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Structural transformation and inequality: A sectoral analysis for low- and middle-income countries

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The study examined the impact of structural transformation to inequality using a panel of low- and middle-income countries from 1996 - 2018. The system generalised method of moments was used to determine the effect of value-added of each sector to income inequality for the countries in the study. Increase in value-added for the mining and construction sectors reduces inequality whilst inequality increased with an increase in value-added for the agriculture and manufacturing sectors. Thus, for the countries in this study mining and construction driven structural transformation has an inequality reducing effect whereas there is a possibility that further structural transformation has no effect to reducing inequality. This implies that there is a probability of an increase in inequality due to further structural transformation. The implication for policy is a consideration of a channel of structural transformation that is suitable for a specific economy.

Keywords: inequality, structural transformation, change, sector, countries, value-added, development, system-GMM

JEL Classifications: O11, O15, O53

1 Introduction

Globally inequality within countries is increasing and persistent, policy makers and academics are looking for solutions to create equitable economies and income mobility across generations. A modern phenomenon of economic growth which is associated with the gradual reallocation of value added from the agricultural sector to the industrial sector and the services sector is regarded as a necessity for addressing developmental challenges in low- and middle-income

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countries (Baek, 2017; Salamanca & Gonzalez, 2021). The process of economic growth that involves shifting relative share of agricultural value added and a rise in the modern industrial and service economy has been devised as a necessary developmental agenda for low- and middle-income economies (Armah & Baek, 2015). However, Ibrahim, Vo and Aluko (2021) asserted that the concurrent pursuant of different goals of structural transformation and reducing inequality can be a developmental dilemma for policy makers. This process of economic growth has been given different terminologies which include *structural change, structural transformation, economic transformation, structural shift, and structural adjustment among others.*

Thus sectoral shifts in structural transformation are measured by the value added contribution of industry as a per cent of gross domestic product or the employment share of the industry to the total population (Baymul and Sen, 2020). Pursuing economic development through improved structural transformation can reduce/generate within country income inequality. Structural transformation and broad-based economic growth are the dual goals pursued by low- and middle-income countries to achieve the Sustainable Development Goals(SDGs), but there is possibility of generating a tension around income inequality (Alisjahbana, 2020). Structural transformation (interchangeably used with structural change hereafter) which is a fabric for economic growth occurs when an economy changes from predominantly low-productivity sectors to those of greater productivity (Sumner & Yusuf, 2020).

The World Bank (2020) defined structural transformation "as a distinctive feature of economic growth that occurs when a sustained period of rising income and living standards coincides with changes in the distribution of economic activity across three broad sectors of an economy—agriculture, industry, and services". Reducing inequalities is a goal in the Sustainable Development Goals (SDGs) as inequalities remains a threat to long term socio-economic development and it harms poverty reduction efforts (United Nations, 2020). Shimeles and Nabassaga (2018) lamented that high and persistent inequality in low and middle-income countries is contributing to slow progress on poverty reduction. The United Nations (2015) opined that reducing inequalities requires transformative change. Timmer and Akkus (2008) reiterated that building a resilient economy and increasing the productivity of economic sectors is a way out of poverty and reducing inequalities.

The role of structural transformation has been among the economic successes towards development that has an effect to reducing income inequality (Sen et al, 2020). Therefore, there is a renewed interest on the effect of structural transformation on income distribution. Most economies in low and middle income countries are transitioning from low productive sectors to high productive sectors; however, failure to anticipate the developmental paths in this transitioning state can create income distribution challenges (Agarwal, 2016). Furthermore,

structural change creates opportunities and challenges as foreign trade, and technological change are pitted as the major drivers of widening income gap, yet they are also drivers of structural transformation (Qureshi, 2021).

Baymul and Sen (2020) findings argued for different impact of labour transitioning from agriculture to the manufacturing sector in structurally developing countries and the structurally developed countries. Furthermore the arguments in literature on structural transformation suggest a path of structural transformation from agriculture to manufacturing then the services sector. It is not clear if this path of structural transformation is applicable to all countries more so, the structurally developing countries. Does the structural transformation follow the same path of structural transformation that is expected and what is this relationship of these sectors to income distribution? This article examines the linkages between structural transformation and inequality for structurally developing countries which are mainly the low- and middle income countries. Literature on the role of structural change on inequality in these countries is very thin and it is inconclusive on how structural transformation affects income inequality (see Baymul and Sen, 2020; Bhorat, Lilenstein, Oosthuizen, and Thornton, 2020). Although structural transformation is opined to be the epitome of the process of economic development and ultimately equal income distribution, Baek (2017) argued that structural transformation is not always associated with reduced income inequalities it may exacerbate income inequality due to lack of inclusive growth. Hence it is the objective of this study to examine the inequality-structural transformation links and which economic sectors have an impact to income distribution.

According to the Standardized World Income Inequality Database (SWIID, 2020) most countries with the highest inequality gap are in low-and middle income bracket. It is imperative to have a study focusing on this income group as they are also either structurally underdeveloped or structurally developing phases. This provides evidence based guide to policy on the dynamics of inequality and how economic sectors affect these dynamics. Does structural transformation increase/reduce income inequality? Which economic sectors reduce or amplify inequality? It is not clear whether structural transformation is linked to the pattern of inequality in low- and middle-income countries. What type of structural transformation can lead to a reduction in inequality? The study seeks to answer these questions as it is vital to understand whether the structure of the economic sectors is associated with income inequality dynamics. This study contributes to literature and the debate on whether structural transformation determines income distribution outcomes. Income distribution studies attempts to link the aspects of economic growth, financial development and institutional factors and inequality; few have attempted to link the relationship of inequality and economic sectors. This study provides the empirical insights on the links between the respective economic sectors and income inequality for low and middle-income countries. Generally, there is a path for structural

transformation but the findings of this study suggest that some sectors amplify income inequality. Hence, policy makers need to understand which economic sectors are essential for their respective economies rather than a one size fits all approach to structural transformation.

The rest of the paper is organised as follows: Section 2, reviews both the theoretical and empirical related literature on the normative structural transformation–inequality nexus. Section 3 is the methodology discussing data and the estimation technique for the study. The results and discussion thereof are in Section 4. Finally, the paper concludes the study with a summary and policy implications in Section 5.

2 Literature Review

The role of structural transformation on income inequality dynamics are theoretically outlined by Kuznets (1955). The theory posits the transfer of labour from rural to urban as the major driver of economic development which is in tandem with increasing income inequality. Thus, the theory summarises that during the process of economic development inequality is inevitable. Thus, change in the sectorial structure can be a driver of economic inequality (Kuznets 1955; 1973). Lewis (1954) also postulated that labour transfer can generate income inequalities as economies move from pre-capitalist sector to a capitalist sector. Theories suggest an upswing in income inequalities during periods of active structural transformation (Kuznets, 1955; Ahluwalia et al. 1979). Sectoral shift of labour within sectors changes income distribution such that Kuznets observed that:

> *'Even if the differential in per capita income between the two sectors remains constant and the intra-sector distributions are identical for the two sectors, the mere shift in the proportions of numbers produces slight but significant changes in the distribution for the country as a whole' (Kuznets 1955: 14–15).*

Thus, Kuznets (1955) believed that initially structural transformation leads to increased income inequality up to a certain threshold where structural transformation reduces income inequality. Hirschman (1958) emphasised on the importance of shifting resources from labour to capital intensive modern sectors at the core of the growth process. Banerjee and Newman (1993) opined that factors that shape structural transformation also affects income distribution. But Piketty (2014) argued that labour transfer between sectors has nothing to do with income inequality but rather institutions and policies. Although Kuznets argued that structural transformation increases inequalities in the early stages which decline with time suggesting an inverted u-shape, Deininger and Squire (1998) disputed a universal law on the relationship between structural transformation and inequalities as the study found inverted u-shape in some countries and not in others. Alvaredo and Gasparini (2015) found the downswing curve for high income countries and the upswing curve for Sub-Saharan Africa countries. Alisjahbana et al.

(2020) arguments suggested a developer's dilemma where a likely trade-off between economic growth and inequality exist due to rapid structural transformation.

Empirical research on the role of structural transformation on inequality is very thin. However, Baymul and Sen (2020) found that labour transfer to manufacturing reduces income inequality irrespective of the country's stage of structural transformation. In the same study it was argued that labour transitioning to services sector has a tandem of creating inequalities in structurally developing countries and reduces inequality in structurally developed countries. Lindert and Williamson (2001) previously disputed that structural transformation generates inequalities but the opening up of economies are the significant drivers on income inequality. Labour reallocation from the agricultural sector to non-agricultural sectors in early stages of development generates income inequalities (İşcan & Lim, 2022). Oyvat (2016) suggested that differences in particularly land inequality generates overall within countries inequality.

McMillan and Rodrik (2011) study failed to conclude on the relationship between structural transformation and inequality as the study argue that structural transformation can either be growth enhancing or growth reducing. In separate studies in Bulgaria, Pi and Zhang (2018) and Mihaylova and Bratoeva-Manoleva (2018) indicated a reverse causality between structural change and inequality. Morsy et al. (2021) found out that the share of labour in the agricultural sector reduces unemployment than the share of labour in the industries and the services sector, hence affecting overall inequality. In a separate study for Indonesia Yusuf, Anglingkusumo and Sumner (2021) concluded that the relationship between inequality and structural transformation evolve over time, and it depends on the path of industrialisation of the economic sectors. During the period of industrialisation structural transformation is not associated with high inequalities compared to increasing inequalities during the period of deindustrialisation (Sen et al., 2020; Yusuf et al., 2021). However, a developer's dilemma is associated with the overall relationship between structural transformation and income inequality (Alisjahbana et al, 2020; Ibrahim et al., 2021). Ibrahim et al. (2021) argued positive association between structural transformation and income inequality. Thus empirically there is no conclusive evidence on the relationship between structural transformation and inequality.

3 Data and Methodology

The study is based on annual data for 41 countries in Africa, Asia and Latin America from 1996 to 2018. Data availability determined the countries and period covered in this study. Furthermore, moving averages could not be used to complete the missing data points from 2018 so as to avoid the structural effects of the Covid-19 pandemic. The 12-sectoral value-addition data (agriculture, mining, manufacturing, utilities, construction, trade services, transport services, business services, financial services, real estate, government services and other

services) is from the Groningen Growth and Development Centre's (GGDC). The database consists of annual series for the gross value-added output at constant 2015 prices in local currency (the study converted the value-added output to millions, US$) for agriculture, mining, manufacturing, utilities, construction, trade services, transport services, business services, government services, and personal services sectors. The list of countries included in the study is in the appendix. The data for inequality was drawn from the Standardized World Income Inequality Database (SWIID) database. The data for all the other variables is from the World Development Indicators of the World Bank

Concerning the control variables incorporated into each of the value addition equations for each economic sector, a specific set of controls were introduced. These encompass gross domestic product per capita, unemployment, and inflation. Gross domestic product per capita is considered to exert an independent influence on inequality, not only by facilitating resource redistribution but also through its impact on the level of economic development via structural transformation. Nations experiencing elevated levels of unemployment are likely to exhibit increased inequality, as income differentials contribute to a widening income gap, as asserted by Magwedere and Marozva (2023). Simultaneously, heightened inflation adversely affects the lower income segments of the population, potentially exacerbating inequality, while also influencing the value addition within each economic sector.

3.1 Estimation Technique

The aim of this study is to determine the sectoral effect of structural transformation on income inequality. To execute the role of structural transformation on income inequality the study used the system generalised method of moments. Ideally the extent of past inequality significantly affects the current level of inequality. Thus, inequality within counties is persistent and the system generalised is the appropriate method to counter endogeneity issues from the persistent series. The methodology accounts for potential endogeneity bias and the technique control for the persistent nature of the variables (Arellano and Bover, 1995; Arellano, 2003). Furthermore, Blundell and Bond (1998) opined that the system GMM methodology is superior to the differenced GMM as it is efficient in eliminating finite sample bias in highly persistent series through the addition of moment restrictions and restricts the lagged first differences which are used as instruments in the levels equation (Arellano and Bover, 1995; Blundell and Bond, 1998; Bond, Hoeffler and Temple, 2001). Additionally following Boateng et al. (2018); Odhiambo (2020), the system GMM method was used because it controls for (1) the unobserved heterogeneity with time-invariant omitted variables and (2) simultaneity in all regressors by employing instrumented explanatory variables. Hence the system GMM technique has an added advantage in that it uses the panel data structure which assists in controlling for the time-invariant unobserved heterogeneity and cross-country variations (Blundell and Bond, 1998).

However, the methodology can have a challenge of instrument proliferation. To control for the instrument proliferation which an over fit the mode the Roodman (2009) forward orthogonal technique was employed to control for instruments proliferation.

The study ensured that the diagnostics of the system GMM for instrument validity and the test for second-order serial correlation are satisfied (Arellano and Bond, 1991). Thus, the absence of autocorrelation in the residuals was tested consistent with the Arellano-Bond test (AR1) and (AR2) (see Arellano & Bond, 1991; Windmeijer, 2005; Roodman, 2009). As there is a likelihood of endogeneity in the explanatory variables, cross-section dependence was also tested consistent with De Hoyos and Sarafidis (2006) and Pesaran (2021). It is necessary when the GMM method to be attentive and be alert on the possibility of instrument proliferation that could conceivably over fit the endogenous variables. Thus, the technique used has to pass both the test for instrument validity and second-order serial correlation. Thus, the validity of using the system GMM was confirmed using Sargan (1958) and Hansen's (1982) over-identifying restrictions. Following Asongu and De Moor (2017) and Odhiambo (2020), instrument proliferation was limited by ensuring that the number of instruments is not more than the number of cross sections (countries/groups).

Therefore, the study estimated equation 1 is:

$$\Delta INEQ_{it} = \beta_0 + \beta_1 \Delta INEQ_{it-1} + \beta_2 \Delta ST_{it} + \sum_{i-1}^{n} \beta_{ij} \Delta X_{j,\,it} + \Delta \mu_i + \nu_t + \Delta \varepsilon_{it} \quad (1)$$

where Δ is the difference operator; INEQ is the GINI coefficient representing income distribution, i and t represent country and time respectively , ST represents a vector of control variables which is the value added for the 12 sectors namely agriculture, mining, manufacturing, utilities, construction, trade services, transport services, business services, financial services, real estate, government services and other services trade services, transport services, business services, the other control variables considered with each of the sectorial value added were regressed with X vector of control variables which included [gross domestic product per capita(gdppc), inflation (inf) unemployment (unemp)] and μ_i captures the unobserved country specific impact with ν_t representing the time specific impact; ε_{it} represent the unobserved regression residual.

4. Results and Discussion

As part of preliminary analysis, the descriptive statistics are presented in Table 1. The sectoral value addition's standard deviations showed that all sectors registered very high volatility in general were manufacturing, Trade services and Government services had the highest, while the mining, utility services and other services sectors had the smallest volatility.

Table 1: Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std, Dev,
INEQ	0,44	0,43	0,66	0,27	0,07
AGRIC	51 912	12 837	1 269 955	0,44	129 900
BUSS	44 914	6 828	995 242	0,24	120 418
CONS	35 175	6 494	838 643	0,25	90 987
FINS	28 003	5 286	1 010 143	0,09	85 869
GOVTS	71 131	12 948	1 794 028	0,62	177 898
MANUF	115 050	16 618	3 642 658	0,68	361 926
MINING	19 767	3 235	395 423	0,23	46 511
TRADES	82 826	17 999	1 834 923	0,59	194 542
TRANSS	29 640	5 915	865 417	0,21	72 072
UTIL	14 966	2 330	259 529	-55,74	40 604
REALE	45 427	6 065	1 367 623	0,27	118 467
OTHS	16 842	4 106	340 115	0,13	40 422
GDPPC	6 692,35	2 827,42	61 373,65	246,39	10 354
INF	7,38	5,32	96,09	-9,62	9,37
UNEMP	7,11	5,02	24,22	0,25	4,93

Source: Authors Estimation using Stata 15.1. 943 000 Observations

The inequality had a variance of 0,07, with a minimum of 0.27 and a maximum of 0.66. The average inequality was 0.44 and was very close to the median of 0.43. Amongst the control variables, GDP per capita registered an average of 6 692.35, with a median of 2 827.42. The standard deviation was 10 354 with a minimum of 246.39 and a maximum of 61 373.65. This output confirms a very high GDP per capita volatility. Inflation had a mean of 7.38 with a median of 5.32. The standard deviation for inflation was 9.37 with a minimum of -9.62 and a maximum of 96.09. Again, this variable had high volatility for countries and the period under investigation. Unemployment exhibited an average of 7.11 with a median of 5.02. The standard deviation for unemployment was 4.93 with a minimum of 0.25 and a maximum of 24.22.

Based on the results in Table 2 and Table 3, inequality was found to be persistent since the inequality in the previous period has an increasing effect on the current level of inequality in all models. This reiterates the fact that income disparities are passed on across generations. Wilson (1987) argues for the existence of “underclass” which is made up of chronically poor people who are trapped in high density suburbs and rural areas and are victim of a “culture of poverty” in this sectors agriculture remains the main source of income.

Table 1: Summary of the deterministic relationship between inequality and structural transformation

	Two-Step System GMM Approach					
Sector	**Agriculture**	**Manufact.**	**Mining**	**Utilities**	**Construction**	**Trade services**
Variables	ineq	ineq	ineq	ineq	ineq	ineq
L.ineq	0.877***	0.867***	0.918***	0.904***	0.924***	0.924***
	-0.0159	-0.0163	-0.017	-0.0127	-0.0161	-0.0205
gdppc	-0.00795***	-0.0106***	-0.0142***	-0.0115***	-0.00589**	-0.00439*
	-0.0015	-0.00107	-0.00156	-0.00162	-0.00181	-0.00208
inf	0.00000182	-0.00000472	-0.0000354***	-0.0000181	-0.0000111	0.00000802
	-0.00000548	-0.00000651	-0.00000808	-0.0000123	-0.0000102	-0.0000107
unemp	0.000691*	0.000606*	-0.000194	0.000372	0.000550*	0.00156***
	-0.000288	-0.000273	-0.00028	-0.000312	-0.000224	-0.000429
agric	0.00404**					
	-0.00126					
manuf		0.00397**				
		-0.00143				
mining			-0.00346**			
			-0.00122			
util				0.00161		
				-0.00129		
cons					-0.00311**	
					-0.00106	
tradeS						-0.000347
						-0.00115
Diagnostic stats for Table 1						
Instruments	34	40	39	40	38	31
AR(1)	0	0	0	0	0	0
AR(2)	0.515	0.489	0.48	0.527	0.487	0.443
Sargan OIR	0.917	0.934	0.974	0.99	0.954	0.906
Hansen OIR	0.606	0.649	0.987	0.567	0.988	0.634
Countries	41	41	41	41	41	41
Observations	861	861	861	861	861	861

Source: Authors Estimation using Stata 15.1. 943 000 Observations

Table 2: Summary of the deterministic relationship between inequality and structural transformation

Continued	Two-Step System GMM Approach					
	Transport Services	**Business Services**	**Financial Services**	**Real Estate**	**Other Services**	**Gov. services**
	ineq	ineq	ineq	ineq	ineq	ineq
L.ineq	0.927*** -0.0206	0.931*** -0.0265	0.915*** -0.0178	0.908*** -0.0231	0.929*** -0.0198	0.913*** -0.0201
gdppc	-0.00543* -0.00216	-0.00459* -0.00232	-0.00182 -0.00212	-0.00339 -0.00234	-0.00383 -0.00242	-0.00453* -0.00197
inf	0.00000187 -0.000011	0.0000147* -0.00000649	0.0000049 -0.00000569	0.0000148 -0.0000109	0.00000773 -0.0000128	0.0000108 -0.00000961
unemp	0.00142*** -0.00037	0.00177*** -0.000378	0.00141** -0.000444	0.00203*** -0.000498	0.00167*** -0.000393	0.00181*** -0.000435
transS	0.000124 -0.000792					
busS		0.000525 -0.00137				
finS			-0.00293 -0.00155			
realE				0.000745 -0.00113		
othS					-0.000206 -0.000749	
govtS						0.00146 -0.00126
Diagnostic stats for Table 2						
Instruments	40	36	33	40	37	38
AR(1)	0	0	0	0	0	0
AR(2)	0.455	0.421	0.424	0.439	0.424	0.433
Sargan OIR	0.775	0.984	0.999	0.865	0.999	0.917
Hansen OIR	0.565	0.526	0.47	0.567	0.638	0.626
Countries	41	41	41	41	41	41
Observations	861	861	861	861	861	861

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, OIR is the over-identified restrictions

Thus, poverty is self-perpetuating especially in situations when little income in communities leads to low human capital formation as the residence in these communities find themselves not included both socially and economically (Adams & Luiz, 2022).

For the mining and construction, sector value addition is negatively related to inequality and based on the probability value, the relationship is statistically significant at 1% level. Therefore, these results support the argument that value addition by critical sectors minimises inequality. This evidence revealed that the benefits of sectorial value addition may go beyond the conventional effects of general sectorial growth or economic growth (Alisjahbana, 2020, İşcan and Lim, 2022). Thus, the mining and construction sectors showed that value addition can be a panacea to poverty reduction and consequently a reduction in inequality. Generally, the mining sector and the construction sectors are labour intensive and a greater portion of those employed are non-skilled labour force. Therefore, the impact of these two sectors on poverty and inequality is enhanced in form of a "multiplier effect" as the mining sector productivity will boost the export sector (Weldegiorgis et al., 2022). Similarly, the construction sector results in the advancement of the much-needed infrastructure for economic growth. The results are not far from the study by Roller and Waverman (2001) who found a large output impact of telecommunications infrastructure in industrial countries, while Fernald (1999) reports similar results for roads using industry-level data for the U.S.

Given the results of this study where an increase in value addition in mining and construction reduces inequality it can be argued that the mining and construction sectors represent the desired value addition for poverty and inequality reduction, and this can be generalised across low- and middle-income countries as the data analysed represented good coverage across these countries and over time. However, it should be noted that the impact of each of these sectors' value addition on inequality is different (see Baymul and Sen, 2020). The mining sector had greater impact as the coefficient was marginally higher. Furthermore, for the sample of countries in this study mining is an essential sector for resource-rich countries where they are leveraging mining linkages with the broad-based economic transformation. Nevertheless, it is not obvious to what extent this sectoral value addition may reflect a causal relation, it can be concluded though that mining, and construction sectors' value addition has a deterministic relationship with inequality.

Results revealed a positive and significant impact of agricultural sector and manufacturing sectors' value addition on inequality. This support the notion of moving the economy from being agriculture based to other sectors as the agricultural sector is a driver of income inequality (Bhorat, et al., 2020). The finding concurs with the Kuznets curve of increasing inequality in a manufacturing based economy. Although the findings of this study is contrast with Baymul and Sen (2020) who found an inverse relationship between manufacturing and inequality at all stages of structural transformation. The studies differ of the measurement used for

manufacturing sector links to income inequality. The Baymul and Sen (2020) study used the share of workers in the manufacturing sector whilst this study using the value addition data from the sector shows that manufacturing is positively associated with an increase inequality. This offers contribution to a debate on whether the measurement of the economic sector has a different effect on income distribution.

With respect to the agricultural sector the study found that the marginal effect of an increase in value addition in the agricultural sector on income inequality has a positive and significant relationship. A positive effect by the agriculture sector can be attributed to perpetuation of already impoverished employees as this sector is traditionally known for exploitation and relatively low incomes as it usually attracts more unskilled labour relative to other sectors. Thus, the future low-and middle countries' structural transformation and inclusive growth path depends on the potential of the country to promote and grow more skills-intensive and higher value-added construction sector, while also promoting employment-enhancing mining sector.

Furthermore, the finding supports the assertion to shift value addition from the agricultural sector to other sectors as there is an inverse contribution of the agriculture to equal income distribution. The impact by the agricultural sector can be easily reversed to the greater good of the economy by implementing a minimum wage above the poverty datum line. Caution should be applied to account for the fact that agronomic potential of different countries under different climate scenarios may differ and this is equally true for differences in the quality of institutions. The study found a positive and significant relationship between manufacturing value addition and income inequality. This is contrary to the expectations where a shift to manufacturing is expected to be more beneficial to reduce income inequalities. This can be explained by that the manufacturing sector is more capital intensive and a significant portion of the workers are skilled and earn well above the poverty datum line. These results call for low- and middle-income countries to redirect their efforts toward the mining and construction sectors if they are to see a significant reduction in inequality. Moreover, government policies should not only focus on boosting the agricultural sector without addressing the wage inequality and exploitation of non-skilled workers in this sector.

In line with other empirically studies, GDP per capita was found to be negatively related to inequality. That is, the higher the GDP per capita the lower the inequality as many citizens are included economically as economic activities are enhanced. The impact of unemployment on inequality was also expected as the results revealed a positive and significant relationship between the variables on some of the models. A priori expectation was that as the unemployment increases, inequality is perpetuated. There are very few citizens that are entrepreneurial in low- and middle-income countries therefore, the quickest and easiest way to earn income and come out of poverty is through getting employment. Thus, it is true that a reduction in unemployment will generally reduce inequality in low- and middle-income

countries. One of the models revealed a positive relationship between inflation and inequality. Inflation leads to the deterioration in the value of the currency ceteris paribus. This worsens the position of the poor as the poverty datum line is pushed higher.

5 Conclusion

The two-step System GMM approach was employed to analyse a balanced panel of data for 41 countries in Africa, Asia and Latin America from 1996 to 2018. Twelve sectoral value-addition data were analysed in a bid to determine its impact on income inequality in these low- and middle-income countries. The relationship was put into perspective as it was not clear whether structural transformation is linked to the pattern of inequality in low- and middle-income countries. Moreover, it was not clear in literature, the type of structural transformation that leads to a maximum reduction in inequality. Thus, it was the aim of this article to provide clarity on whether the structure of the economic sectors is associated with income inequality dynamics. Results showed that, mining and construction sectors' value addition is negatively and significantly related to inequality for low-and middle-income inequality. Thus, these sectors had a role to play as their value additions reduced poverty and inequality through the "multiplier effect". Results also revealed a positive and significant impact of agricultural sector and manufacturing sectors' value addition on inequality. A positive effect by the agriculture sector on inequality can be attributed to increase in employment of rural people that already poor and traditionally this industry is known for exploitation. Most of the workers in this sector live below the poverty datum line.

Also, it the results confirmed that the impact of each sector value addition on inequality is different and the mining sector slightly had a greater impact. Therefore, low- and middle-income countries are encouraged to put more effort on the mining sector or as it might be the much-needed catalytic economic renaissance sector for combating the persistent income inequality. Additionally, one size doesn't fit all in terms of sectorial contribution to inequality reduction. It is expected that through structural transformation the economy shifts from agriculture to manufacturing then the services sector. Therefore, the study offers intuitions on the strategic areas of consensus and dissensus amongst multi-stakeholder clusters with respect to the state of, the barriers to, and the conditions for transformative linkage building those targets reducing inequality in low-and middle-income countries. Hence it is essential for policy makers to target those sectors that have an impact to equal income distribution for their respective economies as to address the challenges of income inequality. Additionally, thoughtful consideration of the effects of a sectoral shift on income inequality assists policy and decision makers to minimize the overall negative effects of sectorial shifts to income inequality.

In summary, this study is a contribution to the empirical literature, principally for the evidence it provides on possible optimal structural transformation that helps with poverty and inequality reduction for low- and middle-income countries as the results showed that sectorial analysis matter from a point of view of its effective distributive effects. Thus, the sectorial value addition analysis revealed a differential impact depending on the sector in question. Governments are recommended to provide polices that will enhance mining industry and construction industry development. Since agricultural sector's value addition was found to perpetuate inequality, government policies should focus on addressing the minimum wage. The question that still remain for further study is whether there are causal effects between inequality and sectoral value-added. Further research on whether the contributions of these other sectors are influenced by higher income inequality such that they are not reaching their potential in reducing income inequality in low- and middle-income countries. Additionally it is recommended for further studies to look at threshold whether sectoral contribution to reducing income inequality is up to a certain threshold beyond which further transformation may reduce or amplify income inequalities.

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Appendix

	Africa	**Asia**	**Latin America**
1	Botswana	Bangladesh	Bolivia
2	Egypt	China	Brazil
3	Ethiopia	Hong Kong, China	Chile
4	Ghana	India	Colombia
5	Kenya	Indonesia	Costa Rica
6	Lesotho	Israel	Ecuador
7	Malawi	Japan	Mexico
8	Mauritius	Malaysia	Peru
9	Morocco	Pakistan	
10	Nigeria	Philippines	
11	Rwanda	Singapore	
12	Senegal	Sri Lanka	
13	South Africa	Thailand	
14	Tanzania	Turkey	
15	Tunisia	Viet Nam	
16	Uganda		
17	Zambia		

Table 3 Correlation Matrix

Variables	INE	AGRIC	BUSS	CONS	FINS	GOVTS	MANUF	MINING	TRADES	TRANSS	UTIL	REALE	OTHS	GDPPC	INF	UNEMP
INEQ	1.000															
AGRIC	-0.077	1.000000														
	0.01	-----														
BUSS	-0.175	0.603929	1.000000													
	0.00	0.0000	-----													
CONS	-0.140	0.816161	0.907294	1.000000												
	0.00	0.0000	0.0000	-----												
FINS	-0.102	0.761525	0.862650	0.929861	1.000000											
	0.00	0.0000	0.0000	0.0000	-----											
GOVTS	-0.132	0.676760	0.957391	0.925272	0.841059	1.000000										
	0.00	0.0000	0.0000	0.0000	0.0000	-----										
MANUF	-0.132	0.832152	0.869616	0.960420	0.955247	0.860036	1.000000									
	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	-----									
MINING	0.053	0.824216	0.512853	0.730406	0.710625	0.565183	0.775571	1.000000								
	0.09	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-----								
TRADES	-0.182	0.693185	0.960526	0.950802	0.845241	0.978465	0.889209	0.608576	1.000000							
	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-----							
TRANSS	-0.154	0.801581	0.901734	0.957487	0.847528	0.949241	0.921210	0.667460	0.967439	1.000000						
	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-----						
UTIL	-0.185	0.681939	0.944514	0.923832	0.835280	0.927138	0.887564	0.554831	0.953313	0.926736	1.000000					
	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-----					

REALE	-0.181	0.663136	0.951287	0.911393	0.794912	0.975884	0.842908	0.532981	0.983608	0.958310	0.934959	1.000000				
	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-----				
OTHS	-0.177	0.601380	0.979814	0.914545	0.859907	0.943668	0.868466	0.519341	0.958544	0.899680	0.961357	0.941856	1.000000			
	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-----			
GDPPC	-0.254	-0.067667	0.327547	0.196008	0.193563	0.260474	0.154977	-0.060542	0.284788	0.215915	0.277250	0.311319	0.331314	1.000000		
	0.00	0.0377	0.0000	0.0000	0.0000	0.0000	0.0000	0.0631	0.0000	0.0000	0.0000	0.0000	0.0000	-----		
INF	0.091	0.139759	-0.047215	0.018554	-0.076555	0.070313	-0.017069	0.055475	0.050678	0.113787	-0.023029	0.093614	-0.065677	-0.218480	1.0000	
	0.00	0.0000	0.1474	0.5693	0.0187	0.0308	0.6006	0.0886	0.1199	0.0005	0.4800	0.0040	0.0438	0.0000	-----	
UNEMP	0.510	-0.116279	-0.100865	-0.106717	-0.083387	-0.066598	-0.109643	-0.066043	-0.125020	-0.097341	-0.088489	-0.096315	-0.091918	-0.090524	0.024	1.00000
	0.00	0.0003	0.0019	0.0010	0.0104	0.0409	0.0007	0.0426	0.0001	0.0028	0.0065	0.0031	0.0047	0.0054	0.457	-----