The Impact of Fiscal and Monetary Policy on Structural Transformation: Insights from the Tanzanian Economy

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Abstract

The study attempts to analyse the impact of fiscal and monetary policy on structural transformation in Tanzania. To attain this objective, it employs an autoregressive distributed lag (ARDL) model using annual time series data over the period between 1990 and 2019. The structural transformation index (STI) was employed as a proxy for structural transformation. Results show that prudent fiscal and monetary policy can be used to boost structural transformation in the country. In addition, the results suggest that in the long run, increased government spending can impede structural transformation while taxation and money supply affect positively structural transformation. In the short run, lagged tax-to-GDP ratio, broad money supply-to-GDP ratio and forex-to-GDP ratio were found to have a positive and significant impact on structural transformation. Generally, the findings suggest that Tanzania can use monetary and fiscal policies to influence structural transformation.

Key Words: Fiscal Policy; Monetary Policy; Structural Transformation; Autoregressive Distributed Lag; Tanzania

JEL Classification Codes: E52, E62, O55

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1. Introduction

Economic structural transformation plays an important role as a mean towards achieving desired economic growth and better people's living standards. As excerpted in UNIDO (2012) and Gollin et al. (2021), structural transformation can essentially be a tool that helps to attain greater diversity within the economy by creating an economy that is both poverty and external shocks resilient. This can be attained through the use of development promoting policies and institutions in adopting technologies that are aimed at changing the way economies run.

According to Kuznets (1966) and Chenery and Taylor (1968), structural transformation in the modern context is recognized as the process of economic development that is characterized by the shrinkage of the share of the agricultural sector to the economy. Thus, as the economy progresses, the importance of agriculture sector drops which leaves space for the expansion of the industrial and service sectors. As far as Tanzania is concerned by looking at her history, agriculture has been the main driver of her economy since independence. The country inherited an export-oriented economy at independence in 1961, with agriculture being the largest sector, contributing more than 50 percent to GDP, with real GDP grew at 4 percent and real per capita income at 1.3 percent. These developments occurred at a time when the government pursued stringent fiscal and monetary policies with the objective of controlling inflation and stabilizing the exchange rate policy in recognition of the dangers of deficit financing in fuelling inflation, and rigid money supply that made the overall monetary and exchange rate system stable and kept inflation at very low levels despite the openness of the economy (Osoro,1994; Kahyarara, 2020).

Later in 1967, the Arusha Declaration came into effect in the midst of a background of economic success with the aim of nationalizing all "commanding heights" of the economy. It brought about significant public-sector involvement productive activities. As a result, economic growth and development stagnated from the late 1970s through to the early 1980s. Some commentators attributed this stagnation to the development policies and strategies that were based on Ujamaa (Socialism) and its Self-Reliance Policy of the Arusha Declaration (Mwinyimvua, 1996; Gabagambi, 2013).

Hence, due to the deteriorating stance of the economy, in the mid-1980s, the country started to implement International Monetary Fund (IMF) and World Bank (WB) sponsored economic reforms aimed at redressing the macroeconomic crises experienced since the 1970s. Economic policy regime shifted to a market led economy which increased the level of economic activity. This resulted into macroeconomic stability in the late 1990s, whereby inflation fell from about 30 percent in the 1980s to a single digit and averaged 7 percent in the 2000s and lowered to 3.45 per cent in 2019. Also, there were accelerated reforms both institutional and structural, as well as well as considerable changes in the sectoral contribution to the GDP (Gabagambi, 2013; IMF, 2004).

With regard to the sectoral contribution to GDP, the changes in their pattern can be displayed by data from the National Bureau of Statistics (NBS) as shown in Table 1.

Table 1: Sectoral Composition of GDP from 1987 to 2020 (selected years) in %

Economic Sectors \ Year	1987	1992	1996	2001	2005	2010	2017	2020
Agriculture	50.7	48.0	48.0	44.7	31.8	28.1	25.1	26.74
Industry	15.7	16.2	14.2	19.3	22.7	24.7	27.6	28.67
Service	38.5	40.3	41.7	48.8	46.5	48.4	47.3	36.25

Source: Author's calculations based on data from the National Bureau of Statistics (NBS)

From Table 1, the agriculture sector accounted for about 50.7 percent of the GDP in 1987 and the remaining portion was shared between the industry (15.7 percent) and service sector (38.5 percent). However, the share of agriculture fell to about 26.74 percent in 2020, while that of the industry rose to about 28.74 percent and the services sector remained as high as 36.25 percent. The service sector has registered a consistent growth during this period (despite a slight drop between 2017 and 2020) and thus has been leading in sectoral contribution to the total GDP which was initially taken by the agriculture sector. These shift in sectoral shares to total GDP in Tanzania strongly suggests the existence of structural transformation.

This paper, therefore, attempts to investigate the role that fiscal and monetary policy plays in promoting structural transformation. The remainder of this paper is divided into four sections. Section two (2) reviews the theoretical and empirical literature on structural transformation and fiscal and monetary policy. Section three (3) discusses the methodology used in which the time series procedure for data analysis, and the ARDL estimation model are presented. Section four (4) presents and discusses the findings and lastly, section five (5) presents the concluding remarks.

2. Literature Review

2.1. Theoretical Review

The model presented by Lewis (1954), which is also known as the two-sector and surplus labour model was developed upon a dualistic economy consisting of rural agriculture and manufacturing sectors. The model gives a comprehensive description of structural transformation in which accumulation by capitalists in the industrial sector results in increased production within the sector and attracts labour from the low-productivity sector. Initially, the majority of labour is employed in the agriculture sector, which uses the land as a fixed resource and labour as a variable input which results in diminishing returns. The diminishing returns of labour result in labour shifting to a more productive manufacturing sector.

Some of the assumptions of the Lewis model include surplus unproductive labour in developing economies in the agriculture sector, higher wages in services and manufacturing sectors, wages are fixed in service and manufacturing sectors, entrepreneurs in these modern sectors make a profit since they charge a price above the fixed wage rate and the model further assumes that the acquired profits are reinvested within the sector in form of fixed capital. The changes in the structure of the economy are manifested through a decline in the contribution of the agricultural sector and increased contribution of the service and industrial sectors, in terms of their contribution to GDP (Romli, 2016; Putri and Mahaendra, 2022).

Thus, in the literature, it has long been referred to as a tradition that, manufacturing is an engine for economic growth and structural transformation. According to Kaldor (1957, 1966), when there is faster growth in the output of the manufacturing sector, then the economy grows faster since an increased growth rate in the manufacturing sector leads to the increased growth rate of productivity of labour in the manufacturing sector and its output which results into increased aggregate productivity of labour. As excerpted by Verdoorn (1949), Kaldor (1966) and Lugina et al. (2022), the manufacturing sector is said to spur growth more than the traditional sector, in the case of this study agriculture, because both static as well as dynamic increasing returns to scale are generated. Production at large scale reduces costs incurred by the firms as a result of specialization which gives way for better labour division whereby firms produce more efficiently.

As far as the services sector is concerned, traditional as well as services related to industrial activities are the two components that compose the services sector as propounded by Kaldor (1968). Services related to the industrial sector are the ones that are used in manufacturing activities and thus will increase as a result of an increase in manufacturing activities. Considering that, the process of development overall goes together with shifts of labour from the traditional sector where there is low productivity to the service sector. Thus, the genesis of the terms "cost disease" or the "structural burden hypothesis"[1] (Baumol, 1967, Baumol et al., 1985).

Hence, for structural transformation to occur, either of the following conditions is necessary. They include resource endowment changes, a country's competitive advantages, and deliberate government policies that are aimed at calculated economic path (Hausmann and Rodrik, 2003; Hausmann and Klinger, 2006; Lin, 2011; Rodrik, 2016; Sarangi et al., 2017). It is evident therefore that, out of the three conditions, government policies which in the case of this study include monetary and fiscal policies are key in determining the correct path that the country can pursue.

Therefore, fiscal and monetary policies are associated with structural transformation. For instance, Lin (2011) and Sarangi et al (2017) propose that economies that have graduated from being poor to being rich applied these policies to sustain structural transformation. Thus, it was possible to gradually move their countries from primary sector to secondary and tertiary sector-driven economies.

2.2. Empirical Review

There are a handful of studies that have examined the impact of fiscal and monetary policy on structural transformation. For instance, a study by Gnath et al. (2020) used panel data for the period from 2006 to 2016 to test the arguments that expansionary monetary policy reduces structural transformation, whereas its proponents argue that it spurs structural transformation. The study empirically studied the effect of monetary policy shocks on structural transformation in the euro area. The study used an event study approach in which it was found that surprise monetary expansions increase the likelihood of structural transformation significantly. For the period between 2006 and 2016, a monetary surprise expansion of 25 basis points by the European Central Bank (ECB) increased on average countries' structural transformation rate by roughly 20 percentage points after two years.

On the other hand, Sarangi et al. (2017) studied the impact of fiscal policy on structural transformation using panel data from 1990 to 2012 for Arab countries. It was found in this study that; fiscal policy choices are important in reducing volatility and encouraging productivity-enhancing structural transformation.

Further to that, Mmolainyane (2019) did a study on the impact of fiscal policy on structural transformation in Botswana. The study assessed the impact of fiscal policy on structural transformation as the driver for economic growth in Botswana by using time series data from 1990 to 2017 and the structural vector autoregressive (SVAR) model. The study found that fiscal policy had a significant positive impact on structural transformation for Botswana.

Other, studies have been conducted to explore structural transformation and its implication to the economy in various countries and regions. These include studies by Cassidy (2017), Busse et al. (2019), and Enache et al. (2016) that were carried out in various African countries, while Wuyts and Kilama (2014), Mpango (2013) as well as Diao et al. (2018) focused on Tanzania. However, not much has been done thus far, on the impact of fiscal and monetary policy on structural transformation.

[1] Starts from the premise that productivity growth is inherently more difficult to achieve in the production of services than in the production of goods.

3. Methodology

3.1. Autoregressive Distributed Lag (ARDL) Model

The study employed Autoregressive Distributed Lag (ARDL) model developed by Pesaran et al. (2001). In implementing this model, the study followed the approach by Belloumi (2014), whereby, the ARDL model as presented in equation (1) was estimated to test for cointegration relation between the structural transformation index and fiscal and monetary policy variables: -

$$\Delta lnSTI_t = a_0 + \sum_{i=1}^{p} \psi_i \Delta lnSTI_{t-i} + \sum_{i=0}^{q_1} \theta_{i1} \Delta\, lnG_{t-1} + \sum_{i=0}^{q_2} \theta_{i2}\, \Delta lnTGDP_{t-1} + \sum_{i=0}^{q_3} \theta_{i3}\, \Delta lnMS_{t-1} + \sum_{i=0}^{q_4} \theta_{i4}\, \Delta lnFX_{t-1} + \sum_{i=0}^{q_5} \theta_{i5}\, \Delta lnINR_{t-1} + \sum_{i=0}^{q_6} \theta_{i6}\, \Delta lnINF_{t-1} + \delta_1 lnSTI_{t-1} + \delta_2 lnG_{t-1} + \delta_3 lnTGDP_{t-1} + \delta_4 lnMS_{t-1} + \delta_5 lnFX_{t-1} + \delta_6 lnINR_{t-1} + \delta_7 lnINF_{t-1} + \mu_t \qquad (1)$$

Whereas; STI is Structural Transformation Index, G is Government Expenditure, $TGDP$ is Tax to GDP ratio, MS is Money Supply to GDP ratio, FX is Forex to GDP ratio, INR is the real Interest rate, INF is the inflation rate, δ_i are the long-run multipliers, a_0 is the intercept, Δ is the difference operator and μ_t are the white noise errors.

This model was estimated in order to run the cointegration bounds test to find out the presence of a long-run relationship amongst the variables by utilizing the joint significance F-test for the coefficients of the lagged variables. Once the cointegration status of the model in equation (1) is established, the conditional $ARDL$ model was estimated as follows: -

$$\Delta lnSTI_t = a_0 + \sum_{i=1}^{p} \delta_1 lnSTI_{t-i} + \sum_{i=0}^{q_1} \delta_2\, lnG_{t-1} + \sum_{i=0}^{q_2} \delta_3\, lnTGDP_{t-1} + \sum_{i=0}^{q_3} \delta_4\, lnMS_{t-1} + \sum_{i=0}^{q_4} \delta_5\, lnFX_{t-1} + \sum_{i=0}^{q_5} \delta_6\, lnINR_{t-1} + \sum_{i=0}^{q_6} \delta_7\, lnINF_{t-1} + \mu_t \qquad (2)$$

The above model in equation (2) involves selecting the optimal order of integration using Akaike Information Criteria (AIC). Then, to obtain the short-run dynamic parameters, an error correction model associated with the long-run estimates was estimated and can be specified as follows: -

$$\Delta lnSTI_t = a_0 + \sum_{i=1}^{p} \psi_i \Delta lnSTI_{t-i} + \sum_{i=0}^{q_1} \theta_{i1} \Delta\, lnG_{t-1} + \sum_{i=0}^{q_2} \theta_{i2}\, \Delta lnTGDP_{t-1} + \sum_{i=0}^{q_3} \theta_{i3}\, \Delta lnMS_{t-1} + \sum_{i=0}^{q_4} \theta_{i4}\, \Delta lnFX_{t-1} + \sum_{i=0}^{q_5} \theta_{i5}\, \Delta lnINR_{t-1} + \sum_{i=0}^{q_6} \theta_{i6}\, \Delta lnINF_{t-1} + \vartheta ecm_{t-1} + \mu_t \qquad (3)$$

From equation (3), ψ and θ_{ij} are the short-run dynamic coefficients of the model's convergence to equilibrium while ϑ is the speed of adjustment.

3.2. Unit Root Test

To test for stationarity, the study applied Augmented Dickey-Fuller (ADF). However, due to the fact that timeseries data are most of the times characterised by structural breaks, the ADF test tend to be biased in favour of the null unit root. To mitigate this limitation, the Zivot-Andrews unit root test was also used. Zivot and Andrews (1992) developed a unit root testing procedure that allows the existence of a possible structural break in the series, without predetermining the breakpoint time. The following Table 2 presents the results: -

Table 2: The Augmented Dickey-Fuller (ADF) and Zivot-Andrews Unit Root Tests

	ADF		**Zivot-Andrews**	
Variables	At Level	After 1st Difference	At Level	After 1st Difference
$lnSTI_t$	$-2.670*$	$-4.195***$	-3.455	-5.831***
lnG_t	-2.421	$-4.360***$	-3.730	$-6.360***$
$lnTGDP_t$	$-3.656**$		$5.007**$	
$lnMS_t$	$-3.428**$		-4.423	$-6.337***$
$lnFX_t$	-2.328	$-4.443***$	-3.467	$-12.881***$
INR_t	-1.911	$-4.971***$	-3.737	$-5.260**$
INF_t	-1.882	$-4.482***$	-3.129	$-6.304***$

****, ** and * represents stationary at **1**, **5** and **10** per cent levels of significance respectively*

Source: Author's calculations based on data

From Table 2, both the ADF and Zivot-Andrews unit root tests result suggest that some of the variables are integrated of order 0 i.e., $I(0)$ while others are integrated of order 1 i.e., $I(1)$.

3.3. Data

This study used secondary time series data for the period between 1990 to 2019. The reason for the choice of this period is data availability, particularly the structural transformation index (STI) as the measure for structural transformation developed by Lin et al. (2019). The study also used fiscal and monetary policy instruments for Tanzania which were drawn from various Bank of Tanzania (BOT) annual reports as well as the National Bureau of Statistics (NBS). The following Table 3 provides the descriptive statistics of the variables used.

Table 3: Descriptive Statistics

	1991 – 2019				
Variable	**Obs**	**Mean**	**Max**	**Min**	**Std Dev**
$lnSTI_t$	30	-0.7628148	-0.7106251	-0.8128794	0.020691
lnG_t	30	16.17866	19.10142	11.49709	2.100828
$lnTGDP_t$	30	1.875113	2.572612	0.2623643	0.6248958
$lnMS_t$	30	2.823273	3.338613	2.596001	0.1844753
$lnFX_t$	30	2.17625	2.858193	1337629	0.3990009
INR_t	30	2.911465	3.582129	1.94591	0.3752393
INF_t	30	2.268368	3.580737	1.249902	0.6994855

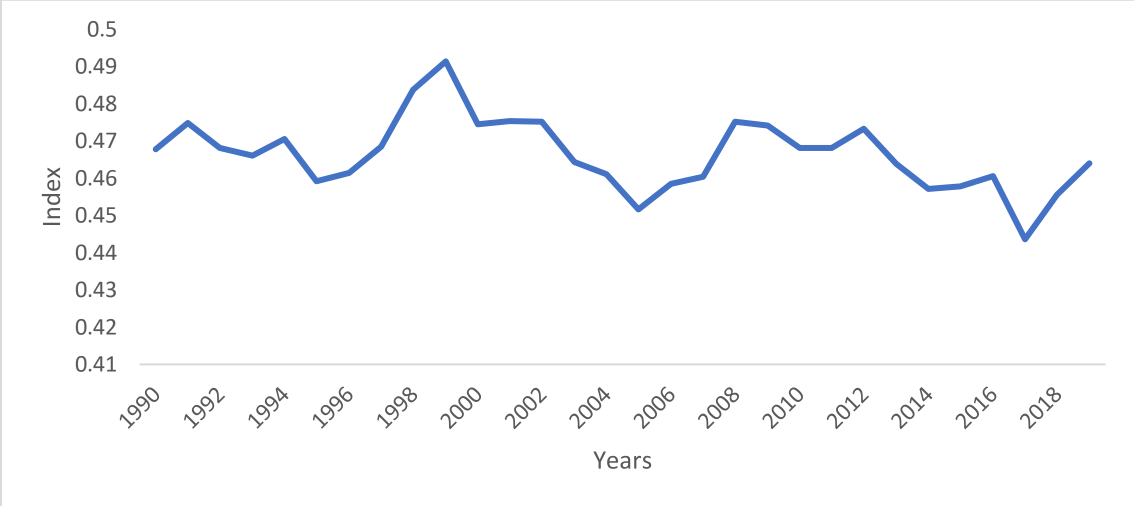
Source: Author's calculations based on data

4. Results and Discussion

4.1. The Trend of Structural Transformation in Tanzania

In establishing the trend of structural transformation in Tanzania, the Structural Transformation index (STI), which is the measure of structural transformation was plotted over time. Hence, the result is presented in the following Figure 1 which covers the period from 1990 to 2019.

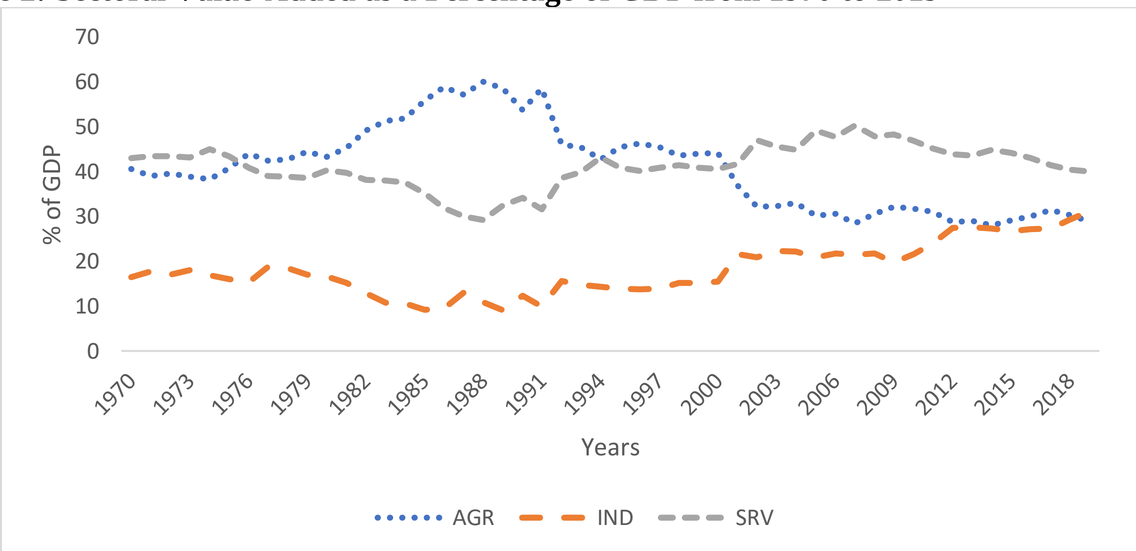
Figure 1: Trend of Structural Transformation Index for Tanzania (1990-2019)



Source: Lin et al., 2019

Tanzania's structural transformation (as depicted in Figure 1), has experienced alternating patterns. This alternating behaviour can be explained by decomposing the STI. Ostensibly the rising of the index between 1995 and 1999 can be attributed to the increases in exports of goods and services from 0.36 to about 0.41 points. Also, during this period, research and development expenditure (% of GDP) increased from 0.45 to 0.49 points. The downfall of the STI from 1999 to 2019 was a result of falling export of goods and services, a fall in the share of manufacturing of medium and high-tech industry (% GDP), and labour productivity per worker (in 2014 USD). Sectoral value addition as a percentage of GDP was also plotted to further explain the trend of structural transformation in Tanzania.

Figure 2: Sectoral Value-Added as a Percentage of GDP from 1970 to 2019



Source: Author's calculations based on data from the Bank of Tanzania (BOT)

The service sector, on average, maintained a high contribution of above 30 percent in terms of its value addition as a percentage of GDP than the remaining two sectors between the years 1970 to 2019, reaching a peak of about 50 percent in 2007 (see figure 2). During this time, the industry sector had grown from 16 per cent in 1970 to 31 percent in 2019. The agriculture sector has been consistently falling, especially from 1988 from 59 percent to 28 percent in 2019.

4.2. Cointegration Analysis, Results, and Interpretation

Cointegration is said to exist if two variables have a long-term, or equilibrium, relationship between them. To that end, an optimal lag length was established as a requirement for the ARDL Cointegration technique. All methods for lag order selection criteria chose 2 optimal lags as presented in the following Table 4.

Table 4: Optimal Lag Order Selection Criteria

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	−68.58				2.165	3.591	3.799	4.147
1	−67.05	3.063	1	0.080	2.126	3.567	3.791	4.164
2	61.56	10.978 *	1	0.001	1.759 *	3.372 *	3.611 *	4.008 *
3	−60.95	1.2208	1	0.269	1.800	3.389	3.642	4.065
4	−60.80	0.29437	1	0.587	1.882	3.426	3.694	4.142

** Indicates lag order selected by the criterion*

Source: Author's calculations based on data.

Thus, the ARDL Co-integration test was carried out using the ARDL bounds cointegration test. The results are presented in the following Table 5: -

Table 5: ARDL Bounds Cointegration test

H_0: no level relationship								$F = 7.880$ $t = -5.555$
	10%		5%		2.5%		1%	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
F	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43
t	-2.57	-4.04	-2.86	-4.38	-3.13	-4.66	-3.43	-4.99

Source: Author's calculations based on data.

As seen in Table 5, the null hypothesis of the presence of co-integrating vectors is not rejected since the test statistics for the F-statistic of 7.880 is greater than the upper boundary at 5 percent degrees of significance. In addition, the absolute value of the t-statistic of about −5.555, is also greater than that of the upper bound of the absolute critical value at the conventional 5 percent degree of significance.

4.3. ARDL Error Correction Model

The results of the ARDL error correction model that explored the impact of fiscal and monetary policy on structural transformation are then presented. Since the ARDL bounds cointegration tests suggested the presence of cointegration (see Table 5), then both the short-run and long-run results, as well as the adjustment (error correction) term, are presented. The results presented here have a natural log of the structural transformation index ($lnSTI_t$) which is the measure of structural transformation as a dependent variable and instruments of fiscal and monetary policy as the exogenous variables. The results are as follows: -

Table 6: Autoregressive Distributed Lag Error Correction Model

	$D.lnSTI$	Coefficient	Newey-West Std. Error	t	P>|t|
ADJ	$lnSTI_{t-1}$	-0.8953	0.1422792	-6.29	0.000 ***
LR	lnG_t	-0.04762	0.0095312	-5.00	0.001 ***
	$lnTGDP_t$	0.151872	0.0510541	2.97	0.014 **
	$lnMS_t$	0.092532	0.0256188	3.61	0.005 ***
	$lnFX_t$	-0.012363	0.0178899	-0.69	0.505
	$lnINR_t$	0.024030	0.0172671	1.39	0.194
	$lnINF_t$	0.009647	0.0053509	1.80	0.102
SR	$D.lnG_t$	-0.071117	0.0587485	-1.21	0.254
	$D.lnG_{t-1}$	-0.127331	0.0672653	-1.89	0.088 *
	$D.lnTGDP_t$	-0.069841	0.0456279	-1.53	0.157
	$D.lnTGDP_{t-1}$	-0.112567	0.0463591	-2.43	0.036 **
	$D.lnMS_t$	-0.147984	0.0275066	-5.38	0.000 ***
	$D.lnMS_{t-1}$	-0.196782	0.0268051	-7.34	0.000 ***
	$D.lnFX_t$	0.066775	0.0128418	5.20	0.000 ***
	$D.lnFX_{t-1}$	0.033223	0.0107976	3.08	0.012 **
	$D.lnINR_t$	-0.021205	0.0113859	-1.86	0.092 *
	$D.lnINF_t$	0.000124	0.0081806	0.15	0.883
	_cons	-0.046288	0.1563522	-2.96	0.014 **
$\boldsymbol{No. of\ Obs = 28, R^2 = 0.897, Adj\ R^2 = 0.723, F(17,10) = 95.44(0.0000)}$ ***					
***, ** *and* * *represents* **1**, **5** *and* **10** *percent levels of significance respectively*					

Source: Author's calculations based on data.

The estimated equilibrium error correction coefficient of about -0.9 is statistically significant, with the negative sign as required. This suggests that aftershock, there is the existence of a high speed of adjustment back to equilibrium. It can be argued that approximately 90 percent of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

In the long run, both fiscal and monetary policy instruments were found to have a significant effect on structural transformation. For instance, government expenditure was found to have a significant negative impact on structural transformation. A unit percentage increase in government expenditure was found to have about a 0.047 percentage decrease in structural transformation in the long run. The negative relationship between government expenditure and structural transformation can be the result of its greater part being dedicated to recurrent expenditure and therefore instead of spurring structural transformation it results in its fall. This is consistent with the finding of Li et al (2018) and Durongkaveroj (2022) that more recurrent government expenditure cannot positively influence structural transformation.

Further to that tax was found to have a significant and positive influence on structural transformation. A unit percentage increase in the ratio of tax to GDP results in about a 0.15 percent increase in structural transformation in the long run. This can be explained by the excerpt by Levin (2005) and Ricome et al (2020), that in Tanzania the proportion of corporate tax for instance collected from the agriculture sector is greater than from the manufacturing and service sectors. As a result, an increase in tax acts as a disincentive to the growth of the agricultural sector relative to other sectors which in turn spurs structural transformation.

Another variable that was found to exert a significant impact on structural transformation, in the long run, is the money supply. It was found that a unit percentage increase in money supply results in about a 0.09 percent increase in structural transformation in the long run which is consistent with a study by Gnath et al (2020). Other variables were not found to be significant in the long run even at a 10 percent level of significance.

In addition, in the short-run, lagged natural log of tax to GDP ratio, the natural log of the broad money supply to GDP ratio and its lag, and the natural log of forex to GDP ratio and its lag were found to have a significant impact on structural transformation at least at 5 percent level of significance. Particularly, tax to GDP ratio as well as money supply were found to exert a negative impact on structural transformation while forex to GDP ratio exerted a positive impact. Lagged natural log of government expenditure and interest rate were found to have a negative and significant impact on structural transformation at a 10 percent level of significance. The remaining variables were not found to be significant in the short run even at a 10 percent level of significance. The constant term portrays a negative relationship with structural transformation meaning that, if all exogenous variables are held constant, the structural transformation will decrease by about 0.046 percent.

As far as the model is concerned, the results are reliable since the F-statistic, which is the test statistic for the overall significance of the model is high at 95.44 and has a probability value of 0.0000 which is statistically significant even at a 1 percent level of significance. This means that all explanatory variables taken together significantly determine structural transformation. The value of R-squared which tells the goodness of fit and shows at which rate variations in the dependent variable are explained by variations in independent variables is about 89.7 percent.

4.4. ARDL Post-Estimation Diagnostic tests

After estimating the ARDL model, some post-estimation diagnostic tests were conducted to test the reliability and stability of the estimated model and to see whether the results can be relied upon. The results for autocorrelation and heteroskedasticity tests are presented in the following Table 7.

Table 7: Autocorrelation and Heteroskedasticity Tests for ARDL Model

Breusch-Godfrey LM Test for autocorrelation			
Lags(p)	Chi2	df	Prob>chi2
1	5.683	1	0.0171
Cameron and Trivedi's decomposition of the IM-test for Heteroskedasticity			
Source	Chi2	df	p
Heteroskedasticity	28.00	27	0.4110

Source: Author's calculations based on data.

Results from Table 7 suggest that the normal standard errors are autocorrelated but not heteroskedastic. However, this is not a concern since the Newey-West standard errors presented in the ARDL model results (see Table 5) are robust to both autocorrelation and heteroscedasticity (Wooldridge, 2009). Further to that, tests for normality included Skewness/Kurtosis and Jarque-Bera normality tests and finally the cumulative sum tests for parameter stability (see Table 8) were conducted.

Table 8: Normality Tests

Skewness/Kurtosis tests for Normality

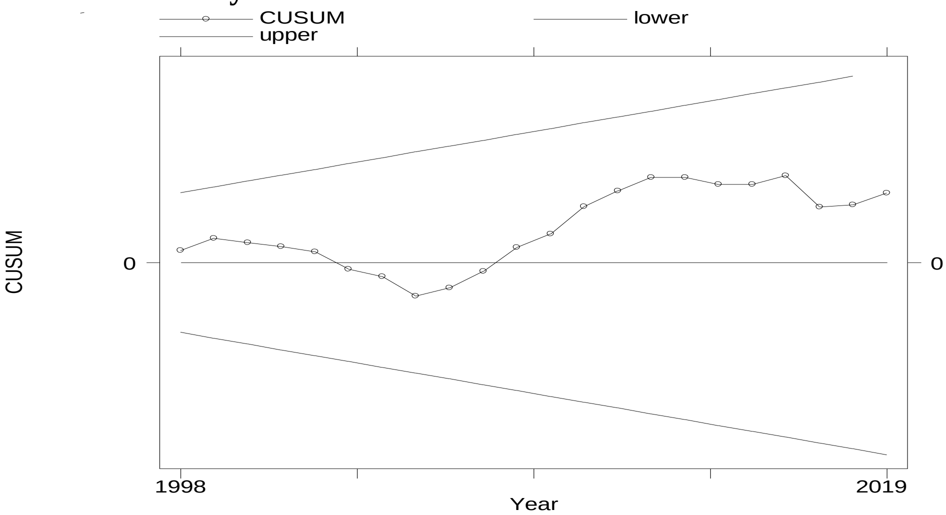
Variable	Obs	Pr (Skewness)	Pr (Kurtosis)	adj chi2 (2)	Prob>chi2
Resid	28	0.5390	0.8437	0.43	0.8075

Jarque-Bera normality test: 0.3369 Chi (2) = 0.845
$\boldsymbol{H_0}$: Normality

Source: Author's calculations based on data.

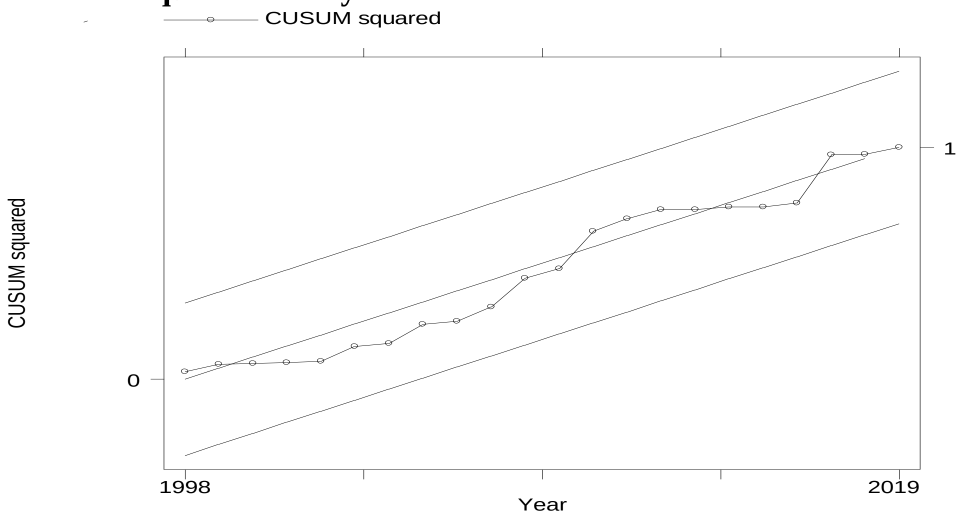
Both the Skewness/Kurtosis and Jarque-Bera normality tests exhibit that the null hypothesis of a normal residual term cannot be rejected at a 5 percent significance level and therefore the residuals are normally distributed. Further to that, the cumulative sum test for parameter stability test was conducted. This test aims at determining whether the model is stable as opposed to being explosive. Two sets of tests were conducted which were the CUSUM and CUSUM square on one side and recursive CUSUM as well as the OLS CUSUM on the other. Both the CUSUM and CUSUM square plots lie within a unit boundary at a 5 percent level of significance (see Figures 3 and 4). Therefore, based on these results the model exhibits total stability.

Figure 3: CUSUM Stability Test for ARDL Model



Source: Author's calculations based on data.

Figure 4: CUSUM-square Stability Test for ARDL Model



Source: Author's calculations based on data.

Recursive and OLS CUSUM parameter stability tests for model stability in the presence of structural breaks were conducted and the results are presented in the following Table 9.

Table 9: Recursive and OLS Cumulative Sum Test for Parameter Stability

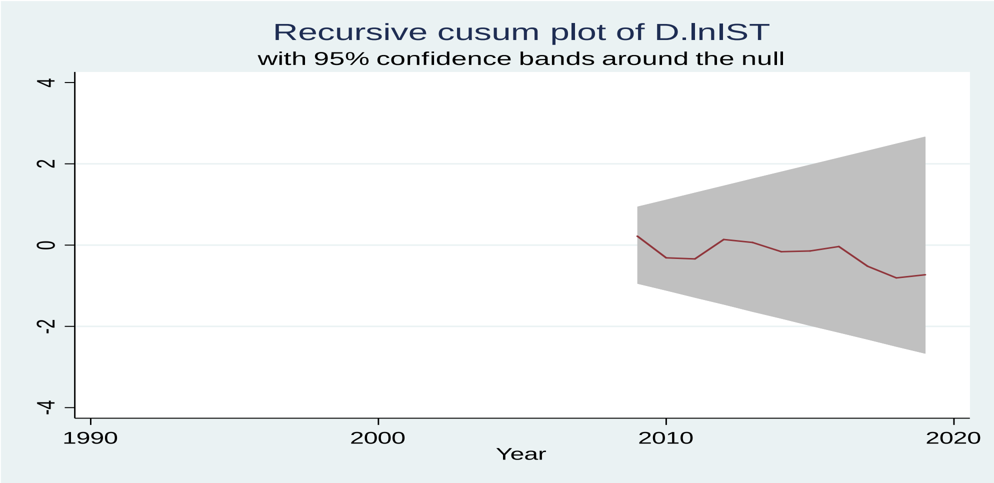
Sample: **1992 – 2019** Number of Observations = 28
$\boldsymbol{H_0}$**:** No structural break

Statistic	Test Statistic	Critical Values		
		1%	5%	10%
Recursive	0.3214	1.1430	0.9479	0.850
OLS	0.1531	1.6276	1.3581	1.224

Source: Author's calculations based on data.

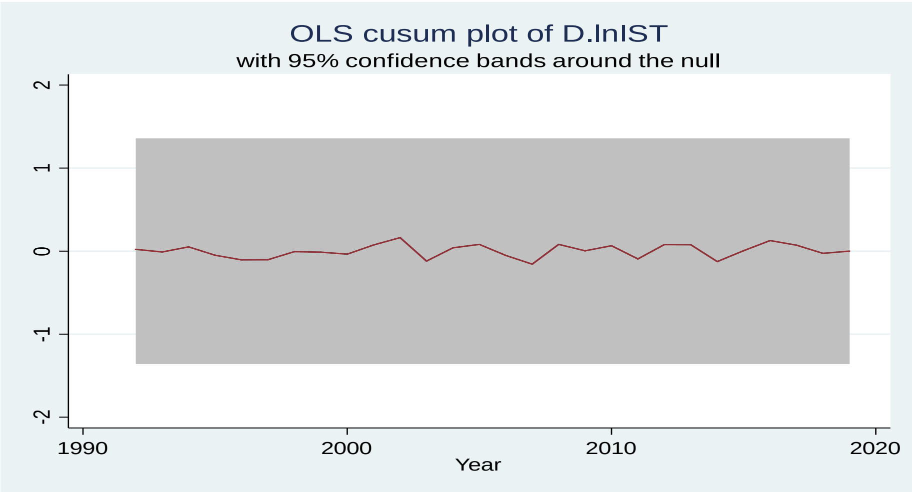
Both the recursive and OLS cumulative sum tests show no evidence of the presence of structural break- even at a 10 per cent degree of significance. The respective figures for the recursive and OLS cumulative sum test are shown in the following Figures 5 and 6 respectively.

Figure 5: Recursive CUSUM plot for $\boldsymbol{D.lnIST}$



Source: Author's calculations based on data.

Figure 6: OLS CUSUM plot for $\boldsymbol{D.lnIST}$



Source: Author's calculations based on data.

Both the recursive CUSUM and OLS CUSUM plots lie within a unit boundary at a 5 per cent level of significance. Therefore, based on the performed reliability and stability post-estimation tests, the results from the ARDL error correction model can be relied upon to draw useful conclusions.

5. Conclusion

This study aimed at investigating the impact of fiscal and monetary policy on structural transformation in Tanzania. The study found out that, sensible fiscal and monetary policy can be used to foster structural transformation in Tanzania. Some of the instruments of fiscal and monetary policy were found to have significant impact on structural transformation. These instruments include government spending which was found to impede structural transformation while taxation and money supply affect positively structural transformation in the long-run. In the short run, lagged tax-to-GDP ratio, broad money supply-to-GDP ratio and forex-to-GDP ratio were found to have a positive and significant impact on structural transformation. Therefore, the empirical results from an autoregressive distributed lag model in this study have established that structural transformation responds significantly to both fiscal and monetary policy instruments.

Policy implications derived from this study are that, amongst other tools used to transform the structure of Tanzania's economy, prudent fiscal and monetary policy can be utilised as the main strategic tools. Given her significant mineral endowment and agricultural potential, these policies can be used to strategically transform the economy into becoming more industrial and services sectors' driven economy.

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