



Terms of Trade Inquiry for the Resource Rich Sub-Saharan African Countries

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Abstract

The resource curse has often been considered as a growth-damaging factor in the context of the Sub-Saharan countries (SSA) countries, since the volatile price fluctuations in natural resource not only resulted in adverse terms of trade shocks but also complicated the macroeconomic management in these countries. This paper extends the basic two-sector framework of terms of trade (TOT) analysis to include the service sector and use a methodology in the national income accounting framework to construct TOT estimates at the 3-sector classification. We therefore work out the TOT effect on agriculture, industry and services during the period 1970-2020 for ten SSA economies and examine whether there is any pattern of movement. Our sample consists ten resource-rich SSA economies, viz., Angola, Botswana, Congo (Republic of), Equatorial Guinea, Gabon, Nigeria, South Africa, Sudan, Tanzania, and Zambia. Our results reveal favourable services TOT in seven SSA economies (Botswana, Congo, Gabon, Nigeria, United Republic of Tanzania (Mainland), United Republic of Tanzania (Zanzibar) and Zambia), along with negative agricultural TOT in five economies (Angola, Botswana, Congo, Gabon, South Africa) in our sample.

Keywords: E31, F4, O13, O55, Q33.

JEL Classification: Terms of trade, Macroeconomics of Trade, Primary Products, Sub-Saharan Africa, Resource Boom.

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1. Introduction:

The indicators of terms of trade (henceforth TOT), at the level of both sectors and international trade, are often perceived to bear significant macro-economic implications. It may be recalled that the TOT at the level of domestic sectors are defined by their relative price ratios, whereas the same at the level of international trade are expressed by the price ratios of exportable to importable. At the one hand, the TOT between agriculture and industry sectors has at times been visualized as a means of extracting surplus from agriculture during the early industrialization phase. On the other, the Prebisch–Singer hypothesis predicted that the price of primary commodities relative to that of manufactured commodities would decline in international trade causing the TOT for primary product based economies to deteriorate. The examination of both the hypotheses remains very relevant and bears the implications for improving upon the income and well-being levels of certain African economies that remained in poverty with stagnant growth for long.

The SSA region is often considered as an example of the resource curse phenomenon recognized by the abundance of natural resources with low economic development. The resource curse refers to the contradiction that countries rich in natural resources failing to achieve economic growth in comparison with countries without such resources. The SSA demonstrates this situation in the sense that despite having wealth of oil, gas and minerals, their economic growth falls behind other nations. The previous analyses have indicated that many African economies have undergone the natural resource curse and experienced relative price levels fluctuate along with their respective non-resource GDP (Corden and Neary 1982, Krugman 1987, Matsuyama 1992, Auty 2001). The fluctuations in the domestic relative price have also been found to be caused by the transmission of world market supply shocks. The existence of any such resource

course is therefore a manifestation of deteriorating macro-economic conditions with uncertain natural resources revenues and declining terms of trade.

The objective of this paper is to undertake a sectoral TOT analysis for a number of resource rich SSA economies, and subsequently examine whether there is a pattern of TOT shift across the economies. In this context, we put into application the TOT measurement within the system of national accounts (SNA) framework and examine the implications of formulating a multi-sector analysis of domestic TOT through case studies of ten resource-rich Sub-Saharan African economies, viz., Angola, Botswana, Congo (Republic of), Equatorial Guinea, Gabon, Nigeria, South Africa, Sudan, Tanzania, and Zambia. It may be noted that the proposed SNA methodology uses an accounting framework, which takes into account the three major sectors of the economy, viz., agriculture, industry and services. The SNA framework of TOT measurement would use a uniform methodology and database to generate consistent and comparable set of TOT estimates from inter-sectoral trade. The plan for the rest of this paper is as follows. We begin by briefly reviewing the literature that highlighted the role of TOT in the development process (section 2). The macroeconomics of the resource curse hypothesis is discussed in section 3. Section 4 provides the methodological framework, sectoral classification and data base used for the calculation of sectoral TOT measures. Subsequently, we work out estimates of TOT effects during the period 1970-2010 in the three major sectors for ten sample economies in section 5. Section 6 summarizes the results and implications of our findings.

2. Terms of Trade as Policy Variable:

Sectoral terms of trade (hereafter TOT), conventionally defined as the ratio of prices received to prices paid between two sectors, are often perceived as having significant implications for economic outcomes faced by developing nations. In fact, the study of TOT between agriculture and industry sectors can be described as one of the most widely researched topics in development economics. Some of the earliest references to TOT can be found in the *classical* writings of Adam Smith and David Ricardo. The *classical*

economists believed that the limited possibility of *division of labor* in agriculture coupled with the twin factors of population growth and scarcity of fertile land would lead to an upward influence on *corn prices*. Later, a contrary assertion emerged from the two separate works by Prebisch [1950] and Singer [1950], which led to the formulation of what has come to be known as the Prebisch-Singer hypothesis. The hypothesis predicted deterioration in the TOT faced by developing countries, if they concentrated on primary sector exports. However, it was Preobrazhensky [1926], who first conceived of TOT as a policy instrument to finance capital formation in the former Soviet Union. He visualized domestic TOT as a means of extracting surplus from agriculture during the early industrialization phase. The idea of *primitive socialist accumulation* in Preobrazhensky [1926] was oriented towards keeping agricultural prices low in relation to industry. Later, Lewis's [1954] dual economy model explicitly brought out the importance of TOT in formulating development strategies for LDCs. Lewis pointed out that deterioration in the industrial TOT can result in a drag on the industrialization process.

Though the analysis of TOT has played an important role in the study of developing economies, many aspects of this enterprise have been subject to debate. One prominent controversy is centered on the role of agricultural TOT in the development process. Thus, the domestic TOT were identified as an instrument that is used to transfer resources from agriculture during the early phase of industrialization. However, subsequently, the view that there should be an outflow of capital from agriculture to industry came to be seriously challenged. In particular Schultz [1964] argued for the importance of a positive agricultural pricing policy to transform traditional agriculture, and perceived unfavorable agricultural TOT as price distortions that adversely affect production incentives. It may also be added that the issues surrounding adverse agricultural TOT informed the assertion that there was an inherent *urban bias* in the policies adopted by LDCs (Lipton 1977).

More recently, the discussion on trade liberalization in developing economies has also invoked attention to the role of agricultural TOT. A large number of studies have indicated that agricultural prices in developing countries are generally well below those in international markets and industrial prices are higher due to policies such as exchange

rate overvaluation and restrictive import tariffs (Peterson 1979, Lutz and Scandizzo 1980, Bautista [1986], Kruger, Schiff and Valdes 1988, Kruger 1992, Schiff and Valdes 1992). It has been argued that government policies oriented towards protecting industry have reduced the price farmers receive and increased the price they pay for their intermediate and consumption purchases. It has been further suggested that trade barriers against agriculture have distorted the domestic relative price structure against agriculture. It is therefore inferred that trade liberalization and deregulation of domestic markets will lead to an improvement in agricultural TOT (Tolley et al 1982, Loo and Tower 1989, Anderson and Tyres 1990, Goldin and Winters 1992, Bautista and Valdes 1993, Kruger 1995).

It may be inferred from this brief review that the perceptions on the role of agriculture-industry TOT in the development process have not remained static. As perceptions of the development process have changed, so has the perceived role of agricultural TOT. In their latest role, sectoral TOT are viewed largely as a policy instrument to get agricultural prices "right" and, improvements in agricultural TOT are perceived to indicate the success of an agricultural reforms programme (World Bank 2008). Some experts have in fact, viewed the events of high cereal prices in 2008 as opportunities in farmer's incentives to boost the agricultural production.

3. Sub-Saharan Africa and Resource-Curse Hypothesis:

According to estimates, the resource-rich SSA accounts for 70 percent of both the subcontinent's GDP and physical capital, 60 percent of its natural capital, and nearly 40 percent of its population. Undoubtedly, the natural resource endowments and the revenues from their extraction provided prospect for the economic growth and development in a number of SSA countries (Sachs and Warner 1995, Lundgren et al 2013). However, the historical experiences of natural resource extraction along with the poor economic performance and low per capita income have led the question to become apparent whether the region has undergone a resource curse. According to Auty (2001), the resource curse experiences are a complicated phenomenon that results from a variety

of reasons, including the Dutch disease, rent seeking, crowding out of human capital, and crowding out of social capital. The Dutch Disease typifies a condition where a country has an export orientation whose performance on world markets is so strong that it appreciates the real exchange rate of that country and makes it harder to export other goods and services. This phenomenon is called the Dutch Disease since the Dutch suffered from this problem in the 1960s after a major discovery of natural gas. In the present context, Dutch disease refers to a declining ability of SSA countries to export in the non-resource sectors as a result of exchange rate appreciation caused by the rising earnings from the natural resources export. Thus, many SSA countries in the past experienced inflation in the weakening non-resource sector due to the country's abundant supply of natural resource in the global market. There are economists who subscribed to the existence of Dutch disease in specific resource-rich SSA countries, viz., Auty (1993), Gylfason (2001), Barbier (2003).

The development economists have deliberated on the aspects of resource curse phenomenon in SSA countries, while the recent developing experiences have revealed that only one natural resource-rich country in the region, viz., Botswana, has succeeded in achieving higher economic growth using its natural resources. It has been observed that the prices of natural resources - not only oil but also minerals, grain, and coffee - remain volatile in the international markets, thereby making countries that specialize in their exports to face adverse terms of trade shocks. Economists have argued that the volatility in primary commodity prices led uncertain revenues from natural resource could adversely impact on the functioning of financial systems and economic growth (Poelhekke and van der Ploeg 2009).

4. Methodology and Data:

The multi-sectoral formulation of TOT evolved in the works of Rasmussen [1957] and Olgaard [1966]. Subsequently, Bjerke [1968, 1972], Olgaard [1981] and Derksen [1980] have made use of this framework in the context of the Danish and Dutch economies. These studies, by employing the inter-industry transactions data within the national

income accounting (NIA) framework, have attempted to provide measures of income gains (or losses) accruing to different domestic sectors as a result of changes in the economy's relative price structure. These effects are referred as the "*sectoral TOT effects*" on various domestic sectors in the economy, which are interpreted as gains (or losses) accruing to sector j due to changes in inter-sectoral TOT and are calculated by using the following formula:

$$\text{TOT Effect (or Gains from TOT change)}_j = \frac{1}{P_{va}} [X'_{va,j} (P_{va,j} - P_{va})] \quad (1)$$

where:

$X_{va,j}$ = sectoral gdp of the j -th sector at current prices

$X'_{va,j}$ = sectoral gdp of the j -th sector at constant prices

$P_{va,j}$ = implicit price deflator for the j -th sector, i.e., $P_{va,j} = X_{va,j} / X'_{va,j}$

P_{va} = implicit price deflator for the economy, i.e., $P_{va} = \sum_j X_{va,j} / \sum_j X'_{va,j}$

and, j runs from 1 to 3 in the case of three-sector classification, viz, j = agriculture and allied, industry and services.

The expression of TOT effect as per equation (1), fundamentally reflects the disproportionate change in implicit price of value added for the j -th sector vis-a-vis that of the economy. Further, the price difference between sector j and the economy is assumed to be in some proportion of the j -th sector's real value added in the inter-sectoral TOT gain (loss) measure. This assumption implicates that sector j purchases commodities in correspondence with its value added output. The final expression captures the sectoral gains as the purchasing power of total GDP basket by undertaking a deflation through such price index. The detailed methodological framework and interpretations of the multi-sectoral TOT measure have been discussed in Deb [2006], while carrying out TOT analysis for the Indian economy.

The estimates of TOT effects are defined using a broad three-sector classification of the economy consisting of i) agriculture and allied activities, ii) industry, and iii) services. Following the United Nation's International Standard Industrial Classification (ISIC), Revision 3, the agriculture and allied activities include agriculture, hunting,

forestry and fishing (ISIC A and B). The industry sector is defined by aggregating mining, manufacturing, utilities and construction (ISIC C, D, E and F), whereas the services sector is comprised of wholesale & retail trade, hotels & restaurants, transport, storage & communication, financial activities, real estate & business activities, public administration, education, health, community, social & personal services and other activities (ISIC G to P).

The basic data on total GDP and constituent sectors (both at current and constant prices) are collected from issues of *National Accounts Statistics*, brought out by United Nations (UN). ADD The constant price estimates refer to the base year 2015. Our data in general refers to the period 1970 to 2020, except for United Republic of Tanzania (Zanzibar), which refers to a shorter period 1990-2020. Therefore, we actually have fifty-one observations on all the economies and twenty-one observations on United Republic of Tanzania (Zanzibar).

5. Discussion of Results:

The results on sectoral TOT for the ten SSA economies during 1970-2020 have been provided in the form of graphical plots in Figure 1 through Figure 11. It appears that sectoral TOT in recent years have by and large remained averse to the agricultural sector in Angola, Botswana, Congo, Gabon and South Africa. On the other hand, while adverse TOT for the industry sector has been noticed for Botswana, Congo, Gabon and Nigeria, the economies of Angola and South Africa seem to have experienced adverse TOT towards the services sector.

We have noted earlier that sectoral TOT have often been perceived as having significant implications for the economic transition process, where it was visualized as a means of extracting surplus from agriculture during the early industrialization phase. In this context, we attempt to examine here the pattern of TOT movements for the domestic sectors across the resource rich SSA economies. The statistical trend of TOT effects during the period 1970-2020 are provided in Table 1 for the three sectors. The general observation that can be made from the results is that agricultural TOT have remained

significantly unfavourable in the five economies of Angola, Botswana, Congo, Gabon and South Africa. On the other hand, there is evidence of a significantly improving TOT effect for agriculture in the four economies of Equatorial Guinea, United Republic of Tanzania (Mainland), United Republic of Tanzania (Zanzibar) and Zambia. We have noticed favourable shifts in the TOT effects for industry in Angola, Equatorial Guinea and United Republic of Tanzania (Zanzibar), but unfavourable industrial TOT effects in Botswana, Congo, Gabon and Nigeria. The service sector results suggest that there have been a significant upward movement for the TOT effects in the seven out of eleven countries in our sample, viz., Botswana, Congo, Gabon, Nigeria, United Republic of Tanzania (Mainland), United Republic of Tanzania (Zanzibar) and Zambia. In contrast, there are only two economies, viz., Angola and South Africa, which revealed a statistically significant negative trend in their respective services TOT. Table 2 classifies the information on all the statistically significant time trend of TOT effects for the three domestic sectors in different economies.

6. Summary:

The natural resources accounts for significant part of export basket and government revenues in many SSA countries. The volatile price fluctuations in natural resource and thereby the unpredictable natural resource revenues have in the past complicated the macroeconomic management and the long-term growth path of the economy. The tentative budget planning, unpredictable government spending and macroeconomic volatility along with real exchange rate pressures have often imposed an uncertainty for the prospective GDP. The experiences have revealed that the revenues from natural resource have not been constructive to higher economic growth or higher living standards in many SSA countries. These experiences have led analyst to examine the experiences and implications of managing natural resources across the SSA region and test whether the resource curse has been a growth-damaging contributor. It may be noted that most of these SSA countries that specialize in their natural resource exports encountered adverse terms of trade shocks.

The key focus of this paper has been to analyse domestic TOT at the 3-sector classification, consisting of agriculture, industry and services. The advantage of using the multi-sectoral approach in TOT measurement is that the same methodology can be used to generate consistent and comparable set of sectoral TOT estimates across different economies. Thus, we have worked out the TOT effect on agriculture, industry and services during the period 1970-2020 for a sample of ten SSA economies. The standard two-sector TOT analysis between agriculture and industry presumes an adverse agricultural TOT to necessarily imply favourable industrial TOT, and vice versa. However, the present TOT analysis based on including the third services sector indicates favourable TOT to services and not the industry segment of the economy. In fact, our results have revealed positive services TOT in seven out of ten SSA economies in our sample (Botswana, Congo, Gabon, Nigeria, United Republic of Tanzania (Mainland), United Republic of Tanzania (Zanzibar) and Zambia), along with negative agricultural TOT in five economies (Angola, Botswana, Congo, Gabon, South Africa) in our sample. The sectoral TOT remaining favourable to industry can only be experienced in the economies of Angola, Equatorial Guinea and United Republic of Tanzania (Zanzibar).

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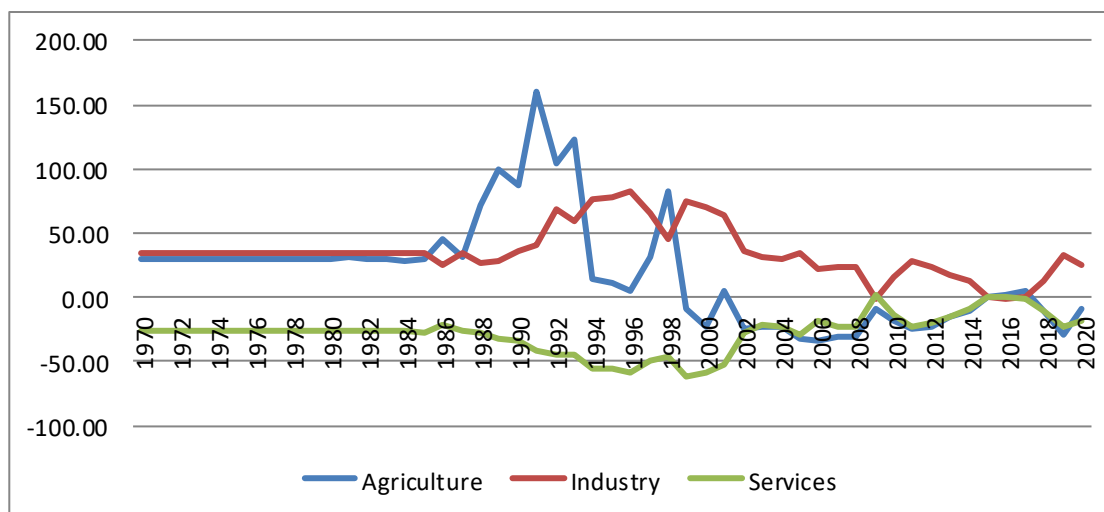


Figure 1: Sectoral Terms of Trade Effect in Angola, base: 2015.

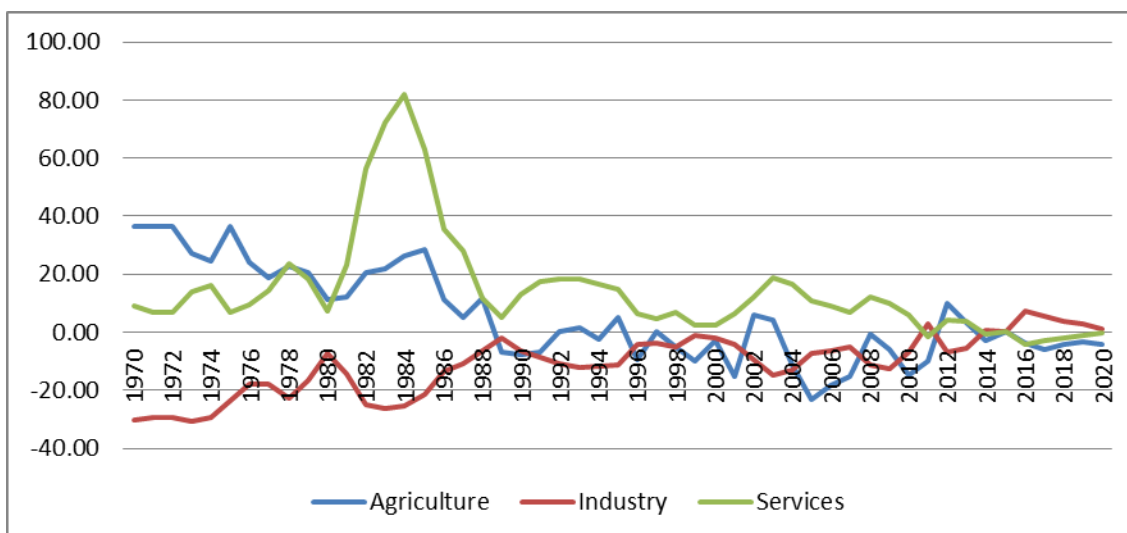


Figure 2: Sectoral Terms of Trade Effect in Botswana, base: 2015.

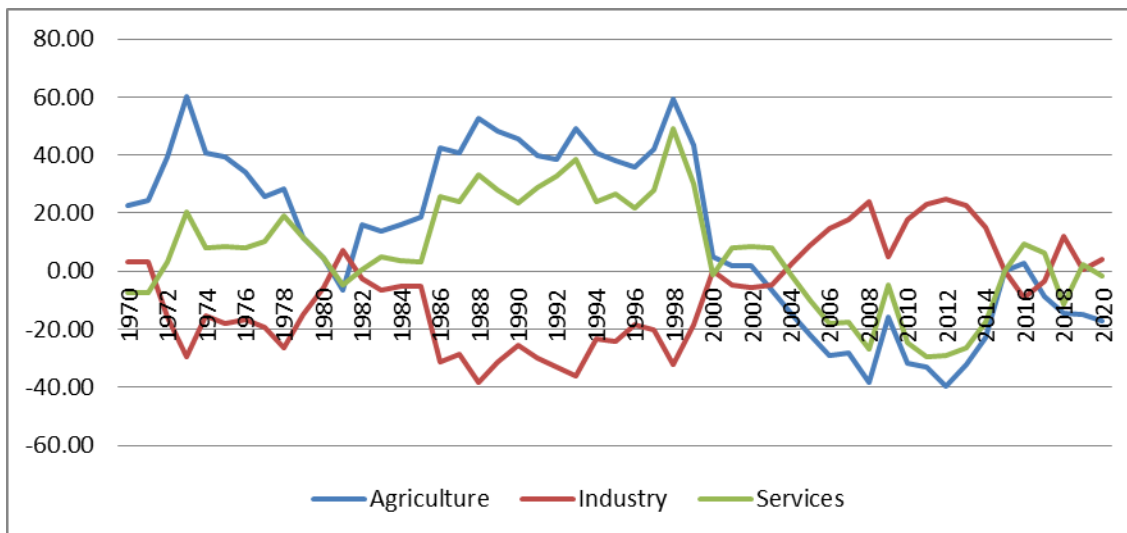


Figure 3: Sectoral Terms of Trade Effect in Congo, base: 2015.

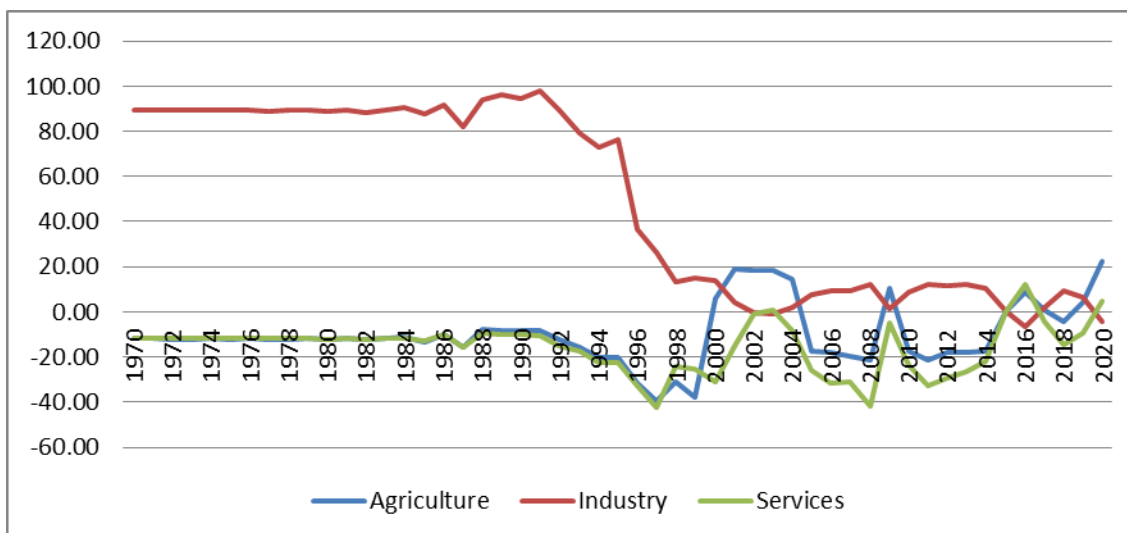


Figure 4: Sectoral Terms of Trade Effect in Equatorial Guinea, base: 2015.

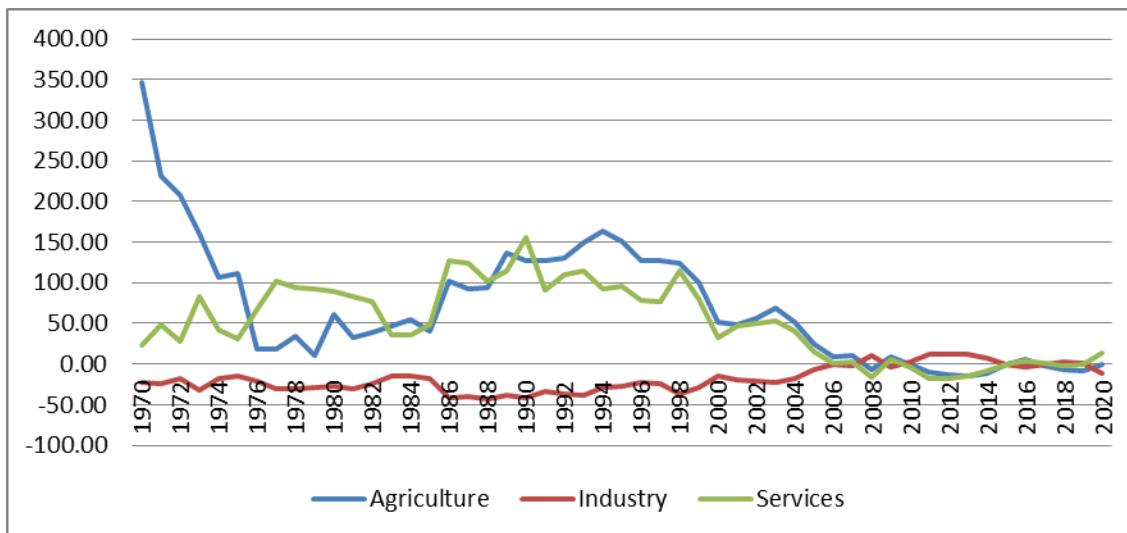


Figure 5: Sectoral Terms of Trade Effect in Gabon, base: 2015.

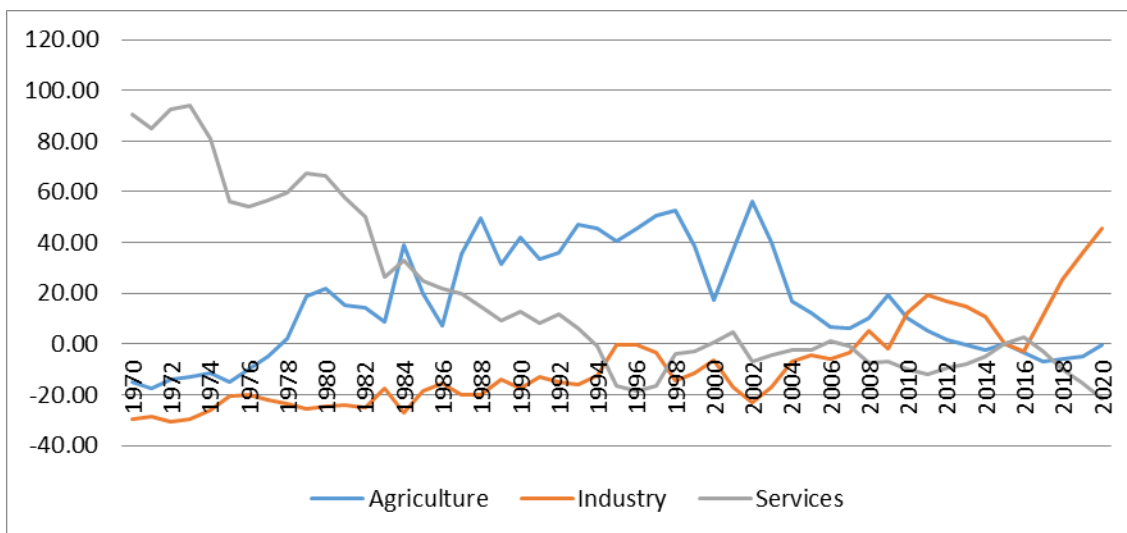


Figure 6: Sectoral Terms of Trade Effect in Nigeria, base: 2015.

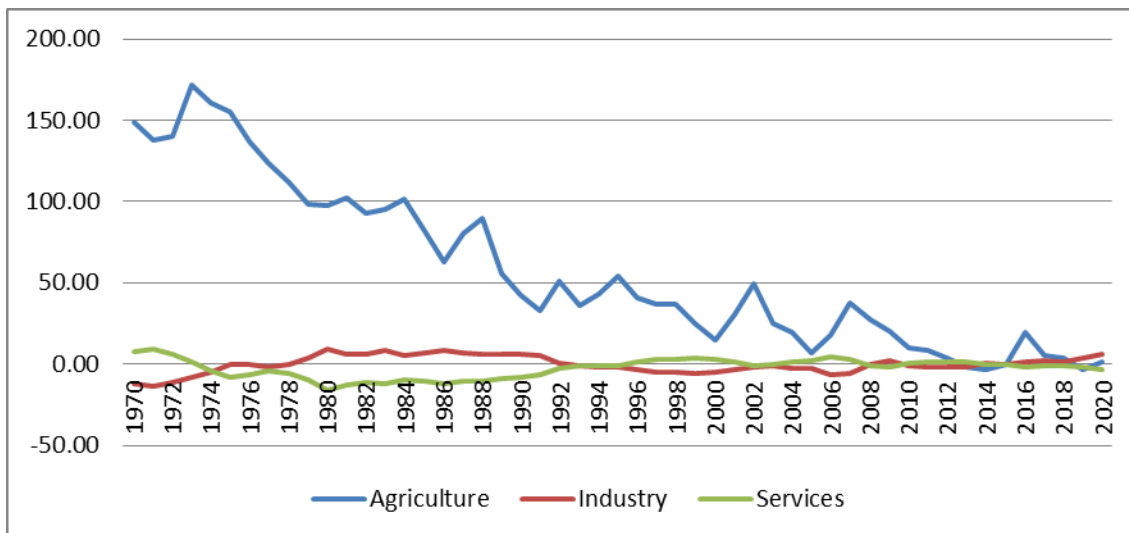


Figure 7: Sectoral Terms of Trade Effect in South Africa, base: 2015.

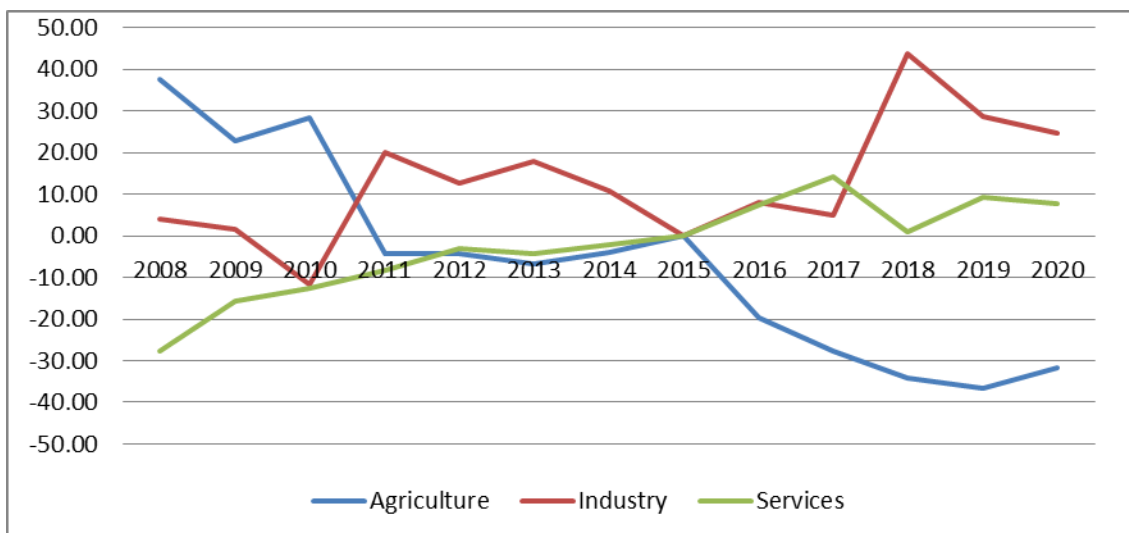


Figure 8: Sectoral Terms of Trade Effect in Sudan, base: 2015.

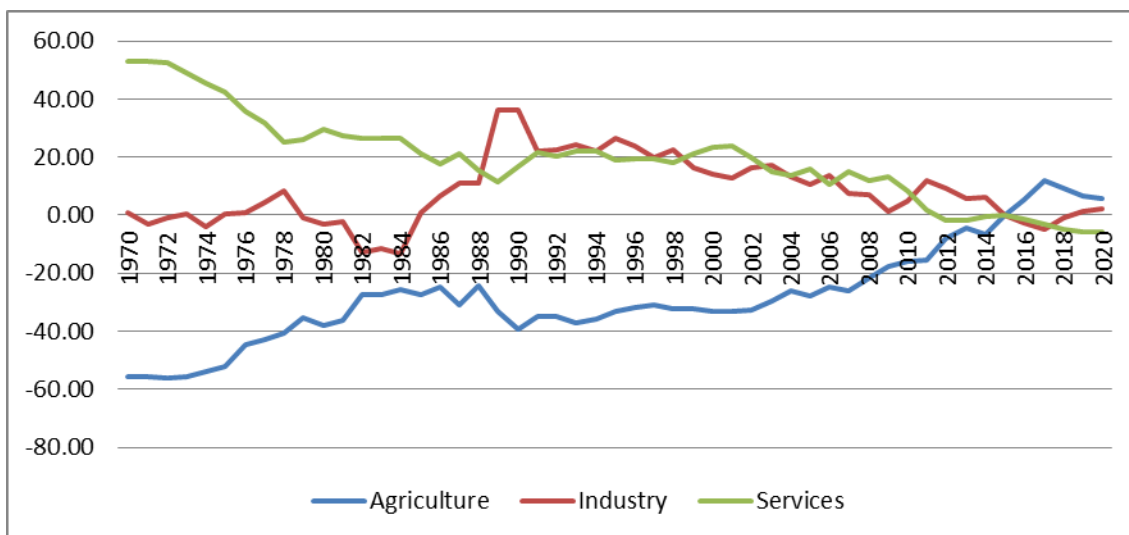


Figure 9: Sectoral Terms of Trade Effect in United Republic of Tanzania (Mainland), base: 2015.

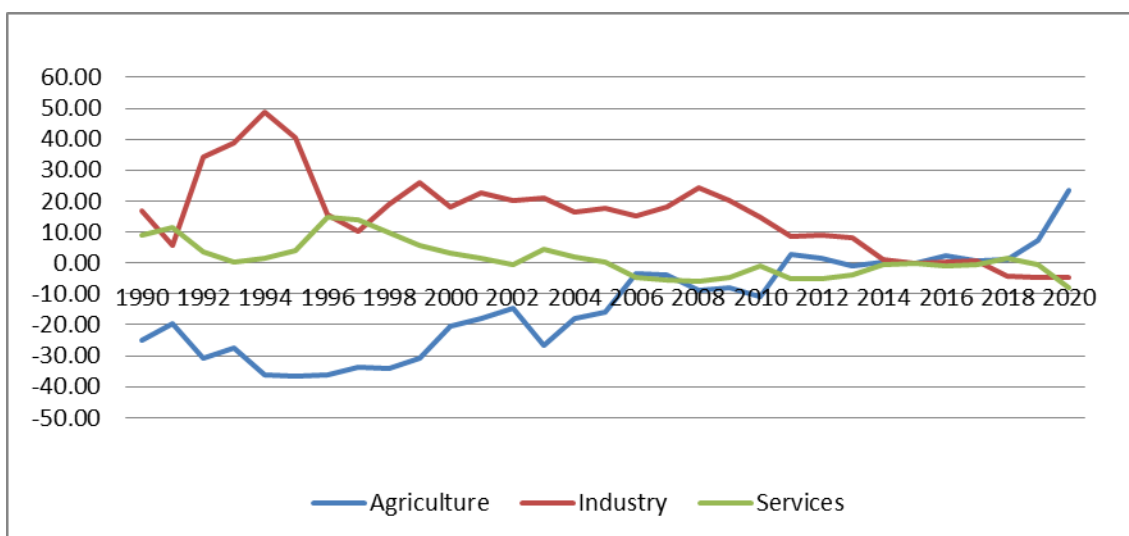


Figure 10: Sectoral Terms of Trade Effect in United Republic of Tanzania (Zanzibar), base: 2015.

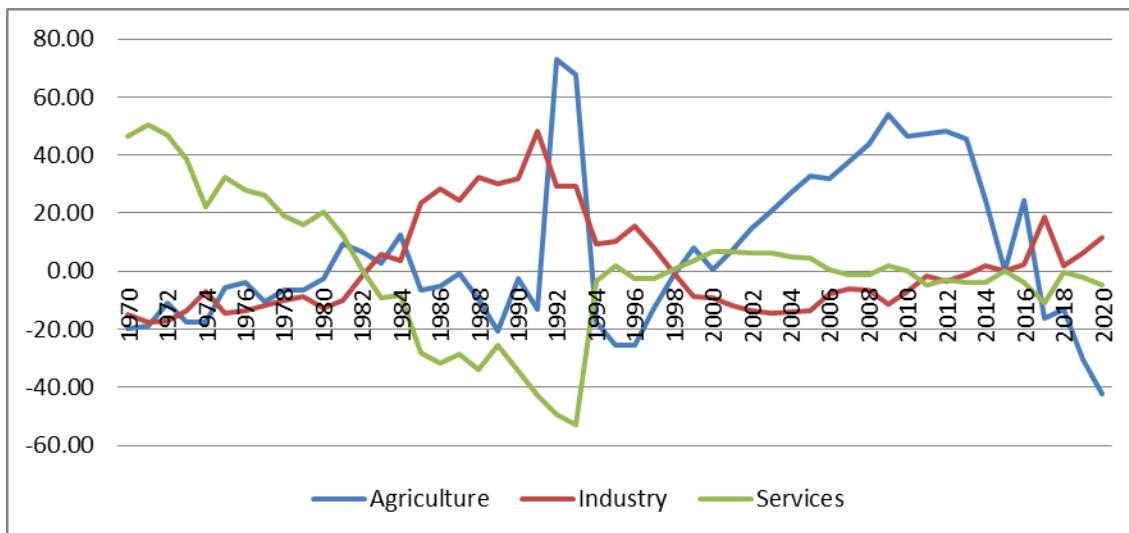


Figure 11: Sectoral Terms of Trade Effect in Zambia, base: 2015.

Table 1: Statistical Trend (Linear) in Sectoral TOT (1970-2020).

Country	Agricultural TOT	Industrial TOT	Services TOT
1. Angola	-1.47 (-4.22)*	-0.40 (-2.22)*	0.29 (2.09)*
2. Botswana	-0.82 (-8.64)+	0.58 (10.69)*	-0.53 (-3.42)*
3. Congo	-1.33 (-6.40)*	0.63 (4.33)*	-0.47 (-2.82)*
4. Equatorial Guinea	0.23 (1.79)*	-2.46 (13.68)*	-0.08 (-0.74)
5. Gabon	-3.12 (-5.56)*	0.71 (6.21)*	-1.83 (-5.03)*
6. Nigeria	0.09 (0.43)	1.01 (11.95)*	-1.96 (-12.36)*
7. South Africa	-3.19 (-18.31)*	0.03 (0.58)	0.13 (2.45)*
8. United Republic of Tanzania (Mainland)	1.02 (12.92)*	0.12 (1.07)	-0.94 (-16.00)*
9. United Republic of Tanzania (Zanzibar)	1.55 (11.16)+	-1.08 (-5.37)*	-0.43 (-4.88)*
10. Zambia	0.61 (2.58)*	0.09 (0.63)	-0.54 (-2.67)*

Notes:

- 1) The sectoral TOT is calculated using: $\text{Gain (Production)}_j = \frac{1}{P_{va}} [X'_{va.j} (P_{va.j} - P_{va})]$
- 2) The statistical trend is derived by linear trend analysis using the form $y = a + bt$.
- 3) * indicates statistical significance at 5% level of significance.
- 4) The sample for United Republic of Tanzania (Zanzibar) refers to a shorter period 1990-2020.

Table 2: Pattern of Sectoral TOT across Economies (1970-2020).

Statistically Significant Trend of Sectoral TOT.		
Sector	Upward (Favourable)	Downward (Unfavourable)
Agriculture & Allied	Equatorial Guinea, United Republic of Tanzania (Mainland) United Republic of Tanzania (Zanzibar) Zambia	Angola Botswana Congo Gabon South Africa
Industry	Angola Equatorial Guinea, United Republic of Tanzania (Zanzibar)	Botswana Congo Gabon Nigeria
Services	Botswana Congo Gabon Nigeria United Republic of Tanzania (Mainland) United Republic of Tanzania (Zanzibar) Zambia	Angola South Africa

Note: Based on statistically significant trend of sectoral TOT as provided in Table 1.