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**TRADE OPENNESS, INDUSTRIALIZATION AND ECONOMIC GROWTH IN NIGERIA  
(1986-2015)**

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**Abstract.**

*This paper examines the relationship among trade openness, industrialization and economic growth in Nigeria between 1986 - 2015 using descriptive analysis and Vector Autoregression (VAR) technique. The variables were subjected to a unit root test to examine the properties of the data. The findings that emerged from the impulse response of trade openness, industrialization proxied by industrial output and economic growth proxied by growth in GDP showed that shocks to these variables generally produce a negative response. Exchange rate and inflation produced a negative response to trade openness while they responded positively to industrial output and economic growth. The general response of the variables to shock were mean reverting. The result of the variance decomposition implied; Firstly, industrial output and financial deepening have the potential to contribute to trade openness in the long run. Secondly, trade openness and financial deepening have the potential to contribute to industrial output in the long run. Lastly, trade openness and industrial output have the potential to contribute to economic growth in the long run. It was therefore concluded that trade openness has a significant potential to promote industrialization and thereby stimulating the economic growth of the Nigerian economy during the study period. It is therefore recommended that the Nigerian government should implement appropriate industrial and trade policies to duly compete in the global market in addition to new and advanced technologies in enhancing the growth of industries which in turn contributes to positive economic growth of the economy. Also, structural regulation of the*

*industrial sector to foster industrial performance thereby promoting economic growth and lastly, government should encourage the financial sector to offer loans and subsidies to private sector as a driver of economic growth in Nigeria.*

**Keywords:** *Trade openness, Economic growth, Industrialization, Vector Autoregression*

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### **Introduction:**

Industrialization in collaboration with international trade has been regarded as the two most important engines for economic growth in many developing countries. It is also of the opinion that industrial growth is an undisputed prerequisite for economic growth, it enhances high linkages with other sectors of the economy which aids self-reliance and strengthening the balance of payment. According to Clunies - Ross *et al.*, (2010), industrialization can be defined as a change in a country's form of production and work force towards producing or minor industries. It was also related to income levels attainment in which nations can be classified into different income levels (high-income, higher upper income, lower upper income, higher middle income, lowers middle income and the low income countries). According to the United Nation (2012), innovation is linked with uncertainty over the outcome of innovation activities, it is subject to spill overs as creative innovation are fully appropriated by the inventing firms and involves investment that may yield potential returns in the future.

The need for industrialization in Nigerian is of interest as it is a means of diversifying the economic base and promoting economic growth. The direction for the current industrial policy in Nigeria was set in the economic transformation agenda, otherwise known as Nigeria Vision 20: 2020 to enhance the development of industrialization. The industrialization strategy which aims at achieving greater global competitiveness in the production of processed and manufactured goods by linking industrial activity with primary sector activity, domestic and foreign trade, and service activity is of paramount interest in affirming economic growth in Nigeria. Yesufu, (1996) inferred that it has been a central economic policy that has been pursued in the Nigerian economy since the attainment of political independence. According to the author, the word "industry" in developing countries is used essentially as a synonym for manufacturing industry. One of the crucial drives for industrial policy in Nigeria is derived from the notion that the growth of industries would provide the avenue for employment of labour, thereby reducing poverty to the lowest level.

The industrial sector accounts for 6 percent of economic activity while the manufacturing sector contributed only 4 percent to GDP in 2011. According to Ogunwusi and Ibrahim, (2014), Nigeria industrial sector's contribution to real GDP recorded an upward trend from 5.9 percent in 1960 to 14.2 percent in 1966. It fell to 14.0 percent in 1967 and 11.2 percent in 1968. It picked up again and rose from 21.5 percent and 34.65 percent from 1971 to 1980. It then increased from 43.45 percent to 46.25 percent through 1981 to 1990. It eventually dropped from 41.25 percent to 37.0 percent between 1991 through 2000. The total industrial output to GDP decreased steadily from 36.0 percent to 22.0 percent between 2001 and 2008. The contribution of the manufacturing sub-sector ranged from 3.6 percent to 11.1 percent from 1960 to 2008 while that of crude petroleum sub-sector increased from 0.4 percent to 40.5 percent respectively within the same period. However, the contribution of the manufacturing sector to GDP was highest from 1960 to 1969 before crude petroleum export took the lead in 1970 with 11.0 percent and maintained the lead throughout the period. Industrialization was perceived as an instrument of economic growth that will assist the government to achieve its macroeconomics purposes but its performance in Nigeria has not been quite motivating. Growth which has been based on industrialization, increased trade openness and exports and gradual financial markets has been import-export led: technology and know-how have been imported from abroad and adapted to the domestic resources, in particular to the abundant labour force (Dutta, 2005). Several governments have used different approaches to meet the demands of industrialization from the commencement of the Nigeria's independence. According to Mike, (2012), the outcome of these policies has been a huge failure and unpredictably, favouring "rent seeking". The two main strategies which have been adopted in the Nigerian economy to foster the process of industrialization includes: The Import Substitution Strategy and the Export Promotion Strategy. The second strategy, which has been in trend since the adoption of the Structural Adjustment Programme (SAP) in Nigeria in mid-1986, emphasizes the promotion of value-added non-oil exports, especially manufactures, and did not eventually achieve significant results (Uniamikogbo, 1996).

There are a number of ways through which a positive link between industrial sector growth and trade policies can be elucidated. Empirical studies like Adenikinju and Olofin, (2000) suggested that development of industrial sector can be determined by trade openness and policies of trade like scale efficiency which is increased through expanding the scope of domestic industrial sector and furthermore causes high competition in the world market, which further boosts

firms in a country to follow and take up modern technology. According to IMF (2010), greater openness may accelerate technological innovations in industrial countries leading to more investment in product development. Soludo and Oji, (2003) pointed out that trade liberalization has led to a massive expansion in the growth of world trade relative to world output, while the world output has expanded five-fold; the volume of world trade has grown sixteen times at an average compound rate of over 7 percent per annum.

Exports have the tendency to grow faster in countries with more liberal trade regimes and these countries have experienced the fastest growth in GDP. The proponents of a free trade policy regime predict gains in manufacturing productivity from outward looking trade policies. Outward trade orientation brings about familiarity with new technologies, induces greater capacity utilization as well as scale benefit through production for export markets and brings about international competition. These in turn are expected to result in productivity improvements in the industrial sector. According to UNIDO, (2002), a more common approach has been plug into global value chains and become a supplier of labour intensive product gradually upgrading technological capacities through foreign investment.

It is quite obvious that Nigeria's quest to become self-reliant and an industrialized economy has resulted to the adoption of liberalization policies over the years towards opening it to industrialized world (Edeme & Karimo, 2014). Trade openness which is said to stimulate industrial development by making inputs available for domestic production predominantly in developing economies including Nigeria where production activities heavily depend on imported inputs had an important role in the economic growth of countries like China, Korea, Taiwan, Indonesia, Soviet Union and Japan who were backward until large scale industrialization was introduced. Moreover, specialization in itself does not necessarily lead to higher growth rates; this is most evident in the case of developing countries dependent on exports of primary products. Trade openness grew at an annual average of 4.59 percent and reduced to -9.16 percent for the period 1971- 1980 and then increased to 13.48 percent for the period 1981-1985. It then further increased intensely to about 1028.93 percent for the period 1999-2008. Nonetheless the overall increase in trade openness stood at 275.39 percent annual average for the period 1971-2008. The maximum increase of 10220.74 percent was recorded in 2008 while 1999 recorded the least openness growth of -43.9 percent.

As real international prices of non-oil commodities have trended downward over time and are subjected to sizeable short-term fluctuations, specialization in

primary production rarely promotes sustained economic growth. In the process of using industrialization to challenge economic growth, the Nigerian governments have neglected the need to establish industries that are most suitable for their environment. In addition, many of the industries are not geared towards exploiting the benefit of trade openness. The realization of the implication of total dependence on one commodity; oil, has turned the country's attention to only one possible way out i.e. industrialization. According to Ayodele and Falokun, (2003), the government specifically in developing countries seeks to use industrialization as a weapon for increasing its national output, minimizing unevenness in development outcomes, generating income, minimizing dependency on the developed countries and therefore minimizing fluctuations in foreign exchange earnings.

The role of trade in stimulating industrialization and economic development cannot be overemphasized in developing countries. It is of the opinion that increase in trade and the transmission of techniques which industrialization proposes are necessary ingredients for the industrial development of the Nigerian economy in attaining economic growth. The challenge, however, is whether Nigeria can take up the advantages of trade openness while at the same time minimize the disruptive consequences of industrialization on economic growth. As no nation can survive on its own, this challenge translates into the Nigerian system by objectively assessing its macroeconomic strengths and weaknesses with a view to optimizing available opportunities and realizing the goal of industrialization.

Therefore, the major objective of this paper is to examine the dynamic relationship among trade openness, industrialization and economic growth by exploring the explanatory and predictive influences of major macroeconomic variables. The relationships are needed to provide room for sustainable economic decisions to foster economic growth through industrialization. The major measures of openness that have greater implications for the development of the country's industrial sector in conjunction with the manufacturing sector, which, according to Egbon, (1995) "is the most favoured sector in the Nigeria economy, especially as the main instrument of rapid growth, structural change and self-sufficiency" will be employed.

The paper is organized into five sections. Following the introductory remarks is a section on the review of the literature. In the third section is the research methodology followed by the results of the analysis respectively. The paper ends with concluding remarks and policy implication.

### Literature Review

Economic scholars have to a large extent established the linkages between economic growth and industrialization at least up to certain levels. In recent decades, industrialization has become the focus of economic research in which was perceived as an instrument of economic growth that will assist government to achieve its macroeconomic objectives. According to Blomstrom, Lipsey and Zegan, (1994) who posit that industrialisation through foreign investment can exert a positive effect on economic growth, the authors argued that industrialisation's contribution to economic growth rate is dependent on the threshold level of income. This deduces that the contribution of industries to economic growth is not significant below the threshold level of income but significant above the threshold. Therefore, it implies that for a country to benefit effectively from the packages of industries and foreign investors, such as new technologies, human capital development and managerial skills, they must have reached a certain level of income.

In investigating the impact of industrialisation on economic growth using panel data of 69 developing countries, Borensztein, DeGregoria and Lee, (1998) found that industrialisation has a positive impact on growth but this is only realised when their measure of schooling is above a certain critical level, which is estimated at 0.52. This was ascertained by using a basic estimating equation of growth with real GDP as the dependent variable and foreign investment, measure of schooling and initial GDP as the independent variables over the period between 1970-1989. In addition, industrialisation and foreign investment exert a negative impact on growth, thus confirming the complementarity of industrialisation, foreign investment and human capital development. Bolaky, (2011) suggests a positive correlation between the level of industrialisation and per capita income for developing countries. It was inferred that there is a higher marginal product of labour from the industrial sector than in the agricultural sector and so the transferring of resources from the agricultural sector to the industrial sector raises total productivity in the economy.

Tamuno and Edoumiekumo, (2012) examine the impact of globalization on the Nigerian industrial sector. They made use of annual time series data covering the period 1970-2008. Cointegration test and error correction mechanism was employed in the analysis. The result of cointegration test showed existence of long run relationship among the variables in the model while that of the error correction model for short run dynamics showed that external debt, gross capital formation, nominal exchange rate and degree of openness have negative impact on the Nigerian industrial sector, whereas, foreign direct investment has positive

impact on industrial output in Nigeria. The study therefore concludes that the Nigerian industrial sector has a weak base which makes it difficult to compete favourably with her foreign counterparts.

Economic theory postulate that openness to trade promote competition, support international trade and specialization, drives the process of economic growth and development and thereby enhancing market efficiency (Fratzcher and Bussierc, 2004). According to Dean *et al.*, (1994), it was concluded that trade openness enhances the integration of a nation's trade regime into the global economy requiring opening up of the external sector to the international community and the dismantling of international trade barriers. The impact of the reforms of the early 1990s on manufacturing firms depended on their location and technological level. In addition, Aghion *et al.*, (2003) also affirmed that liberalization fostered innovation, profits and growth in industries that were close to the technological frontier, while it reduced in industries that were far from the frontier. Also, pro-worker labour regulations at state level discouraged innovation and growth in all industries and this effect increased with liberalization.

In contract to the aforementioned authors, trade policy might affect industrial growth through several channels, Adenikinju and Olofin, (2002) pointed out. There is a less protectionist trade regime which increases the scale efficiency by expanding the domestic market which otherwise might be too small for the efficient production of goods that show increasing returns to scale. They further pointed out that a more liberal trade regime which leads to increased competition from abroad forces domestic firms to adopt more efficient technology to reduce inefficiency and waste. Then lastly, it was argued that an opened economy relieve foreign exchange constraints faced by most developing countries and hence enables a country to import required raw materials and capital goods. They concluded that a more open economy results in a faster rate of technological progress. In another study by Mishra and Kumar (2005), it was concluded that trade liberalization has decreased wage inequality in industry. This however occurred in sectors with large tariff reductions, wages increased relative to the economy-wide average. Since the tariff reductions were relatively larger in sectors with a higher proportion of unskilled workers and these sectors experienced an increase in relative wages, the unskilled workers experienced an increase in income relative to skilled workers.

Shafaeddin, (2005) in his own view argued that trade liberalisation is essential when an industry reaches a certain level of maturity, as long as it is done selectively and gradually. He claimed that any new industry that comes up would

be in line with static, rather than dynamic comparative advantage. The low income countries will be locked in production and exports of primary products, simple processing and at best assembly operation or other labour intensive ones with little prospect for upgrading. By analysing the economic performance of a sample of developing countries that have undertaken economic reforms since the early 1980s with the objective of expanding exports and diversification in favour of manufacturing sector, the result showed that forty percent of the sample economies experienced very rapid expansion of exports of manufactured goods. In addition, it was found that rapid export growth was also accompanied with fast expansion of industrial supply capacity and upgraded mostly East Asian countries.

By specifying a workable model with GDP as the dependent variable while industrial output, foreign direct investment, interest rate, foreign exchange rate and inflation rate as independent variables, Jelilov *et al.*, (2016) used ordinary least square (OLS) to investigate the impact of industrialization on economic growth in Nigeria. Using data spanning from 2000-2013, the result revealed that industrialization has a negative impact on economic growth in Nigeria in the long run. The study recommends amongst others, that the government should redirect its industrial and investment policy so as to increase output of the domestic production (RGDP), flexible exchange rate and control inflation rate since it showed that increase in exchange and inflation rate, decreased output, industrial and investment policy should be flexible on infant industries so as to encourage productivity and improve GDP.

There are a number of contributions by recent development economists on the relationship that exist among openness of trade, industrial developments and economic growth. The results achieved by these contributors at national and international levels are mixed. Oyefusi and Udoh (2004) in their analysis of openness, trade liberalization and economic growth in developing countries came to the conclusion that openness to trade is a necessary path a developing country must tread if it is to attain sustainable economic growth and development. It was however argued that the ability of a nation to benefit from trade liberalization is largely dependent on appropriate domestic policies, adequate human capital, the capacity for strategic government intervention, and proper harnessing of the socio-economic and political factors supportive of growth. Therefore, it can be inferred that the lack of positive impact of globalization on Nigeria is due largely to the failure of the country to possess these preconditions.



In investigating the relationship between trade liberalization and industrial growth in Nigeria, Umoru and Eborieme, (2013) adopted the human capital model of endogenous growth with modifications for trade liberalization within the Nigerian context. Co-integration and error correction estimation was carried out. Error Correction Model [ECM] was used to verify the short run dynamics around the equilibrium. The study found a positive and significant correlation between trade liberalization and industrial growth in Nigeria, structural deregulation had positive impact on industrial growth in Nigeria. Industrial production showed a negative and insignificant relationship to capital formation in Nigeria and concluded that industrial growth is cumulative and self-sustaining in Nigeria.

Edeme and Karimo, (2014) applied the marginal impact estimation technique with standard errors corrected for serial correlation on the dummy variable structural break model to examine the impact of economic liberalization on the industrial sector performance in Nigeria. The study found that economic liberalization has a significant impact on performance of the Nigerian manufacturing, mining and quarrying, and power subsectors, respectively and the aggregate industrial sector. Also the interaction of the policy with energy consumption was negative but financial deepening and energy consumption has dampening effect on the performance of the mining and quarrying subsector. While it has enhancing impact on the aggregate industrial sector and was not significant on mining and quarrying and power subsectors, economic liberalization decreased the performance of the manufacturing subsector. Furthermore, financial deepening has mix impact on the performance of the industrial sector while it has increasing impact on the aggregate industrial sector but its impacts on manufacturing performance was negative.

Ebong *et al.*, (2014) examined the effect of globalization on the industrial development of Nigeria over the past five decades. They employed Engle-Granger two-step and Johansen cointegration tests, the vector auto-regressions technique was used within an error correction framework over the period 1960-2010. The result revealed that globalization had significant impacts on industrial development in Nigeria. In addition, trade openness had a positive influence on industrial development. The result recommended that increasing the level of trade with the rest of the world would create opportunities to export local raw materials and import necessary inputs into the industrial process.

Employing econometric techniques based on Vector Error Correction Model (VECM) and economic indicators such as exchange rate, financial deepening, trade openness and lending rate, Okoye *et al.*, (2016) examined the effect of

economic liberalization policy on the performance of industrial sector in Nigeria over the period 1986-2014. The study found that the rate of exchange rate, trade openness and lending rate exert a negative and significant impact on industrial output. There is also a positive impact of financial deepening in industrial output. The granger causality estimate showed a weak causal impact of financial deepening in industrial output as well as bi-directional causation between trade openness and industrial output. There was also a causal impact of industrial sector on lending rate which indicates that industrial development generate demand for financial resources.

From the review of the literature on the theoretical as well as the empirical analysis, it can be summarised that there is strong evidence in favour of openness to trade. Openness to trade is an important factor that enhances industrial growth and the overall economic performance. But a successful outcomes demand that the economy should be competitive and dwell in their factor endowment along with strong institutional framework. However, developing nations like Nigeria, must adopt appropriate policies to improve trade performance as well as industrial advancement to foster economic growth of the country.

An evaluation of the existing literature on the interactions among trade openness, industrialisation and economic growth from developed and emerging economies, developing countries elicited that extensive studies have been carried out on the subject matter. But investigations on the relationship among trade openness, industrialization and economic growth is scarce. Some scholars have concentrated on the source of industrial growth, the link between industrial output and its effect on the various sectors of the economy and policies issues. Few studies have carried out the dynamic relationship among trade openness, industrialization and economic growth in developing countries. Therefore, it will be important to examine the relationship using a different technique to ascertain the outcome of the analysis.

## **Methodology**

### **Theoretical Framework**

The theoretical framework for this study is based on endogenous growth theory which links trade openness with innovation and growth. A number of theoretical arguments linking trade liberalization with higher rate of industrial productivity growth has been ascertained. According to Krugman (1986), there is the argument of industrial output growth effects of scale benefits, industrial productivity growth effects of reduction in managerial slackness due to

competition and industrial productivity growth effects of imported technology innovations. In addition, Grossman and Helpman (1991) deliberated how trade and industrial policies affect the long-run rates of innovation and growth.

### Model Specification

The model adopted for this study is the modification of Oyovwi and Eshenake (2013) who used financial depth proxied by  $M_2/GDP$ , trade openness and investment to GDP to explain growth rate of GDP in Nigeria. This paper employs industrial output as a whole and identify the major measures that have greater implications for the development of the Nigerian industrial sector. The modification of the model expressed growth rate of GDP as a function of trade openness, industrial output, financial deepening, exchange rate and inflation. The relationship among trade openness, industrialization and economic growth is thus modelled as:

$$GRO = f(TOP, IND, FD, EXR, INF) \quad (1)$$

where GRO is growth in GDP, TOP is trade openness, IND is industrial output, FD is financial deepening, EXR is exchange rate and INF is inflation.

An econometric expression of the model in equation 1 is represented as:

$$GRO_t = \beta_0 + \beta_1 TOP_t + \beta_2 IND_t + \beta_3 FD_t + \beta_4 EXR_t + \beta_5 INF_t + \varepsilon_t \quad (2)$$

where  $\beta_0$  is constant,  $\beta_1 - \beta_5$  is coefficient of exogeneous variables and  $\varepsilon_t$  is the error term.

The specified VAR model for the purpose of this study is represented in equations 3 to 5.

$$\Delta TO_{1,t} = \alpha_1 + \sum_{k=1}^{\alpha} \beta_{1,k} \Delta TO_{t-k} + \sum_{k=1}^{\alpha} \varphi_{1,k} \Delta INO_{t-k} + \sum_{k=1}^{\alpha} \varpi_{1,k} \Delta GRO_{t-k} + \sum_{k=1}^{\alpha} \delta_{1,k} \Delta FD_{t-k} + \sum_{k=1}^{\alpha} \theta_{1,k} \Delta EXR_{t-k} + \sum_{k=1}^{\alpha} \pi_{1,k} \Delta INF_{t-k} + \Sigma_{1,t} \quad (3)$$

$$\Delta INO_{1,t} = \alpha_2 + \sum_{k=1}^{\alpha} \varphi_{2,k} \Delta INO_{t-k} + \sum_{k=1}^{\alpha} \beta_{2,k} \Delta TO_{t-k} + \sum_{k=1}^{\alpha} \varpi_{2,k} \Delta GRO_{t-k} + \sum_{k=1}^{\alpha} \delta_{2,k} \Delta FD_{t-k} + \sum_{k=1}^{\alpha} \theta_{2,k} \Delta EXR_{t-k} + \sum_{k=1}^{\alpha} \pi_{2,k} \Delta INF_{t-k} + \Sigma_{2,t} \quad (4)$$

$$\Delta GRO_{1,t} = \alpha_3 + \sum_{k=1}^{\alpha} \varpi_{3,k} \Delta GRO_{t-k} + \sum_{k=1}^{\alpha} \beta_{3,k} \Delta TO_{t-k} + \sum_{k=1}^{\alpha} \varphi_{3,k} \Delta INO_{t-k} + \sum_{k=1}^{\alpha} \delta_{3,k} \Delta FD_{t-k} + \sum_{k=1}^{\alpha} \theta_{3,k} \Delta EXR_{t-k} + \sum_{k=1}^{\alpha} \pi_{3,k} \Delta INF_{t-k} + \Sigma_{3,t} \quad (5)$$

where  $\Delta$  is the first difference operator;  $t$  denotes the year in the panel ( $t=1, 2, \dots, T$ );  $\varepsilon_t$  is the error term with a zero mean and a finite heterogeneous variance. If the variables are  $I(1)$  but not cointegrated, the next step is to estimate the reduced form VAR model as represented in equations 3 to 5. If the variables are however  $I(1)$  and co-integrated, then Vector Error Correction model (VECM) will be estimated. The alternative approach is the estimation of the impulse response forecast and variance decomposition from unrestricted VAR in levels.

### **A priori Expectation:**

It is expected that a positive relationship will exist between trade openness, Industrial Output and financial deepening while a negative relationship is expected between Industrial output, Exchange rate and Inflation. Hence this can be mathematically represented as  $\beta_1 > 0$ ,  $\beta_2 > 0$ ,  $\beta_3 > 0$  while  $\beta_4 < 0$ ,  $\beta_5 < 0$ .

### **Source of data and Estimation Technique**

The study employed secondary data spanning from 1986 to 2015. Annual data on variables such as degree of openness, growth in GDP, industrial output and inflation were sourced from World Bank Development Indicators of the World Bank, 2015 edition while, financial deepening and exchange rate was sourced from the Central Bank of Nigeria Statistical Bulletin, 2015 edition. Data collected was analysed using both descriptive and econometric (Vector Autoregression VAR) techniques.

The descriptive statistics prior to analyzing time series data has become highly imperative in order to observe distribution and variability of the variables. The descriptive statistics of data series provide information about sample statistics such as mean, median, maximum value, minimum value and the distribution of the sample captured by Skewness, Kurtosis and Jarque-Bera statistics. Therefore, it is important to know: if the variables are symmetric (for instance, mean=median=mode); how skewed the variables are, the values of kurtosis, and the standard deviation values. In order to avoid a spurious regression result, unit root test using ADF (Dickey Fuller, 1981) and Phillip Perron, (1988) test was performed on all the variables. The selection of an appropriate lag length is as significant as determining the variables to be included in any system of equations, therefore it is appropriate to determine the optimal lag length to be used. This was followed by Impulse response functions which are very useful in ascertaining the direction of the effect of shocks to innovations of a variable. It shows the size of the impact of the shock plus the rate at which the shock dissolves, allowing for the interdependencies. Finally, the variance decomposition was used to show the proportion of the forecast error variance of a variable that is attributable to its own innovations and other variables; in other words, they show the explanatory contribution of the shock to the innovations of the variables. They indicate the proportion of the forecast error in a given variable that is accounted for by innovations in each endogenous variable (Akinlo, 2003).

## Data Analysis and Interpretation

**Table 1: Descriptive Statistic of the Variables**

	TOP	IND	GRO	FD	EXR	INF
Mean	54.54627	37.40984	4.713998	13.06905	83.21702	20.43447
Median	57.90042	40.65207	4.649226	11.09412	106.4643	11.8975
Maximum	81.81285	52.99716	33.73578	36.89332	192.4405	72.8355
Minimum	23.71676	20.66649	-10.7517	5.917133	1.754523	5.382224
Std. Dev.	14.81429	9.17607	7.272567	6.991336	64.30656	19.12738
Skewness	-0.32469	-0.32972	1.696018	1.756342	-0.04239	1.47873
Kurtosis	2.358753	2.140677	10.29744	6.187306	1.349578	3.735785
Jarque-Bera	1.0411	1.417719	80.94812	27.18492	3.413851	11.60993
Probability	0.594194	0.492205	0	0.000001	0.181423	0.003013

Table 1 shows the summary statistics of trade openness (TOP), industrial output (IND), economic growth (GRO), exchange rate (EXR) and inflation rate (INF). These relate to mean, median, minimum and maximum values, and the distribution of the sample measured by the skewness, kurtosis, and the Jarque-Bera (JB) statistic. The result show that economic growth, financial deepening and inflation are positively skewed while trade openness, industrial output and exchange rate are negatively skewed. It also showed that economic growth, financial deepening and inflation follow a leptokurtic distribution which implies that the distribution is greatly peaked to normal distribution while trade openness, industrial output follow a platykurtic distribution which implies that the distribution is less peaked relative to normal distribution. The probability on Jarque-Bera (JB) statistics found that trade openness, industrial output and exchange rate are normally distributed except economic growth, financial deepening and inflation. This led to further analysis to ascertain the relationship among trade openness, industrialization and economic growth in Nigeria.

**Table 2: Unit Root Test of Annual Data Series**

	ADF			PP		
	At Levels	1 <sup>st</sup> Diff	Status	At levels	1 <sup>st</sup> Diff	Status
GRO (C)	-4.4130***	-	I(0)	-4.3877***	-	I(0)
GRO (C/T)	-4.4598***	-		-4.4101***	-	

TOP (C)	-2.9598**	-7.9395***	I(1)	-2.9460**	8.5407***	I(1)
TOP (C/T)	0.4386	-4.3514**		-3.0442	-26.4080***	
IND (C)	-0.8318	-5.9136***	I(1)	-2.0934	-6.6152***	I(1)
IND (C/T)	-2.7687	-6.7064***		-2.9827	-10.0692***	
FD (C)	-1.7576	-5.1999***	I(1)	-1.6653	-6.3227***	I(1)
FD (C/T)	-3.3336*	-5.1210***		-2.5609	-6.5174***	
EXR (C)	-0.0850	-4.9089***	I(1)	-0.0577	-4.9000***	I(1)
EXR (C/T)	-2.2519	-4.8433***		-2.2519	-4.8360***	
INF (C)	-3.9073***	-	I(0)	-2.6298*	-6.2644***	I(1)
INF (C/T)	-3.0495	-3.5275		-3.1767	-6.1108***	

NOTE: (a) The ADF/PP Critical Value with intercept (C) are -3.6893(1%), -2.9678(5%) and -2.6230(10%)

(b) The ADF/PP Critical value at intercept(C) and trend(T) are -4.3090(1%), -3.5742(5%) and -3.2217(10%)

(c) \*\*\*, \*\*and \* denote significance at 1%,5% and 10% respectively

The result of the unit root test using ADF (Dickey and Fuller) and PP (Phillip and Perron) was reported in Table 2. The test statistics of growth in GDP (GRO) was stationary at levels I(0) while trade openness (TOP), industrial output (IND), financial deepening (FD), exchange rate (EXR) and inflation (INF) were non-stationary at levels with intercept and trend but stationary at first difference I(1) with intercept and trend. Since the series is an integration of different orders, we do not conduct the cointegration test.

**Table 3: Lag Length Selection Criteria**

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	-619.0657	NA	5.17e+12	46.30117	46.58913	46.38679
1	-550.3365	101.8211*	4.92e+11*	43.87678	45.89252*	44.47616*
2	-508.9987	42.86878	5.19e+11	43.48139*	47.22492	44.59453

The lag length selection indicated in Table 3 was selected based on various selection criteria including LR test statistics (LR), Final prediction error (FPE), Akaike information criteria, Schwarz information criteria and Hannan-Quinn information criteria. Most of the selection criteria suggested lag order of one except AIC. Therefore, this study selected lag order of one based on LR, FPE, SIC and HQ.

**Figure 1: VAR Impulse Response of Trade Openness**

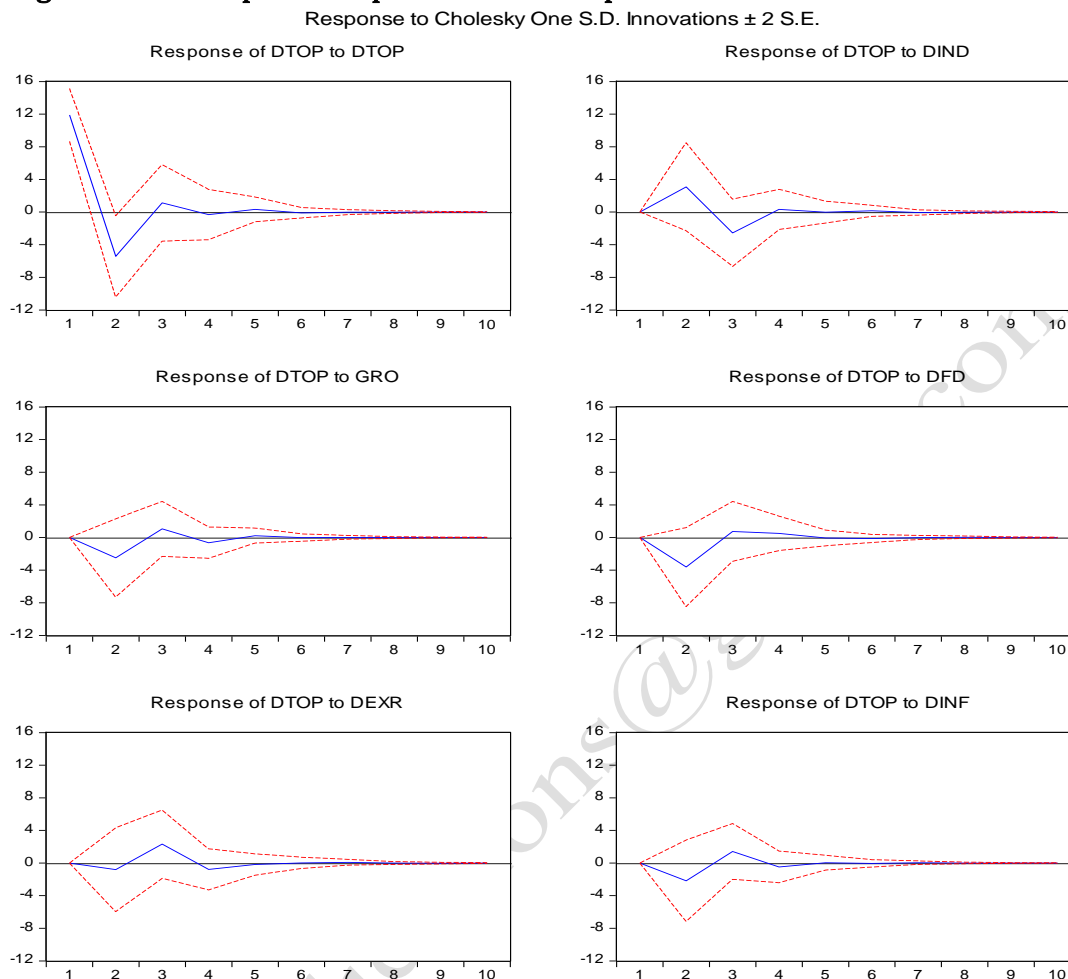


Figure 1 shows the response of trade openness (TOP) to macroeconomic variables. The response of TOP to itself was a volatile response which decreased from the first period followed by a sharp negative drop in the second period. It then adjusted to normal in the third period until the tenth period. The response of trade openness to industrial output (IND) was positive in the first and the second period and then negative in the third to the fourth period which then adjusted to normal from the fourth period to the tenth period. The response of trade openness to economic growth (GRO) was negative in first to the third period and slightly positive thereafter and then adjusted normally in the fourth through the tenth period. The major responses to financial deepening (FD), exchange rate (EXR) and inflation (INF) was a negative response in the first and second period, followed by a positive response and then a normal response from the fourth period to the tenth period.

Figure 2: VAR Impulse Response of Industrial Output

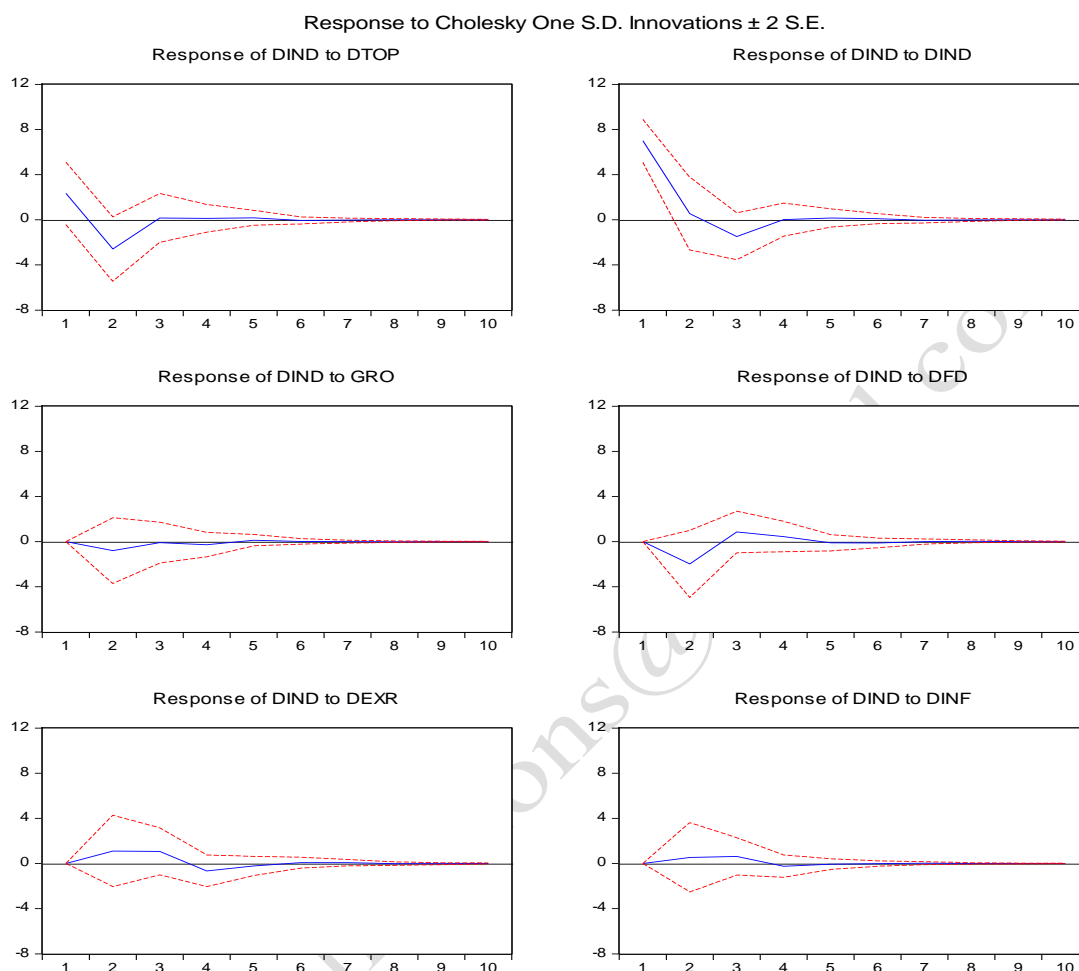


Figure 2 display the response of industrial output (IND) to macroeconomic variables. The response of industrial output to itself was a sharp negative drop in the first through the fourth period. It then reverted to normal from the fourth period to the ninth period. The response of industrial output to trade openness (TOP) was a negative drop in the first and second period, it peaked up in the third period and then adjusted to normal through the end of the periods. The response of industrial output to economic growth (GRO) was slightly negative through the first to the third period and then adjusted to normal from the third to the tenth period. The major responses to financial deepening (FD), exchange rate (EXR) and inflation (INF) was a slight positive response in the first to the third period, followed by a normal response except financial deepening (FD) which was



negative in the first to the third period before responding normally from the fourth to the tenth period.

**Figure 3: VAR Impulse Response of Economic Growth**

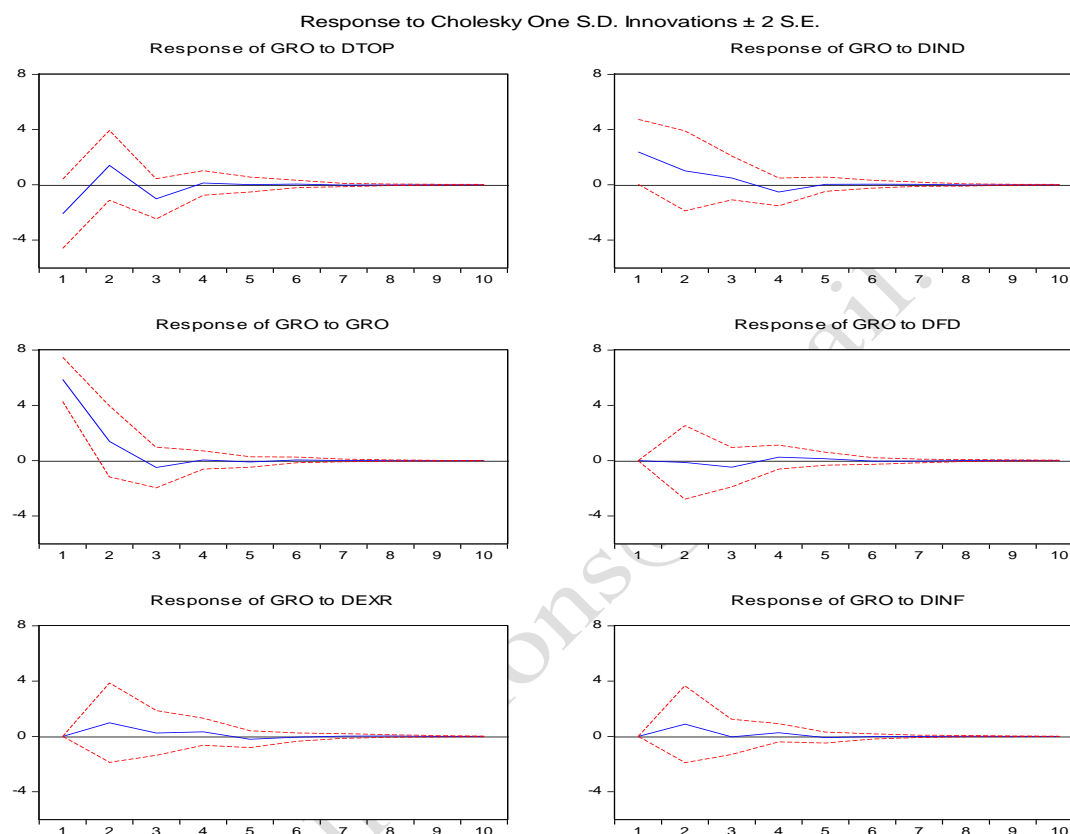


Figure 3 illustrate the response of economic growth (GRO) to macroeconomic variables. The response of economic growth to itself was a sharp negative response from the first period to the third period and then adjusted towards normal from the fourth to the tenth period. The response of economic growth to trade openness (TOP) was a negative response which increased from the first to the second period, dropped in the third to the fourth period followed by a normal response from the fourth to the last period. The response of economic growth to industrial output (IND) was a negative response from period one through the fourth period and adjusted to normal through the fifth to the last period. The major responses to exchange rate (EXR) and inflation (INF) was a slight positive response in the first to the third period, followed by a normal response while financial deepening (FD) responded almost normally from the first to the tenth period.

The general findings of the impulse response of trade openness, industrial output and economic growth is that the shock generally produces a negative impulse response. Furthermore, exchange rate and inflation was negative in response to trade openness and positive in response to industrial output and economic growth. Financial deepening was negative and quick to normal. Therefore, the standard error is indicating that the responses of the variables to shocks are mean reverting.

**Table 4: Variance Decomposition Analysis of Trade Openness**

Period	DTOP	DIND	GRO	DFD	DEXR	DINF
1	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
4	77.00374	7.225668	3.466358	6.210832	2.969356	3.124049
8	76.96420	7.229392	3.486539	6.212215	2.984417	3.123232
10	76.96409	7.229397	3.486534	6.212228	2.984522	3.123231

Table 4 presents the variance decomposition of trade openness (TOP) which shows the contribution of each of the independent variable inclusive on the dependent variable. It showed that trade openness was solely responsible to its own shock in period one. It begun from 100% and decreased to 77% in period 4. It then marginally declined to 76.96% in period 8 and 10. In period one, trade openness is solely responsible for shock to itself. In period 4 and 8, industrial output (IND) and financial deepening (FD) contributed 7.23% and 6.21% to shock in trade openness. Then in period 10, industrial output and financial deepening contributed 7.23% and 6.21% to shock to trade openness. The outcome of the result showed that the variation in the level of trade openness in Nigeria is endogenous. It can thus be inferred that industrial output and financial deepening have the potential to contribute to variation in trade openness in the long-run.

**Table 5: Variance Decomposition Analysis of Industrial Output**

Period	DTOP	DIND	GRO	DFD	DEXR	DINF
1	10.05314	89.94686	0.000000	0.000000	0.000000	0.000000
4	16.81891	70.68916	0.969153	6.634776	3.862872	1.025126
8	16.82548	70.56832	0.989418	6.655492	3.932354	1.028934
10	16.82548	70.56793	0.989420	6.655508	3.932700	1.028960

Table 5 presents the variance decomposition of industrial output (IND) which shows the contribution of each of the independent variable inclusive on the dependent variable. The response of industrial output to its own shock was highest in period one. It started from 89.95% and decreased to 70.69% in period 4. It further decreased to 70.57% in period 8 and 10. In period one, industrial output is majorly responsible for shock to itself in which trade openness (TOP) contributed 10.05% in period one. In period 4, trade openness (TOP) and financial deepening (FD) contributed 16.83% and 6.66% to shock in industrial output. Furthermore, in period 8 and 10, trade openness and financial deepening contributed 16.83% and 6.66% to shock to industrial output. The result revealed that the variation in the level of industrial output in Nigeria is endogenous. It can thus be inferred that trade openness and financial deepening have the potential to contribute to variation in industrial output in the long-run.

**Table 6: Variance Decomposition Analysis of Economic Growth**

Period	DTOP	DIND	GRO	DFD	DEXR	DINF
1	9.875764	12.70740	77.41683	0.000000	0.000000	0.000000
4	13.84215	13.42351	68.47449	0.573410	2.114338	1.572097
8	13.82449	13.40593	68.37420	0.608783	2.200861	1.585740
10	13.82446	13.40594	68.37403	0.608909	2.200914	1.585738

Table 6 presents the variance decomposition of economic growth (GRO) which shows the contribution of each of the independent variable inclusive on the dependent variable. The response of economic growth to its own shock was highest in period one. It started from 77.42% and decreased to 68.47% in period 4. It then decreased to 68.37% in period 8 and period 10. In period one, economic growth is majorly responsible for shock to itself in which trade openness (TOP) and industrial output (IND) contributed 9.8% and 12.71% respectively. In period 4, trade openness and industrial output contributed 13.84% and 13.42% to shock in GRO. Furthermore, in period 8 and 10, trade openness and industrial output contributed 13.82% and 13.41% to shock in economic growth. The result showed that the variation in the level of industrial output in Nigeria is endogenous. It can thus be inferred that trade openness and industrial output have the potential to contribute to variation in economic growth in the long-run.

The general findings from the variance decomposition can be summarized as follows: Firstly, industrial output and financial deepening have the potential to contribute to trade openness in the long run. Secondly, trade openness and

financial deepening have the potential to contribute to industrial output in the long run. Lastly, trade openness and industrial output have the potential to contribute to economic growth in the long run. The findings of this study are in line with Borensztein, DeGregora and Lee (1998) who concluded that industrialization has a positive impact on growth; Umoru and Ebioreme (2013) who ascertained a positive and significant correlation between trade openness and industrialization; Edeme and Karimo (2014) who confirmed that trade openness has a significant impact on the performance of the Nigerian industrial sector; Financial deepening has an increasing impact on the aggregate industrial sector; Ebong *et al.*, (2014) who concluded that trade openness has a positive influence on industrialization; Ebong *et al.*, 2014 who posited that trade openness has a positive influence on industrialization; Okoye *et al.*, (2016) who found a bidirectional causation between trade openness and industrialization, a positive impact of financial deepening on industrial output but in contrast with a negative and significant impact of exchange rate, trade openness and lending rate on industrial output. The study was in contrast to Jelilov *et al.*, (2016) who concluded that industrialization has a negative impact on growth in Nigeria in the long run.

### Conclusion

This paper empirically investigates the relationship among trade openness, industrialization and economic growth in Nigeria using the Vector Autoregression (VAR) model. Secondary data spanning from 1986 to 2015 was employed in the analysis. Annual data on variables such as degree of openness, growth in GDP, industrial output and inflation were sourced from World Bank Development Indicators of the World Bank, (2015) while, financial deepening and exchange rate was sourced from the Central Bank of Nigeria Statistical Bulletin, (2015). ADF (Dickey and Fuller) and PP (Phillips and Perron) unit root was used to test the stability of the variables while VAR techniques was employed to verify the relationship among the three variables. The results of the unit root tests indicated the variables under study were  $I(0)$  and  $I(1)$  processes in which impulse response and variance decomposition was consequently employed.

The result of the analysis revealed that industrial output and financial deepening have the potential to contribute to trade openness in the long run. Secondly, trade openness and financial deepening have the potential to contribute to industrial output in the long run. Lastly, trade openness and industrial output have the potential to contribute to the economic growth of the Nigerian economy in the long run within the study period. The policy implication derived

from the result of the impulse response analysis shows a weak interaction among trade openness, industrialization and economic growth in Nigeria. This can be linked to the presence of some structural rigidities in the country that prevents the full realization of the relationship that exist between trade openness and industrialization thereby bringing about economic growth. It is therefore important to evade the structural rigidities that prevent the outcome of economic growth challenged through industrialization to trade openness.

In conclusion, trade openness has a significant potential to promote industrialization and thereby leads to the economic growth of the Nigerian economy. Furthermore, industrialization has a significant impact on trade openness thereby translating into economic growth in Nigeria. Finally, financial deepening and industrialization have the potential to contribute to trade openness thereby fostering economic growth in Nigeria. Therefore, the study inferred that the potential benefit can be extended by the Nigerian economy by adopting relevant trade policies to accelerate and sustain industrial growth in Nigeria. One of the factors that makes a country great is its level of industrialization. Unless the Nigerian economy is industrialized, it will still be rated as a non-industrialized country which will affect the economic growth of the nation. Nigeria should industrialize in its areas of high comparative advantage. The strength of the Nigerian economy should be in building up our factor endowment to boost productivity. Finally, importing technology and raw materials should be the focus of policy makers rather than importing manufactured goods which lower the economic growth of the country.

Therefore, this study recommends the Nigerian government to implement appropriate industrial and trade policies to duly compete in the global market in addition to new and advanced technologies in enhancing the growth of industries which in turn contributes positively to the economic growth of the country. The Nigerian government should be aware that any trade and industrial policy not complimented with sound economic growth policy has a high propensity to fail. Also, structural regulation of the industrial sector to foster industrial performance thereby promoting economic growth and lastly, government should encourage the financial sector to offer loans and subsidies to private sector as a driver of economic growth in Nigeria.

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**Appendix**

Period	S.E.	DTOP	DIND	GRD	DFD	DEXR	DINF
1	11.90487	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	14.33245	83.29908	4.667994	3.033524	6.375771	0.317799	2.305835
3	14.90728	77.56112	7.234510	3.305860	6.143659	2.712927	3.041920
4	14.96531	77.00374	7.225668	3.466358	6.210832	2.969356	3.124049
5	14.97191	76.98295	7.219343	3.487233	6.206690	2.981735	3.122052
6	14.97367	76.96899	7.228478	3.486510	6.212250	2.981151	3.122625
7	14.97410	76.96466	7.229327	3.486414	6.211920	2.984427	3.123249
8	14.97415	76.96420	7.229392	3.486539	6.212215	2.984417	3.123232
9	14.97416	76.96412	7.229380	3.486534	6.212219	2.984519	3.123230
10	14.97416	76.96409	7.229397	3.486534	6.212228	2.984522	3.123231
Cholesky Ordering: DTOP DIND GRD DFD DEXR DINF							

Period	S.E.	DTOP	DIND	GRD	DFD	DEXR	DINF
1	11.90487	10.05314	89.94686	0.000000	0.000000	0.000000	0.000000
2	14.33245	18.07532	72.96069	0.927797	5.774162	1.828154	0.433880
3	14.90728	16.97916	71.44534	0.879831	6.430844	3.306739	0.958086
4	14.96531	16.81891	70.68916	0.969153	6.634776	3.862872	1.025126
5	14.97191	16.82863	70.59562	0.989063	6.638401	3.920068	1.028223



6	14.97367	16.82696	70.57520	0.989319	6.655352	3.925328	1.027837
7	14.97410	16.82579	70.56917	0.989212	6.654557	3.932322	1.028954
8	14.97415	16.82548	70.56832	0.989418	6.655492	3.932354	1.028934
9	14.97416	16.82550	70.56796	0.989414	6.655470	3.932702	1.028958
10	14.97416	16.82548	70.56793	0.989420	6.655508	3.932700	1.028960
<b>Cholesky Ordering: DTOP DIND GRO DFD DEXR DINF</b>							

Period	S.E.	DTOP	DIND	GRO	DFD	DEXR	DINF
1	11.90487	9.875764	12.70740	77.41683	0.000000	0.000000	0.000000
2	14.33245	12.43025	13.01617	71.12369	0.033696	1.887760	1.508436
3	14.90728	13.95277	13.03462	69.16253	0.459310	1.931249	1.459518
4	14.96531	13.84215	13.42351	68.47449	0.573410	2.114338	1.572097
5	14.97191	13.82128	13.40526	68.38966	0.604548	2.193482	1.585772
6	14.97367	13.82448	13.40500	68.37903	0.606513	2.199322	1.585651
7	14.97410	13.82462	13.40575	68.37526	0.608786	2.199986	1.585592
8	14.97415	13.82449	13.40593	68.37420	0.608783	2.200861	1.585740
9	14.97416	13.82446	13.40595	68.37408	0.608908	2.200873	1.585736
10	14.97416	13.82446	13.40594	68.37403	0.608909	2.200914	1.585738
<b>Cholesky Ordering: DTOP DIND GRO DFD DEXR DINF</b>							