Services Sector FDI-Growth Nexus in Nigeria: Does Liberalization Policy Matter?

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Since it is the need of developing countries to step up own industrialization process and growth and calls for more technology spill-over through foreign investments. This made it a necessity that efforts are made by these countries to attract foreign direct investment (FDI) because of its acknowledged advantages as a tool of economic development. Nigeria, in particular, joined the rest of the world in the quest for increased FDI inflows arising from the notion that FDI leads to economic benefits within the host country. This study analyzed the role of liberalization policy on the nexus between services sector FDI and economic growth in Nigeria under scenarios with and without a structural break for the period 1981-2018. Time-series properties were examined using both conventional and unit root tests with structural breaks to account for shift dummy in the series. Their results indicate that the series is stationary at I(1) and this prompt the use of vector error correction model (VECM). The statistical results show the existence of the long-run relationship between services FDI and economic growth though services FDI spurs growth when policy shift is not included but retards growth when it is included. In the short-run, the estimate under a scenario without break reveals significant positive relationship with growth but negative and statistically insignificant under the scenario with the break. The overall analyses show that services FDI could only play a significant role in Nigeria's growth when there is no change in government policy or intervention. Based on these findings, the policy implications include the expansion of more

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service-oriented firms to increase sectoral share in the total GDP. The potential benefits from such expansion include creation of jobs, more inclusive growth and development, and the higher plant survival tends to increase social prosperity.

1. INTRODUCTION

The potential and significant roles of foreign direct investment (FDI) in any developing economy cannot be undermined. FDI encourages an open business climate, builds technologies and advances employee training, and also help towards improving government revenue generation. FDI has been used by most of the developing countries as a substitute in the development finance process and as a key instrument to promote the growth of any economy [1,2,3]. The term FDI is defined as an investment that is made to acquire a lasting interest in an enterprise operating in an economy other than that of the investor [4]. In another dimension, Ogunkola and Jerome [5] defined it as investments in businesses of another country. This may be in the form of greenfield investment or merger and acquisition that involves the acquisition of existing assets rather than new investment. It occurs when an investor based in one country (the home country) creates or acquires the ownership of assets in another country (the host country) with the intent to manage that asset. Such investment could be through financial collaborations, joint ventures and technical collaborations, capital markets via Euro issues and private placements or preferential allotments [4]. Effective operations of FDI are contingent on economic policies of the government, transparency and well supportive infrastructure availability in the host country [6].

In the literature, there have been a lot of arguments on the relationship between FDI and economic growth. Some studies showed that FDI inflows induce economic growth [7,8,9,10]. Some studies report the existence of the linear and non-linear relationship between FDI and growth [11,12]. However, several other studies advocate that significant positive impact of FDI on the growth of host country is contingent on certain factors such as human capital, the availability of quality infrastructures, market size and trade openness, good governance and economic freedom [13,14,15]. Despite numerous studies that have examined the relationship between FDI (aggregate and sectoral) and economic growth, only a few studies exist on the link between services sector FDI and growth [16,17,18]. These studies were conducted for India. Studies that examined FDI impact on different sectors (primary, manufacturing, and services sectors), Chughtai [19] conducted for Pakistan while Alfaro [20] for cross-country although, Cheah [21] and Kaliappan, Khamis and Ismail [15] focused specifically on the services sector. However, in Nigeria, the existing studies [22] focused only on telecommunication services sub-sector while Imoughele and Ismaila [23] focused on various sectors such as quarrying, telecommunication, building and construction, trading and business and agricultural sectors.

The motivation for this present study is in two folds. First, given the unresolved nature of relationships between FDI (both aggregate and sectoral) and growth, the significant role of liberalization policy was therefore conceived on this relationship. In Nigeria, the major liberalization policy that concerns all sectors including services sector was in 1986 during the structural adjustment programme (SAP). In the literature, despite a large number of studies that have examined the relationships between FDI and growth, none of these studies ever looked into this dimension. The motive is to see whether liberalization policy could promote services sector FDI and growth relationship in Nigeria. Second, this study employed the VEC model through which structural break was introduced. This made the analysis to be partitioned under two scenarios (without and with break). The first scenario does not consider liberalization policy while the second scenario considered it.

The main objective of this study is to explore the significant role of liberalization policy on the nexus between the services sector FDI and economic growth in Nigeria. Forecast error variance decomposition also was used to measure the degree of variability each variable contributes to the others while the granger causality test was used to examine the causal relationship between variables. After an introductory section, the remaining part of the paper is structured as follows: Trend analyses of both aggregate and disaggregated services sector GDP and net inflows of services sector FDI (% of GDP) are analysed in section two.

Section three discusses the review of the literature. Section four presents the theoretical framework and methodology adopted for the study. The empirical results are discussed in section five while section six provides conclusion and recommendations.

1.1 Stylized Facts on Aggregate/ Disaggregated Services Sector GDP and Net Inflows of Service Sector FDI (Percentage of GDP) in Nigeria

Service sector comprises the following sub-sectors: transport; information and communication; utilities; accommodation and food services; finance and insurance; real estate; professional, scientific and technical services; administrative and support services business services; public administration; education; human health and social services; arts, entertainment and recreation; and other services. This section discusses the trends of aggregate/disaggregated service sector GDP as well as net inflows (measured by % of GDP) in Nigeria. Over a period 1981-2018, aggregate service sector GDP recorded an increasing trend with an average of ₦9828.54. Fig. 1, for instance, shows that the aggregate service sector GDP stood at ₦3,668.44 million in 1981 and increased to ₦3,892.22 million in 1986, accounted for about 6.1% increase. In 1991, it increased steadily to ₦4,761.09 million and continued till 2006 with an average of ₦7,048.07 million. The same scenario was recorded between 2007 and 2018 (Central Bank of Nigeria (CBN), 2018)). During these periods, it marked a magnificent increase, recording an average of ₦20,148.71 million which is higher relative to previous periods.

1.2 Trends of Disaggregated Service Sector GDP in Nigeria

Table 1 demonstrates the trend of disaggregated service sector GDP in Nigeria. Across the various sub-sectors of services, there were significant variations in their contributions. For instance, between 1981 and 2005, real estate performed higher than other sub-sectors, accounted for about 26.3% of the total GDP. This was followed by public administration with about 19.9% contribution. With the liberalization of the telecommunication sector, this development stimulates the contribution of information and communication and far above others, recorded about 28.5% of the total GDP during the period 2006-2018. This was followed by real estates with 20.76%. The sudden increase in the performance of information and communication during this period could be attributed to higher usage of telecommunications and information services and the inflow of FDI in the telecommunications industry.

1.3 Net Inflows of Service Sector FDI (% of GDP) in Nigeria

Fig. 2 shows that the trend of services sector FDI net inflows (% of GDP) in Nigeria experience fluctuations from 1981 to 2018. Net inflows of services sector FDI (% of GDP) stood at 0.42% in 1981 and increased to 3.6% in 1992. Also, between 1993 and 1999, it recorded a tremendous increase. From 2000, however, significantly declined was recorded. Such decrease was maintained till 2018 when its contribution is below 0.1%.
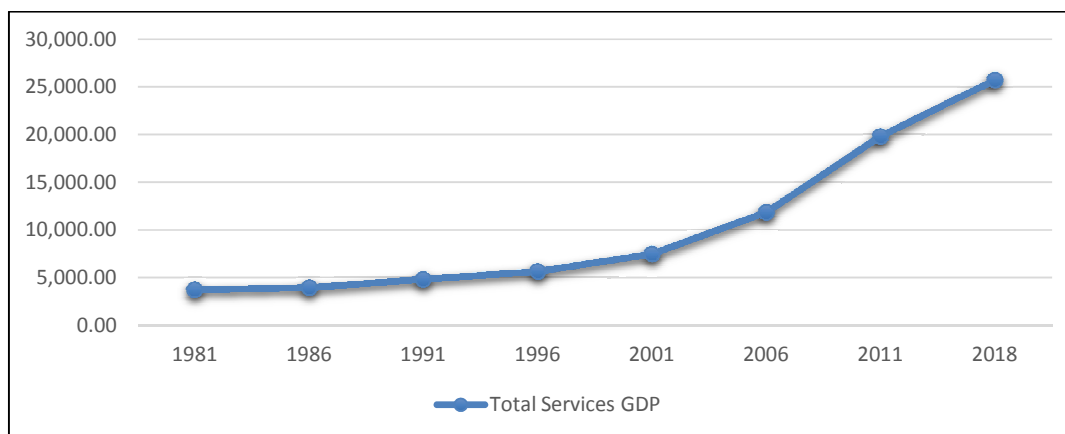

Fig. 1. Trend of aggregate service sector GDP in Nigeria
Source: Central Bank of Nigeria Statistical Bulletin (2018)

16

Table 1. Trends of disaggregate service sector GDP in Nigeria

Subsector/ Year		1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010	2011-2018
Transport	Average value	205.72	181.28	201.71	229.71	367.16	610.06	2710.52
	%contribution	5.5	4.34	3.95	3.73	4.11	4.05	3.47
Information and Communication	%contribution	255.91	207.86	243.91	369.12	1210.69	3828.10	24696.26
		6.85	4.98	4.78	6	13.55	25.39	31.60
Utilities	%contribution	18.53	16.09	22.26	24.30	141.92	204.09	1204.30
		0.5	0.39	0.44	0.39	1.59	1.35	1.54
Accommodation and Food Services	%contribution	43.29	34.31	36.29	40.43	80.71	197.80	1836.33
		1.16	0.82	0.71	0.66	0.9	1.31	2.35
Finance and Insurance	%contribution	302.72	471.02	878.41	1064.87	1418.10	1743.89	6357.74
		8.1	11.28	17.21	17.3	15.87	11.57	8.14
Real Estate	%contribution	1080.61	1134.58	1340.01	1611.40	2055.24	3382.12	14917.15
		28.91	27.16	26.26	26.17	23	22.43	19.09
Professional, Scientific and Technical Serv.	%contribution	489.41	667.70	749.29	905.80	1145.65	1522.01	7859.70
		13.09	15.99	14.68	14.71	12.82	10.09	10.06
Administrative and Support Services Business Services	%contribution	3.76	5.13	5.75	6.95	8.79	11.68	45.66
		0.1	0.12	0.11	0.11	0.1	0.08	0.06
Public Administration	%contribution	844.77	939.00	1033.23	1127.46	1428.55	1839.20	5308.04
		22.6	22.48	20.25	18.31	15.98	12.2	6.79
Education	%contribution	253.88	282.20	310.52	338.84	421.87	687.84	4591.86
		6.79	6.76	6.09	5.5	4.72	4.56	5.88
Human Health and Social Services	%contribution	115.87	128.79	141.72	154.64	176.40	275.65	1471.90
		3.1	3.08	2.78	2.51	1.97	1.83	1.88
Arts, Entertainment and Recreation	%contribution	4.08	3.62	4.64	9.40	16.01	25.78	449.95
		0.11	0.09	0.09	0.15	0.18	0.17	0.58
Other Services	%contribution	118.83	105.30	134.94	273.62	465.81	749.93	6695.57
		3.18	2.52	2.64	4.44	5.21	4.97	8.57
Total		**3737.379**	**4176.888**	**5102.684**	**6156.569**	**8936.885**	**15078.16**	**78144.96**

Source: Author's computation based on data extracted from CBN, various editions
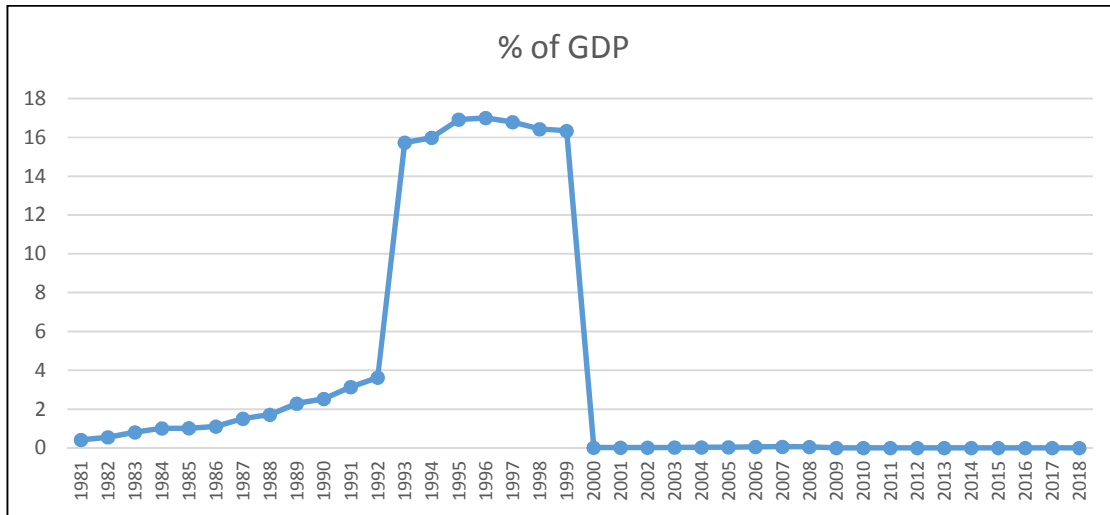
Fig. 2. Trend of net inflows of service sector FDI (% of GDP) in Nigeria
Source: Author's computation

2. LITERATURE REVIEW

Several studies had been undertaken on the role of FDI on economic growth. This section provides a brief review of the various empirical findings and conclusions of some existing studies on the subject matter. For country-specific studies that focused on developed countries, Akulava and Vakhitova [24] found that firms with foreign capital perform better than domestic firms across the three sectors of the economy concerning the direct effect of FDI. The results also hold after adding spillovers controls. While analyzing bi-directional relationships between FDI inflows and employment in manufacturing and services sectors in Singapore between 1997 and 2005, Wong and Tang [25] found evidence of long-run causality, running from employment in manufacturing and services to FDI inflows, and from FDI inflows and services employment to manufacturing employment. Furthermore, there is evidence of short-run causality showing strong FDI-employment and employment linkages, predominantly from the manufacturing to services.

Cross-country evidence on the role of FDI (either total or sectoral) on growth is mixed. A handful of studies show significant positive impact while some other studies found a significant negative impact. Alfaro [20], for instance, explored the effect of FDI on growth across sectors (primary, manufacturing, and services sectors) for 47 countries between the periods 1981-1991. The findings showed a negative relationship between the GDP (primary sector) and FDI inflows,

whereas FDI inflows in the manufacturing sector have a positive impact while evidence from the foreign investments in the service sector is ambiguous. While investigated the impact of FDI on economic development of post Comecon transition countries between 1998 and 2009, Melnyk, Kubatko and Pysarenko [26] found a positive relationship between FDI in former Comecon transitional and developing economies and economic growth. Kaliappan, Khamis and Ismail [15] examined whether ASEAN countries would be able to attract the services-based FDI and get benefits from the inflows over the period 2000-2010. The findings show that services FDI is positively and significantly determined by human capital, the availability of quality infrastructures, market size and trade openness, whereas inflation (a proxy for macroeconomic stability) is found to be negative and insignificant. In another dimension, Cheah [21] investigated if FDI could significantly affect export sophistication over the period 2002-2011. The result reveals that FDI per capita has a significant long-term non-linear impact on service export sophistication. In Sub-Sahara Africa (SSA), similar results were found though the emphasis was on total FDI. For instance, Adeleke [13] employed a combination of Pooled OLS, fixed effects (FE) and random effects (RE) techniques to examine the interaction of FDI and governance on growth across 31 SSA countries for the period 1996-2010. The result reveals that FDI significantly promotes growth, especially when it is accompanied by good governance. Also, in a panel analysis that involves 19 SSA countries during the period 1995-2010, Ajide and

Eregha [14] found a positive relationship between FDI inflows and GDP per capita in the region when economic freedom is controlled for.

Concerning country-specific studies that focus on developing countries, evidence has shown that aggregate or sectoral FDI significantly stimulates growth. For instance, Sen [16] adopted OLS technique and found that during the period 1970-2008, phenomenal growth of the services sector in India is mainly influenced by trade, hotels and restaurants, transport, storage and communications sector. Using the descriptive approach, Sirari and Bohra [17] also found that over the period 1991-2010, FDI has helped to raise output, productivity and employment at the sectoral level of Indian economy, especially in the service sector. With FDI in India, studies such as Saleena [7,18] all found the existence of a positive relationship between FDI inflow and the growth of the service sector. For emerging countries, Almfraji and Almsafir [27] employed the ECM approach to examine FDI-EG relationship in Malaysia and found significant positive, but negative or even null in some cases. During the period 1986-2016, Saleh, et al. [28] found that service sector FDI in Vietnam are driven by market-seeking, government policies and culture, all of which have significantly contributed to FDI. Similar findings are reported in most of the developing countries. For instance, Javaid [8], with the use of ARDL found the existence of a positive and significant impact of FDI on the economic growth of Pakistan. Using the same approach, Sunde [9] found that both FDI and exports boost the economic growth of South Africa.

Specifically, in Nigeria, a handful of studies have found mixed results with regards to the relationship between FDI (either total or sectoral) and growth are mixed. For instance, Ezeanyeji and Ifebi [22] used the OLS technique and found a positive and significant impact of FDI on the performance of the telecommunication sector provided there exists a stable political environment. In a related study that focused on sectoral classification and sub-sector, Imoughele and Ismaila [23] found that constant inflow of FDI across sectors in Nigeria tends to stimulate its growth rate. Using VECM, Jibir and Abdu [10] found a positive and significant link between FDI and growth in Nigeria, though non-existence of causality in their relationship. However, in an attempt to examine the sectorial inflow of FDI on Nigeria's economic growth over a period 1970-

1998, Oladele [11] with the use of OLS found that due to inconsistency of Nigeria government policy and framework, significant positive impact exists only in the short-run whereas negative impact in the long-run. Correspondingly, Adekunle and Sulaimon [12] employed the ARDL approach to analyze the relationship between foreign capital flows and economic growth in Nigeria. Their results also reveal a significant positive impact of net FDI on growth.

2.1 Theoretical Framework

The theoretical framework for this study follows Romer [29], Grossman and Helpman [30], and Barro and Salai-martin [31]. These scholars assumed that capital deepening in the form of increasing the numbers of varieties of capital goods in an economy strictly depends on the available technical progress. Given this condition, the link between the services sector FDI and the growth of the Nigerian economy can be analyzed using augmented Cobb-Douglas production function as follows.

$$Y_t = AH_t^{\alpha} K_t^{1-\alpha} \qquad (1)$$

Where Y_t is real output at time t, H_t represents human capital and K_t denotes physical capital at time t. It should be recognized that the spillover effect could be generated through the existence of additional stock of services FDI. The spillover effect is otherwise known as an externality and it is expressed as:

$$E_t^{\gamma} = \left[H_t, K_t \right]^{\delta} \qquad (2)$$

By incorporating the component of externality into the production function, equation (1) can be rewritten as:

$$Y_t = AH_t^{\alpha} K_t^{1-\alpha} E_t^{\gamma} \qquad (3)$$

Where; A captures the production efficiency, while α $1-\alpha$ and are the shares of labour and capital inputs.

Substituting equation (2) into (3); we have;

$$Y_t = AH_t^{\alpha+\delta} K_t^{(1-\alpha)+\delta} \qquad (4)$$

From equation (4), a dynamic production function can be generated by taking both its logarithms and time derivatives and thus becomes;

19

$$g_y = g_A + (\alpha + \delta)g_t(1 - \alpha - \delta)g_t \qquad (5)$$

Where g_t is the growth rate of Y_t A_t H_t K_t and respectively?

Equation 5 shows that the growth of an economy is contingent on increasing FDI associated factors such as efficient production techniques[1]; human capital development; technology transfer and capital deepening which have important effects in spurring economic growth. These growth-spurring factors are considered essential to stimulate growth through FDI both at aggregate and sectoral levels.

3. METHODOLOGY

The study begins with an examination of time series properties to ensure consistent estimation of the relationships among the series. Based on the outcome of the time series examined, this study employs vector error correction (VEC) model which is a special case of the VAR, mostly used when variables are stationary in their differences (i.e., I(1)). The VEC can also take into account any cointegrating relationships among the variables. Since the series are found to exhibit at least one-cointegrating equation, it is therefore required to estimate a vector error correction (VEC) model with the incorporation of an error correction mechanism term from the estimated VAR model. The model for this study is specified as:

$$\Delta V_t = \delta_{it} + \sum_{i=1}^{k} \beta_{ij} \Delta V_{t-j} + \phi_{ij} ECM_{t-j} + \varepsilon_{it} \qquad (6)$$

Where;

V_t = vector of variables [RGDP, SFDI, OPT, CPI, EXR, SERLIB, GFCFGDP, SEREM].
V_{t-J} = Vector of lagged variables
δ_{it} = vector of intercept.
ε_{it} = error term

Note: all the variables are in logged form except CPI

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[1] *Act of upgrading already existing products and services together with designing new ones.*

3.1 Estimation Technique and Procedures

The estimation procedures begin with the examination of the stochastic properties of the data in which unit root tests are performed. The variables used for the analysis are subjected to different unit root tests to determine stationary or non-stationary of the series. The motivation behind the variety of tests is to find reliable and consistent results. Apart from the conventional unit root tests of Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP), this study also considers the Kwiatkowski-Phillips-Schmidt-Shin (KPSS). These are all designed to overcome the difficulties of low power and size distortions inherent in the conventional unit root tests [32]. In addition to the conventional methods, unit root tests with structural breaks (Perron 2006 and Zivot-Andrews (ZA)) were conducted to determine the unexpected shift in time series that can lead to unreliable estimates. In each of these tests performed, the null hypothesis with intercept and trend was considered to determine whether each of the variables in the model being analysed is stationary or not. However, in the empirical analysis, the structural break was considered only for services FDI to reflect the period of SAP in Nigeria. Based on this, we included a dummy variable (dummy_SFDI) into the model to account for this structure break.

Following was the cointegration test using the vector error correction model (VECM) technique developed by Johansen [33]. Also, diagnostic tests were performed on the model. Finally, variance decomposition analysis and Granger causality test were undertaken to determine how much of the forecast error variance for each variable attributable to its innovations and innovations in the other variables in the system. The entire data set covered the period 1981 to 2018 for which data are available.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Unit Root Tests

Time-series properties of the variables used in the model were tested by performing a univariate regression (i.e. unit root test). To ascertain whether each of these variables has unit root (non-stationary) or does not have unit root (stationary series), this study used three (3) of the conventional unit root tests (ADF, PP and KPSS) and two (2) of the unit root tests with structural breaks (Perron 2006 and Zivot-

Andrews tests). An observation from the summary results of the unit root tests presented in Table 3 indicates that all the variables are non-stationary in their levels I(0) but at first difference I(1). Based on this, there is a need to conduct a cointegration test to confirm the existence of a long-run relationship among the variables in the model.

Following the results of the stationary tests, an attempt is made to verify the existence of co-integration among non-stationary variables using the Johansen co-integration test. In Table 4, the trace statistic reveals the existence of four co-integrating equations in the model. However, the result from the maximum-Eigen statistic reveals the existence of one co-integrating equation in the model. To establish a long-run relationship, there must be the existence of at least one co-integrating equation in the model. Given this condition, the null hypothesis of no co-integration is rejected at 5% critical value for both trace and maximum-Eigen statistic.

In estimating VECM, the optimal lag length needs to be determined and this is based on five different information criteria which are: Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQ), Final Prediction Error (FPE) and Sequential Modified LR test Statistic. Thus, Table 5 reveals the optimal lag length suggested for the stochastic equation is one, i.e. $p^*=1$ is chosen.

4.2 Vector Error Correction Model

Table 6 shows the estimates of a VEC model for the co-integrated variables to evaluate both the short-run and long-run relationships between the co-integrating variables. For the long-run, causal relationship is determined by the significance of the error correction term. However, the short-run causal relationship is established by the sum of the lagged coefficients of the explanatory variables at a given significance level.

The analysis of this study is done under two (2) scenarios. The first scenario is estimated without the consideration of the break period while the second scenario is estimated with the inclusion of break for both long-run and short-run estimations as presented in Table 6. The rationale for this innovation is to verify whether the incidence of the break (i.e. structural or policy shift) tends to overestimate or underestimate the coefficients of the variables in the model. As revealed in Table 6, there exists a long-run relationship between economic growth and services FDI under both scenarios (without and with the inclusion of break). This is shown by the coefficient of error correction term (ect(-1)) which is negative, less than zero and statistically significant. The ect(-1) coefficients under the two scenarios (i.e. without and with break) show that unbalance economic growth in the short-run could be adjusted within the first quarter of the year.

In the long-run estimates under a scenario without break, RGDP has a significant positive relationship with LSFDI. This result strictly conforms to the theory but contradicts the findings of Oladele [11] who revealed a significant negative relationship between sectoral FDI and growth in the long-run. Although when no consideration is given to period (i.e. either short or long-run), the result corroborates the findings of previous studies [7,9]. The estimates also reveal RGDP to have a significant negative relationship with OPT, LEXR, SERLIB and CPI. Specifically, the negative coefficient of OPT is not theoretically supported and also contrary to the finding of Kaliappan, Khamis and Ismail [15], who found a significant positive relationship between openness and growth. However, under the scenario with the break, there exists a significant negative relationship between RGDP and LSFDI. This result is contrary to the finding of Alfaro [20], who found an ambiguous relationship between the services sector FDI and growth, though the structural break was not considered in his analysis. In this study, the negative relationship between SFDI and growth could be explained by the nature of investment and compatibility of such investment with the policy in place. This study found that liberalization policy does not favour services sector FDI in Nigeria. Also, it could be that since investment in the services sector is essentially on non-tradable goods which appear to have very strong forward linkages to the domestic economy, different sub-sectors within the services industry could play different roles in influencing domestic growth. RGDP has a significant positive relationship with LSEREM while the negative relationship with other explanatory variables together with structural breaks (dummy_SFDI). This is an indication that without consideration to the inclusion of policy shift in the model, LSFDI significantly spurs growth. However, liberalization policy (inclusion of policy shift) does not promote growth led services sector FDI in Nigeria.

Table 2. A priori expectation of the variables used in the model

Abbreviation of variables	Explanation of variables	Measurement	Expected relationship (sign)	Data source
RGDP	Real GDP (a proxy of Economic growth)	GDP at market prices (constant 2010 US$).		CBN statistical bulletin
SFDI	Services sector FDI	FDI inflows into the services sector	+	CBN statistical bulletin
EXR	Exchange rate	Real exchange rate	_	CBN statistical bulletin
OPT	Openness to trade	(Export + Import)/GDP	+	CBN statistical bulletin
CPI	Consumer price index	Consumer price index	_	World Development Indicators (WDI)
SEREM	Total employment of services sectors		+	National Bureau of Statistics (NBS)
GFCFGDP	Gross fixed capital formation	Gross fixed capital formation	+	CBN statistical bulletin
SERLIB	Services sector liberalization	A dummy variable (used the value of 0 to capture period before SAP while the value of 1 for SAP and post-SAP period.	+/-	Author's formulation

Table 3. Summary and decision for unit root tests

Variables	ADF	PP	KPSS	ZA	Perron 2006	Decision
LRGDP	I(1)	I(1)	I(0)	I(1)	I(0)	I(1)
LSFDI	I(1)	I(1)	I(0)	I(1)	I(1)	I(1)
LCPI	I(1)	I(1)	I(1)	I(0)	I(0)	I(1)
LEXR	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LGFCF	I(1)	I(1)	I(0)	I(1)	I(0)	I(1)
LSEREM	I(1)	I(1)	I(1)	I(1)	I(0)	I(1)
OPT	I(1)	I(1)	I(0)	I(1)	I(0)	I(1)
LGFCFGDP	I(1)	I(1)	I(1)	I(1)	I(0)	I(1)

Source: Derived from Table A1 and A2 in the appendix
Note: The decision made in each of the tests is based on the estimation results with consideration to intercept and trend. I(0) represents stationary of a variable (i.e. significant at level) while I(1) denotes non-stationary (i.e. significant at first difference)

Table 4. Co-integration test result

		Trace statistic		Max-eigen statistic	
H_0	H_1	λ Trace	5% critical value	λ Max	5% critical value
r=0	r=1	226.7950	159.5297	73.71110	52.36261
r≤1	r≥2	153.0839	125.6154	40.88417	46.23142
r≤2	r≥3	112.1997	95.75366	35.33332	40.07757
r≤3	r≥4	76.86639	69.81889	31.54408	33.87687
r≤4	r≥5	45.32231	47.85613	23.54537	27.58434
r≤5	r≥6	21.77694	29.79707	11.38992	21.13162
r≤6	r≥7	10.38702	15.49471	9.522058	14.26460
r≤7	r≥8	0.864962	3.841466	0.864962	3.841466

*Source: Computed; Note: *** implies significant at 1%, while ** implies significant at 5% and * significant at 10%*

Table 5. Maximum lag length table

VAR lag order selection criteria					
Endogenous variables: LRGDP LSFDI OPT LEXR CPI LSEREM SERLIB LGFCFGDP					
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-169.4309	NA	2.02e-06	9.590859	9.939166	9.713653
1	139.9925	468.3165*	3.79e-12*	-3.675271*	-0.540512*	-2.570122*

*Source: Computed; Note: * indicates lag order selected by the criterion*

In the short-run analysis, estimates under the two scenarios reveal that the lag value of RGDP in period one D(LRGDP(-1)) has a significant positive relationship with the current RGDP. In the case of LSFDI, the estimate under a scenario without break reveals a significant positive relationship with growth. This result is in line with the finding of Oladele [11], who found a positive and significant impact of sectoral FDI on growth in the short-run. However, the estimate shows a negative and insignificant impact under the scenario with the break. This indicates that the services sector FDI could only play a significant role in Nigeria's growth provided there is no change in government policy or intervention. Inflation rate proxied by CPI has a significant negative relationship with growth under the two scenarios. This conforms to the theoretical expectation and agrees with the finding of Ayanwale [34], who concluded that ability to curb inflation in an economy is expected to reduce investment risks and thus enhance FDI and growth. Total employment in the services sector has a significant negative relationship with growth under a scenario without break and this does not conform to the theoretical expectation. More so, under a scenario with the break, the exchange rate has a significant positive relationship with growth. This implies that the depreciation of domestic currency promotes growth. However, liberalization of the services sector (SERLIB) reveal a significant negative relationship with growth and this does not conform to the theoretical expectation. Lastly, structural shift denoted by dummy_SFDI reveals a significant negative relationship with growth. This connotes that such policy shift may not be favourable possibly because of the associated

conditionalities and as a result, retards growth in Nigeria.

In the diagnostic test results presented in Table 6, there is evidence of no serial correlation. This is shown by the LM statistic of 46.705 and 66.914 with the probability of 0.949 and 0.869. This, therefore, suggests that the null hypothesis of no serial correlation cannot be rejected. The F-statistic shows that the overall fitness of the models is 3.55 and 2.59 at 5% significant level. The results of R-squared are 0.55, and 0.51, respectively. This connotes that in the short-run, changes in RGDP under a scenario without break is accounted for by 55% variation in the explanatory variables while accounting for 51% variation in the explanatory variables in the model under a scenario with the break.

4.3 Forecast Error Variance Decomposition

This measures the proportion of variability each variable contributes to the other variables in the autoregression. It is used to determine how much of the forecast error variance for each variable that is attributable to its innovations and

innovations in the other variables in the system. Presented in Table 7a and 7b are the results of the variance decomposition analysis showing the proportion of the forecast error variance in RGDP explained by its innovations and innovations in explanatory variables both under the two scenarios (i.e. without break and with break).

The variance decomposition analysis above covers 10 years to ascertain the roles of innovation attributed to other variables in the system on LRGDP for a relatively long time. During the first year, LRGDP is strongly endogenous as it strictly explained by its innovations, as suggested by Brooks [35]. During this period, innovations from other variables accounted for 0% of its variation. At period 4, LRGDP is weakly endogenous as it is explained by about 66% of its innovation while explanatory variables accounted for 34% of the error variance. For instance, LSFDI explains about 10%, OPT accounts for about 6% while innovation attributed to LEXR accounted for about 13%. Also, it is observed that innovation in LEXR is on the increase and ahead of innovation in OPT and LSFDI.

Table 6. Estimates of vector error correction model

Long-run estimates		
Variables	**Without break**	**With break**
LSFDI(-1)	0.058 (10.600)***	-0.112 (-4.872)***
OPT(-1)	-0.295 (-6.561)***	-0.666 (-6.916)***
LEXR(-1)	-0.057 (-3.096)***	0.031 (0.607)
SERLIB(-1)	-0.062 (-3.522)***	-0.231 (-5.298)***
LGFCFGDP(-1)	0.007 (0.936)	-0.166 (-7.653)***
CPI(-1)	-0.003 (-12.702)***	0.002 (-3.074)***
LSEREM(-1)	-0.018 (-0.557)	0.905 (11.751)***
dummy_SFDI		-1.338 (-11.495)***
C	-5.423	-9.017
Short-run estimates		
CointEq1	-0.345 (-4.091)***	-0.110 (-3.493)***
D(LRGDP(-1))	0.366 (2.489)**	0.509 (3.031)***
D(LSFDI(-1))	0.013 (2.467)**	-0.014 (-1.511)
D(OPT(-1))	-0.020 (-0.651)	-0.009 (-0.264)
D(LEXR(-1))	0.008 (0.335)	0.049 (1.787)*
D(SERLIB(-1))	-0.020 (-1.144)	-0.039 (-2.074)**
D(LGFCFGDP(-1))	-0.0001 (-0.014)	-0.008 (-1.416)
D(CPI(-1))	-0.003 (-2.860)***	-0.001 (-0.754)***
D(LSEREM(-1))	-0.079 (-1.709)*	-0.011 (-0.255)
D(dummy_SFDI(-1))		-0.122 (-2.705)***
C	0.031 (4.030)***	0.013 (2.151)**
Diagnostics test		
R^2=	0.551	0.509
F-stat	3.550**	2.589**
Autocorrelation LM test	46.705(0.9487)	66.914(0.8697)

*Source: Computed; Note: *** implies significant at 1%, while ** implies significant at 5% and * significant at 10%*

Table 7a. Variance decomposition of LRGDP (without break)

Period	S.E.	LRGDP	LSFDI	OPT	LEXR	SERLIB	LGFCFGDP	CPI	LSEREM
1	0.015420	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.024931	90.46986	0.523735	2.647301	0.397612	0.643930	2.413200	1.636879	1.267486
3	0.034858	80.11921	4.157355	5.715119	3.117582	0.561100	1.322782	3.974453	1.032400
4	0.045618	66.31002	9.860815	6.275656	12.51709	0.414825	0.822305	2.995866	0.803421
5	0.055665	57.13628	13.53797	5.379164	20.20357	0.385569	0.606241	2.061483	0.689726
6	0.064654	51.35816	15.89830	4.729089	24.86410	0.324522	0.609566	1.588488	0.627768
7	0.072520	47.62335	17.51370	4.302621	27.45442	0.269444	0.678319	1.542861	0.615282
8	0.079723	44.79130	18.80378	4.038416	28.89790	0.224123	0.774688	1.854384	0.615406
9	0.086545	42.32947	19.88032	3.838564	29.73205	0.191373	0.899759	2.503049	0.625410
10	0.093127	40.08524	20.78634	3.669006	30.13528	0.173163	1.041519	3.470261	0.639188

Source: Author's computation

Table 7b. Variance decomposition of LRGDP (with break)

Period	S.E.	LRGDP	LSFDI	OPT	LEXR	SERLIB	LGFCFGDP	CPI	LSEREM	dummy_SFDI
1	0.016453	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.029986	95.39809	0.635165	1.519265	0.470293	0.868489	0.042457	0.200456	0.614787	0.250997
3	0.040972	89.06330	2.795127	2.806026	0.567976	0.465283	0.366533	0.816537	0.475461	2.643757
4	0.051419	80.49442	5.476936	2.982095	4.629590	0.648647	0.328916	0.673210	0.404427	4.361763
5	0.060174	73.94617	7.445481	2.423497	9.259168	0.666809	0.264216	0.491692	0.339394	5.163575
6	0.067831	69.64583	8.533158	2.024164	12.57412	0.779427	0.213206	0.481304	0.310469	5.438328
7	0.074441	67.15080	9.236407	1.765851	14.27066	0.834076	0.188522	0.602098	0.291843	5.659739
8	0.080602	65.18592	9.797028	1.597426	15.34682	0.937811	0.189139	0.863195	0.280309	5.802354
9	0.086386	63.44660	10.29428	1.461298	16.10421	1.042289	0.208470	1.264623	0.271131	5.907102
10	0.091932	61.78810	10.72628	1.347112	16.67190	1.167411	0.253372	1.820833	0.264053	5.960942

Source: Author's computation

At period 10, LRGDP explains about 40% of its variation. The remaining 60% is explained by the explanatory variables in the system. During this period, innovation in LEXR substantially increases to about 30% while that of LSFDI increases to about 21% and OPT remains at about 4%. This connotes that a larger proportion of about 60% error variance in LRGDP is attributed to innovations in the explanatory variables in the system.

Similarly, in the first year under the scenario with the break, LRGDP is strongly endogenous as it strictly explained by its innovations. Innovations from other variables accounted for 0% of its variation. However, at period 4, LRGDP is strongly endogenous, accounted for about 81% of its innovation while explanatory variables accounted for 19% of the error variance. During this period, innovations from LSFDI, LEXR, dummy_SFDI and OPT accounted for about 6%, 5%, 4% and 3%, respectively. With the inclusion of a break in the analysis, it is observed that innovation from policy shift is marginally increasing throughout the period under consideration.

At period 10 under a scenario with the break, LRGDP explains about 62% of its variation. The remaining 38% is explained by the explanatory variables in the system. During this period, innovation in LEXR considerably increases to about 17% while that of LSFDI increases to about 11%, dummy_SFDI accounts for about 6% and OPT remains at 1%. This explains that with the inclusion of break, the proportion of error

variance in LRGDP attributed to innovations in the explanatory variables in the system accounted for about 38%.

Generally, the variance decomposition analysis results under the two scenarios conform to economic theory. This is because shocks to the explanatory variables continued to explain a significant proportion of the variation in RGDP. This is further illustrated in the appendix Figs. B1 and B2.

4.4 Granger Causality Test

The granger causality test results presented in Table 8 is conducted to examine the role of the services sector FDI on economic growth in Nigeria. The result shows that there is a uni-directional causality between real GDP and SFDI. This implies that the growth of the Nigerian economy is significantly influenced by services sector FDI. More so, the result shows the existence of unidirectional causality between RGDP and inflation rate proxied by CPI. This shows that the growth of the Nigerian economy is significantly influenced by the inflation rate. This further confirms the empirical findings that the inflation rate is an important factor that inhibits growth. Also, the result shows the uni-directional relationship between RGDP and total employment in the services sector (SEREM). This is also expected because employment generation is an important indicator of growth. Therefore, the higher employment level created by the services sector, the higher the contribution of the sector to the growth of Nigerian economy.

Table 8. VEC granger causality

Null hypothesis	Chi-square statistic	Probability	Remarks
RGDP does not granga cause SFDI	6.084078	0.0136	Reject
SFDI does not granga cause RGDP	0.586560	0.4438	Accept
RGDP does not granga cause OPT	0.424042	0.5149	Accept
OPT does not granga cause RGDP	0.968430	0.3251	Accept
RGDP does not granga cause EXR	0.112397	0.7374	Accept
EXR does not granga cause RGDP	1.93E-05	0.9965	Accept
RGDP does not granga cause SERLIB	1.310306	0.2523	Accept
SERLIB does not granga cause RGDP	2.117392	0.1456	Accept
RGDP does not granga cause GFCFGDP	0.000205	0.9886	Accept
GFCFGDP does not granga cause GDP	0.128306	0.7202	Accept
RGDP does not granga cause CPI	8.182192	0.0042	Reject
CPI does not granga cause RGDP	0.231145	0.6307	Accept
RGDP does not granga cause SEREM	2.922312	0.0874	Reject
SEREM does not granga cause RGDP	0.246334	0.6197	Accept

Source: Author's computation

This result is similar to the findings of Wong and Tang [25], although they found bi-directional causality between FDI inflows and employment in manufacturing and services sectors both in the short-run and long-run. However, between RGDP and OPT, RGDP and EXR, RGDP and SERLIB, RGDP and GFCFGDP, there exist no causal relationships. This is an indication that openness to trade (OPT), the exchange rate (EXR), liberalization of services sector (SERLIB), gross fixed capital formation as a percentage of GDP (GFCFGDP) do not have played a significant role of the growth of Nigerian economy.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This paper explores the role of liberalization policy on the nexus between the services sector FDI and economic growth in Nigeria. It utilizes the vector error correction model (VECM) to assess both short and long-run relationships. The results show that the absence of liberalization policy significantly promotes growth led services sector FDI in the long-run. However, liberalization policy (inclusion of policy shift) does not promote growth led services sector FDI in Nigeria. In the short-run, the estimate under a scenario without break reveals significant positive relationship with growth but negative and statistically insignificant under the scenario with the break. This suggests that liberalization policy does not matter in the relationship between the services sector FDI and growth in Nigeria. In the short-run, the estimate under a scenario without break reveals significant positive relationship with growth but negative and statistically insignificant under the scenario with the break. This indicates that services FDI could only play a significant role in Nigeria's growth provided there is no change in government policy or intervention. The study also reveals the existence of unidirectional causality between real GDP and SFDI.

Based on these findings, the policy implications include the expansion of more service-oriented firms to increase sectoral share in the total GDP. Since most developing economies like Nigeria stands to gain many economic benefits from services FDI when they are open to foreign trade, the Nigerian government should intensify efforts towards reducing the bureaucratic bottlenecks in foreign trade transactions which are characterized by stringent custom duties and port-authorities' regulations. Policymakers should formulate policies that will encourage foreign investors. Expansion of more services-oriented firms tends to increase the sectoral share of the total GDP. The potential benefits from such expansion include creation of jobs, more inclusive growth and development, and the higher plant survival tends to increase social prosperity.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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APPENDIX

Table A1. Unit root tests

| Method	Augmented Dickey Fuller (ADF)		Phillip-Perron (PP)		KPSS	
Variables	Level	1st difference	Level	1st Difference	Level	1st Difference
LRGDP	-2.428182	-3.910023**	-2.569493	-3.910023**	0.102911	0.141303*
LSFDI	-2.294956	-5.657699***	-2.349893	-5.657699***	0.116122	0.071642
LCPI	-1.556443	-3.863921**	-0.844375	-3.248376*	0.618771***	0.091298
LEXR	-1.307104	-5.524198***	-1.356365	-5.524198***	0.161857**	0.049018
LGFCF	-1.712054	-5.924749***	-1.934508	-5.924749***	0.098273	0.114042
LSEREM	-1.869967	-5.477295***	-2.002750	-5.477295***	0.679347***	0.069572
OPT	-2.344468	-4.763693***	-2.449884	-4.763693***	0.115414	0.042493
LGFCFGDP	-0.064692	-6.801027***	0.361874	-6.801027***	0.303244***	0.095937

Table A2. Unit root tests with structural breaks

Variables/Method	Zivot-Andrews (ZA test, 1992) one-break		Perron 2006 with one break	
	TB	t-stat	TB	t-stat
LRGDP	1991	-2.49389	2000	-5.530637***
LSFDI	2000	-3.50696	1997	-2.849572
CPI	1994	-5.66812***	1992	-5.684262***
LEXR	1999	-3.91091	1999	-2.527850
LSEREM	2002	-4.50276	2000	-3.996324***
OPT	2005	-3.49424	2004	-3.204990*
LGFCFGDP	2007	-4.12462	2006	-3.394604*

Source: Computed; Note: t indicates the t-statistic and TB denotes the structural break dates. The critical values for Perron (2006) are given at the 1%, 5% and 10% significance levels as -3.9759, -3.4185 and -3.1314. The critical values are given at the 1% and 5% significance levels as -5.57 and -5.08 for the Zivot-Andrews one-break unit root test
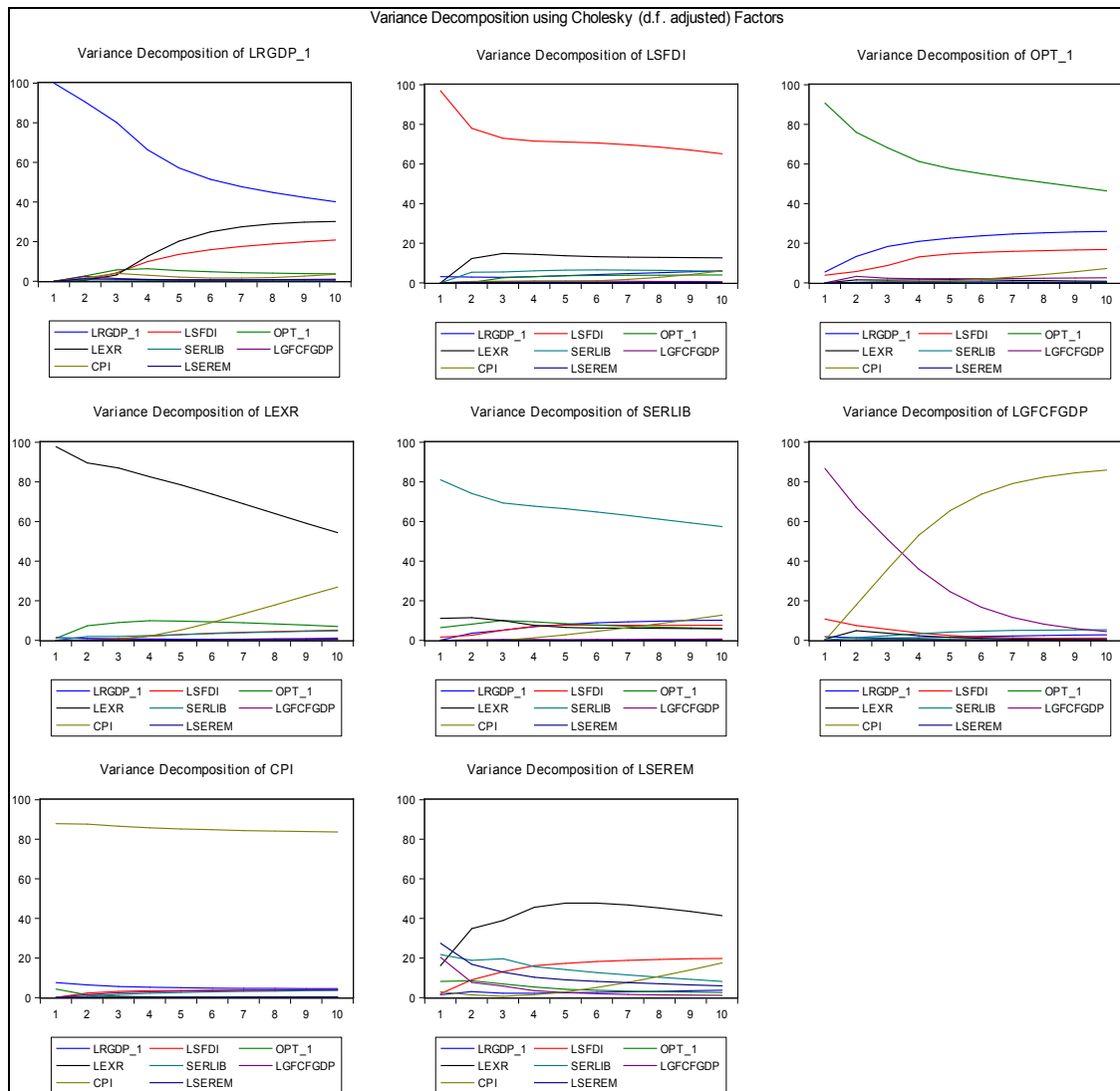
Fig. B1. Variance decomposition analysis without structural break
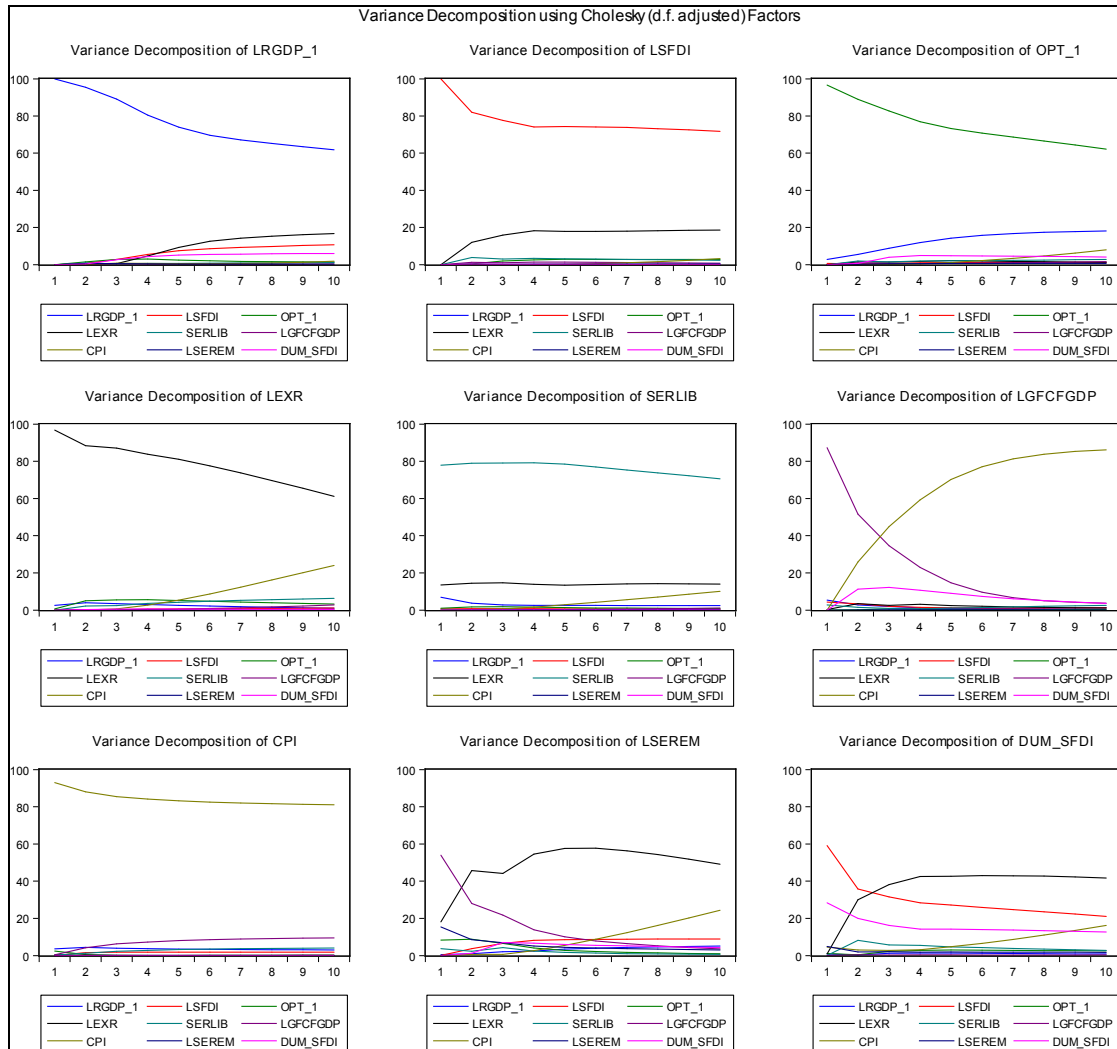
Fig. B2. Variance decomposition analysis with structural break