

THE NEXUS BETWEEN COMMODITY TERMS AND NATIONAL TERMS OF TRADE OF SUB-SAHARA AFRICAN COUNTRIES: IMPLICATION FOR INTERSECTORAL LINKAGE

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Abstract

This study investigates the relationship between national terms of trade (price of export relative to import) and commodity terms of trade (price of primary commodity relative to manufactured goods) using data on forty-eight (48) Sub-Saharan Africa (SSA) countries. Data sourced from the International Monetary Fund (IMF) database and World Bank (WB) Development Indicator (WDI) was estimated via panel autoregressive distributed lag (panel-ARDL). The result provides evidence of a stable positive long-run relationship between commodity terms of trade and terms of trade of individual Sub-Saharan Africa countries. This implies that a decline in the relative price of primary commodity will result in a fall in aggregate terms of trade in the long run. The study submitted that commodity terms of trade is a useful indicator of the movement in the aggregate terms of trade of countries in Sub-Saharan Africa and the validity of Prebisch-Singer hypothesis (PSH). We recommend a big-push investment in the production and export of primary commodity since the trend in the terms of trade of primary commodity reflects the trend in the terms of trade of manufactured goods.

JEL Classification: P20, O41, C32

Keywords: Commodity terms of trade, National terms of trade, Prebisch-Singer Hypothesis, Panel-ARDL, Sub-Saharan Africa

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1. Introduction

Economies are composed of three basic sectors; the primary, secondary, and tertiary sector (Onakoya, 2014; Antai, Udo & Effiong, 2016; Akita & Hau, 2008). These sectors are interrelated and interdependent as reported in the literature (Chernyshev, 2018; Akita & Haiu, 2008; Subramaniam & Reed, 2009). To explain the linkage among the sectors, Macrae (1971) pointed out that the primary-agrarian- and secondary-industrial-based sector linkage emanates from the surplus produced in each sector in terms of labour, food, or investment finance, and available for exchange between sectors. According to the author, agriculture provides industry with food and raw materials, while industry, in return supplies its surplus of producer and consumer goods. Given the link between agriculture and industry, movement in the prices of agricultural produce is expected to have growth effect on the prices of non-agricultural produce, especially that of industry. According to Vittal (1986), this price relationship between agriculture and industry determines capital accumulation.

Generally, the terms of trade reflects price signals and economic incentives for producers and, hence, could be a determinant of supply response and growth performance of agriculture and the aggregate economy (Dholakia & Sapre, 2013). Accordingly, the issue as to whether reducing the price of agricultural to industrial, intersectoral terms of trade, which is the relative price of agricultural to industrial goods, can help extract a surplus from agriculture for industrialisation in the early stages of economic development has been crucial not only for centrally planned economies but also for developing countries that depend on agriculture (Fardmanesh, 2017). This issue led to two schools of thought in the literature. The first view argued for reduced agricultural prices relative to those for non-agricultural goods, based on the position that industrial accumulation has been hindered by rising farm prices, while the other line of thought argued for higher agricultural prices, based on the position that the non-agricultural sector of the economy has an unfair edge over the agricultural sector (Vittal, 1986). Meanwhile, whether reducing or increasing the agricultural terms of trade stimulates industrial capital accumulation depends on whether or not the terms of trade react to agricultural growth. According to de Souza (2014), development in agriculture will stimulate accumulation of capital in industry only if the fall in agricultural terms of trade dominates the increase in industrial wages in terms of food.

It has been assumed that the trend in commodity terms of trade CIT (price of primary commodity relative to manufactured goods) for primary commodity exporting developing countries generally reflects the trend in the aggregate terms of trade (price of export relative to import). However, the use of commodity terms of trade assumes that all developing countries export primary commodity and import manufacturing good in the same proportion. This might not be the case, especially for Sub-Sahara Africa countries, with relatively undiversified export across the range of primary products where only one or two commodities often account for the bulk of export

earnings (Cashin & Pattillo, 2006). According to Subramaniam and Reed (2009), export diversification varied, with some countries in Sub-Sahara Africa experiencing better success in the transition process. Consequently, the export baskets of many of these countries are likely to be related to aggregate price of primary commodity (price of export relative to import) rather the widely used commodity terms of trade (price of primary commodity relative to manufactured goods). Furthermore, these countries' narrow production structures reduced the chances that Sub-Sahara Africa region import prices loosely follow the diversified manufacturing values series. In addition, since the primary commodity in the measurement of commodity terms of trade reflect the share of commodity-dependent Africa countries in world commodity exports and the manufacturing commodity that was used to deflate the price of primary commodity reflect the unit values of export of a group of industrial countries, commodity terms of trade may not be a good proxy for aggregate terms of trade of the countries in the region (Cashin & Pattillo, 2006).

In this study, our interest is to test whether there is a negative trend in the terms of trade of countries that are largely dependent on primary commodity exports by studying the relationship between commodity terms of trade and aggregate terms of trade of SSA countries to determine if the two series are actually negatively related in the long-run, as assumed in most studies that used commodity terms of trade, while neglecting the aggregate terms of trade to determine whether there is a negative trend in the terms of trade of primary commodity-dependent nations and for the validity of Prebisch-Singer hypothesis (PSH).

1.1 Problem Statement

In the Sub-Sahara Africa region, the process of structural transformation is slow and below that of other developing regions as many of the countries in the region still have large shares of their employment in agriculture, compared to the shares in industrial countries (Africa's Pulse, 2018). When compared with all other regions, Sub-Sahara Africa has the highest costs of export and the highest costs of import after Latin America and the Caribbean, based on border compliance, and South Asia, based on documentary compliance (UNCTAD, 2019). Consequently, growth in the region has decelerated from 2.5 per cent in 2017 to 2.3 per cent in 2018, below the rate of growth of the population for the fourth consecutive year, reflecting weaker exports from the region's large oil exporters (Nigeria & Angola), due to falling oil production amid high and volatile international crude oil prices, in addition to the deeper contraction in Sudanese economic activity and a slowdown among non-resource-intensive countries. During the period between 2018 and 2019, industrial commodity prices decline sharply. Even when the prices of other primary commodities stabilised, the trend in oil price remained dependent on the dictates of Organization of Petroleum Exporting Countries (Africa's Pulse, 2018).

In development economics literature, studies that tested whether there is a negative trend in the terms of trade of primary commodity-dependent nations and the validity of Prebisch-Singer hypothesis (PSH) are scarce. The few available studies not only produced mixed result but have also frequently used commodity terms of trade while neglecting aggregate terms of trade. This has been attributed to the widely held assumption that, for commodity exporting developing countries, the trend in each country's commodity terms of trade generally reflects the trend in the aggregate terms or net barter terms of trade, which may not hold. This is because a direct trend between the two terms of trade presupposes the existence of a stable long-run relationship between the two series (Cashin & Pattillo, 2006). Accordingly, the study of the relationship between commodity terms of trade and aggregate terms of trade is imperative.

In line with Cashin and Pattillo, (2006), this study addresses this gap by investigating the relationship between commodity terms of trade and aggregate terms of trade term in Sub-Sahara Africa to determine whether commodity terms of trade is a good proxy for the aggregate national terms of trade of individual SSA countries, as commonly used in the analysis of the implication of terms of trade on SSA. We improve on Cashin and Pattillo, (2006) by using a more recent dataset extended to cover the 2020s from 1995 to 2018. Also, we used both Levin-Lin-Chu and Fisher ADF unit root tests to determine the possibility of a cointegrating relationship among the variables. Subsequently, we applied autoregressive distributed lag ARDL approach, which can handle a mixture of stationary and non-stationary data to investigate the long-run relationship between the two series. The analysis helps to determine if it will be desirable for SSA countries to encourage diversification of their exports in favour of manufacturing goods (World Bank, 2000). The study also contributes to the literature focusing on the implication of sectoral decline in the trend of commodity terms of trade (CTT) on output and growth in SSA.

1.2 Objective and Significance of the Study

The aim of this investigation is to study the relationship between the commodity terms of trade and aggregate terms of trade in Sub-Sahara Africa. The specific objectives are to:

- a. examine the relationship between the commodity terms of trade and the aggregate terms of trade of SSA countries,
- b. examine the relationship between price of oil and the aggregate terms of trade of SSA countries.

The study, in line with Cashin and Pattillo, (2006) tested the validity of Lutz's (1999) argument of a long-run negative trend in the prices of primary commodity relative to those of manufacturing product (Prebisch-Singer hypothesis). That is, whether there is a negative trend in commodity terms of trade of countries

largely dependent on primary commodity exports. This negative trend is tested by examining the relationship between commodity terms of trade and aggregate terms of trade of SSA countries to determine whether the two series are negatively related in the long run. Since most SSA countries continued to rely on primary commodity, while many other developing countries now export larger share of manufacturing, a stable relationship is expected between the two terms of trade. The study is particularly important for African countries, which have become increasingly dependent on primary commodity exports with evidence of sectoral decline in net barter terms of trade. The study would also provide useful information that can be used to determine the impact of various trade policies aimed to diversify export, in line with trade policy adopted by respective countries.

This study is structured in four sections. Section one, introduction, was tailored on the background of the study, the research problem statement, the objective, and significance of the study. Section two focused on literature review, clarifies concepts and presents the review of existing literature and theories. Section three on methodology focused on model specification, data sources and measurement. Finally, section four is on results, discussion, and recommendations.

2. Literature Review

In this section, we clarify concepts and present the review of existing relevant literature and theories.

2.1 Sectoral Composition and terms of trade

The three basic sectors of an economy are the primary, secondary, and tertiary ones (Antai, Udo & Effiong, 2016; Akita & Hau, 2008). According to Akita and Hau, (2008), the primary sector includes agriculture and mining, the secondary sector refers to all industries and is, thus, interchangeably used with manufacturing sector, while the tertiary sector consists of all service activities, including construction. In the view of Antai, Udo and Effiong (2016), the primary sector comprises of agriculture, mining, and quarrying, inclusive of oil and gas. The service sector, otherwise known as the tertiary sector, consists of the activities where knowledge and know-how of people are offered for improve productivity and performance. This sector provides intangible goods, which include attention, advice, access, experience, and discussion (Onakoya, 2014).

Studies agreed that as an economy grows, labour gravitates from the agricultural to industrial sector, and then more of the labour force shift to the service sector (Onakoya, 2014; Africa's Pulse, 2019). This movement of labour from low to high-productivity sectors in an economy is referred to as structural shift, transformation, or change (Ajakaiye, Jerome, Nabena & Alaba, 2016). According to Jedwab, Gollin and Vollrath (2013), structural transformation is the transition of a

country from low productivity, labour-intensive sector to higher productivity, skill-intensive sector. The transition of an economy from agricultural to industrial sector and then, finally, to service economy has been recognised in the literature as the main determinant of economic progress of a nation (OECD, 2008; Onakoya, 2014). Service economy is characterised by sustained higher proportion of service components in intermediate inputs (OECD, 2000). In service economy, there is a rise in the proportion of service inputs in agriculture, production, employment, consumption, and trade (Onakoya, 2014).

Terms of trade emanates from foreign trade and has acquired added emphasis in the context of relations between rich and less-developed nations (LDCs) (Vittal, 1986). Terms of trade reflects the price incentives producers in the respective sectors faced, determining their investments, savings, and competitiveness (Dholakia & Sapre, 2013). In literature, there are different types and measures of terms of trade. According to Cashin and Pattillo (2006), commodity terms of trade reflects price of primary commodity relative to manufactured goods, while the aggregate terms of trade or the net barter terms of trade is the ratio of price index of exports of goods to imports of goods. Khusro (1961) defined the net barter terms of trade as the price ratio of commodity exported from and imported into the agricultural sector.

2.2 Theoretical Background

There are many theories providing the basis for explaining the relationship between terms of trade, sectoral growth, and aggregate productivity. These theories include the three-sector hypothesis, circular cumulative causation theory, cost-disease hypothesis, and Kuznets model.

2.2.1 The three-sector hypothesis by Clark (1940)

Fisher (1935) and Clark (1940) were two British economists that introduced the three-sector model. The model was later expanded by Fourastié, a French Economists in 1949. The three-sector hypothesis divides the economy into three sectors of activity: primary (extraction of raw materials), secondary (manufacturing) and tertiary (services) (Onakoya, 2014). The foundation of Clarks' three-sector hypothesis was based on Petty's idea of labour drift from agricultural to non-agricultural sector, often referred to as Petty's Law. The law states that "There is more to be gained by manufacture than by husbandry, and by merchandise than by manufacture" (Hospers & Steenge, 2002). According to the hypothesis, sectoral shift is mainly driven by rising income and elasticity of demand. That is, on a low-income level the demand for goods is relatively inelastic and focused on satisfying basic needs.

The theory described and predicted sectoral structural change in a national economy, where, at low level of development, the economy is dominated by the primary sector (agriculture), later the secondary sector (industrial production)

and, as the final achievement, by the tertiary sector (services) (Klodt, 2014). Along this path, agriculture first, followed by industry, will reach a peak level of relative employment over time. After reaching the tipping point of relative employment, the national share of employees in manufacturing will be shrinking. This is notwithstanding the fact that in the case of rising productivity, reduced employment does not necessarily go along with reduced output. In line with societal development over time, the tipping point at which deindustrialisation starts should be related to a certain income per capita. Thus, on the path of development, services become increasingly more favoured (Przywara, 2016).

2.2.2 Baumol's Cost-Disease Hypothesis (1967, 2001)

Baumol (1967), cited in Costa (2019), distinguished two sectors of an economy: the technologically progressive and technologically non-progressive sectors. These sectors are distinct as the latter is more labour-intensive than the former (Costa, 2019). In the technologically non-progressive sector, output is demand driven by the rise of productivity since workers are also consumers and their wages increase with productivity in the technologically progressive sector.

According to the hypothesis, the cost of labour is higher in the technologically non-progressive sector because, even though there is more input (labour), productivity is not growing as fast as in the manufacturing sector. To support the extra labour needed, there must be a larger share of GDP allocated to the technologically non-progressive sector to cover increasing relative costs in the sector (Costa, 2019). Therefore, the technologically non-progressive sector will require that a higher share of labour is allocated to it, which means that its relative cost of labour will increase. This implies that the relative cost of labour will increase in the non-progressive sector when wages increase, given that productivity remains constant in this sector. Therefore, cost disease affects stagnant sectors the most when the difference between wage growth and productivity growth is higher. In fact, cost disease may affect the economy even more because the share of non-progressive industries is increasing (Nordhaus, 2008).

In most developed countries, there has been an increase in the share of labour allocated to services sector – technologically non-progressive sector leaving a smaller share allocated to more progressive sectors (Colombier, 2017). According to Baumol (1993), some of the services are still demanded when its price increases, which means they are price inelastic. However, for this to happen, productivity needs to be at a 'normal/good' level, otherwise demand for it will disappear.

2.2.3 Circular Cumulative Causation (CCC) Theory by Myrdal (1957)

Myrdal (1957) developed CCC theory as a critique of stable equilibrium and the stability generally assumed in neo-classical economics. The theory of circular

cumulative causation (CCC) formulated by Myrdal (1957) treats the elements of social and economic processes as highly interrelated, so that the deterioration of one element necessarily influences other elements (Hirvilammi, 2019). Myrdal also made clear that this approach includes value premises that can only justify the desirable and possible features of the system. Myrdal, thus, paid attention to cumulative causes, causal chains, and path dependencies (Pierson, 2004). Myrdal (1957) argued that there is no tendency that would automatically stabilise the social system; rather, the contrary is true. If a change occurs, it accelerates supporting rather than countervailing changes, which shift the whole system in the same direction as the initial change, only much faster. Myrdal favoured the values of democratic equality, as clearly reflected in his concern about the vicious circle of increasing international inequalities (Berger, 2008). According to Myrdal, social change emerges in a process of reciprocal interaction between different elements in society (Hirvilammi, 2019).

In sum, for Kaldor, Myrdal's cycle of cumulative causation is that demand and output growth fuel productivity growth due to increasing returns to scale, which, in turn, fuels capital accumulation (Schlogl and Sumner, 2020). The investment in and location of a new manufacturing factory may ignite more employment in the factory and indeed generate more ancillary jobs and service industries in the area. Verdoorn's argument was one of cumulative causation where demand, rather than supply, determines the rate of accumulation (Hirvilammi, 2019). According to Onakoya, (2014), the circular cumulative causation theory believed that growth, by itself, can transform an economy. According to Myrdal (1957), the social process of circular causation "tends to become cumulative and often to gather speed at an accelerating rate". When defining economic and structural changes, Myrdal (1957) argued that there is no tendency that would automatically stabilise social system; rather, the contrary is true.

2.2.4 Kuznets Model

Kuznets (1955) model, as cited in Baymul and Sen, (2013) opined that, during the early stage of economic development, inequality will increase but, at a later stage, inequality may fall through the government's redistributive policies combining progressive taxation with welfare spending. The Kuznets process of structural transformation with widening inequality is made up of two sub-processes: the movement of the population from a sector characterised by lower mean income to a sector characterised by higher mean income, and the movement of the population from a sector with low within-sector inequality to a sector with higher within-sector inequality. If both sub-processes work in the same direction -that is, if workers move from a sector with both a low mean and low variance income to a sector with a higher mean and high variance income- then structural transformation will unambiguously increase inequality. However, if the movement of workers is from a

sector with a low mean but higher variance income to a sector with a higher mean but lower variance income, then it is less obvious that inequality will necessarily increase (Baymul and Sen, 2013). In Kuznets' view, the sector where workers are moving out of is clearly agriculture. However, the sector that is absorbing labour is not clarified in the 1955 paper, but the sector is quite likely to be industry and it could also be services.

Whether the Kuznets process holds for any particular economy depends on the specific characteristics of the path of structural transformation the economy follows. For example, are workers moving from an agricultural sector that has high land inequality or is the agricultural sector in this economy characterised by more equal land distribution, or is the movement of workers to sector with relatively low mean incomes, such as low-productivity services, or to sector with high within-sector inequality, such as mining or capital-intensive manufacturing? (Baymul & Sen, 2013). Kuznets (1968), as cited in Baymul and Sen, (2013) also observed that, for a successful development strategy, technological advancement must support both industrialisation and improvements in agricultural productivity. Recognising that economic growth is (not) just a matter of easy transfer of labour from subsistence agriculture to progressive industry; Kuznets emphasised the increase in agricultural productivity as an indispensable base of modern economic growth (Saikia, 2009).

2.3 Empirical Studies

Several studies that tested whether there is a negative trend in the terms of trade of primary commodity-dependent nations and the validity of Prebisch-Singer hypothesis (PSH) have frequently used commodity terms of trade while neglecting the aggregate terms of trade. For instance, Grilli and Yang (1988) reported that from 1988 to 1986 the relative prices of all primary commodities fell on trend by 0.5 per cent a year, while the price of non-fuel primary commodities fell by 0.6 per cent a year. The study corroborates the negative signs, but not the magnitude of the trend in Prebisch's work. They envisaged that some limited sectoral decline shown by their relative price indexes may be magnified by an incomplete account of quality improvements in manufacturing. The study also indicates that, despite the decline that has probably occurred during the current century in the terms of trade of non-fuel primary commodities, the purchasing power of total exports of these products has considerably increased. Similarly, the fall that may have occurred after World War II in the net barter terms of trade of developing countries seems to have been more than compensated for by the steady improvement in income terms of trade.

In the same vein, Aslan and Nazlioglu (2018) reported partial support for the Prebich-Singer hypothesis since only 7 out of 24 commodities studied display negative trend. The objective of the study was to investigate whether shocks to real

international commodity prices are transitory or permanent based on sequential panel selection model. Similar result was established by McGregor, Sartorello and Verspagen (2018) using the “World Bank’s Global Economic Monitor, Commodities” on data covering the period of 1960 to 2015 for 52 different commodities, while utilising panel error correction models, to examine the short- and long-term effects of international commodity prices on output per capita. The study shows evidence of a long-term negative impact of commodity prices on per capita GDP but the effect tends to be limited to energy, with the effects of rising non-energy commodity prices tending to have a positive long-term impact on per capita GDP. The short-term effect of commodity price growth on per capita GDP growth was positive. In addition, Ogundipe, Adu, Ogundipe and Asaleye (2019) reported similar result that the share of agriculture in primary commodity exports has consistently remained below 3 per cent since the advent of crude oil. The study assessed the macroeconomic impact of agricultural commodity price volatility in Nigeria from 1970 to 2017 using Autoregressive Distributive Lag (ARDL) cointegration and Impulse-Response Function (IRF) analysis. It was also found that volatile agricultural prices were responsible for a meagre 2 per cent of macroeconomic fluctuations. Furthermore, the study found that swings in agricultural prices affect foreign reserves and inflation and is more significant and appears earlier in the time horizon than other macroeconomic aggregates.

In the same vein, Olakojo (2015) provides evidence of a significant positive effect of primary commodity export prices on economic growth in selected African countries in the long run. The analysis was based on 24 primary commodity-based African economies using pooled mean group (PMG) heterogeneous panel data. The study also revealed that the adjustment of African economies to long-run equilibrium, when there is short-run disequilibrium, is weak, which implies that there is low level of diversification among many African economies and a limitation for manoeuvring in cases where commodity prices crash. Similar result was reported in the study conducted by Cashin, and Pattillo (2006) on the analysis of the relationship between African terms of trade and commodity terms of trade; little support was found for a stable, long-run relationship between commodity terms of trade and national terms of trade.

Similarly, Witkowska (2016) discussed if the observed trends in long-term price developments, as well as the primary commodity terms of trade of the most important primary commodity, can provide a confirmation of the Prebisch-Singer Hypothesis. The study presumed that the idea of the Prebisch-Singer Hypothesis can be used to provide explanation for the diverging terms of trade development of industrialised countries with different export structures. The study indicate that the possible cause lies in the differing specialisation of specific export sectors of these countries and the corresponding price developments of the goods exported.

In another study, Ingram (2014) reported that during commodity price booms, the faster growth occurs towards the end of the boom. Likewise, most price collapses occur towards the end of slumps. The study introduced a new approach to the analysis of the cyclical behaviour of world commodity prices based on a novel way to conceptualise shocks to commodity prices, such as cyclical occurrence; besides, based on the newly established empirical regularity, the size of cyclical shocks act as a leading indicator of impending turning points. The study also reported that, within booms and slumps, the behaviour of commodity prices seems to be quite similar, surprisingly even among different types of commodities (soft and hard), which are influenced by different shocks. Also, Miečinskienė and Lapinskaitė (2014) find that variation in general price level in Lithuania depends on changes of commodity prices in world commodity exchanges, affected mainly by the prices of aluminum, cocoa, coal, and oil. Their studies examine the effect of changes in commodity price level in the world commodity exchanges on the variation of general price level index in Lithuania based on correlation regression analysis.

2.4 Stylised Facts

Table 1 classified Sub-Sahara countries into three sectors, namely: top, middle, and bottom terciles as a threshold of resilient growth based on domestic growth performance across 44 Sub-Sahara African countries.

Table 1. Structural Transformation in Sub-Sahara Africa across Growth Performance Terciles (average shares, unweighted)

	Bottom		Middle		Top	
	1995-08	2015-18	1995-08	2015-18	1995-08	2015-18
Value-added shares (%)						
Agriculture	21.5	17.6	26.9	22.9	31.9	28.8
Industry	31.4	27.8	20.0	19.0	19.4	21.5
Services	42.2	49.0	47.5	48.9	41.8	43.2
Employment Share (%)						
Agriculture	56.8	51.3	60.2	55.4	65.5	56.6
Industry	12.2	13.2	12.5	12.4	8.9	11.9
Services	31.0	35.5	27.3	32.2	25.5	31.5

Source: Africa's Pulse, 2019.

The shift in the data in Table 1 captures the trend of structural transformation in the region. In the bottom tercile there are countries whose economic performance declined from 1995-2008 to 2015-18; in middle tercile are countries whose growth rate remained invariant over time, between 3.5 per cent and 5.4 per cent, in both periods, while countries in the top tercile have improved economic performance with growth of exceeding 5.4 per cent per year in both periods (Africa's Pulse, 2019).

Table 1.1 above shows that the average value-added share in agriculture is the smallest in the bottom tercile (17.6 per cent in 2015-2018), while it is the largest in the top tercile (28.8 per cent in 2015-18). Although the value-added share in agriculture declined for all terciles (bottom, middle, and top) from 1995-2008 to 2015-18, the largest drop took place in the bottom and middle terciles (with an average decline of about 4 per cent), while the smallest drop happened in the top tercile (with an average drop of 3.1 per cent). The table also shows that agricultural employment shares fall across all terciles in the region from 1995-2008 to 2015-18, and workers drift from primary to services and, to a lesser extent, the industry sector.

It is evident, first and foremost, that there is linkage among the various sectors in Sub-Sahara Africa countries given the movement of workers from one sector to another. Secondly, it is evident that these countries have experienced structural transformation from agriculture to services and, to a lesser extent, the industry sector. The fall in agricultural value added across all terciles is a confirmation of structural shift to the service economy and a pointer of premature de-industrialisation in the region, since the bulk of the region excess labour is currently absorbed in non-tradable services operating at very low levels of productivity in activities such as retail trade and housework (Rodrik, 2014). The movement has so far not delivered rapid growth to the level of the region growth potential. Accordingly, it is now an empirical question whether a service-led model can deliver rapid growth and good jobs in Africa as experienced under the manufacturing-led model.

3. Research Methodology

The study used data on forty-eight (48) Sub-Sahara Africa countries as enlisted in the World Bank 2019 data on Sub-Sahara Africa published online. The justifications for our choice of Sub-Sahara Africa as a case in study is the unequal distribution of the benefit of the transition process among countries in the region; while some countries experienced better success in the transition process than others (Subramaniam & Reed, 2009), the transition process in the region is slow and also lags behind developing regions, as such many of these countries still have large shares of employment in agriculture, compared to the shares in industrial countries (Africa's Pulse, 2019). Also, the study of the region offers the opportunity to contribute to the ongoing debate on premature de-industrialisation of Africa.

The data covers twenty-four (24) years from 1995 to 2018. The scope of the study covers the same period used by Africa's Pulse, (2019) in the analysis of structural transformation in Sub-Sahara Africa across the growth performance terciles. The period captured the structural transformation pattern of the region in terms of labour movement from one sector to another. Accordingly, there are forty-eight (48) cross-sectional units (nations) and twenty-four (24) years with 1152 total observations in the study. Data was collected from World Bank, World Development Indicator (WDI) and International Monetary Fund (IMF). Table 3.1 shows the description, sources, and unit of measurement of the data used.

Table 2. Data Description, Unit and Sources

SN	Variables	Description Symbol	Operational Definition	Measurement unit	Sources
1	National terms of trade	ATT	Price index of exports of goods divided by imports of goods. It proxies windfall gains and losses of income associated with changes in world prices.	Fixed Weights Index (2012 = 100)	IMF 2019
2	Commodity terms of trade	CTT	Proxy by Net barter terms of trade index calculated as the price of primary commodity relative to the price of manufactured product, measured relative to the base year 2000	Index 2000 = 100	World Bank, 2019 Database (WDI)
3	Real price of oil	ROIL	Measured by the nominal price of oil (\$US) deflated by the price of manufacturing goods	Index Base Year = 2000	IMF 2019

Source: Authors' Compilation, 2020

In order to analyse the relationship between the commodity terms of trade and the aggregate terms from 1995 to 2018, the study adopted the model used in the study conducted by Cashin and Pattillo (2006) in their analysis of the relationship between African terms of trade and commodity terms of trade (net barter terms of trade), where the aggregate index of the terms of trade was the dependent variable, while commodity terms of trade (the price of primary commodities relative to the price of manufacturing) and the real price of oil (nominal price of oil deflated by the price of manufacturing) were the explanatory variables. The model is specified as follows:

$$ATT_t = f(CTT, ROIL_t) \quad (1)$$

ATT = Aggregate index of the terms of trade

CTT = Commodity terms of trade

ROIL= Real price of oil

The inclusion of the real price of oil is to capture the effect of oil price on terms of trade since our sample included both oil and non-oil-exporting primary commodity developing African countries. There is a need to capture the implication of oil export component on the movement of aggregate terms of trade. Based on a priori

expectations, it is expected that commodity terms of trade have long-run relationship with aggregate terms of trade. Also, oil price is expected to have negative effect on terms of trade since household purchasing power falls with rise in oil prices.

The model was analysed using the panel autoregressive distributed lag ARDL cointegration approach to investigate the long-run relationship among the variables against the Johansen and Juselius (1990) cointegration approach used by Cashin and Pattillo (2006). The ARDL model used in the study, in line with Pesaran, Shin and Smith (1999), is stated as follows:

$$ATT_{it} = \beta_0 + \sum_{j=1}^{p-1} \beta_1 ATT_{it-j} + \sum_{j=0}^{q-1} \beta_2 CTT_{it-j} + \sum_{i=0}^{q2} \beta_3 ROIL_{it-i} + \mu_{it}$$

This method was adopted because, when compared to other multivariate cointegration methods, such as the Johansen and Juselius (1990) cointegration approach, the ARDL approach allows the cointegration relationship to be estimated by OLS once the lag order of the model has been identified. Furthermore, by the application of this method, long run and short run parameters of the models can be simultaneously computed (Lawal, 2016). Finally, our choice of ARDL approach is because of its edge in handling a mixture of stationary and non-stationary data to other cointegration approach. The unit root was tested to determine the possibility of a cointegration relationship among the variables using both the Levin-Lin-Chu and Fisher ADF unit root tests. In the actual estimation of the model, the pooled mean group (PMG) and dynamic fixed effects (DFE) was used. The choice of the PMG is because it allows short-run estimates as well as intercepts, speed of adjustment to long-run equilibrium statistics and error variances that are heterogeneous on a country-by-country basis, while long-run slope coefficients are restricted to be homogeneous across countries, which is particularly useful when there are reasons to expect long-run convergence (Samargandi, Fidrmuc & Ghosh, 2014). The DFE was also used because it imposes restriction on slope coefficients and ensures error variance is equal across all countries in the long run. DFE also restricts the speed of adjustment coefficient and the short-run coefficient to ensure they are equal, too, but the model allows for country-specific intercepts (Samargandi, Fidrmuc & Ghosh, 2014).

4. Results and Discussion

In the analysis of the relationship between commodity terms of trade and aggregate terms, the study employed cointegration analysis after the stationarity test. The result of the cointegration analysis, informed our choice of the Panel-ARDL estimation approach.

4.1 Panel Unit Root Test

In the test for the unit root, we used Levin-Lin-Chu and Fisher ADF unit root tests. The test statistics are based on Newey-West automatic bandwidth selection and Bartlett kernel procedure of the three-time series are presented in Table 3.

Table 3. Panel Unit Root Test

Variables	Levin-Lin-Chu			Fisher ADF		
	Level	First Diff.	Order	Level	First Diff.	Order
ATT	-0.59359 (0.2764)	-28.7427 (0.0000)	I(1)	77.8244 (0.8860)	857.858 (0.0000)	I(1)
CTT	-3.74297 (0.0001)		I(0)	100.096 (0.2647)	794.836 (0.000)	I(1)
ROIL	12.9730 (1.0000)	-18.7214 (0.0000)	I(1)	11.6966 (1.0000)	482.050 (0.0000)	I(1)

Source: Author, 2020

The result in Table 3 based on Levin-Lin-Chu unit root test depicts that aggregate terms of trade and real price of oil are non-stationary at levels, while commodity terms of trade is stationary at levels. Using the Fisher ADF unit root test, all series were found to be non-stationary at level. However, there is controversy in the result of Levin-Lin-Chu and the Fisher ADF unit root tests: both results indicated the possibility of cointegration relationship among the series. Since ARDL approach is useful in analysing the relationship among non-stationary variables or that have mixture of stationarity; this informed our choice of panel ARDL approach in analysing the long-run relationships between commodity terms of trade and aggregate terms of trade to align the results of both test.

4.2 Panel ARDL

The results of the pooled mean group (PMG) and dynamic fixed effects (DFE) estimates of the relationship between commodity terms of trade and aggregate terms are reported in Table 4.

In the pooled mean group and dynamic fixed estimators, having dropped five cross-sectional units, it was found that commodity terms of trade exerts positive and significant impact on aggregate indices of the terms of trade in both the short and the long run. While the dynamic fixed estimate suggests a significant positive impact of oil price movement on aggregate terms of trade only in the long run, in the pooled mean group result its effect is not statistically significant in either the long run or short run at 5 per cent level of significance. The estimated coefficient

of commodity terms of trade in the long-run (0.241408) and short run (0.743794) implies that a 1 per cent increase in the commodity terms of trade is correlated with a 0.24 per cent and 0.74 per cent rise in the aggregate terms of trade in the long-run and short run, respectively, based on the pooled mean group result, while in the dynamic fixed effect estimates, the estimated coefficient of commodity terms of trade in the long-run (8.478742) and short run (6.404844) implies that a 1 per cent increase in the commodity terms of trade is correlated with a 847.8 per cent and 640 per cent increase in the aggregate terms of trade in the long-run and short run, respectively. The result suggests a stable positive long-run relationship between commodity terms of trade and terms of trade of individual Sub-Sahara African countries.

Table 4. Pooled Mean Group and Dynamic Fixed Effects Estimates

	Pooled Mean Group			Dynamic Fixed Effects		
Variables	Coefficients	t-Statistic	Prob.	Coefficients	t-Statistic	Prob.
Long-run						
CTT	0.241408***	11.34617	0.0000	0.226590***	8.478742	0.0000
ROIL	-3.97E-08	-0.638236	0.5235	1.24E-07***	2.742808	0.0062
Short run						
COINTEQ01	-0.285340***	-5.495088	0.0000	-0.192586***	-5.373712	0.0000
Δ (CTT)	0.743794***	5.981907	0.0000	0.674816***	6.404844	0.0000
Δ (ROIL)	1.50E-06*	1.912300	0.0563	1.56E-07	0.207382	0.8358
Intercept	25.52595	4.786573	0.0000	15.91233	4.483761	0.0000
No. of Countries	48			43		
Observations	1152			1032		
Hausman Test				44.3013		
				(0.0000)		

Note: Δ is first difference operator

Source: Authors, 2020

In order to measure efficiency and consistency among estimators, the Hausman test has been applied. The result validates long-run homogeneity restrictions across Sub-Sahara Africa countries, and, hence, efficiency of both estimators. The Hausman test results accept the null hypothesis of homogeneity restrictions on long run regressors, which indicates that both estimators are efficient. From the overall panel ARDL model, we found long run positive relationship between commodity terms of trade and aggregate indices of terms of trade.

5. Conclusion and Recommendations

This study investigates the relationship between national terms of trade (price of export relative to import) and commodity terms of trade (the price of primary commodity relative to manufactured goods) for commodity- dependent developing countries using data on forty-eight (48) Sub-Sahara Africa (SSA) countries. Data was sourced from the International Monetary Fund (IMF) database, and World Bank (WB) Development Indicator (WDI) was estimated using panel autoregressive distributed lag (panel-ARDL). The result shows that, expanding the sample period into the 2020s, there is evidence of a stable positive long-run relationship between commodity terms of trade and terms of trade of individual Sub-Sahara African countries. Therefore, commodity terms of trade is a good proxy of national terms of trade of SSA countries. This implies that a decline in the relative price of primary commodities will result in a fall in aggregate terms of trade in the long run. Therefore, commodity terms of trade is a useful indicator of general movement in the aggregate terms of trade of countries in Sub-Sahara Africa. As such, movement in commodity terms of trade reveals a lot of information about movements in the national terms of trade of individual countries. Our study corroborates the findings in the study conducted by Aslan and Nazlioglu (2018) that provide partial support for the Prebich-Singer hypothesis since only 7 out of the 24 commodities studied display negative trend. Our result is in contrast to the study conducted by Cashin and Pattillo (2006), which provides little support for a stable, long-run relationship between commodity terms of trade and national terms of trade.

The policy implication of the result justifies the desirability of a consistent big-push investment in production and export of primary commodity since the trend in the terms of trade of primary commodity reflects the trend in the terms of trade of manufactured goods. Therefore, the development of the agricultural sector has a desirable spill-over effect on the growth of other sector of the economies in the region and the region as a whole. By and large, our result supports Prebisch-Singer hypothesis (PSH), that favourable agricultural sector terms of trade translate to higher growth in agriculture and the economy as a whole.

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