DBN Development Bank of Nigeria
...Financing Sustainable Growth

WORKING PAPER SERIES

213, 2020

Ethnic Diversity and Inequality in sub-Saharan Africa: Do Institutions Reduce the Noise?

Forthcoming: Social Indicators Research

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Abstract

Studies on the causes of income differences between the rich and the poor have received extensive attention in the inequality empirics. While ethnic diversity has also been identified as one of the fundamental causes of income inequality, the role of institutions as a mediating factor in the ethnicity-inequality nexus has not received the scholarly attention it deserves. Accordingly, it is of policy relevance to assess how a policy variable (i.e. institutional quality) can be employed to modulate the effect of ethnicity on inequality. This study complements the existing literature by investigating the extent to which an institutional framework corrects the noisy influence originating from the nexus between "ethnic diversity" and inequality in 26 sub-Saharan African countries for the period 1996-2015. The empirical evidence is based on pooled OLS, fixed effects and system GMM estimation techniques. The main findings reveal that the mediating influences of institutional settings are defective, thus making it extremely difficult to modulate the noisy impacts of ethno-linguistic and religious heterogeneity on inequality. In addition, the negative influence orchestrated by ethnic diversity on inequality only marginally fades out as its interaction with institutions is controlled for. Policy implications are discussed.

***Keywords*:** Linguistic, religious, ethnicity, inequality, Kuznets curve.

***JEL Classification*:** C23, D02, D63, E02.

1.0 Introduction

Understanding the root causes of inequality remains the surest pathway of proffering long-term solutions to the challenges[1]posed by it. Theoretically, various factors have been put forward as engendering inequality-related problems. The identified factors include starting points, early life opportunities, global influences, national economy and tax policy, among others. However, since the seminal contribution of Easterly and Levine (1997), ethnic diversity has received substantial research attention till date. Scholars have associated ethnic diversity to political instability and conflict (Easterly 2001; Buhaug 2006); low provision of public goods (Miguel & Gugerty 2005; Kimenyi 2006); high inequality (Barr and Oduro 2002; Milanovic 2003); and more importantly as being responsible for Africa's low economic growth (Easterly & Levine 1997; Posner 2004a). Meles Zenawi (the former Ethiopian prime minister) has summarized the political economy of Africa as follows: "*ethnic, religious and other sources of diversity are the hall-marks of African societies'' and rent-seeking in our economies is not a more or less important phenomenon as would be the case in most economies. It is the centerpiece of our economies*" cited in Easterly (2001, p.688). Thus, the investigation into the causal connection between ethnic diversity and inequality has dominated the empirical research space, mostly among academics, policymakers and other stakeholders. Arguably, the empirical regularity validating the ethnically-induced problems occasioning inequality of some sorts has been extensively established in the literature (Barr & Oduro 2002; Milanovic 2003; Glaeser 2005; Dincer & Lambert 2006). This apart, it has equally been well conjectured that regardless of the stages and levels of development, no nation can claim to be completely absolved of ethnical bias except for a completely homogeneous society whose structural make-up is somehow flawless, which in most cases is impracticable. Strictly speaking, every economy, be it developed or developing has some patches of ethnical fissure in its structural make-up which mostly emanate via various channels such as migration, international relations, colonial affiliations and globalization forces. What is however apparent is that the degree of ethnic diversity tends to vary from one country, region or continent to another (Alesina et al, 2003; Fearon 2003)[2].

[1] Income inequality tends to bring about lower life-expectancy; increase in crime rates and a range of other negative social outcomes (see Wilkinson and Pickett (2009) for more detailed exposition).
[2] This has been lent credence through statistics.

While it is true that extensive studies exist in the empirical literature about the ethnic diversity-inequality linkage, (Milanovic, 2003;Glaeser, 2005; & Dincer & Lambert, 2006), the moderating role of a sound institutional framework on its identified adverse consequences has hardly been given the priority it deserves. By extension, the strand of literature that delves into accounting for institutional roles in such relationships is conspicuously missing or at best emerging. It is instructive to argue that institutions play a pivotal role in an economy. This is because sound institutions that give legal protection to minorities, guarantee freedom from expropriation, grant freedom from repudiation of contracts, and facilitate cooperation for public services might possibly constrain the amount of damage that one ethnic group could do to another[3]. However, the extent to which institutions act as a moderator in ethnic diversity-inequality relations remain an empirical issue. It is puzzling however, to note that while the developed countries, with sound institutional frameworks are still grappling with disparate inequality outcomes induced by ethnic diversity, developing countries which are known to be plagued with defective institutional infrastructures, are equally not immune from socio-economic and political inequalities. The pertinent questions then remain: To what extent can this institutional infrastructure stall the noisy influence emanating from ethnic diversity-inequality causal linkages in the developing regions of the world like sub-Saharan Africa (SSA)? Are there causal connections in their relationships? Proffering answers to the foregoing questions remain the focal target the paper seeks to unveil.

This paper specifically focuses on sub-Saharan Africa as a candidate region based on several considerations. (i) Many of the countries in the sub-region are ethnically heterogeneous and thus diverse in nature, for instance, Nigeria alone has over 250 ethnic groups. It is instructive to state that empirical findings have shown an African dummy variable to be statistically significant (see Michalopoulos 2008; Ahlerup & Olsson 2009). It has equally been further confirmed that Africa's standard deviation in the number of ethnic groups per country is more than 35% higher than any other region. (ii) The prevalence of ethnic-based conflicts remains the common feature of the socioeconomic-political landscapes in the sub-region. This assertion is underpinned by numerous practical examples which include but are not limited to Burundi's ethnic crisis spanning 1970 through 1974, Tigray from Ethiopia in 1991, and

[3] This is well exposited in Easterly (2001).

Rwanda's genocides in1994, to mention but a few. Importantly, Africa has also been confirmed to have the highest level of internal displacements in the world. (iii) The ethnically diverse region has been described by scholars as constituting a "drag" on the continent's economic growth (Easterly and Levine, 1997; Posner, 2004a), as promoting political instability and conflict (Buhaug , 2006; Easterly, 2001), and as leading to the low and poor provision of public goods (Kimenyi, 2006; Miguel &Gugerty,2005). (iv) The region has been confirmed to have the highest levels of inequality both in terms of income and gender (see, Regional Economic Outlook: sub-Saharan Africa, 2016 [4]). (v) The sub-region is largely characterized by dysfunctional institutions. (vi) A recent world report on the attainment of the Millennium Development Goal (MDG) extreme poverty target has revealed that extreme poverty has been decreasing in all regions of the world with the exception of sub-Saharan Africa where close to 50% of countries in the sub-region were substantially off-track from achieving the MDG extreme poverty target (Asongu & Nwachukwu, 2017a). Moreover, given that the sub-region has been enjoying more than two decades of growth resurgence that began in the mid-1990s, it is apparent that the underlying extreme poverty is the result of non-inclusive growth (Asongu & Nwachukwu, 2016a), essentially because the response of poverty to growth is a decreasing function of inequality (Fosu, 2008, 2009, 2010a, 2015)[5].

In the light of the above apparent policy syndrome of inequality and the established role of institutions in reducing poverty, income inequality and ethnic inequality (Elu & Loubert, 2013; Asongu & Kodila-Tedika, 2018), it is policy relevant to complement existing literature by assessing how institutions modulate the effect of ethnic diversity on inequality. The position of the study departs from recent literature on inclusive development which has focused on *inter alia*: wage inequality and employment protection (Perugini & Pompei, 2016); views on sustainable and inclusive development in emerging markets (Stiglitz, 2016); optimal redistribution and economic inequality via taxation (Yunker, 2016); gender equality (Baliamoune-Lutz & McGillivray, 2009; Anyanwu, 2013a; Elu & Loubert, 2013; Baliamoune-Lutz, 2007;

[4] Regional Economic Outlook: Sub-Saharan Africa (REO) was prepared by a team led by Céline Allard under the direction of Abebe Aemro Selassie.

[5] The response to poverty to growth as a decreasing function of inequality is also known as the Fosu conjecture. More specifically: "*The study finds that the responsiveness of poverty to income is a decreasing function of inequality*" (Fosu, 2010b, p. 818); "*The responsiveness of poverty to income is a decreasing function of inequality, and the inequality elasticity of poverty is actually larger than the income elasticity of poverty*" (Fosu, 2010c, p. 1432); and "*In general, high initial levels of inequality limit the effectiveness of growth in reducing poverty while growing inequality increases poverty directly for a given level of growth*" (Fosu, 2011, p. 11).

Anyanwu, 2014a), the redistributive effect of regulation in developing nations (Atsu & Adams, 2015); rural-urban inequality (Baliamoune-Lutz & Lutz, 2005), poverty nexuses (Anyanwu, 2013b, 2014b), relationships between finance, poverty, employment and economic growth (Odhiambo, 2009, 2011), nexuses between human development, information technology and inclusive development (Gosavi, 2017; Minkoua Nzie et al., 2017; Asongu & Nwachukwu, 2018) and the relevance of finance in poverty mitigation (Odhiambo, 2010a, 2010b, 2013).

The rest of the study is structured as follows. Section 2 covers stylized facts on ethnic diversity and inequality, while Section 3 discusses the relevant literature. The data and methodology employed are presented in Section 4. The results are disclosed and discussed in Section 5 while Section 6 concludes with implications and future research directions.

Table 1: Ethnic Diversity and Components in SSA Countries

	Countries	**Ethnic**	**Linguistic**	**Religious**
1.	Angola	0.79	0.79	0.63
2.	Benin	0.79	0.79	0.55
3	Botswana	0.41	0.41	0.60
4.	Burkina Faso	0.74	0.72	0.58
5.	Burundi	0.30	0.30	0.52
6.	Cameroun	0.86	0.89	0.73
7.	Cape Verde	0.42	-	0.08
8.	Central Africa Republic	0.83	0.83	0.79
9.	Chad	0.86	0.86	0.64
10.	Comoros	0.00	0.01	0.01
11.	Congo	0.87	0.69	0.66
12.	Cote d'Ivoire	0.82	0.78	0.76
13.	Democratic Republic of Congo	0.87	0.87	0.70
14.	Equatorial Guinea	0.35	0.32	0.12
15.	Eritrea	0.65	0.65	0.43
16	Ethiopia	0.72	0.81	0.62
17.	Gabon	0.77	0.78	0.67
18.	Gambia	0.78	0.81	0.10
19.	Ghana	0.67	0.67	0.80
20.	Guinea	0.74	0.77	0.26
21.	Guinea Bisau	0.81	0.81	0.61
22.	Kenya	0.86	0.89	0.78
23.	Lesotho	0.26	0.25	0.72
24.	Liberia	0.91	0.90	0.49
25.	Madagascar	0.88	0.02	0.52
26.	Malawi	0.67	0.60	0.82
27.	Mali	0.69	0.84	0.18
28.	Mozambique	0.69	0.81	0.68
29.	Namibia	0.63	0.70	0.66

30.	Niger	0.65	0.65	0.20
31.	Nigeria	0.85	0.85	0.74
32.	Rwanda	0.32	-	0.51
33.	Sao Tome and Principe	-	0.23	0.19
34.	Senegal	0.69	0.70	0.15
35.	Seychelles	0.20	0.16	0.23
36.	Sierra Leone	0.82	0.76	0.54
37.	Somalia	0.81	0.03	0.002
38.	South Africa	0.75	0.87	0.86
39.	Swaziland	0.06	0.17	0.44
40.	Togo	0.71	0.90	0.66
41.	Uganda	0.93	0.92	0.63
42.	Tanzania	0.74	0.90	0.63
43.	Zambia	0.78	0.87	0.74
44.	Zimbabwe	0.39	0.45	0.74

Source: Encyclopedia Britannica

2.0 Stylized Facts about Ethnic Diversity and Inequality

This section focuses exclusively on indices of ethnic diversity as well as the measure of inequality (Gini coefficients) in Sub-Saharan Africa countries.

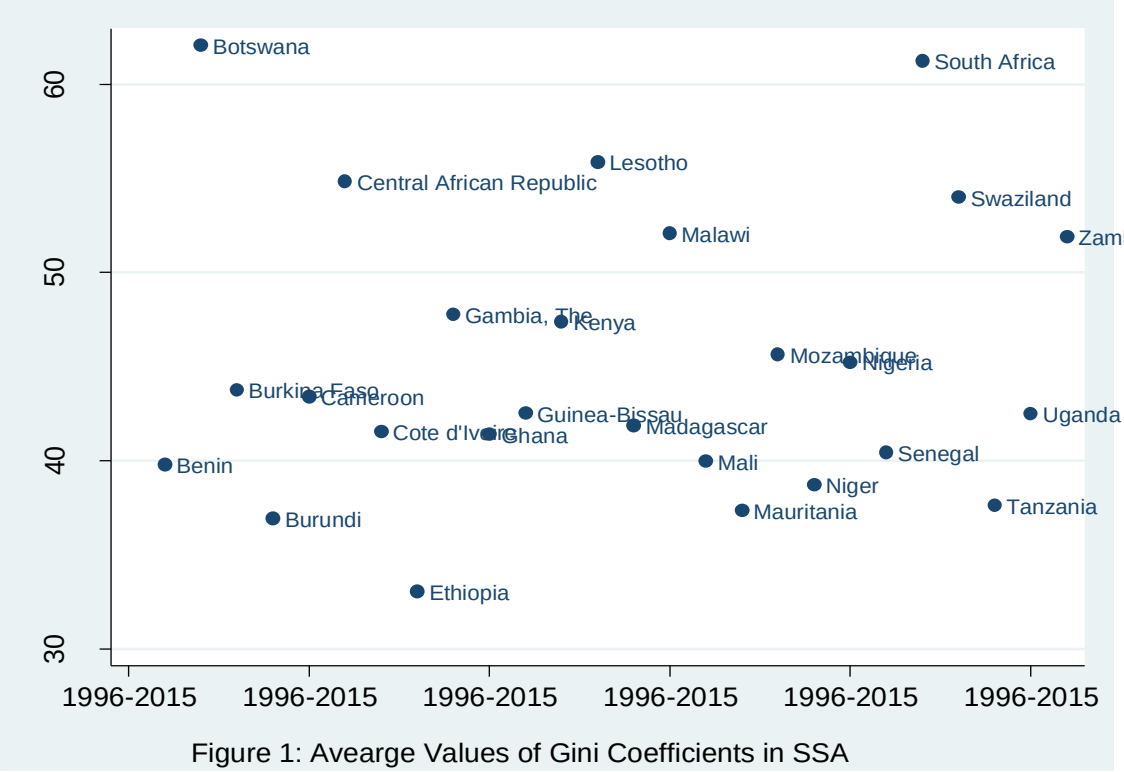
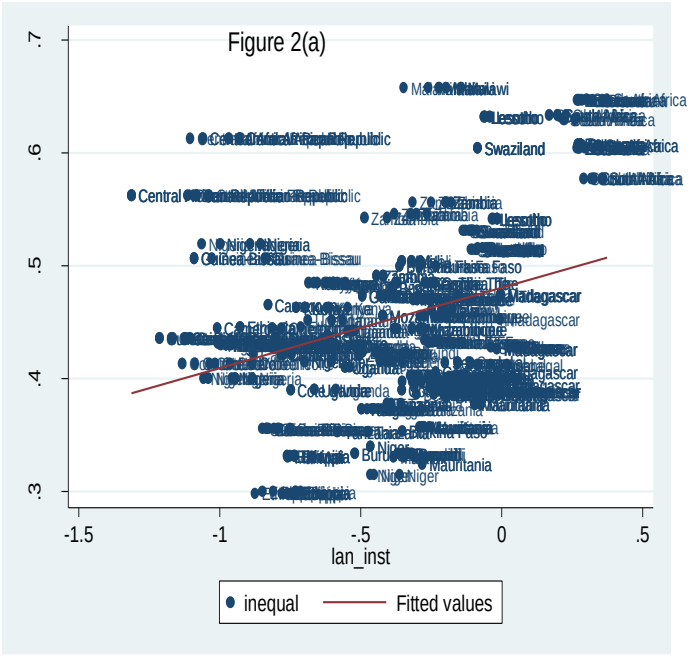


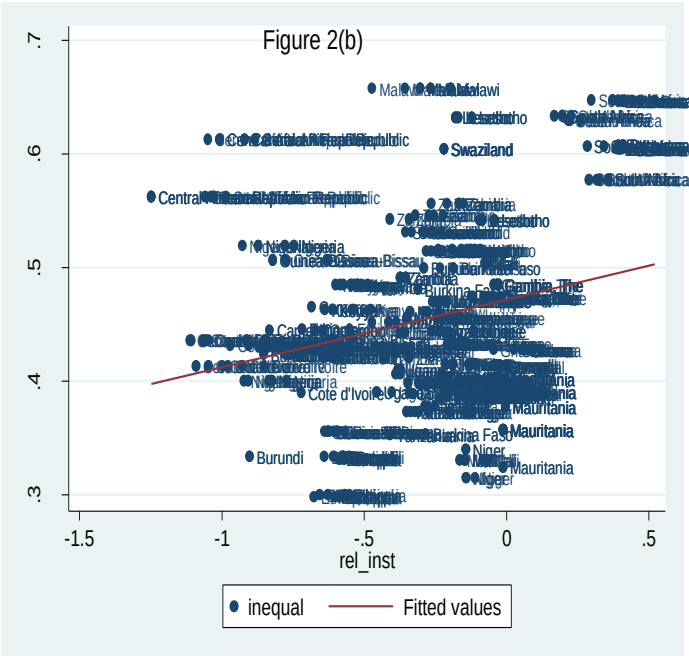
Figure 1: Avearge Values of Gini Coefficients in SSA

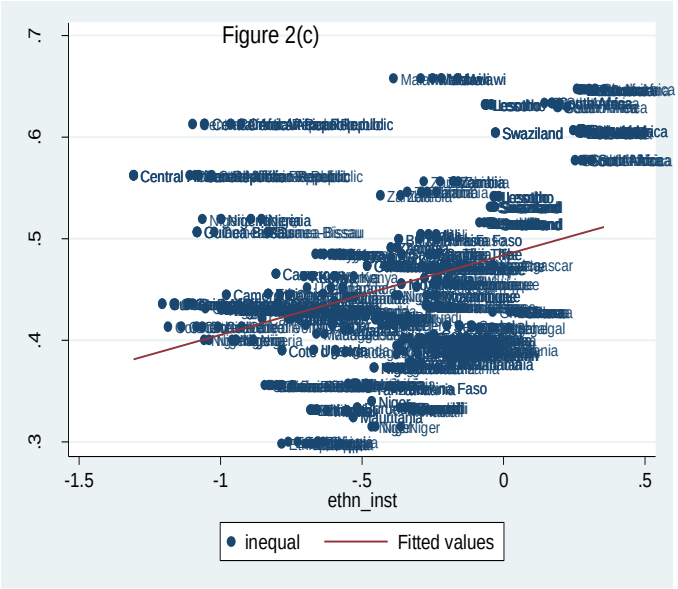
Source: Graphed with underlying data from World Development Indicator (WDI, 2016).

Table 1 presents the ethnic fractionalization index (Ethnic) for the most and least diverse countries within the sub-Saharan Africa region. Apart from this, it also details

the decomposition of the ethnic fractionalization index into linguistic and religious components, respectively. From the table, Uganda appears to be the most ethnically fragmented country with an Ethnic index of 0.93 while Liberia and Madagascar occupy second and third positions with 0.91 and 0.88 respectively. In Uganda alone, there are eight different groups: Ganda (17.80 percent), Teso (8.90 percent), Nkole (8.20 percent), Soga (8.20 percent), Gisu (7.20 percent), Chiga (6.80 percent), Lango (6.00 percent) and Rwanda (5.80 percent). It is worth mentioning that over 70% of countries within SSA region are ethnically diverse. The least ethnically diverse country is Comoros with ethnic fractionalization index of 0.000, suggesting that the country is highly homogeneous. Thus, in Comoros, Comorian takes 100 percent. With respect to linguistic diversity, Uganda also takes a lead with 0.92 and the last goes to Comoros as well. The most diverse in terms of religion is South Africa with a 0.86 while the last is claimed by Somalia with 0.002. The most prominent religion in South Africa is Christianity with 27.97 percent, directly followed by Protestant (13.79percent), Black Independent Church (9.35 percent), other protestant (8.84 percent) and other black independent (7.29 percent) in that order. In Somalia, Sunni Muslim alone takes almost 100 percent of the religious landscape, thus contrasting sharply with that of South Africa with over thirty religious sects.







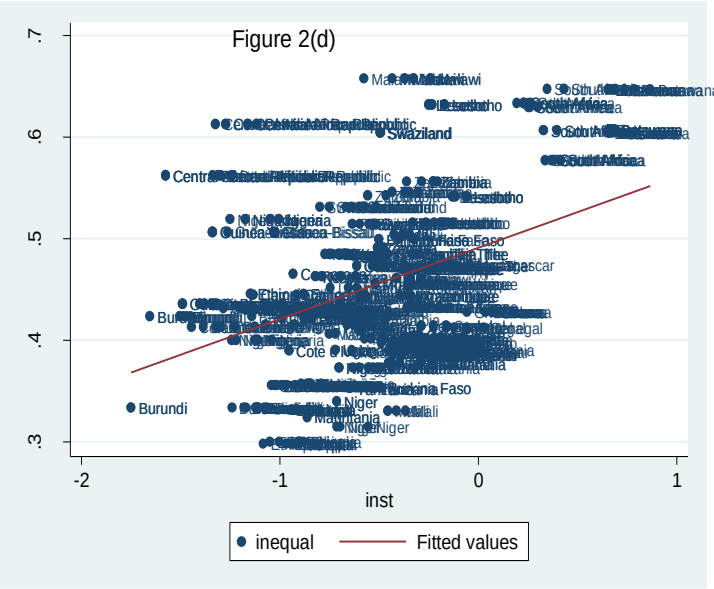


Figure 2(a-d): Scatter plots of Inequality and Ethnic Diversity and Components and Institution

Figure 1 shows a scatter plot of the average Gini coefficients for SSA countries. From the diagram, income inequality appears to be higher among the Southern Africa countries like South Africa, Botswana and Lesotho. We also provide the scatter plots of income inequality for the four regions of SSA countries in Figure 1a-d (see Appendix). The lowest seems to go to countries like Ethiopia, Burundi, Mauritania and Tanzania. Apart from Figure 1 above, the scatter plots of income inequality (y-axis) on interaction of ethnic diversity (linguistic, religious and ethnic) and institutions variables (x-axis) are presented in Figures 2(a) to 2(c). The visual evidence of the nature of their relationships revealed a positive association between inequality and the interactive terms. It implies that institution settings in the region do not possibly mediate the adverse effect of ethnic diversity on income equality. From the scatter plot in Figure 2(d), a direct relation is also reported between institution and income inequality. From the scatter diagrams, the parameter estimates using the simple linear regression of religious diversity, linguistic diversity, ethnic diversity and institutional quality are 0.0597, 0.0714, 0.0784 and 0.0703 respectively when the regress and is inequality[6]. These are just preliminary analysis subject to confirmation in Section 5 after adding other factor determinants of inequality. The outcomes can be further supported in the words of Easterly which reads as follows: "*Ethnolinguistic fractionalization in the cross-country sample adversely affects income, growth, and*

[6] All the parameter estimates are significant at 5% level but their explanatory powers are low.

economic policies, which is one explanation for Africa's poor growth performance" Easterly (2001, p. 690). The foregoing, however, represents preliminary analysis which is subject to further empirical scrutiny in the subsequent sections.

3.0 A Brief Empirical Exposition

This section undertakes a brief survey of the previously conducted empirical studies on ethnic diversity and inequality across different regions so as to provide a compelling context for subsequent empirical analysis. Undeniably, a large body of empirical research has probed into the causal linkages between ethnic diversity and its associated inequalities within the space of socio-economic and political spheres of an economy. Prior to documenting some of these empirical counts with respect to ethnically diverse-inequality relations, attempts will be made to x-ray the groundwork for the theoretical arguments into the issue. Gary Becker (1957) was one of the pioneer researchers who laid out the argument concerning ethnic diversity and inequality around racial prejudice and discrimination. According to him, if a person has a "taste for discrimination" he must act as if he were willing to forfeit income in order to be associated with some persons or groups instead of others. As a means of validating Becker's analysis, a substantial body of empirical research has trailed the theoretical conjectures of racial prejudice in a wide variety of contexts. Such studies like Alesina and La Ferrara (2000, 2002), Alesina and Glaeser (2004), and Luttmer (2001) have lent credence to the arguments. Using a model of group participation, Alesina and La Ferrara (2000) found that the members of non-majority group derive positive utility from interacting with the members of the same group and negative utility from interactions with members of the majority group. A similar conclusion was reached by the same authors when they submitted that the level of trust seemed higher in racially homogeneous communities (see, Alesina & La Ferrara, 2002).

We commerce an overview of the empirical literature with Dincerand Lambert (2006) who set out to analyze both the direct and indirect effects of ethnic and religious heterogeneity on income inequality and on welfare programs across US states using a seemingly unrelated regression (SUR) method. They employed two measures of ethnic diversity, namely the polarization index (PI) and the fractionalization index (FI) and they assessed the relationship between ethnic diversity and income inequality as captured by the Gini coefficient. For PI, they were

able to establish a positive and linear relationship between ethnic and religious heterogeneity and Gini coefficient on the one hand, with a negative and linear relationship between ethnic and religious heterogeneity and AFDC/TANF[7] payments on the other hand. The results appear to chart a different path with the use of fractionalization index. With FI, an inverse-U shaped relationship is obtained between ethnic and religious heterogeneity and the Gini coefficient and a U-shaped relationship between ethnic and religious heterogeneity and AFDC/TANF payments. Statistically speaking, the ethnic and religious polarization index explained about 37% of the variation in the Gini coefficient across states in the US (increases to about 75% when control variables are well accounted for) and close to 10% in AFDC/TANF (up to 65% when other explanatory variables are included). Similarly, FI explains almost 40% of the variation in Gini coefficients (about 80% with the inclusion of other control variables) and almost 20% in AFDC/TANF payments (rises to about 65% when other conditioning variables are taken into consideration). The outcomes of the follow up research by Dincer and Hotard (2011) do not significantly differ from the above reported results. In their study, they explore the relationship between ethnic and religious diversity and income inequality spanning over a 10-year period for 58 countries. In the final analysis, they discovered a positive relationship between ethnic and religious polarization and income inequality and an inverse U-shaped relationship between ethnic and religious fractionalization and income inequality. They also established that transiting from homogeneous position (that is, polarization index of zero) with respect to ethnic (religion) to heterogeneous stance (polarization index of one) would increase the Gini coefficient by almost 6 for ethnic and 3 percentage points for religious fractionalization respectively. Using a pooled ordinary least squares (OLS), Hotard (2008) tested the relationship between income inequality and ethnic heterogeneity on a panel of 58 countries. His results showed that ethnic polarization exerts a positive and significant effect on income inequality, even after controlling for country characteristics and regional differences. Similar in spirit with the present inquiry was a study conducted by Easterly (2001) who was able to establish that ethnic diversity exerts a more adverse effect on economic policy and growth when institutions are poor. Conversely, in countries with sufficiently good institutions, ethnic diversity does not seem to lower growth or worsen economic policies.

[7] Refers to Aid to the Families with Dependent Children/Temporary Assistance to Needy Families.

In light of the brief expositions, it is apparent that the particular literature that crafts a role for institutions in ethnic diversity-inequality relation is still at its infancy. It is in recognition of this fact that the present study draws its strength.

4.0 Empirical Strategy and Data

4.1 Empirical Modeling

The empirical model for estimating the causal linkage between ethnic diversity and inequality together with interaction terms duly aligns with other previously conducted studies on modulating policy syndromes with policy variables to achieve favorable macroeconomic outcomes (Asongu & Nwachukwu, 2016b, 2017b; Asongu *et al*., 2017). The model specification is stated as follows:

$$Inequal_{i,t} = \alpha_0 + \alpha_1 EthnDiv_{i,t} + \alpha_2 Inst_{i,t} + \alpha_3 (EthnDiv \times Inst)_{i,t} + \alpha_4 Control\text{var}_{i,t} + \mu_{i,t} \quad (1)$$

In a more explicit form, the above equation (1) can be rewritten as thus:

$$Inequal_{i,t} = \alpha_0 + \alpha_1 EthnDiv_{i,t} + \alpha_2 Inst_{i,t} + \alpha_3 (EthnDiv \times Inst)_{i,t} + \beta_1 GDPPC_{i,t} + \beta_2 LITR_{i,t} + \beta_3 GLOB_{i,t} + \beta_4 URB_{i,t} + \beta_5 FDEV_{i,t} + \beta_6 INF_{i,t} + \beta_7 LFC_{i,t} + \beta_8 POLITY\_IV_{i,t} + \mu_{i,t} \quad (2)$$

where *Inequal* represents a surrogate for inequality is captured by the Gini coefficient, *EthnDiv* stands for the measures of ethnic diversity which in this case are two, namely language and religious diversity, *Inst* denotes institutional index and the variable comprises of six indices, which are Control of Corruption, Voice and Accountability, Rule of Law, Government Effectiveness, Regulatory Quality and Political Stability. This is one of the most carefully constructed indicators. The indices ranged from –2.5 (being the weakest) to 2.5 (being the strongest), while the percentile ranking ranged from 0(weakest) to 100(strongest). i is country, t is time and μ is the error or disturbance term with expected mean zero and constant variance. In addition, the error term is both identically and independently distributed. *EthnicDiv×Inst* constitutes the interactive term between ethnic diversity and inequality and *Controlvar* is an omnibus variable for a set of control variables capable of influencing inequality. These are carefully selected variables in the inequality literature (see Asongu & Asongu, 2018; Asongu & Odhiambo, 2018). The variables include gross domestic product per capita (*GDPPC*), literacy rates (*LITR*),

globalization (*GLOB*), urbanization rates (*URB*), financial development (*FDEV*), inflation (*INF*), labour force participation rates (*LFC*) and political regime types (*POLITY_IV*) respectively.

In terms of *a priori* expectations, irrespective of ethnic diversity measures (whether linguistic or religious as the case may be) used, a positive relationship is hypothesized between ethnic diversity and inequality. By implication, the higher the ethnic diversity, the higher the incidence of inequality. Many studies (e.g. like Alesina & Glaeser, 2004; Dincer & Lambert, 2006; Dincer & Hotard, 2011) have offered empirical support to this. A reverse outcome is expected between institutions and inequality. That is, an inverse relationship is posited in the sense that a sound institutional framework is expected to mitigate the impacts of inequality. Conversely, a bad institutional infrastructure may help deepen the effects of inequality on the economy. The interactive term is also expected to be inversely correlated with a measure of inequality. Thus, an ethnically fractionalized country that is being adorned with sound institutions would help minimize the effects of inequality and vice versa. This explains why a developed country like the US has a comparatively high level of income inequality, while having a highly racial and religious heterogeneous society.

Apart from the core variables of interest, the control variables also have some theoretical relationships with inequality. For instance, the relationship between per capita GDP and ethnic diversity is conjectured to be ambiguous according to the Simon Kuznets hypothesis. This is confirmed to be true given the level and stage of development of the country concerned. According to Kuznets, a country's level of income inequality is affected by the state of economic development. In poor countries, economic growth increases the income disparity between the rich and poor people. In wealthier countries, economic growth narrows the difference. Hence, support for the existence of an inverted U-shaped relationship between income inequality and economic growth. In terms of educational variables, literacy rates are also assumed to have a negative causal relationship with ethnic diversity. This can be explained to mean that increased literacy rates tend to narrow down the extent of ethnic diversity. A reduced level of literacy might end up widening inequality. The effect of globalization forces on inequality can be said to be

ambiguous. On the one hand, the level of integration of a country can help lift people of that country from poverty due to exposure to state-of-the-art technology, thus reducing inequality; it can also be argued, on the other hand, that globalization may end up enriching the few privileged individuals thereby widening the gap between them and the poor. The degree of urbanization is hypothesized to bear a negative relationship with inequality. The higher the urbanization rate, the lower the level of inequality. The more a country's financial system deepens, the better the financial services become, with the overall consequence being reduction in inequality. Thus, a negative causal relationship is envisaged. Macroeconomic stability (surrogated by inflation rates) equally goes a long way in determining the level of inequality in an economy. Inequality worsens in an environment that is macroeconomically unstable. In this case, a positive relationship is posited. The variable of labour force participation is expected to have a negative correlation with inequality. Hence, the higher the labour force participation rates, the lower the inequality level and vice versa. Lastly, the type of political regime is another determinant of inequality in the empirical literature. If a democratic system of governance prevails, reduced inequality is expected to manifest, while a reverse condition will be envisaged in case of an autocratic governance type. Hence, the use of polity IV (that is the difference between the two regimes) and the coefficient is assumed to be negative under an autocratic system while it becomes positive for a democratic rule.

4.2 Estimation Techniques

The paper employs a panel data analysis since it allows for the control of variables that are unobservable as well as immensurable. Basically, the panel OLS, fixed effects (FE) and system generalized method of moments (GMM) estimation methods are adopted in this study. The panel OLS combines the subscript of time series (*t*) and cross-sectional unit (*i*) to accommodate the properties of both time series and cross-section data. This is similar to equation (2) and it is summarily given as:

$$y_{i,t} = \alpha + X'_{i,t}\beta + \mu_{i,t} \quad i = 1,..., N;\ t = 1,..., T \tag{3}$$

The cross-section dimension such as country is represented by *i* subscript and the time series dimension denoted by *t* subscript. More so, α is a scalar; β is a row

vector $K \times 1$; $X_{i,t}^{'}$ is the *i*th observation on K explanatory variables; $\mu_{i,t}$ is the stochastic term. The one-way error component panel fixed effect split the error term $(\mu_{i,t})$ into two components as:

$$\mu_{i,t} = u_{i,t} + v_{i,t} \; i = 1,..., N; \; t = 1,..., T \tag{4}$$

where u_{it} is the unobservable individual specific effect accounting for any individual-specific effect that is not included in the regression; and $v_{i,t}$ is idiosyncratic disturbance varying with individuals and time (Baltagi, 2008).Using the fixed effects method, $\mu_{i,t}$ denotes fixed parameters that is estimated; $v_{i,t}$ is independent and identically distributed [IID($0, \sigma_v^2$)] (the normality and heteroskedasticity assumption); and $X_{i,t}^{'}$ is assumed to be independent of $v_{i,t}$ for all country (*i*) and time (*t*) (endogeneity assumption). In addition, we assume the unobserved effects vary between countries (i.e. heterogeneous) rather than a random term that assumes usage of the random effect's technique. We further used the cross-section weights (a feasible Generalized Least Squares (GLS) specification assuming the presence of cross-section heteroskedasticity) to correct for cross-section heteroskedasticity and autocorrelation of idiosyncratic disturbance. The reason for employing the cross section weights is to ensure that the fixed estimator is efficient and consistent for our analyses as used by earlier studies such as Hammoris and Kai (2004); Guordon, Maystre and Melo (2006); and Heinrich (2009). The Hausman test result is also computed to confirm the efficiency of the fixed effects estimator.

We further applied the system GMM method to establish the relationship among our variables based on five motivational reasons in its use as documented in Asongu and De Moor (2016). These reasons are: (a) The estimation process is a good fit for addressing the issue of high persistence in the dependent variable. The result of correlation coefficient of income inequality and its lagged of one value is 0.956 which supersedes the value of the rule of thumb threshold (0.800). (b) The process is good for a study that has lower number of years per country (T) than the number of countries (N), thus, our T(20) < N(26). (c) It is capable of controlling for potential endogeneity in all regressors. (d) The approach does not eliminate cross-country variation (e) Based on the fourth merit, Bond, Hoeffler, and Tample (2001) suggested

the system GMM estimator by Arellano and Bover (1995) and Blundell and Bond (1998) as a better fit compared to the difference estimator by Arellano and Bond (1991). The requirements for adopting the approach is based on the first-two reasons (Tchamyou & Asongu, 2017) while the last three stressed the associated merits for its adoption (Tchamyou,2018).

The study used the forward orthogonal deviations instead of first differences adopted by Roodman (2009a,b) which is an extension of Arellano and Bover (1995). According to Love and Zicchino (2006) and Baltagi (2008), the estimation method can control for cross-country dependence and check over identification and control the proliferation of instruments. The two-step approach is employed in the specification since it controls for heteroskedasticity as against the one-step that is consistent with homoskedasticity. Equations (5) and (6) in levels and first difference respectively summarize the standard system GMM estimation process in line with our baseline model (Equation 1).

$$Inequal_{i,t} = \theta_0 + \theta_1 Inequal_{i,t-\tau} + \theta_2 EthnDiv_{i,t} + \theta_3 Inst_{i,t} + \theta_4 (EthnDiv \times Inst)_{i,t} + \sum_{h=1}^{8} \vartheta_h Control\,\mathrm{var}_{h,i,t-\tau} + \pi_i + \varpi_t + \varepsilon_{i,t} \quad (5)$$

$$Inequal_{i,t} - Inequal_{i,t-\tau} = \theta_0 + \theta_1 (Inequal_{i,t-\tau} - Inequal_{i,t-2\tau}) + \theta_2 (EthnDiv_{i,t} - EthnDiv_{i,t-\tau}) + \theta_3 (Inst_{i,t} - Inst_{i,t-\tau}) + \theta_4 [(EthnDiv \times Inst)_{i,t} - (EthnDiv \times Inst)_{i,t-\tau}] + \sum_{h=1}^{8} \vartheta_h (Control\,\mathrm{var}_{h,i,t-\tau} - Control\,\mathrm{var}_{h,i,t-2\tau}) + (\varpi_t - \varpi_{t-\tau}) + \varepsilon_{i,t-\tau} \quad ,(6)$$

where $\theta_0, \theta_{1-4}, \vartheta_h$ are parameter estimates; τ represents tau; π_i is the country-specific effect, ϖ_t is the time specific constant; and $\varepsilon_{i,t}$ is the stochastic term. The difference equation is derived from the level equation and tau is defined as the autoregressive order, which is one in the analysis because one period can comprehensively capture past exogenous information. It is also imperative to discuss briefly some drawbacks identified by Brambor, Clark and Golder (2006) following the use of interactive regressions. The authors further note that in the model specifications, all constitutive variables should be absorbed. The estimated coefficients should be interpreted as conditional marginal impacts for them to make economic sense (Asongu & Nwachukwu, 2016c).

We further conducted some post-estimation diagnostic tests to establish the consistency of the system GMM coefficients. The presence of second-order serial correlation is confirmed based on the value of AR(2) which denotes the absence of autocorrelation in the error terms should not be rejected. If the probability value is not rejected, therefore, the problem of second-order autocorrelation exists. Furthermore, the null hypotheses of the Sargan and Hansen over-identification restriction test should not also be rejected, implying that the instruments are valid, that is they are not correlated with the error terms. In summary, the Sargan (Hansen) over-identification restriction tests implies not robust but not weakened by instruments (is robust but weakened by instruments). We address this conflict by prioritizing the Hansen test and ensuring that the number of instruments in each specification is less than the corresponding number of countries in order to avoid instrument proliferation. The joint validity of our estimated parameters was confirmed from the statistical value of Fisher test.

4.3 Data Source

The data spanning from 1996 to 2015 were obtained from the following sources: Easterly and Levine (1997), The Ethnic Power Relations (EPR) core dataset 2015, Worldwide Governance Indicators (WGI) CD-ROM and World Development Indicators (WDI). The 26 Sub-Saharan African countries are Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Senegal, South Africa, Swaziland, Tanzania, Uganda and Zambia. The sources of our data as well as their definitions are presented in Table 2. The choice of the periodicity and sampled countries is motivated by data availability constraints. Moreover, data on institutions from WGI is only available from 1996.

Table 2: Variables' Definitions

Variables	Signs	Variable measurements	Sources
Income inequality	INEQUAL	Gini Coefficient measure the disparity of income earn by residents in a country.	Easterly and Levine, 1997
Linguistic diversity	LIN	It measures differences in language among groups in a country ranging from 0 to 1.	Encyclopedia Britannica
Religious diversity	REL	It measures differences in religious activities among people of a country ranging from 0 to 1.	Encyclopedia Britannica
Ethnic diversity	ETHN	It measures differences in ethnical values and beliefs among groups in a country ranging from 0 to 1.	Encyclopedia Britannica
Institution	INST	It comprises of six institutional components, control of corruption, voice and accountability, rule of law, government effectiveness, regulatory quality, and political stability. It ranges from –2.5 (beingthe weakest) to 2.5 (being the strongest).	World governance Indicators (2016)
GDP per capita	GDPPC	Gross Domestic Product per capital (Constant 2010 US$)	World Development Indicators (2016)
GDPPC square root	GDPPC_SQD	Square values of Gross Domestic Product per capital (Constant 2010 US$)	World Development Indicators (2016)
Literacy (adult total)	LITR	The percentage of literate people within the ages 15 and above.	World Development Indicators (2016)
Globalization rate	GLOB	This measures the rate of globalization in countries around the world which is measured in three dimensions, economic, social and political.	Dreher, Gatson and Martens (2008)
Urban population growth	URB	The annual growth of people living in urban area.	World Development Indicators (2016)
Domestic credit to private sector	FDEV	The ratio of domestic credit to private sector by bank to GDP.	World Development Indicators (2016)
Inflation rate	INF	The annual rate of consumer price index	World Development Indicators (2016)
Labour force, total	LFC	The percentage of total population within ages 15+ (national estimate) who are eligible to work in a country.	World Development Indicators (2016)
Democratic rule	PRTY_1	The political regime of democratic rules ranging from 0 to +10	Polity IV (2015)
Autocratic rule	PRTY_2	The political regime of autocratic rules which ranges between -1 to -10	Polity IV (2015)

Table 3: Descriptive statistics

Variables	Mean	Max.	Min.	Std. Dev.
Income inequality	0.4534	0.6576	0.2981	0.0860
Linguistic diversity	0.6732	0.9226	0.0204	0.2529
Religion diversity	0.5682	0.8603	0.0149	0.2383
Ethnic diversity	0.6867	0.9302	0.0582	0.2054
Institution	-0.5357	0.8677	-1.7500	0.4864
GDP per capita	1277	7611	187	1605
GDP per capita (ln)	6.7007	8.9373	5.2307	0.8598
GDPPC square root (ln)	45.637	79.876	27.360	12.189
Literacy (adult total)	54.738	94.598	12.848	20.846
Globalization rate (ln)	3.7230	4.1784	3.0559	0.2094
Urban population growth	3.9794	6.7261	-0.0466	1.1988
Domestic credit to private sector by banks	19.003	160.13	0.4104	24.625
Inflation rate	7.7397	50.734	-9.6162	8.1734
Labour force, total	65.226	92.700	6.1700	16.852
Democratic rule (A)	3.7250	9.0000	-8.0000	3.9221
Autocratic rule (B)	1.3837	9.0000	-8.0000	3.0754
Political regime types (A–B)	2.3423	9.0000	-9.0000	5.0860

Number of observation is 520. STD. DEV. is standard deviation.

Table 4: Correlation between Ethnic Diversity, income inequality and its determinants

	INEQUAL	LAN	REL	ETHN	INST	LAN×INST	REL×INST	ETHN×INST	GDPPC	GDPPC_SQD	LITR	GLOB	URB	FDEV	INF	LFC
LAN	-0.1002	1														
REL	0.3408	0.2577	1													
ETHN	-0.2407	0.6770	0.1740	1												
INST	0.3979	-0.1500	-0.0307	-0.1914	1											
LAN_INST	0.3073	-0.4895	-0.1658	-0.4438	0.8804	1										
REL_INST	0.2415	-0.2580	-0.3465	-0.2824	0.9199	0.9067	1									
ETHN_INST	0.3284	-0.3682	-0.1371	-0.5034	0.8993	0.9645	0.9076	1								
GDPPC	0.5296	-0.0773	0.1718	-0.2425	0.5292	0.4264	0.4333	0.4453	1							
GDPPC_SQD	0.5452	-0.0919	0.1795	-0.2650	0.5370	0.4440	0.4442	0.4637	0.9969	1						
LITR	0.4457	-0.2999	0.4572	-0.3123	0.2751	0.3291	0.1367	0.3152	0.5283	0.5357	1					
GLOB	0.2926	0.1245	0.0573	-0.0024	0.4749	0.3505	0.4212	0.3592	0.6928	0. 6767	0.3196	1				
URB	-0.5205	0.1774	-0.2101	0.3311	-0.2034	-0.1834	-0.1113	-0.2073	-0.5487	-0.5588	0.3833	-0.2835	1			
FDEV	0.3457	0.1070	0.1867	0.0080	0.3831	0.3914	0.3740	0.3876	0.5555	0.5888	0.3414	0.4676	-0.2787	1		
INF	0.0771	-0.0544	0.2784	-0.0428	-0.0108	0.0182	-0.0784	0.0232	-0.0493	-0.0458	0.2131	0.0100	-0.0204	-0.0724	1	
LFC	-0.1839	0.0843	0.2452	0.1790	-0.1006	-0.0480	-0.1714	-0.0613	-0.4189	-0.4110	-0.1005	-0.2263	0.3348	-0.0959	0.0847	1
POLITY_IV	0.1786	0.0258	0.2614	0.0965	0.4037	0.3244	0.2910	0.3040	0.1065	0.1180	0.1097	0.1837	0.0017	0.2684	0.0691	0.1261

Notes: INEQUAL is income inequality, LAN is linguistic diversity, REL is religious diversity, ETHN is ethnic diversity, INST is institutional quality, LAN×INST is interaction between linguistic diversity and institutional quality, REL×INST is the interaction between religious diversity and institutional quality, ETHN×INST is the interaction between ethnic diversity and institutional quality, GDPPC is gross domestic product per capita, GDPPC_SQD is gross domestic product per capita squared, LITR is literacy rates, GLOB is globalization, URB is urbanization rates, FDEV is financial development, INF is inflation rate, LFC is labour force participation rates and POLITY_IV is political regime types.

5.0 Empirical Result and Discussion

5.1 Analysis of Preliminary Statistics

The descriptive statistics of the panel datasets is presented in Table 3. The mean value of income inequality is 0.4534. The average values of linguistic, religion and ethnic diversities are 0.673, 0.568 and 0.687 respectively. This indicates the high heterogeneous nature of religion, linguistic and ethnicity in the region. The negative mean values of institutional index of -0.536 further accentuates the level of the region's infrastructure decadence. The average value of domestic credit to the private sector by financial institutions to the size of the SSA economy stand at 19.0%. The democratic system of governance has the highest mean value of 3.725 compared to the average value of the autocratic rule which is 1.383 making the mean value of polity IV index to be 2.3423. By implication this is suggestive that most of the countries in the region have embraced democracy as their system of governance. The region also has an average labour force size and literacy level of 65.23% and 54.74% respectively, representing those that are within the age bracket of 15 years and above, while the urban population grows at an annual rate of 3.98%. The average value of GDP per capita of the region is US$1,277 indicating that the region falls within the lower middle-income economies according to the recent classification of the World Bank Atlas method.

The correlation coefficients of the relationship between the measures of ethnic diversities (linguistic, religion and ethnic), institutions, other covariates and income inequality are presented in Table 4. The measures of linguistic and ethnic diversities are found to be negatively correlated with income inequality while religious diversity has a contrary sign. Of the diversity measures, religion has the highest correlation coefficient followed by ethnic diversity and linguistic diversity. From the table, institutional variable appears to be moderately and positively correlated with income inequality. The results are in tandem with the directions of the scatter plots presented in Figures 2(a-d). All other variables convey positive correlation coefficients except for urban population growth and labour force. Literacy rate is negatively correlated with linguistic diversity while urban population growth is indirectly correlated with religion diversity. Conversely, literacy rate, GDP per capita and its squared value are very much correlated with ethnic diversity. The interactive terms of institution and the diversity measures are inversely correlated with ethnic,

religion and language diversities. Thus, other correlation coefficients of the indicators are further reported in the table at varying degrees and magnitudes.

5.2 Empirical Estimates of the Panel Regression Models

The discussion of empirical results for income inequality is presented in Tables 5 and 6.

5.2.1 Baseline Pooled and Fixed Effects Regressions

Table 5 reports the results of pooled OLS and panel fixed effects which controls for unobserved country characteristics. The Hausman test statistics presented in the table reveals the appropriateness of the panel fixed effects as the results reject the null hypotheses for all the considered models at 5% significance levels based on the calculated Chi-Square values. The models are first estimated without the interactive terms of institutions and ethnic diversity composition, and these are shown in the first six columns. The last six columns present the estimated regression results with the interactive terms of the key variables of interest. The results of our coefficients are not consistent in terms of signs with respect to the two baseline estimators, namely OLS and fixed effects. The findings from the pooled OLS established that: (a) linguistic, religious and ethnic diversity increase the level of inequality in the region and (b) the interaction terms of institutional quality and linguistic, religious and ethnic diversity reduce inequality, while institutions still maintain a direct relationship with inequality. From panel fixed effects, the results reveal that (a) an inverse relationships exist between linguistic, religious and ethnic diversity and income inequality and (b) the impact of the interactive terms of institutional quality, together with linguistic, religious and ethnic diversity respectively on inequality are insignificant at their conventional levels. A system GMM is equally deployed to increase the bite on endogeneity, notably by: (a) controlling for time invariant omitted variables in order to further account for the unobserved heterogeneity and cross sectional dependence and (b) accounting for simultaneity or reverse causation by means of the instrumentation process. This is discussed below.

5.2.2 Empirical Discussion of the System GMM Results

Table 6 presents the findings of the linkages between ethno-linguistic and religious diversities, institutions and inequality. From the table, the effect of linguistic diversity on inequality, though duly conform to a prior expectation and as well found to be

positive and statistically significant at conventional 5% level after interacting it with institutions. The result has lent credence to the fact that linguistic diversity had severe implications for causing income inequality in the region. The economic intuition behind it is that language differences contribute to promoting income disparity in the region. This is plausibly logical as people who speak the same language tend to discriminate against those who speak other languages both in terms of employment allocation and job placements. The result of religious diversity does not differ markedly both in terms of direction and magnitude to that of linguistic diversity. By implication, inequality gets wider as religion disparity surfaces. The results further reveal that the effect of fractionalization disappears marginally as the interactive terms of the variables and institutions are added to the models. The coefficients of both linguistic and religious diversity indicate the severity of inequality generated in the latter case seemed more damaging than that of former.

The result also shows that ethnic diversity adversely affects income equality in the region. The impact of ethnic diversity on income inequality in SSA countries is statistically significant at 10% level. The coefficient of institutional quality indicates that institution is directly related to income inequality implying that the institutional framework in this region is not good enough to lessen the inequality brought by ethnic diversity. In addition, the interactive term of ethnic diversity and institution has direct and significant impact on income inequality in SSA countries. This result appears counterintuitive as institutions are expected to play a mitigating role than acting contrary.

Few control variables are reportedly significant at 5%. The parameter estimates of GDP per capita reveal a positive and direct connection between income levels and inequality in the region. This suggests that wide disparity indeed exists between the rich and the poor. It is interesting however to note that Kuznets hypothesis remains valid across the models. The coefficients on urbanization rate have negative effects on income inequality in the region thus authenticating the assertion of the influx of people from rural to urban centers. Financial development, globalization index and labour force participation rate are negatively associated to inequality but they are found to be insignificant at their conventional levels. This implies that better financial services, high labour force participation rates and the level of countries' integration

into the global world tend to lower inequality level but exert no significant influence. On average, the rate of literacy is unable to narrow the inequality gap while macroeconomic instability can marginally close the gap. Their coefficient values are not statistically significant. The parameter estimates of polity IV values depict prevalence of democratic system in the region. The insignificance of the coefficients indicates that the existence of democratic rule does not really represent a potent force capable of reducing inequality in the region.

Our main findings, however, emerge from the bottom part of Table 6 in the row named "*Net Effects*". This reveals the impact of ethnic diversity on inequality when the model includes the interactive institution terms. The net impact from the various regression models with interactive institution variable is calculated as: $\left[\frac{\%\ \Delta\ in\ inequal}{\%\ \Delta\ in\ EthnInst} = \theta_2 + \theta_4 Inst\theta_{i,t}\right]$.

The result shows that the elasticity of income inequality obtained from the system GMM regression approach are 0.0031, 0.0017 and 0.0084 for linguistic, religious and ethnic diversity respectively, when they were evaluated at an average institutional index level of -0.5357. Correspondingly, the elasticity of inequality becomes 0.0017, -0.0025 and 0.0056 evaluated at one standard deviation below the mean value of institution (-1.0021) while at one standard deviation above the mean value (-0.0493), inequality elasticity turns out to be 0.0044, 0.0059 and 0.0112.

Table 5: Pooled and Fixed Effects Estimation Results

Variables	**Dependent Variable:** Income Inequality											
	Pooled OLS			**Fixed Effect[a]**			**Pooled OLS**			**Fixed Effect[a]**		
	Linguistic	**Religion**	**Ethnic**	**Linguistic**	**Religion**	**Ethnic**	**Linguistic**	**Religion**	**Ethnic**	**Linguistic**	**Religion**	**Ethnic**
Constant	**1.1362 (0.177)*** **	**1.0438 (0.167)*** **	**1.0913 (0.186)*** **	**1.4461 (0.513)*** **	**1.245 (0.434)*** **	**1.4744 (0.624)*** **	**1.1350 (0.174)*** **	**1.1887 (0.172)*** **	**0.9783 (0.179)*** **	**1.4512 (0.511)*** **	**1.2445 (0.434)*** **	**1.4707 (0.531)*** **
LAN	**0.0372 (0.013)*** **			**-0.02148 (0.008)*** **			**-0.0411 (0.0230)***			**-0.0216 (0.076)*** **		
REL		**0.085 (0.016)*** **			**-0.0219 (0.008)*** **			0.0195 (0.0258)			**-0.0219 (0.0076)*** **	
ETHN			0.0216 (0.0175)			**-0.02146 (0.008)*** **			**-0.1650 (0.0032)*** **			**-0.2141 (0.0774)*** **
INST	**0.0323 (0.0079)*** **	**0.042 (0.008)*** **	**0.0294 (0.008)*** **	-0.0157 (0.0140)	-0.0159 (0.014)	-0.0157 (0.0140)	**0.1130 (0.021)*** **	**0.1230 (0.027)*** **	**0.1938 (0.0255)*** **	-0.0412 (0.0300)	-0.0145 (0.0272)	-0.0181 (0.055)
LAN×INST							**-0.1275 (0.031)*** **			0.0426 (0.044)		
REL×INST								**-0.1289 (0.040)*** **			-0.0281 (0.0468)	
ETHN×INST									**-0.2520 (0.0372)*** **			0.0033 (0.0754)
lnGDPPC	**-0.1721 (0.057)*** **	**-0.0154 (0.054)*** **	**-0.1635 (0.061)*** **	-0.0943 (0.1018)	-0.00997 (0.1038)	-0.0094 (0.1038)	**-0.1623 (0.056)*** **	**-0.1867 (0.055)*** **	**-0.0815 (0.049)***	-0.0091 (0.104)	-0.01001 (0.1039)	-0.0098 (0.1043)
lnGDPPC_SQD	**0.0142 (0.0041)*** **	**0.013 (0.004)*** **	**0.0137 (0.004)*** **	0.0034 (0.007)	0.004 (0.008)	0.00034 (0.0080)	**0.0130 (0.004)*** **	**0.0146 (0.004)*** **	0.0064 (0.0043)	0.000077 (0.008)	0.00044 (0.008)	0.00035 (0.0080)
LITR	**0.00077**	0.00027	**0.00066**	-0.00019	-0.00018	-0.00019	**0.00074**	**0.00035**	**0.00065**	-0.000096	-0.00019	-0.00018

	(0.0002)* **	(0.0002)	**(0.0002)*** **	(0.00031)	(0.00031)	(0.0003)	**(0.0002)*** **	**(0.0002)*** **	**(0.0002)*** **	(0.00033)	(0.00032)	(0.00032)
LNGLOB	**-0.0395 (0.0215)***	-0.019 (0.021)	-0.0330 (0.0214)	**-0.0551 (0.028)****	**-0.0541 (0.0282)***	**-0.0551 (0.0282)****	-0.0329 (0.0212)	-0.0174 (0.0208)	**-0.0399 (0.021)****	**-0.0575 (0.028)****	**-0.0540 (0.0282)***	**-0.0551 (0.0282)****
URB	**-0.0217 (0.003)*** **	**-0.0189 (0.003)*** **	**-0.0217 (0.003)*** **	**-0.0135 (0.004)*** **	**-0.0135 (0.0041)*** **	**-0.0135 (0.004)*** **	**-0.0205 (0.003)*** **	**-0.0178 (0.003)*** **	**-0.0186 (0.003)*** **	**-0.0133 (0.004)*** **	**-0.0135 (0.0042)*** **	**-0.0135 (0.0042)*** **
FDEV	-0.000295 (0.00019)	-0.00019 (0.00018)	-0.00023 (0.00002)	**0.0018(0.0005)*** **	**0.0018 (0.0005)*** **	**0.0018 (0.0005)*** **	0.00015 (0.0002)	-0.000012 (0.00018)	**0.00064 (0.00023)*** **	**0.0019 (0.0005)*** **	**0.0018 (0.0005)*** **	**0.0018 (0.00046)*** **
INF	0.00038 (0.00037)	0.000012 (0.0004)	0.00042 (0.00037)	-0.00018 (0.00029)	-0.00019 (0.00028)	-0.00018 (0.00029)	0.00049 (0.00036)	0.00015 (0.00037)	**0.00071 (0.00036)*** **	-0.00016 (0.00029)	-0.00019 (0.0003)	-0.00018 (0.00029)
LFC	0.000066 (0.000197)	-0.00029 (0.0002)	0.000089 (0.0002)	-0.00012 (0.00022)	-0.00011 (0.00022)	-0.00012 (0.00022)	0.00016 (0.0002)	**-0.000033 (0.0002)***	0.00028 (0.00019)	-0.00012 (0.00022)	-0.00011 (0.00022)	-0.00012 (0.00022)
POLITY_IV	**0.00107 (0.00064)***	0.000007 (0.00066)	**0.0011 (0.00065)***	-0.00011 (0.00085)	0.0011 (0.00085)	0.0011 (0.00085)	0.00059 (0.00064)	-0.000066 (0.000656)	0.00026 (0.00064)	0.0012 (0.00086)	0.0011 (0.0009)	0.000112 (0.00086)
Net Effects	**-**	-	**-**	-	-	-	0.0272	0.0886	-0.0300	n.a	n.a	n.a
Adj. R^2	0.433	0.456	0.426	0.121[b]	0.121[b]	0.1208[b]	0.463	0.466	0.473	0.122[b]	0.121[b]	0.1209[b]
F-Statistics	**37.08*****	**40.56*****	**36.05*****	**29.99*****	**28.01*****	**30.61*****	**36.48*****	**38.71*****	**39.78*****	28.42***	27.02***	26.41***
Hansen Test	-	-	-	**7.38*****	**7.42*****	**7.37*****	-	-	-	**7.40*****	**7.43*****	**7.14*****
Countries	26	26	26	26	26	26	26	26	26	26	26	26
Obs.	520	520	520	520	520	520	520	520	520	520	520	520

Notes: Standard errors clustered at the country level are reported in parentheses; *, ** & *** indicate 10%, 5% and 1% significance level respectively. INEQUAL is income inequality, LAN is linguistic diversity, REL is religious diversity, ETHN is ethnic diversity, INST is institutional quality, LAN×INST is interaction between linguistic diversity and institutional quality, REL×INST is the interaction between religious diversity and institutional quality, ETHN×INST is the interaction between ethnic diversity and institutional quality, GDPPC is gross domestic product per capita, GDPPC_SQD is gross domestic product per capita squared, LITR is literacy rates, GLOB is globalization, URB is urbanization rates, FDEV is financial development, INF is inflation rate, LFC is labour force participation rates and POLITY_IV is political regime types. (a)- one-way fixed effect (b)- adjusted R^2 (within). The significance of estimated parameters, F-statistics and Hausman test. *na* implies not applicable due to the insignificance of marginal effects.

Table 6: Panel System GMM Estimation Regression Results

Variables	**Dependent Variable:** Income Inequality					
	Linguistic	**Religion**	**Ethnic**	**Linguistic**	**Religion**	**Ethnic**
Constant	**-0.1098 (0.060)*** **	**-0.1201 (0.055)** **	**-0.0904 (0.0634)**	**-0.1046 (0.050)** **	**-0.1250 (0.052)*** **	**-0.0843 (0.052)***
INEQUAL(-1)	**1.0113 (0.030)*** **	**1.0089 (0.029)*** **	**1.0061 (0.030)*** **	**1.0151 (0.026)*** **	**1.0116 (0.030)*** **	1.0109 (0.0221)
LAN	0.00470 (0.0031)			**0.0045 (0.0027)***		
REL		0.00639 (0.0067)			**0.00637 (0.0031)** **	
ETHN			**0.0094 (0.0050)***			**0.0115 (0.0126)***
INST	**0.0024 (0.0011)** **	**0.0027 (0.0014)** **	**0.0029 (0.0014)** **	0.0035 (0.0114)	**0.00201 (0.0011)***	-0.0019 (0.00151)
LAN×INST				**0.0027 (0.0016)***		
REL×INST					**0.0087 (0.0016)** **	
ETHN×INST						**0.0058 (0.0031)***
lnGDPPC	**0.0289 (0.016)***	**0.0293 (0.017)***	**0.0230 (0.0107)** **	**0.0259 (0.0148)***	0.0298 (0.0179)	**0.0172 (0.0103)***
lnGDPPC_SQD	**-0.0025 (0.0013)***	**-0.0021 (0.0013)***	**-0.00173 (0.00101)***	**-0.0018 (0.0013)**	**-0.0021 (0.0011)***	**-0.00182 (0.0011)***
LITR	0.000019 (0.00007)	-0.000016 (0.00006)	0.000019 (0.000073)	0.000023 (0.000072)	-0.000016 (0.00006)	0.000021 (0.000076)
lnGLOB	-0.0012 (0.0110)	0.0033 (0.0119)	-0.0011 (0.0109)	-0.0013 (0.0102)	-0.0032 (0.0115)	0.00088 (0.0106)
URB	**-0.0071 (0.0016)*** **	**-0.0053 (0.0016)*** **	**-0.0011 (0.0018)**	**-0.0025 (0.0014)***	**-0.0026 (0.0015)***	**-0.0069 (0.0014)*** **
FDEV	-0.00034 (0.00053)	-0.00039 (0.0005)	-0.00019 (0.00066)	-0.0022 (0.00086)	-0.00036 (0.00061)	-0.000054 (0.00093)
INF	-0.00051 (0.00034)	**-0.00056 (0.00030)***	-0.00049 (0.00036)	-0.00049 (0.00038)	**-0.00054 (0.00032)***	-0.00044 (0.00038)
LFC	-0.000138 (0.00091)	0.00011 (0.0001)	-0.00013 (0.000094)	-0.000141 (0.00009)	0.00010 (0.000095)	-0.00013 (0.000093)
POLITY_IV	0.00015 (0.0002)	0.00021 (0.00022)	0.00019 (0.0634)	0.00011 (0.00022)	0.00019 (0.00023)	0.00014 (0.00023)
Net Effects	-	-	-	0.00305	0.00171	0.00839
Fisher	2831.19***	6776.3***	3125.91***	3658.06***	7343.50***	4012.65***
AR(-1)	(0.003)	(0.002)	**(0.003)**	(0.002)	(0.002)	**(0.003)**
AR(-2)	**(0.208)**	**(0.205)**	**(0.207)**	**(0.206)**	**(0.206)**	**(0.210)**
Sargan OIR	**(0.790)**	**(0.796)**	**(0.789)**	**(0.800)**	**(0.796)**	**(0.799)**
Hansen OIR	**(0.101)**	**(0.133)**	**(0.098)**	**(0.098)**	**(0.141)**	**(0.108)**
Instruments	15	15	15	16	16	16
Countries	26	26	26	26	26	26
Obs.	494	494	494	494	494	494

Notes: Standard errors clustered at the country level are reported in parentheses;*, ** & *** indicate 10%, 5% and 1% significance level respectively. INEQUAL is income inequality, LAN is linguistic diversity, REL is religious diversity, ETHN is ethnic diversity,

INST is institutional quality, LAN×INST is interaction between linguistic diversity and institutional quality, REL×INST is the interaction between religious diversity and institutional quality, ETHN×INST is the interaction between ethnic diversity and institutional quality, GDPPC is gross domestic product per capita, GDPPC_SQD is gross domestic product per capita squared, LITR is literacy rates, GLOB is globalization, URB is urbanization rates, FDEV is financial development, INF is inflation rate, LFC is labour force participation rates and POLITY_IV is political regime types.OIR is Over-identifying Restrictions Test. The significance of bold values is in three ways: (a) The probability values of estimated coefficients and the Fisher statistics. (b) The failure to reject the null hypotheses of: (i) no autocorrelation in the AR(1) and AR(2) tests and; (ii) the validity of the instruments in the Sargan OIR test.

6.0 Concluding Implication and Future Research Direction

Studies on the causes of income differences between the rich and the poor have received an extensive attention in the inequality empirics. While ethnic diversity has also been identified as one of the fundamental causes of income inequality, the role of institutions as a mediating factor in the ethnicity-inequality nexus has not received the scholarly attention it deserves. Accordingly, it is of policy relevance to assess how a policy variable (i.e. institutional quality) can be employed to modulate the effect of ethnicity on inequality. This study complements the existing literature by investigating the extent to which the institutional framework corrects the noisy influence originating from the nexus between "ethnic diversity" and inequality in twenty-six SSA countries for the period 1996-2015. The empirical evidence is based on pooled OLS, fixed effects and system GMM estimation techniques.

The study discovered that the direct influences of linguistic, religious and ethnic diversity on inequality are inevitable in the region. Religion and ethnic diversity were found to be statistically significant at their conventional levels. The findings also revealed that the indirect influence disappears within an interactive regression framework. The adverse effects of the three components of ethnic diversity decrease marginally when institution index and its interaction with ethnicity factors are added, although, direct relationships exist with their interactive terms. Four main policy implications can be inferred from the findings: (a) the institutional infrastructures in the region have not been able to solve inequality problems orchestrated by ethnic diversity. Therefore, there is need for the region to restructure the institutional settings to tackle the byproducts of ethnic differences that are politically motivated by selfish individuals or groups, which threaten national unity. (b) Meaningful gains from liberalization within and across the region, financial supports to the less-privileged, high literacy and guaranteeing a fair playing ground to all citizens will go a long way to dampen uneven wealth distribution in the region. (c) Efforts should be made to stop religious and ethnically induced hate speech and unite all concerned parties to embrace tolerance and peaceful coexistence as the region stands to gain more socially, economically and politically. (d) The democratic system of governance should be practiced in a way that everybody stands to gain without prejudice/being biased or compromising the right of others.

It may not be surprising if institutions in SSA cannot effectively modulate the effect of ethnic diversity on inequality. This is essentially because institutions, instead of playing the role of policy variables may reflect policy syndromes. In other words, institutions may reflect negative signals instead of positive signals. This is essentially the case when the institutional variables are negatively skewed. This narrative on the assimilation of negative skewness to a policy syndrome is consistent with Asongu and Nwachukwu (2016d) who have predicted the occurrence of the 2011 Arab Spring from institutional indicators in Africa that are negatively skewed. In the light of this clarification, the role of institutions in modulating the effect of ethnicity on inequality can be tailored to effectively reduce inequality by improving the following factors that are not mutually exclusive: (a) the election and replacement of political leaders (i.e voice & accountability and political stability); (b) the formulation and implementation of sound policies that deliver public commodities (i.e. government effectiveness and regulation quality) and (c) the respect by the State and citizens of institutions that govern interactions between them (i.e. corruption-control and the rule of law).

Future studies can use alternative measures of the variables of interest (i.e. institutional quality, inequality and ethnic diversity) to assess whether the established findings withstand further empirical scrutiny. Moreover, comparative studies within an intercontinental framework would provide lessons from best performers to their least-performing counterparts. Country-specific studies are also worthwhile for more targeted policy implications.

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Appendix

Figure 1(a): Scatter Plot of Income Inequality of Southern African Countries

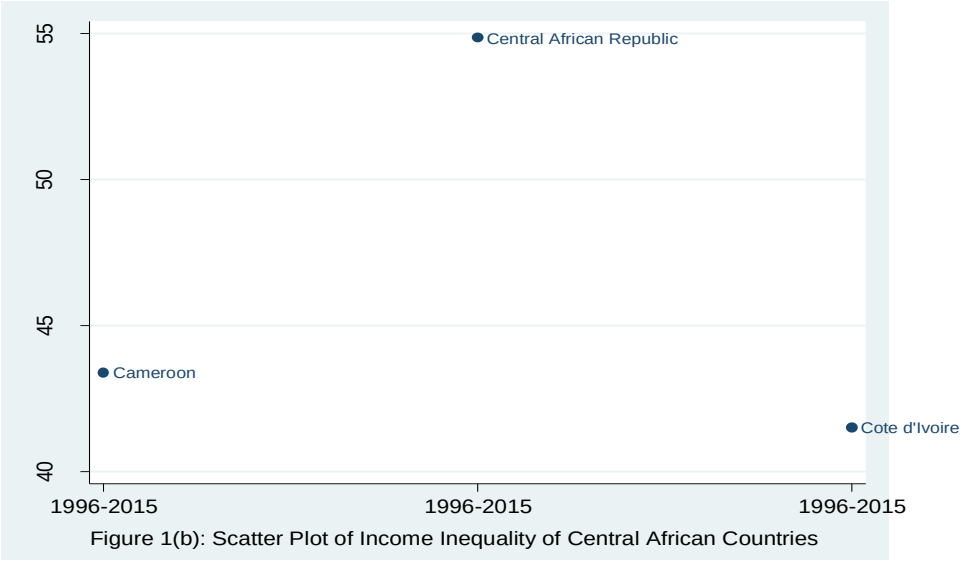

Figure 1(b): Scatter Plot of Income Inequality of Central African Countries

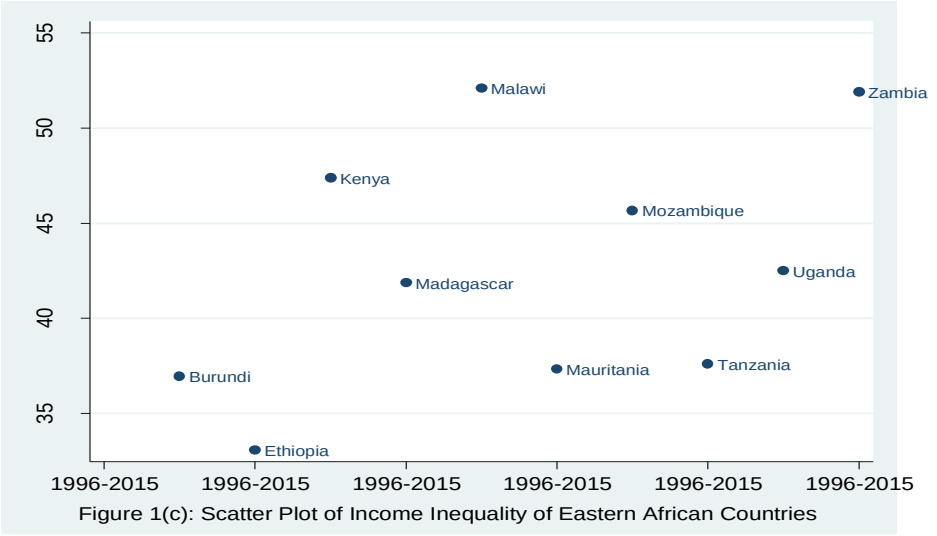

Figure 1(c): Scatter Plot of Income Inequality of Eastern African Countries

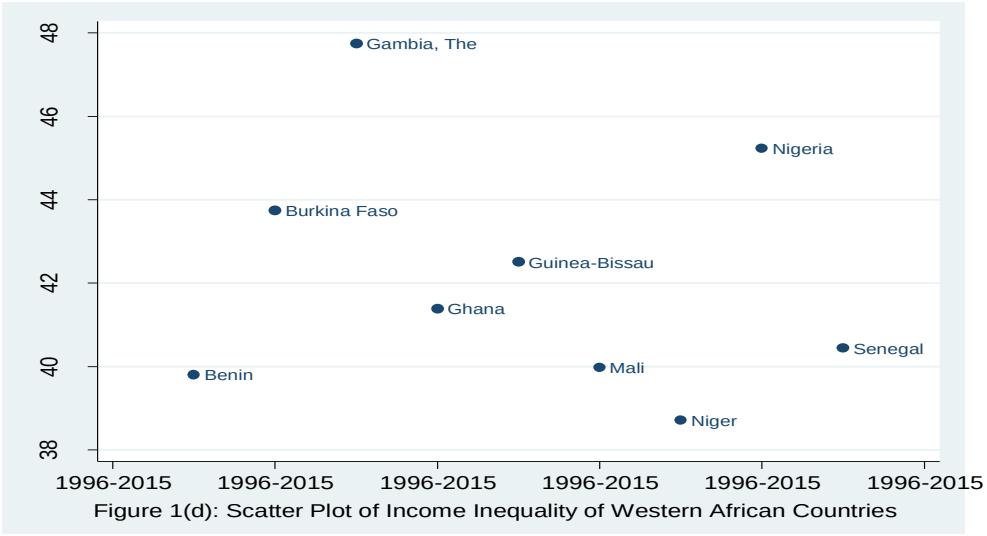

Figure 1(d): Scatter Plot of Income Inequality of Western African Countries

Figure 1(a-d): Scatter plots of Income Inequality of the four Regions of SSA Countries.