Aaberge and Brandolini, 2015; Coady, et al. 2015). This research focuses on income inequality. The main reason for this choice is the unavailability of data concerning our field of research which is made up of the WAEMU countries. Income inequality measures the interpersonal distribution of income, capturing how income is distributed across the population at a given time (Coady et al. 2015). It is therefore interpreted as an economic hierarchy: the rich are at the top and the poor are at the bottom (Baumann and Bultmann, 2020). Several indicators are used to measure income inequality: Gini coefficients of income, income shares, measures of income mobility, Palma ratio and Theil coefficient. Rising income inequality is slowing economic growth (Dabla-Norris et al. 2015). Over the past two decades, income inequality has fallen in Africa. The income share of the wealthiest 1% rose from 0.205 to 0.202 from 2002-2011 to 2012-2021. On the other hand, it has increased in Central Africa, from 0.252 to 0.254 over the same period. However, in West Africa and Sub-Saharan Africa (SSA), it decreased over the same period. Indeed, the income share of the richest 1% fell from 0.158 to 0.143 and from 0.223 to 0.215 respectively. As for the countries of the West African Economic and Monetary Union (WAEMU), they benefit from a slight decrease in income inequality. In fact, the income share of the richest 1% fell from 0.158 to 0.144 from 2002-2011 to 2012-2021. “If the wealthiest 1% got more, it’s because the 99% got less” (Sayer, 2015). Therefore, if the wealthiest 1% got less, it’s because the 99% got more. The decline in income inequality in WAEMU over the period 2002-2021 is therefore undeniable. However, the Gini coefficient remains high in the WAEMU countries. In 2021, for example, while it is 0.425 in France and 0.577 in the United States of America, it is worth 0.639 in Benin; 0.603 in Togo; 0.601 in Cote d'Ivoire; 0.589 in Senegal; 0.571 in Burkina Faso; 0.545 in Niger. Gini coefficients of pre-tax income reveal a strong uneven distribution of market income (Nolan, Salverda & Smeeding, 2009). Therefore, these

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ISSN : 2658-9311
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figures indicate that income inequality remains a major concern in WAEMU countries. Yet less inequality is a source of happiness (Greve, 2021i; Martela & al. 2020). In addition, reduced income inequality is associated with strong GDP growth (Berg & Ostry, 2011). A better redistribution of income is therefore essential (Rawls, 1971; Friedman, 1962; Murphy & Nagel, 2002; Hemel, 2019; Horwitz, 2021). Income redistribution through taxation reduces inequality (Caminada & al. 2019a; Caminada & al. 2019b). Optimal taxation is one that ensures the most equal distribution of income (Guala, 2009). Governments must therefore act on taxation to reduce inequality (Greve, 2021k; Piketty, 2019). Yet there are several types of taxation systems: progressive, proportional and regressive taxation. Taxation is progressive when it imposes a higher tax burden as a percentage of the taxpayer's income as it reaches higher levels (Green, 2020). It therefore shifts the tax burden to higher-income earners, and remains a means of redistribution (Berens and Gelepithis, 2018; Duncan and Peter, 2016; Jakobsson, 1976). But regressive taxation is the type of taxation that requires paying a higher proportion of the resources of the poor than those of the richer (Green, 2020; Lahey, 2019; Alston & Reisch, 2019; Wilensky, 1976). It consists of indirect taxes such as Value Added Tax (VAT), excise duties, etc. (Clements & al. 2015; Alston & Reisch, 2019). Proportional taxes are those that require the same percentage of taxable resources at all income or wealth levels (Green, 2020). OECD statistics show a predominance of regressive taxes in the WAEMU area over the relevant period (2000-2021). They amount to 70.25% of total tax revenues against 10.90% for progressive taxes and 2.19% for proportional taxes. A drop in taxes from regressive to progressive taxes has been remarkable over the past five years. Indeed, regressive taxes decreased from 69.077% in 2016 to 66.139% in 2020 while progressive taxes increased from 10.295% to 11.438% over the same period. Proportional taxes also fell from 2.413% in 2017 to 2.159% in 2020. Changes in tax regimes can lead to changes in the distribution of pre-tax income (Bourguignon, 2015). But which of these tax regimes significantly affects income inequality in the WAEMU area? For some, progressive taxation is the most effective way to reduce income inequality (Pigou, 1912; Dalton, 1920; Wagner, 1958; Horwitz, 2021; etc.). For others, regressive taxation is the ideal remedy to combat inequality (Ganghof, 2006a; Ganghof, 2007; Crawford, Keen & Smith, 2010; Coady, et al. 2015; Bastagli et al. 2015; Kato, 2003; Wilensky, 1976; etc.). A third category of authors, however, emphasizes proportional taxation as a measure of reducing inequality (Smith, 1776; Friedman, 1962; Rawls, 1971; Piketty and Saez, 2007; Tanzi, 2018; etc.). These contradictions raise the following question: What is the influence of the tax structure on income inequality in the WAEMU countries? This research

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ISSN : 2658-9311
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aims to analyze the influence of the tax structure on income inequality in WAEMU countries. We predict that tax progressivity negatively affects income inequality in WAEMU countries. The rest of the document is organized into four sections. The literature review is developed in Section 1. The research methodology used is discussed in Section 2. The estimation results are interpreted in Section 3 while Section 4 concludes and proposes economic policy implications.

1. Taxation and income inequality

1.1. Theoretical influence of taxation on income inequality

1.1.1. Social Contract Theory

Two principles are supposed to govern the basic institutions of a just society (Rawls, 1971): an equal right for all and a principle of difference that benefits not only the least privileged, but also guarantees conditions of equal opportunity. According to Rawls' theory, every increase in inequality is justified only if it improves the conditions of the less fortunate. This has a direct impact on tax policy across four functional "branches". These are the allocation branch, the distribution branch, the stabilization branch and the transfer branch. Thus, Rawls explains that the purpose of levies is not to generate revenue for the government, but to gradually and continuously correct the distribution of wealth and prevent concentrations of power at the expense of the fair value of political freedom and equal opportunities.

1.1.2. Tax Structure Theory

Tax progressivity developed during the 1980s as the distribution of pre-tax income became much more important. The tax burden had to be shifted from the high to the middle income class (Slemrod 1996). In fact, the rich could not be taxed more because the optimal marginal tax rate at the highest income level is zero (Triest, 1996). In addition, the redistributive impact of taxes is limited in developing countries because of their dependence on indirect taxes (Bastagli et al. 2015). In our analysis, we break down the tax structure into progressive, proportional and regressive taxes.

Progressive taxation

Taxation is progressive when it imposes a higher tax burden as a percentage of the taxpayer's income as it reaches higher levels (Green, 2020). It thus shifts the tax burden from low-income to high-income earners and thus remains a means of redistribution (Berens & Gelepithis, 2018; Duncan & Peter, 2016; Jakobsson, 1976). Tax regimes that appear proportional but contain exemptions are also progressive (Green, 2020). Several theories justify progressive taxation: 1)

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the theory of ability to pay and equal benefits (Green, 2020) 2) the moral theory of utility (Mill, 1870) and 3) the theory of the social contract of John Rawls (1971). Thus, if the income distribution is significantly unequal, the tax system must be progressive so that high-income groups, which have a higher tax capacity, pay higher average tax rates to contribute more to total tax revenues (Tanzi, 2018). From this perspective, personal income tax is a progressive tax (Coady & al. 2015). But Friedman (1962) finds that it has limited effectiveness in reducing inequality.

Regressive taxation

It is the type of taxation that requires a higher proportion of the resources of the poor than those of the wealthier (Green, 2020; Lahey, 2019; Alston and Reisch, 2019; Wilensky, 1976). Indirect taxes including VAT generally tend to be regressive (Clements et al. 2015; Alston and Reisch, 2019). As the financial needs of states continue to grow, they increasingly resort to regressive taxation (Newbery & Stern, 1987; Keen & Simone, 2004; Beramendi & Rueda, 2007; Kato, 2003; Ganghof, 2006a). Progressive taxation is based on the theory of economic liberalism (Nozick, 1974). The emphasis on near absolute property rights has led the Liberals to oppose progressive and proportional taxation. Consumption taxes are regressive because they do not necessarily take into account people's ability to contribute (Lahey, 2019). Taxes such as VAT and excise duties are regressive taxes (Cnossen, 2005; Alston and Reisch, 2019; Coady et al. 2015; Lahey, 2019). Overall, indirect taxes tend to be regressive and therefore have a small impact on income distribution (Chu, Davoodi & Gupta, 2004; Gemmell & Morrissey, 2005; Coady, 2006). As a result, the increasing use of VAT is likely to push low-income people deeper into poverty and structurally undermine development (UN, 2014). Thus, the distributive impact of VAT has been mixed (Bird and Zolt, 2005; Coady, 2006).

Proportional taxation

The tax is proportional when it requires the same percentage of taxable resources at all income or wealth levels (Green, 2020). Proportional taxation is based on the fact that the tax must be based on "ability to pay" or reflect "equal benefit" (Smith, 1776). Kaldor, (1955) and Rawls (1971) find that proportional taxes are best because they «are levies according to the amount that a person withdraws from the commons and not according to the amount of his income. Indeed, the reasons why one person with greater ability to pay should pay more for the same utilities than another with lower capacity remain unclear (Green, 2020). Nor is the logic of equal

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benefits always convincing. It stems from the assumption that public services such as military defence or police disproportionately benefit those with more assets to protect and should therefore pay more. But of course, this is not always the case and the reverse is often true. Indeed, the wealthy owner of a solid brickwork may need less fire protection than the poor in a dilapidated wooden slum (Groves 1948). Capital gains taxes and wealth taxes are taxes owed by the wealthiest of taxpayers since those who save and invest are generally among the wealthiest (Coady et al. 2015). Moreover, it can be administratively difficult to tax capital given its mobility, which gives rise to many opportunities for evasion and avoidance.

Moreover, it can be administratively difficult to tax capital given its mobility, which gives rise to many opportunities for evasion and avoidance. In addition, capital mobility allows businesses to shift much of the burden of these taxes on labour. These taxes can be grouped into two broad categories (Eyraud, 2015): those that apply to wealth assets (property tax and net wealth tax) and those that apply to wealth transfers, which are then divided into transaction taxes (collected at the time of sale of the asset) and in taxes on gifts and estates (levied when the property is disposed of). The ex-ante reduction of inequalities can therefore be achieved by taxing intergenerational transfers of wealth, as well as inter-vivos transfers which are often advances on inheritance (Bourguignon, 2015).

1.1.3. Measures of progressivity, degressivity and fiscal proportionality

The Suits indices for the various taxes and an aggregate Suits index are used to assess the progressivity or degressivity of the tax system (Suits, 1977). The Suits index is analogous to a Gini tax coefficient and is constructed from an income concentration curve (a graph of cumulative tax burden versus cumulative income). A proportional tax analysis would have an income concentration curve that follows the 45° line. A progressive tax is likely to fall below the 45° line while a regressive tax would rise above the 45° line. The Suits index is equal to 1 minus the ratio between the area under the income concentration curve and the area under line 45°. It ranges from -1 to +1, with negative values indicating a regressive tax, 0 a proportional tax and positive values a progressive tax. Metcalf (1996) constructed the Suits Index as the weighted average of the indices by tax nature, with the average tax rates serving as weights. The statistics needed to calculate the Suits indices for the WAEMU zone are lacking. We have therefore approximated progressivity by the ratio of total progressive taxes to total tax revenues. Degressivity is measured by the ratio of total regressive taxes to total tax revenues. Finally, proportionality is approximated by the ratio of total taxes proportional to total tax revenues.

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Obviously, any synthetic measure of the progressivity of a tax system is imperfect (Metcalf, 1996). But we think it can help us to better understand the tax structure of WAEMU countries.

1.1.4. Measures of Income Inequality

Traditional measures of income inequality

Bourguignon (2015) distinguishes essentially four measures of inequality: the share that goes to the richest (1%, 5%, or 10%), the relative gap between living standards in the extreme deciles (the richest 10% and the poorest 10%), the Gini coefficient, and the Theil coefficient. However, Miller (2021) points out that there are three common types of measures of income inequality: Gini coefficients of income, income shares and measures of income mobility. Gini's coefficients measure how far a revenue distribution is from being perfectly equal (Miller, 2021). However, changes in the Gini coefficient do not necessarily reflect changes in inequality. The Gini coefficient is probably the most frequently used measure of inequality especially in international comparisons (Miller, 2021; Bourguignon, 2015; Bastagli et al. 2015). But it takes into account the entire distribution rather than just the extremities (Bourguignon, 2015). Income shares for specific quantiles are the other main tool for measuring income distribution (Miller, 2021). This is the proportion of income to those with the highest incomes (1% or 10%) (Greve, 2021b). This indicator of the evolution of equality measures if the distribution bias increases. Derived income shares were made possible by the creation of the Piketty–Saez series (Piketty & Saez, 2003; 2004). The Palma ratio is calculated as the share of income received by the 10% with the highest disposable income divided by the 40% with the lowest income. A higher level therefore implies a higher degree of inequality whereas at the same time, it is a measure that does not depend on what happens in the middle of the distribution (Cobham, Schlögl and Sumner, 2016). Theil's coefficient also takes into account the full range of distribution. For any decomposition of the population into distinct groups, it has the property of being decomposable into the sum of intergroup inequality and intra-group inequality which is an advantage (Bourguignon, 2015).

New measure of inequality: ZZ Inequality

In the framework of this research, we have constructed a new measure of income inequality that is better suited to the context of the WAEMU zone. This is a coefficient of ZZ inequality (Inég. ZZ). It is equal to the difference between the income share of the richest 1% and that of

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the bottom 50% of income redistribution. A high gap indicates an increase in inequality, while a small gap indicates a high level of equality.

1.1.5. Theoretical influence of the tax structure on income inequality

Theoretical influence of the overall level of taxation on income inequality

Some researchers argue that the overall level of taxation is best suited to reduce income inequality. For example, Lindsey (1990) argues that pre-tax income inequality increased as a result of tax cuts in the 1980s. Yet Clements & al. (2015) believe that improving income redistribution requires an increase in average tax ratios. But many authors point out that it is the structure of the tax system is important to describe the impact of taxes on inequality (Greve, 2021j; Bussoloa & al. 2019; Bastagli & al. 2015).

Theoretical influence of progressive taxes on income inequality

Income inequality should at least decrease as a result of any income transfer from a richer person to a poorer person (Pigou, 1912; Dalton, 1920; Wagner, 1958). Thus, changes to the tax system could have two effects on income inequality (Karoly, 1996). The first is the direct redistributive effect of taxes on income distribution through the progressivity of the tax system. Second, changes in tax policy can have dynamic or indirect effects on income distribution by changing the distribution of pre-tax income. This means taxing some people at higher rates than others (Horwitz, 2021).

Theoretical influence of proportional taxes on inequality

Unlike previous authors, proponents of proportional taxation argue that to improve the distribution of a country's income, all citizens must be taxed in proportion to their income (Smith 1776; Friedman 1962; Rawls 1971; Piketty and Saez 2007; Tanzi 2018). Indeed, the most redistributive countries tend to be financed by less progressive tax systems (Prasad and Deng, 2009 ; OECD, 2008). However, Coady et al. (2015) find that flat tax systems are generally less redistributive than those that gradually increase personal tax rates, particularly for higher incomes.

Theoretical influence of regressive taxes on inequality

Many researchers are not in favour of progressive taxes or proportional taxes. For them, an increase in regressive taxes can always be the best way to support redistribution provided that

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the public spending they finance is very progressive (Ganghof 2006a; Ganghof, 2007; Crawford, Keen & Smith 2010; Coady & al. 2015; Bastagli & al. 2015; Kato 2003; Wilensky 1976). This is disputed by authors such as Coady & al. (2015), Clements & al. (2015) and Lahey, (2019). For the latter, regressive taxation is less appropriate to achieve redistribution objectives. As a result, the increasing use of VAT to replace progressive income tax structures risks pushing low-income people deeper into poverty and hindering development (UN, 2014). In developing countries, the redistributive impact is limited by dependence on indirect taxes (Bastagli & al. 2015).

1.2. Empirical influence of taxation on income inequality

The theoretical controversies are also seen on the empirical level. Thus, unlike some thinkers who show that it is the overall level of taxation that influences inequality (Dianov & al. 2022; Mourfou & Ouédraogo, 2021; Ouédraogo & al. 2022; etc.), others attest that it is progressive taxes, either regressive taxes are proportional taxes that affect income inequality (Stiers & al. 2021; Chen, 2020; Carroll & al. 2020; Dyrda & Pedroni, 2022).

1.2.1. Empirical influence of the overall level of taxation on income inequality

Among the authors who have highlighted this influence are those who have led to the results that taxation reduces income inequality and those whose results show that taxes increase inequality.

Dianov & al. (2022) reveal that taxes helped reduce income differences in 28 EU countries over the period 2005-2019. From a cluster analysis, the authors prove that there is no qualitative econometric dependence between the tax factors analysed and the Gini index in five EU countries. However, the Gini index has been linked to property taxes.

Ouédraogo & al. (2022), on the other hand, prove that direct taxes increase income inequality and their increasing effects are greater in countries with higher income inequality in Sub-Saharan Africa (SSA). The authors use different estimation techniques (OLS, IV-2SLS, IVQR) from a panel of 45 SSA countries over the period 1980-2018. Their results also indicate that indirect taxes increase income inequality in the least unequal countries, but they have no significant effect in the most unequal countries. In contrast, in countries with high income inequality, this component increases income inequality. In addition, they reveal the existence of an inverted U-shape relationship between indirect taxes and income inequality in sub-Saharan Africa during the period concerned.

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Mourfou & Ouédraogo (2021) analysed the effect of different types of tax revenues (total tax burden, direct tax burden, indirect domestic tax burden and commercial tax burden) on income inequality in WAEMU countries from 1996 to 2015. Double least squares (2SLS) are used as estimation technique. The results show that an increase in the level of total tax revenues as well as direct tax revenues leads to a significant reduction in income inequality. Indirect domestic tax revenues and commercial tax revenues are neutral.

Messy & Ndjokou (2021) show that tax revenues as a percentage of GDP are the only tax indicator that reduces income inequality in sub-Saharan Africa. On the other hand, direct and indirect taxes do not appear to be instruments to combat income inequality. They used the fixed-effect Ordinary Least Squares (OLS) method with instrumental variables on data from 34 SSA countries during the period 1992-2017.

Karakotsios & al. (2020) note a long-term two-way causal effect between the tax-to-GDP ratio and income inequality. The negative effect of the tax-to-GDP ratio on income inequality supports the redistributive role of taxes. They point out that taxation can be a powerful policy instrument to reduce inequality. On the other hand, the negative impact of income inequality on tax revenues can be attributed to the fact that inequality could encourage tax avoidance and evasion resulting in low levels of tax compliance. Autoregressive Distributed Lag Models (ARDL) are used on data from 58 countries covering the period 1995-2016. Pooled mean group (PMG)) estimation was also applied. Their findings further suggest that economic liberalism has a positive effect on income inequality. This indicates a compromise between economic liberalism and income equality. In other words, institutional changes and liberalization policies have important implications in terms of income distribution and inequality.

1.2.2. Empirical influence of tax structure on income inequality

The following researchers provide empirical evidence that progressive taxation is an effective means of reducing inequality for some, that proportional taxation is another for others and that regressive taxes seem to be the best inequality reducer for a third group of authors.

Empirical influence of tax progressivity on income inequality

Dianov & al. (2022) find that income inequality has increased in twelve (12) of the 28 EU countries despite the increasing role of income and land taxes. Moreover, in the former socialist countries, the indicators of personal income tax are not significant in explaining income differentiation. The redistributive role of personal income tax is evident in only four countries.

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Stiers & al. (2021) relied on survey data from the year 2019, to study progressive tax preferences in Belgium using the Ordinary Least Squares (OLS) technique. Their results show a preference for progressive taxation in general. But higher-income respondents opt for less progressive taxation.

Chen (2020) based the non-linear least squares year-to-year estimates of Chen & Guo (2013) linked to the United States Federal Personal Income Tax Schedule for the period 1966 to 2005, to examine the effects of progressive tax systems on income inequality. He notes that an increase in the progressivity of capital income tax monotonously reduces working hours. A higher progressivity of the labour income tax worsens both income inequality and inequality of the workforce while it improves inequality of working hours.

Anyaduba & Otulugbu (2019) showed that it is the tax structure rather than the level of social spending that influences support for progressive taxation. They found that the more effort a government puts into pro-poor spending categories, the less support for a more progressive tax system. The likelihood of support for progressive taxation decreases sharply as the share of social spending on progressive social assistance programs increases. On the other hand, this probability increases when cash transfers are less concentrated on the poor. They applied a logistic regression model to 2006 survey data for 33 OECD countries. The results also show that high-income households are more likely to oppose greater fiscal progressivity when social spending is more favourable to the poor (the level of income inequality has remained constant).

Guillaud & al. (2019) show that fiscal progressivity and the average tax rate have a significant impact on redistribution in each of the 22 OECD countries over the period 1999-2016. Moreover, high average tax rates do not end up with very progressive tax systems. The authors arrived at such results by calculating the Gini index at different stages of income.

Duncan & Peter (2016) used the instrumental variable (VI) estimation technique on data from 189 countries from 1981 to 2005, to indicate that a one-unit increase in the progressivity of the marginal or average tax rate reduces the Gini coefficient. They also find that increasing progressivity at the top of the income scale is a more effective method to reduce income inequality. Moreover, their estimates indicate that progressivity has a greater equalizing effect in countries with better access to political rights and civil liberties.

Rodriguez & al. (2002) studied inequality in the United States and realized that the economic conditions of the poor remained unchanged while the rich became relatively richer. Changes in income and wealth inequality due to age differences are mostly insignificant. On the other hand, the changes in inequality due to the employment situation and the level of education are very

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significant. Earnings mobility has decreased somewhat, but income mobility has increased for the non poor and non rich. The authors used Survey of Consumer Finance (SCF) data from 1992 and 1998 and secondary data from the Panel Study of Income Dynamics (PSID) from 1989, 1994, and 1996.

Empirical influence of tax regression on income inequality

Carroll & al.(2020) reveal that higher consumption taxes redistribute wealth, reducing long-term inequality. Like consumption taxes, taxes on capital income unequivocally reduce wealth inequality in the long run. Taxes on labour income have a very small effect on the lower end of the wealth distribution, increasing inequality just slightly. At the middle and upper ends, however, taxes on labour income have much stronger effects in reducing inequality. The macroeconomic model modeled by Aiyagari (1994) extended to a range of tax instruments and elastic labour supply was used on US data covering a five-year period. The results show that for poor households, the ideal tax mix is a mix of high consumption taxes, moderate capital income taxes and zero labour income taxes. As wealth increases, the privileged combination shifts to zero consumption taxes, high taxes on labour income, and slightly lower taxes on capital income. Change occurs around a level of wealth at which the household earns a large fraction of its capital income. Higher consumption taxes redistribute resources from rich to poor households through higher effective wages. These poor households have a higher marginal propensity to consume, so the capital stock is reduced. In general, a household favours tax policies that reduce the tax burden on its main source of income.

Anyaduba & Otulugbu (2019) examined the impact of value-added tax (VAT), customs duties, excise taxes, oil tax, profits and corporate income tax on income inequality in Nigeria. The analysis of data covering the period 1990-2016 was carried out using a combination of error-corrected models (ERM). They observe that VAT, customs and excise duties have increased income inequality. The study concludes that direct taxes reduce income inequality while indirect taxes worsen it.

Empirical influence of tax and flat-rate proportionality

Dyrda & Pedroni, (2022) show that flat-rate taxes help reduce the inequalities and risks faced by households in the United States. These authors used a global optimization algorithm in a standard incomplete market model during the period 1995-2007. Changes to the capital income

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tax are the main source of redistributive gain from optimal policy. Lower labour income taxes reduce average well-being. In a representative economy without heterogeneity, it is optimal to obtain all the necessary income through flat-rate taxes. Capital income tax affects both ex ante and ex post risk incurred by households. They find it optimal to obtain all income through flat-rate taxes by fixing taxes on capital and labour income so as not to distort the decisions of the agent.

Stiers & al. (2021) result in higher income with a greater likelihood of supporting a flat tax.

This overview of the empirical literature reveals a lack of work on the subject in the WAEMU countries. Most of the research on the subject concerns countries outside the WAEMU zone. The few studies on WAEMU countries, such as that of the authors Mourfou & Ouédraogo, (2021), have focused more on the effect of direct and indirect taxes rather than the tax structure seen in terms of proportional, progressive and regressive taxes. Moreover, taxes on profits are by definition distribution-neutral (Green, 2020). We therefore believe that we can fill this knowledge gap on the WAEMU countries through this research.

2. Research methodology

2.1. Theoretical model

We construct our theoretical model as follows. The share of the incomes of the richest 1% (R^r) and the bottom 50% (R^m) are represented respectively according to Duncan and Peter (2016):

$$R^r = \alpha^r + \delta^r P + \beta^r X + \mu^r \qquad (1)$$

$$R^m = \alpha^m + \delta^m P + \beta^m X + \mu^m \qquad (2)$$

The difference between equation (1) and equation (2) is income inequality (I) in the country.

$$\boldsymbol{I = R^r - R^m = \alpha + (\delta^r - \delta^m)P + \beta X + \mu,} \quad \boldsymbol{E[X_\mu] = 0,} \quad \boldsymbol{E[P_\mu] \neq 0,} \quad \boldsymbol{(3)}$$

If inequality is measured by the Gini index, then equation 3 becomes :

$$\boldsymbol{R(\tilde{x}) = \frac{\Delta}{2m} = \frac{1}{2n^2 m}\sum_{i=1}^{n}\sum_{j=1}^{n}|x_i - x_j| = \alpha + (\delta^r - \delta^m)P + \beta X + \mu,} \quad \boldsymbol{E[X_\mu] = 0,}$$

$$\boldsymbol{E[P_\mu] \neq 0,} \ \boldsymbol{(4)}$$

where P is the measure of the tax structure, X is the set of exogenous characteristics of the country not correlated with errors μ^r et μ^m, $\alpha = \alpha^r - \alpha^m$, $\beta = \beta^r - \beta^m$ et $\mu = \mu^r - \mu^m$.

Tax policy is generally seen as a possible solution to the problem of growing income inequality because higher tax rates and the resulting increase in progressivity imply that the rich pay a share relatively larger (compared to the poor) their pre-tax income rates to the government. As

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a result, after-tax income tends to be more evenly distributed. This redistributive effect is further enhanced if tax revenues are redistributed to the poor. While progressivity and income inequality are negatively linked, these policies have important implications for income distribution. So $\delta^r < 0$ and δ^r are likely to be smaller (more negative) in countries that facilitate pro-poor government transfers $\delta^r < \delta^m$ and $\Delta\delta = |\delta^r - \delta^m|$ increases with the responsiveness of evasion to progressive changes.

2.2. Empirical model

Empirically, we model income inequality (I_{it}) as follows.

$$\boldsymbol{I_{it} = \beta_0 + \delta P_{it} + \beta_1 Z_{it} + \tau_t + \varepsilon_{it}} \qquad (6)$$

where I_{it} is a measure of inequality developed above (Gini coefficient, Palma coefficient or inequality ZZ) from country i to year t, P_{it} is a vector of measures of the tax structure (progressive taxes, proportional taxes or regressive taxes), Z_{it} is a vector of control variables as detailed below, τ_t captures time effects and ε_{it} refers to the error term. The key interest parameter δ captures the effect of the tax structure on income inequality.

2.2.1. Variables, Definitions and Sources

Table n°1 gives the definitions of the variables and their data source.

Table N°1: Variables, definitions and sources

Variables	Notation	Explanation	Authors	Sources	Expected sign
Dependent variables					
Gini coefficient	Gini	Gini coefficient of income before taxes	Greve, (2021b), Alvaredo & al. (2018), Piketty & Saez, (2007),	World Inequality Database	
Palma ratio	Palma	Palma ratio of income before taxes	Banerjee & Duflo, (2019), Alston et Reisch, (2019)	World Inequality Database	
ZZ inequality	Inég ZZ	inequality ZZ income before taxes	Banerjee et Duflo, (2019), Alston et Reisch, (2019)	authors	
Independent variables					

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Variables of interest					
Progressive taxes	ImpProg	Proportion of progressive taxes on total tax revenues	Duncan & Peter (2016), Metcalf (1996), Suits (1977),	OCDE	Negative
Proportional taxes	ImpProp	Proportion of proportional taxes on total tax receipts	Duncan & Peter (2016), Metcalf (1996), Suits (1977),	OCDE	Negative
Regressive taxes	ImpRegr	Proportion of regressive taxes on total tax revenues	Duncan & Peter (2016), Metcalf (1996), Suits (1977),	OCDE	Negative
Overall tax level	NivFisc	total tax revenues as a percentage of GDP	Duncan & Peter (2016), Metcalf (1996), Suits (1977),	OCDE	Negative
Control variables					
income per capita	RevAdult	relative income of households before taxes and transfers in absolute values	Berens et Gelepithis (2018), Berens & von Schiller, (2017)	World Development Indicators	Negative
Financial development	DevFin	credit to the private sector as a percentage of GDP.	Claessens & Perotti (2007), Galor & Zeira (1993), Corak (2013)	World Development Indicators	Negative
Level of education	NivScol	per capita health expenditure	Grossman (1972), De Gregorio & Lee, (2002)	World Development Indicators	Negative

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Level of employment	NivEmp	labour force employment ratio	Rodriguez & al. (2002)	World Development Indicators	Negative
Freedom of enterprise	LibEntr	percentage of self-employed in the labour force	Carter (2007); Apergis & coll. (2013)	World Development Indicators	Negative
Quality of the institutions	QliInst	the proceeds of the corruption index by the law enforcement index	Duncan & Peter (2008)	Worldwide Governance Indicators	Negative

Source: auteurs

2.2.2. Descriptive Statistics

Descriptive statistics are summarised in Table n°2 below

Table N°2: Descriptive statistics

Variables	Mediane	Mean	Min	Max
Gini	0,60049	0,5913667	0,5294186	0,6665251
Palma	373,7656	365,2043	252,5092	544,3921
InegZZ	0,0163	0,3469579	0,2492	0,4715
ImpProg	10,12418	10,9097	5,868117	18,63045
ImpProp	2,297117	2,198236	0,4539744	3,914341
ImpRegr	69,77011	70,25405	51,77865	80,45616
NivFisc	7,976924	12,91569	6,996391	18,35054
QliInst	0,3315691	0,4455022	-0,0962375	1,923882
DevFin	15,43459	17,29162	3,859404	40,16302
LiberEntr	0,8	0,9346032	0,48	1,98
NivEmpl	61,464	60,86787	42,415	79,266
NivScol	12,77683	9,213042	1,189073	22,24828
RevAdult	3167,222	3570,347	1605,003	7864,528

Source : Synthesis of the authors

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2.2.3. Estimation Technique

One of the peculiarities of the data extracted from the WID database is that the process of imputation of the data makes it possible to obtain bias-correcting estimators in case of non stationarity of the variables (Solt, 2019). This means that conventional unit root tests are no longer needed when these data are used in a regression. In the literature, studies using these data do not perform unitary root tests (Agnello & Sousa, 2014; Ball & al. 2013; Woo & al. 2013). The choice of estimation technique depends very much on the nature of the data. We have panel data with a smaller individual dimension (8 countries) than the temporal dimension (20 years). In addition, an endogeneity problem is undeniable in our data for the following reasons. First, the variables of taxation and institutional quality are endogenous. Indeed, a favourable institutional environment facilitates the reduction of income inequalities and, in turn, high income inequalities reduce the possibilities of maintaining the proper functioning of the institutional framework of countries (Martinez-Vazquez & al. 2012). Second, there is endogeneity between taxation and income inequality (Dao & Godbout, 2014). High levels of inequality increase incentives to mobilize tax revenues and, conversely, increased mobilization of tax revenues reduces income inequality (Agnello & Sousa, 2014; Bird & al. 2004). For example, a government may be required to change its tax structure precisely because of pre-existing income inequality.A solution to the problem of endogeneity is to use the technique of least squares in two stages (MC2E) or 2SLS (Rios-Avila & Canavire-Bacarreza, 2018). This procedure requires fewer restrictions on the joint distribution of data-generating functions (Greene, 2012). Further simplification of the estimation of standard errors in two-step models is noted by Terza (2016). Moreover, it is a robustness estimation method because it allows a better specification of the model by calculating the standard errors corrected in the second step that take into account the estimation error of the first step (Kripfganz & Schwarz, 2015). This estimation technique is used in this research.

3. Results and Interpretation

The estimation of the model using the two-stage least squares method yielded results recorded in Table 3 below.

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Table N°3: Estimation results

VARIABLES	Gini	Palma	InegZZ
NivFisc	-0.000424	-2.049	-0.00174
	(0.00204)	(4.206)	(0.00304)
ImpProg	0.00375***	6.834***	0.00390**
	(0.00117)	(2.410)	(0.00174)
ImpProp	0.000298	2.448	8.52e-05
	(0.00308)	(6.367)	(0.00460)
ImpRegr	0.00396***	7.570***	0.00531***
	(0.000406)	(0.840)	(0.000606)
DevFin	-0.00123**	-1.862	-0.00218***
	(0.000564)	(1.164)	(0.000840)
LiberEntr	0.0139*	32.73**	0.0108
	(0.00711)	(14.68)	(0.0106)
NivEmpl	0.000374	0.864	0.00121*
	(0.000465)	(0.960)	(0.000693)
NivScol	0.000214	-0.249	0.00164*
	(0.000582)	(1.203)	(0.000868)
QliInst	0.0103*	19.30*	0.0143*
	(0.00554)	(11.44)	(0.00826)
RevAdult	2.37e-06	0.00776*	8.73e-06***
	(2.02e-06)	(0.00418)	(3.01e-06)
Constant	0.248***	-305.1**	-0.475***
	(0.0719)	(148.6)	(0.107)
Observations	126	126	126
Number of Code	6	6	6

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source : Compilation of authors

The results show that among the three measures of inequality selected, the ZZ Inequality (Ineg ZZ) is the one that better understands income inequality in the context of WAEMU. Indeed, all the significant variables in the model dependent on the ZZ inequality are also for the other measures of inequality (Gini index, Palma ratio). In addition, explanatory variables with a

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higher degree of significance are more numerous when inequality is measured by Ineg ZZ than the Gini index and the Palma ratio. Moreover, the Gini index focuses more on the inequalities of the middle of the distribution than those of the extremities. Therefore, we rely on the ZZ inequality results for interpretations.

3.1. The influence of interest variables on income inequality in WAEMU

Regarding the four variables of interest, two are significant whereas are not. Thus, progressive taxation significantly affects income inequality in WAEMU in a positive way. Indeed, an increase in progressive taxes of 1% causes an increase in inequality of 0.4%. This is due, on the one hand, to the direct redistributive effect of progressive taxes on income distribution and, on the other, to fiscal policy. The latter has had dynamic or indirect effects on the distribution of income by changing the distribution of pre-tax income. In addition, changes in labour supply, savings and portfolio decisions as a result of revisions to tax codes are contributing to the increase in inequality before taxes. It can be explained by the fact that the distribution of income before tax is much more unequal in the WAEMU countries while the way taxes are applied remains unfair and inequitable. Indeed, governments in these countries have real difficulties in taxing higher-income earners since the optimal marginal tax rate at the highest income level is zero (Triest, 1996). In addition, administrative systems suffer from poor detection and enforcement capacity, resulting in high levels of tax evasion, particularly for high-income groups. In the WAEMU countries, the tax base has been reduced by numerous exemptions and exemptions. Tax expenditures in the form of special exemption schemes or other tax benefits significantly erode the tax base. Personal income tax is so arbitrary that its impact and effectiveness in reducing inequality remains very limited. This finding supports the theories of several authors who have effectively challenged the effectiveness of progressive taxation (Mill, 1848; Friedman, 1962; Nozick, 1974; Kato, 2003; Bastagli & al. 2015; Hanni & Martner, 2019). Our results appear to be those of Dianov & al. (2022) which have shown that increased property and income taxes have increased income inequality in twelve (12) of the 28 countries of the European Union. Similarly, regressive taxes have a significant positive impact on income inequality. This implies that an increase in these taxes leads to more income inequality in the context of WAEMU. Specifically, an increase in tax regression of one percentage point increases inequality by 0.5%. This result is explained by the fact that when it comes to regressive taxes, people with low or no income pay the same rates as those with higher incomes. These taxes therefore do not take into account the ability to pay (Lahey, 2019). Yet the principle

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of the ability to pay taxes is a fundamental principle of tax fairness that should prevent governments from collecting taxes from those who do not. Taxation, for example, on people who are below the poverty line can be detrimental to survival and human development. This could justify that the increase in inequality as a result of an increase in regressive taxes. Therefore, regressive taxation is less appropriate to achieve better income redistribution (Coady et al. 2015; Clements et al. 2015; Lahey, 2019). Our go in the same direction as those of Anyaduba and Otulugbu (2019) who also found that VAT, customs and excise duties have increased income inequality in Nigeria. On the other hand, the overall level of taxation as well as proportional taxes do not have significant effects on income inequality in the context.

3.2. Influence of control variables on income inequality in WAEMU

Financial development is negatively associated with income inequality. This means that financial development reduces income inequality in WAEMU. The one percent increase in financial development reduces income inequality by 0.2%. By the way, access to credit by the less fortunate can allow them to move from a lower to a higher social class. The level of employment and education play a significant role in income inequality. Thus, the more people are employed, the more inequality increases. This can be explained by differences in wage levels. Moreover, the educational level contributes to the increase in income inequality due certainly to the inequality in education and capability. The quality of institutions reveals a significant effect on income inequality. However, its sign is positive. This implies that poor quality institutions increase income inequality in the WAEMU area. Indeed, embezzlement, corruption and politicization are the root causes of inequality. The average income per adult is significant and shows a positive sign that the low level of development is a source of inequality in the context of WAEMU. Freedom of enterprise is insignificant. This shows the embryonic level of the private sector in the context of WAEMU.

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4. Conclusion

The objective of our research is to analyze the influence of the tax structure (progressive taxes, regressive taxes, proportional taxes) on income inequality in the context of WAEMU during the period 2000-2020. The majority of research on the influence of taxation on income inequality relies on the Gini index as a measure of inequality and on the types of taxes (direct, indirect) for tax measures. This research work analyzes the subject from a totally different angle with the ZZ inequality as a measure of inequality on the one hand and progressive, proportional and regressive taxes as a measure of taxation. The use of the two-step ordinary least squares regression resulted in the following results. Progressive and regressive taxation have a significant effect on income inequality in the WAEMU area. Both forms of taxation contribute to increasing income inequality. However, the overall level of taxation and proportional taxation do not significantly affect income inequality. Control variables such as financial development, educational attainment, institutional quality, development and economic liberalism are all significant with the exception of the latter. The level of education, institutional quality and level of development have a positive effect while financial development has a negative effect on income inequality.

In the option of reducing inequalities, these results imply policy implications. Tax reforms leading to a small reduction in progressive taxes and a sharp reduction in regressive ones are needed. These tax cuts, along with reducing the tax burden on the less wealthy and the poor, help fight tax evasion and evasion. In addition to reducing the rate of Value Added Tax, States must introduce changes that take into account the ability to contribute. Significant changes are needed in tax codes in different countries to remove tax exemptions and exemptions that do not benefit the rich. In addition, States must ensure that the quality of institutions is improved and take measures to promote access to credit by the less fortunate. The removal of barriers to free market play also contributes to lower income inequality. This requires states to invest heavily in education and health to raise the level of education and competence of the median citizen also contributes to the equalization of pre-tax income.

Our research has focused on income inequality. Further work could extend the analysis of the effects of the tax structure on inequality of opportunity, health and education in WAEMU countries. Health and education are at the heart of any sustainable development process. Future research could be done.

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