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# INDUSTRIAL DEVELOPMENT AND TRADE LIBERALIZATION IN NIGERIA: IS THERE A SIGNIFICANT CORRELATION?

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## ABSTRACT

*This study investigates the relation between trade liberalization and industrial development in Nigeria. Adopted in the study is the human capital model of endogenous growth with modifications for trade liberalization within the Nigerian context. In the empirical investigation, co-integration and error correction estimation approaches were carried out with the aid of the Generalized Method of Moments [GMM] estimator. A unique co-integration between industrial development and the explanatory variables in the study is found. In order to determine the short-run dynamics around the equilibrium relationship, we estimated an error correction model [ECM]. The empirical findings in this study have it that there is a positive and significant correlation between trade liberalization and industrial development in Nigeria, structural deregulation had positive impact on industrial development in Nigeria, Nigerian industries are labour intensive, industrial production responded negatively and insignificantly to capital formation in Nigeria, industrial development is cumulative and self-sustaining in Nigeria. The result however does not provide evidence of significance of structural deregulation over the period of short-run analysis. The results of the study suggest the need for government to embark on comprehensive implementation of trade liberalization policies in order to accelerate and sustain industrial development in Nigeria. However, the implementation of trade liberalization polices should be gradual.*

**Keywords:** Trade liberalization, Industrial output, generalized method of moments, Dummy variable, Nigeria

## BACKGROUND AND THE PROBLEM

For over a decade, the drive to transform the Nigerian economy from non-industrialized position to an industrialized status has been the pre-occupation of successive Nigerian governments<sup>3</sup>. Beginning from the *import substitution industrialization[ISI]* policy of the immediate post independent era to the policy of the development of export oriented industries in the 1980s, the momentum has not subsided at the policy development level.

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<sup>2</sup> Indeed, successive governments in Nigeria have been quite consistent, at least in theory, through an expression in annual budgets, in pursuance of an industrial policy that aims at ensuring economic growth and development.

Despite the implementation of four development plans from 1962-1985, as well as rolling plans that came with the *Structural Adjustment Programme [SAP]* in 1986, through the 1990s, the industrial sector of the Nigeria economy has not been transformed to reflect the objective of the sector. According to Freeman (1976), industrialization is generally argued as capable of increasing the pace of economic growth and ensuring swift structural transformation of the economy. The critical role of the industrial sub-sector is predicated on the fact that it acts as an engine of growth by broadening the productive and export base of the economy, reducing unemployment and stemming rural-urban drift as well as helping to reduce poverty [Freeman, (1976) and Bhagwati, (1987)].

In contradiction, Nigeria as a developing country has failed to achieve industrial development despite several industrial policies and reforms. Unfortunately, despite the abundant natural endowment, both human and non-human of the country, efforts at creating a vibrant and sustainable development of the real sector economy have proved unsuccessful (IMF, 2010; World Bank, 2012). Worst of all, over the years there has been a stable decline in the sectoral contribution of the industrial sector to macroeconomic productivity. Ajayi, (2009) outlined that the Nigerian industrial sector are city-based, jam-packed with production sub-contracting linkages and the inability to revolutionize production. These features have been attributed largely to low technology as well as the control of the industrial sector in most developing economies by multinational companies (Matin and Page, 1992). In Nigeria, the degree of use of imported inputs is still high due to the inadequate supply of local raw materials. This is in addition to the fact that the Nigerian industrial sector is suffering from meager funding of science and technological education which have in turn manifest in low technological development and labour intensive industrial sector (European Commission, 1996). Nigeria is an open economy. Accordingly, developments in international circles have profound implications on the path of the country in terms of the development of her industrial sub-sector (Freeman and Perez, 1988). It has been the goal of trading with countries to obtain improved and more secure access to markets abroad. This is intended to provide the country with the opportunity to explore economies of scale beyond the limit of the domestic market and facilitate access to foreign exchange with which to finance critical imports needed for development (Adenikinju, 2002). It has been empirically validated that trade and trade policies are important determinants of economic development; international trade offers opportunities for employment (Umoru, 2013), greater specialization, increased capacity utilization and import of goods and services. Several studies have also shown that there is a positive relationship between openness and economic performance (World Bank 1991; Ahmed, 1999; Dutta and Ahmed, 2000; Shahbaz, 2012). However, there appears to be lack of empirical consensus on the relationship between trade liberalization and industrial development. Hence, we are set out in this paper to empirically estimate the accurate correlation coefficient between trade liberalization and industrial development in Nigeria. Specifically, we will empirically estimate the impact of trade liberalization, stock of the Nigerian labour force and capital formation on industrial performance in Nigeria.

In line with the stated objectives, we hypothesize that:

$H_0^1$ : *There is no significant positive relationship between trade liberalization and industrial development in Nigeria*

$H_0^2$ : *There is no significant positive relationship between labour force and industrial development in Nigeria*

$H_0^3$ : *There is no significant positive relationship between capital formation and industrial development in Nigeria*

The paper is structured into seven sections for ease of analysis. Preceding section one is the literature review. While section three is devoted to a situational analysis of trade policy and industrial development in Nigeria, section four presents the theory and empirical model that guides the study. Section five contains the discussion of the methodology and data set. Section six presents and analyzes regression results and section seven concludes the paper with a summary of empirical findings followed by policy recommendations.

## PREVIOUS EMPIRICAL STUDIES

The recent move towards more open trade policies in developing countries, after decades of protection, has sparked off lively debates. The proponents of trade liberalization argue that an open market policy will result to a permanent direct minimum increase in gross domestic product in addition to the indirect benefits that accrue in the form of a reduced regressive tax burden and positive dynamic externalities (Odusola and Akilo, 1995). Much of the controversy centers on the macro analysis of trade-growth linkages. There are many arguments explaining why more open trade regimes lead to productivity improvements in the industrial sector. Perhaps the most basic is that returns to entrepreneurial effort increases as exposure to foreign competition rises (Martin and Page, 1983; Tybout, 1992). A second argument is that increasing returns to scale imply lower costs per unit as output increases (Hoffman, 1958; Hoffman and Kaplinsky, 1988; Inter-American Development Bank, 1990; Tybout, 1992). The conventional views that trade liberalization is necessary and has positive effects for development and of the growth performance of the industrial sector constitute an increasing controversial issue. Adenikinju and Olofin, (2002) report that trade policy might affect industrial growth through several channels. First, a less protectionist trade regime increases scale efficiency by enlarging the domestic market which otherwise might be too small for the efficient production of goods that show increasing returns to scale. Second, a more liberal trade regime leads to increased competition from a broad forcing domestic firm to adopt less more efficient technology to reduce in efficiency and waste. Thirdly, it is argued that a freer economy eases foreign exchange constraints faced by most developing countries and hence enables a country to import needed raw materials and capital goods. Porter, (1980, 1985, 1990) argued that a more open economy results in a faster rate of technological progress. Kaplinsky, (1984, 1988, 1990), and latter on, Grossman and Helpman (1991) argued that technological change can be influenced by a country's openness to trade. Openness to trade provides access to imported inputs, which embody new technology and increases the size of the market facing producers which in turn raises returns to innovation and affects a country's specialization in research intensive production (Kaplinsky, 1994). Thus, a country's openness leads to improvements in domestic technology, helps the production process become more efficient and culminates in productivity improvements.

Prebisch, (1959); Cline, (1979); Saxenian, (1996) and Srevens, (1996) enumerated the classical benefits of a move towards free trade as including savings to consumers through lower prices that is an increased "consumer surplus" and the liberalization of domestic resources that were formally used inefficiently for use in more productive activities. In addition, to the static welfare benefits of free trade, cline acknowledges the importance of economic of scale as export sector increase its output, benefits accrue from a stimulus to investment as new export opportunities arises. Tharaken, (1983) noted that there are additional benefits from increased domestic efficiency and technical changes provided by

the new competition from abroad. Following the same line of reasoning, Haberler (1988) and WTO, (2002) identified four key points in discussing the beneficial effect of international trade on participating developing countries. First, trade provides material means (capital goods machinery and raw and semi-finished materials), indispensable for economic development. Secondly, and even more important, trade is the means and vehicle for the dissemination of technological knowledge, the transmission of ideas for the importation of know how skills, managerial talents and entrepreneurship. Thirdly, trade is a vehicle for international movement of capital especially from the developed countries. Fourthly, free international trade is the best anti monopoly policy and the best guarantee for the maintenance of a healthy degree of free competition.

IMF, (2010) noted that greater openness may accelerate technological innovations in industrial countries leading to more investment in product development. Trade liberalization has led to a massive expansion in the growth of world trade relative world output, while the world *GDP* has expanded five-fold; the volume of world trade has grown sixteen times at an average compound rate of just over seven percent per annum (Syrquin and Chenery, 1989; Soludo and Oji, 2003). In some individual countries, notably in south-east Asia, the growth of exports has exceeded ten percent per annum (Oyejide, 2003). King and Levine, (1993a, b) found that exports have tended to grow faster in countries with more liberal trade regimes, and these countries have experienced the fastest growth of *GDP*. The proponents of a free trade policies regime predict gains in manufacturing productivity from outward looking trade policies (Leibenstein, 1978). Outward trade orientation brings about familiarity with new technologies induces greater capacity utilization as well as scale benefit via production for export markets and brings about international competition. These in turn are expected to result in productivity improvements in the industrial sector. Okamoto, (1994) however found no clear evidence regarding the impact of trade liberalization as measure measured by effective rates of protection on *TFP* growth. The role of foreign direct investment policies was found to be significant. Kajiwara, (1994) observes that for the Philippines, even though the *TFP* growth rates in the manufacturing sector during the 1970s and 80s were negative there were improvements brought about by trade liberalization. Kim, (2000) examines dynamic impact of trade liberalization on productivity, competition and scale efficiency and found that despite the positive impact, the productivity increase was not significant because the extent of trade liberalization was not substantial enough in Korea. Kwak, (1994) undertakes an inter-industry regression comprising 26 manufacturing sectors using the ratio of export to output and effective rate of protection rates in the 1980s experience a large increase in productivity. In the 1970s and for extended periods including the 1970s, the effective protection rate was not statically significant.

### **Trade policy and industrial development in Nigeria**

Trade liberalization encompasses both openness and changes in trade orientation. Openness is an economy wide measure, whereas trade orientation is an industry specific measure (Pritchett, 1996; WTO, 2002). For developing countries like Nigeria, a more open international trade system means greater opportunity to earn foreign exchange through exports since the availability of foreign exchange is imperative for the purchase of imported capital goods and raw materials necessary for rapid growth (Abromowitz, 1956; Saxenian, 1996; World Bank, 1988). According to Odusola and Akinlo, (1995); Oyejide, (2003); Soludo and Oji, (2003), the trade policy reforms that have been adopted by the Nigerian government in pursuit of macroeconomic policy objectives comprise of partial abolition of import license scheme, granting of special tax incentives and tax holidays to enable local industries build up adequate funds for expansion and to encourage firms invest in economically disadvantage areas, reduction of corporate income tax rate and introduction

of tax-free dividends for foreign persons and to encourage local research and development, promulgation of export incentives decree in which various incentives to enhance export promotion were stipulated, establishment of export credit guarantee and insurance scheme to assist Nigeria companies compete effectively in the international market, government grant of 140 percent tax relief to firms in respect of research and development of raw materials, export stimulation loan scheme to provide foreign producers that require imports inputs essential to the production of export products, opening of domiciliary account to keep firms' export earnings in foreign currencies, government institutional supports through the establishment of industrial development coordinating committee, data bank, raw material research and development council, project development agency, federal institute of industrial research, export processing zone, Nigeria investment promotion council, simplification of industrial licensing, exchange market deregulation to enhance access of firm to foreign exchange and devaluation of the naira.

Indeed, the government adopted the import substitution industrialization (*ISI*) and export processing zone (*EPZ*) as a development strategy after political independence with the intent of minimizing the dependence on imported consumer goods and create employment opportunities for the Nigerian work force. Achieving sustainable growth in industrial production and globally competitive and resilient economy that is not dependent on the petroleum oil sector became the objects of Nigeria's economic reforms (Adenikinju, 2002). The *IMF* induced structural adjustment programme (*SAP*) engaged the promulgation of the new industrial policy of 1989. This policy ended up in reversing some of the provisions of the Nigerian indigenization policy and opened up the economy for foreign investors (Adenikinju and Olofin, 2002). Subsequent to the re-establishment of democracy in 1999, uptight plans were made in redirecting developmental policies and programmes in the country. One of such programmes was the small and medium industries equity investment scheme fund (2001) with the objectives of facilitating the flow of funds for the establishment of new small and medium investment projects, providing project capital and financing of small and medium industries and developing local technology and generating employment (Oyejide, 2003).

### **Theoretical framework and empirical model**

The guiding theories of the study are the absolute and comparative advantages of Smith, (1776); Ricardo, (1817) as in Evans, (1989) and; Storper and Walker, (1989). The policy of trade liberalization was earlier advocated by Smith, (1776) who has in the past posited that it is always safer to allow the economy to be propelled by an invisible hand, that is, the forces of competition motivated by industrial self-interest. Smith's (1776) argument for trade<sup>4</sup> liberalization is based on the role which division of labour plays in economic growth and development. For example, expansion of international trade is an important method of widening the market and of promoting the division of labour. Smith's proposition found support from Ricardo (1817), who emphasized the role of "comparative advantage, market mechanism" and "competition" in the growth of the economy. According to the classical theory of international trade, "free trade is the best policy" and it leads to the optimization of world's resources through international division of labour. Indeed, these authors long viewed international trade as engine of economic growth and development.

A number of theoretical arguments linking trade liberalization with higher rate of industrial productivity growth and development can be put down. There is the argument of industrial

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<sup>4</sup> Trade restrictions limit the size of the market, diminishes the scope for international specification, and thus lowering domestic productivity [Wade (1990)].

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 (Krugman, 1986). Technological change has been the focus of the endogenous growth literature (Lucas, 1988). Their works show how trade liberalization may raise growth rates in the long run by generating economics of scale, operating through research and development, knowledge spillover, human capital accumulation and learning by doing. Sutcliffe, (1971);Rodrik, (1995) and Nadvi, (1996) have shown that a domestic firm, rate of technological ‘catch-up’ is positively related to the market share. The proposition is that the sectors that gain in productivity are exportable sectors and the import competing sectors have a non-positive impact as far as technological change is concerned. Accordingly, the integration of the world economy is seen as having important influence on the pace and direction of technical change. The theory of endogenous growth links trade openness with innovation and growth (Tharaken, 1983). Grossman and Helpman, (1991) consider how trade and industrial policies affect the long-run rates of innovation and growth. The study adopted the endogenous growth framework of Lucas, (1988) where output is generated via a production function of the form:

$$GNG^{NRT} = q_0CAK^{SOCK(q_1)}[HMC^{CAPK} LAB^{FOCK(1-q_1)}L] \tag{1}$$

Where  $GNG^{NRT}$  is industrial production (output),  $CAK^{SOCK}$  is capital stock,  $HMC^{CAPK}$  is human capital stock in Nigeria,  $LAB^{FOCK}$  is labor force. The study extends the Lucas’s framework to factor in the relationship between trade liberalization and industrial output within the Nigerian context. According to Adenikinju and Chette (1999), trade liberalization captures the spillover effect on industrial production. For example, the more opened the domestic economy is to integration with international industries, the more the growth of industries in the economy. Capital stock is expected to have strapping positive influence on industrial growth. Industrial output grows faster with a high level of human capital development as measured in terms of high level of educational attainment (Mankiw *et al.*, (1992). Labour force is better equipped to adapt to new technologies and management skills developed elsewhere (Stewart, 1979; Yoffie, 1983; Pyke *et al.*, 1990; Nelson, 1993). If the dummy variable is positive and significant, it means that the adoption of *SAP* had made industrial performance to be more efficient. Using the endogenous growth framework of Lucas, (1988) as a bench mark, a simple reduced form relationship is specified, which links industrial production (output) to trade liberalization and a vector of other control variables namely, real exchange rate, labour force, capital formation, dummy variable and human capital stock. The model is thus specified functionally as:

$$GNG^{NRT} = F(CAK^{SOCK}, LAB^{FOCK}, HMC^{CAPK}, EXR^{RATE}, DMV^{DMMY}, TRA^{LBZT}) \tag{2}$$

Where  $EXR^{RATE}$  is the real exchange rate,  $DMV^{DMMY}$  is the dummy variable and  $TRA^{LBZT}$  is trade liberalization. The empirical equation is specified as follows:

$$\begin{aligned} \text{Log}[GNG^{NRT}] = & q_0 + q_1\text{Log}[CAK^{SOCK}] + q_2\text{Log}[LAB^{FOCK}] + q_3\text{Log}[HMC^{CAPK}] \\ & + q_4\text{Log}[EXR^{RATE}] + \text{Log}[GNG^{NRT}] + q_5\text{Log}[DMV^{DMMY}] \\ & + q_6\text{Log}[TRA^{LBZT}] + U_t \end{aligned} \tag{3}$$

The coefficients  $[q_1, q_2, q_3, q_5, q_6]$  are the elasticity parameters. With the exemption of the exchange rate impact, all other impacts to be estimated are expected to be positive. The error-correction specification of the model may be represented as follows:

$$\Delta\text{Log}[GNG^{NRT}] = q_0 + q_1\Delta\text{Log}[CAK^{SOCK}] + q_2\Delta\text{Log}[LAB^{FOCK}] + q_3\Delta\text{Log}[HMC^{CAPK}]$$

$$+q_4\Delta\text{Log}[EXR^{RATE}] + q_5\Delta\text{Log}[DMV^{DMMY}] + q_6\Delta\text{Log}[TRA^{LBZT}] + q_7ECM_{[t-1]} + U_t \quad (4)$$

Where  $\Delta$  is the difference operator and  $ECM_{[t-1]}$  is the error-correction term (Engle and Granger, 1987). The error correction mechanism, in general, represents the “equilibrium error”, which can be used to relate the short-run level of industrial growth to the long-run level of industrial development. If the error correction coefficient is between zero and negative one, the adjustment to industrial production in the current period [t] is a fraction of the error in the previous period [t-1]. In this case, the error correction coefficient plays a crucial role in causing the level of industrial development to converge monotonically to its long run equilibrium path in relation to changes in *the real exchange rate, structural adjustment measure, trade liberalization, capital stock, human capital stock and labour force*. In effect therefore, if the coefficient of the error correction coefficient is positive, industrial production will diverge between periods, while if the coefficient is negative, the error correction coefficient generates a dampened oscillation in the industrial sector about its equilibrium path.

## METHODOLOGY

### Unit root, co-integration and error correction method

The stability of the model of industrial development in Nigeria might be disturbed by the oil boom in the 1970s, the devaluation of exchange rate in 1987, the liberalization of interest rate in 1987 and the policy shift from a fixed exchange rate regime to a floating exchange regime in October 1987. All these are capable of inducing erroneous inference on the basis of the estimated regression results. Therefore, recent developments in time series econometrics of differencing to achieve stationarity of variables in the regression model are imperative. This minimizes the possibility of spurious result and in effect determines the robustness and consistency of estimated coefficients. In general, the use of differencing has been found to reduce the possibility of spurious regression results (Granger and Newbold, 1979; Plosser and Schwart, 1978).

The Dickey-Fuller [DF] is used to test the hypothesis that our series are generated by first order autoregressive process [AR (1)]. The *Dickey Fuller* test is extended to allow for n-order autoregressive process [AR (n)] to generate the *Augmented Dickey Fuller [ADF]*. The stationarity test by *Phillips-Peron* is also utilized in the study. The Johansen, (1988) and Johansen and Juselius, (1990) co-integration techniques are adopted in testing the existence of long-run correlation in the study. Having ascertained the existence of a long-run correlation between the variables in the study, the *Generalized Method of Moments [GMM]* is utilized in estimating the error correction model. The short run adjustment process is measured by the error correction coefficient having estimated the error correction model (Engle and Granger, 1987)].

### Partial correlation matrix test method

To estimate empirically the correlation between trade liberalization and industrial growth in Nigeria, the study made use of the partial correlation coefficient to compute the correlation matrix. The correlation coefficient is computed by considering the pairs of values corresponding to the range of times, making use of the following partial product moment formulae:

$$\begin{aligned}
 r_{x_1x_2 \cdot x_3} &= \frac{r_{x_1x_2} - r_{x_1x_3} \cdot r_{x_2x_3}}{\sqrt{(1 - r_{x_1x_3}^2)(1 - r_{x_2x_3}^2)}} \\
 r_{x_1x_3 \cdot x_2} &= \frac{r_{x_1x_3} - r_{x_1x_2} \cdot r_{x_2x_3}}{\sqrt{(1 - r_{x_1x_2}^2)(1 - r_{x_2x_3}^2)}} \\
 r_{x_2x_3 \cdot x_1} &= \frac{r_{x_2x_3} - r_{x_1x_2} \cdot r_{x_1x_3}}{\sqrt{(1 - r_{x_1x_2}^2)(1 - r_{x_1x_3}^2)}}
 \end{aligned}
 \tag{5}$$

Where  $r_{x_1x_2 \cdot x_3}$  is the partial correlation coefficient which is an estimated sample correlation coefficient for the theoretical population coefficient between  $x_1$  and  $x_2$  holding  $x_3$  fixed,  $r_{x_1x_3 \cdot x_2}$  is the partial correlation coefficient between  $x_1$  and  $x_3$  holding  $x_2$  fixed,  $r_{x_2x_3 \cdot x_1}$  is the partial correlation coefficient between  $x_2$  and  $x_3$  holding  $x_1$  fixed. By definition,  $r_{x_i x_j}^2$  is the simple correlation coefficient between any two regressors say  $X_i$  and  $X_j$ ,  $R^2$  is the multiple coefficient of determination, a measure of the overall goodness-of-fit. Accordingly, as collinearity increases between any two regressors, the variances and hence standard errors of the *OLS* estimators evenly increase. Thus, as the correlation coefficient,  $r_{x_i x_j}$  measures the degree of collinearity between the explanatory variables, the variance inflation factor (*VIF*) quantifies the speed at which variances and covariances increases. For this reason, as the collinearity between the explanatory variables increases and tends to unity, that is, the case of perfect multicollinearity, the *VIF* approaches infinity ( $\infty$ ). Also, if the collinearity between the explanatory variables,  $[x_1, x_2]$  is zero, the variance-inflating factor<sup>5</sup> will be equal to unity. In sum;

$$Lim VIF \rightarrow \infty$$

$$r_{x_i x_j}^2 \rightarrow 1$$

$$Lim VIF \rightarrow 1$$

$$r_{x_i x_j}^2 \rightarrow 0$$

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<sup>5</sup>Thus, the *VIF* measures the extent by which the variance of *OLS* estimator is inflated due to the presence of multicollinearity. By definition:

$$VIF = \frac{1}{1 - r_{x_i x_j}^2}$$



$$VIF = \frac{1}{1 - r_y^2} = \begin{bmatrix} \infty & VIF_{12} & VIF_{13} \\ VIF_{21} & \infty & VIF_{23} \\ VIF_{31} & VIF_{32} & \infty \end{bmatrix}$$

Using the notations of the *VIF*, the variances of each parameter estimate  $\hat{\phi}_1$  and  $\hat{\phi}_2$  for the three-variable model can be stated as follows (see Gujarati, 2003);

$$Var(\hat{\phi}_1) = \frac{S_v^2}{\sum x_1^2 (1 - r_{x_1 x_2}^2)}$$

$$Var(\hat{\phi}_2) = \frac{S_v^2}{\sum x_2^2 (1 - r_{x_1 x_2}^2)}$$

Where  $r_{x_1 x_2}$  is the correlation coefficient between  $\hat{\phi}_1$  and  $\hat{\phi}_2$ . In essence, if the explanatory variables in a multiple regression model are uncorrelated, the sampling variances reduce to those for the simple regression model. The intuition is that, a high degree of collinearity or correlation between the explanatory variables has the tendency of inflating the variances and hence the standard errors of the multiple regression model. Test of significance of the correlation coefficient is evaluated as a test of hypothesis on the basis of the sampling distribution of  $r_{x_1 x_2 x_3}$ . This methodology involved in the test of hypothesis is stated as below:

$$H_0^4 : r_{xixj} = 0$$

$$H_1^4 : r_{xixj} \neq 0$$

This methodology involved in the test of hypothesis is in the test statistic which is given as:

$$t = \frac{r_{xixj} \sqrt{N - 2}}{\sqrt{1 - n^2}}$$

The test statistic obeys the student's t-distribution with  $[v = (N - 2)]$  degrees of freedom

**Data**

The data for this study have been obtained from the central bank of Nigeria [CBN] statistical Bulletin and Annual Report and statement of accounts, and the federal office of statistics [FOS], Annual abstracts of statistics. The time series of the variables of the model are used

to examine the impact of trade liberalization on industrial performance. There are time series data on various measures of industrial performance in the *CBN* statistical Bulletin. These include real, nominal values, and index of industrial production. We use annual values of gross real industrial output, as it is expected that the real values would reflect better the role of openness in industrial growth. Industrial output growth is measured as the sum of *manufacturing output, mining output and the output from electricity generation*. Following Edwards (1992), Sachs and Warner (1995), the level of trade openness is measured as the ratio of *imports plus exports to GDP*. The dummy variable is used to capture the effect of *policy shock* and change in pattern and planning strategies during the period of structural adjustment. In the estimated model, this variable is assigned the value of one during the SAP era and zero otherwise.

## ANALYSIS OF REGRESSION RESULTS

### Stationary and co-integration results

The results of the stationarity test are reported in Appendix A1. The *ADF* unit root test shows that all the variables are stationary at first difference using the trend and intercept test equation at a critical value of -3.259. Also, the *Philips-Peron* test shows that all the variables are first-difference stationary with a critical value of -3.637. Appendix A2 presents the co-integration results. It examines the joint movement of the variables in the long-run following the methodology of Johansen, (1988) and Johansen and Juselius, (1990). The estimation results provide evidence of statistical long run relationship between the natural logarithm of industrial development as measured by output of the industrial sector, capital stock, the Nigerian labor force, human capital stock, trade openness, real exchange rate, structural deregulation variable and trade liberalization. This is easily ascertained on the basis of the fact that the likelihood ratios and the max-eigen values all exceed the critical values at the one percent level of significance.

### GMM error correction results

With a significant t-statistics, there exist a significant positive correlation between trade liberalization and industrial growth in Nigeria. In the short run, a ten percent rise in trade liberalization lagged one, two and three periods stimulates industrial production by 1.55, 1.09 and 1.23 percent respectively. This indeed indicates that the process of trade liberalization is cumulative and self-sustaining. The industrial production responded negatively and insignificantly to capital formation even after the third lag. By economic intuition, the real savings are not enormously available in Nigeria, credit and financial institutions are yet to mobilize adequate savings and to divert them in preferred channels and above all savings are up till now not adequately utilized for investment in capital goods. Accordingly, the rate of capital formation by means of savings mobilization and investment that will increase the production capacity of the Nigerian industries is low. Therefore, per-capita income is low and the propensity to save is exceptionally low. In effect, the result implies that the Nigerian economy is not capital intensive. Industrial production correlates positively and significantly with industrial production at both the first and third lags. The elasticity of industrial growth with respect to the first and third lags of labor force in Nigeria is 1.02 and 1.39 respectively. In effect, the results indicate that the industrial growth effect of labour force has a delayed effect. The significant effect of the Nigerian labor force on industrial production is not farfetched given that the Nigerian economy is labour intensive. It means that the industries should embark on labor intensive projects, since it has comparative advantage in it than capital intensive projects.

The coefficient of the dummy variable, which represents the policy shock of the period of structural adjustment, is positive but insignificant. The result thus portrays the fact that structural deregulation had positive but insignificant impact on the growth of industrial production in Nigeria. With a coefficient of 0.23, it indicates that ten percent increase in the policy shock associated with structural deregulation will induce 2.3 percent positive impact on industrial production in Nigeria. The insignificance of the structural deregulation could be pointing to the fact that during the era of structural adjustment in Nigeria, Nigerian industries were made to look inward for the source of raw materials. Industrial production lagged one period has a positive and significant relationship with its current index. Also ten percent rise the in previous level of industrial production will bring about a rise in the current level by 2.53 percent. This indeed indicates that industrial growth is cumulative and self-sustaining in Nigeria. Industrial output growth responded positively and significantly to real exchange rate over the period of analysis. A ten percent rise in the real exchange rate will induce 2.9 percent devaluation of the *naira vis-à-vis the US dollar* rate of foreign exchange. This in turn facilitates the export of industrial production in Nigeria. The *R-squared* explains 89 percent of the systematic variations in industrial growth in Nigeria on account of the policy changes in capital stock, labor force, human capital stock, real exchange rate, structural deregulation and trade liberalization.

The F-statistic shows that industrial production exhibits significant correlation with the variables. The *Durbin-Watson* Statistic shows that there is no problem of serial correlation. Therefore, the *GMM* estimates can be relied upon for meaningful statistical inference. The *ECM* depicts the 89 percent adjustment speed of convergence to long run equilibrium value of industrial growth in Nigeria after policy shocks or changes in trade liberalization together with other explanatory variables in the study. The estimated error correction model will act rightly to correct any deviations from the long-run equilibrium of industrial production in Nigeria. In effect, when level of industrial production deviates from equilibrium, there will be a feedback mechanism equal to 89%. The correlation coefficient between trade liberalization and industrial development in Nigeria is 0.962 (Appendix A4) and it passes the test of significance with a t ratio of 12.66 and a probability value of 0.002 (Appendix A5). In sum, the empirical findings in this study have it that there is a positive and significant correlation between industrial development in Nigeria and trade liberalization.

## CONCLUSION AND POLICY IMPLICATIONS

This study investigated focus mainly on the relation between trade liberalization and industrial growth in Nigeria. Adopted in the study is the human capital model of endogenous growth with modifications for trade liberalization within the Nigerian context. In the empirical investigation of the aggregate function of industrial development in Nigeria, co-integration and error correction estimation were done. A unique co-integration between industrial production and the explanatory variables in the study is found. In order to determine the short-run dynamics around the equilibrium relationship, we estimated an error correction model [*ECM*]. The empirical findings in this study have it that there is a positive and significant correlation between trade liberalization and industrial growth in Nigeria, structural deregulation had positive impact industrial growth in Nigeria, Nigerian industries are labor intensive, industrial production responded negatively and insignificantly to capital formation in Nigeria, industrial growth is cumulative and self-sustaining in Nigeria, that is, there is a feedback mechanism in the level of industrial production even in the case of deviation from equilibrium and real exchange rate devaluation facilitates the export of industrial production in Nigeria. The result however does not provide evidence of

significance of structural deregulation and of capital formation on industrial output growth in Nigeria over the period of short-run analysis. The policy implications are simple. The results of the study suggest the need for government to embark on comprehensive trade liberalization policies in order to accelerate and sustain industrial growth in Nigeria but in a gradual process. This is because excessive liberalizing trade could disadvantageous to industrial development as it capable of bringing into the domestic markets, imported new finished products that are indeed substandard. The Nigerian government should embark on structural deregulation in the industrial sector of her economy. Nigerian industries should embark on labor intensive projects since it has comparative advantage in it than capital intensive projects. There is need for the government to enhance the rate of capital formation by means of savings mobilization and investment that will stimulate the production capacity of the Nigerian industries.

## REFERENCES

- Abromowitz, M. (1956). Resources and Output Trends in the United States since 1879, *American Economic Review*, Vol. 46, pp. 52–3
- Adenikinju, A. F. (2002). Trade Liberalization, Market Structure and Productivity in Nigerian Manufacturing. Interim Report Presented at AERC research
- \_\_\_\_\_ and S. Olofin. (2002). Economic Policy and Manufacturing Sector Performance in Africa. *The Nigerian Journal of Economic and Social Studies*, Vol. 42, No. 1 pp. 1-22
- Ahmed, N. (1999). Trade Liberalization in Bangladesh. Dhaka, University Press Limited
- Bhagwati, J. N. (1987). Immiserizing growth, in J. Eatwell, M. Milgate and P. Newman (eds.), *The New Palgrave: A Dictionary of Economics*, London: Macmillan
- Bakht, Z. (1998). Trade Liberalization, Exports and Growth of Manufacturing Industries in Bangladesh. Dhaka, Bangladesh Institute of Development Studies (Mimeo).
- Balakrishnan, *etal.* (2000). Trade Liberalization and Productivity Growth in Manufacturing: Evidence from Firm Level Data. *Economic and Political Weekly Distribution*, Vol. 13, pp. 3-29
- Cline, W. R. (1979). A Quantitative Assessment of the Policy Alternatives. In *Policy Alternatives for a New International Economic Order: An Economic Analysis*. N. R Cline, ed. Praeger Publishers, New York, pp. 1-59
- Edwards, S. (1993). Openness, Productivity and Growth. What do we really Know *Economic Journal*, Vol. 108, pp. 383-398
- European Commission. (1996). Building the European Information Society for Us All, Brussels: European Commission
- Evans, D. E. (1989). Comparative Advantage and Growth: Trade and Development in Theory and Practice, Hemel Hempstead: Harvester Wheatsheaf
- Engle, R. F. and C. W. J. Granger. (1987). Co-integration and Error Correction Representations, Estimation and Testing. *Econometrica*, March, pp. 251-76
- Freeman, C. (1976). *The Economics of Industrial Innovation*, London: Penguin Books
- Freeman, C. and C. Perez. (1988). Structural crises of adjustment, in Dosi Giovanni *et al.* (eds.), *Technical Change and Economic Theory*, London: Frances Pinter
- Granger, C.W. J. and Newbold, P. (1977). Time Series Approach to Econometric Model Building. in Sims C. A. (ed.), *New Methods in Business Cycle Research*. Proceeding from Conference. Federal Reserve Bank of Minneapolis
- Grossman, G. M. and E. Helpman. (1991). Trade, Knowledge Spillovers and Growth. *European Economic Review* 35, April
- Haberler, G. (1988). International Trade and Economic Growth Development. *International Centre for Economic Growth*

- Helleiner, G. (1986). Outward Orientation, Import Instability and African Economic Growth: An Empirical Investigation. In S. Lall and F. Stewart, (eds), Theory and Reality in Development. Macmillian, London.
- Hoffman, K. and R. Kaplinsky. (1988). Driving Force: the Global Restructuring of Technology, Labor and Investment in the Automobile and Components Industries, Boulder, Colo. Westview Press
- Hoffman, W. (1958). The Growth of Industrial Economies, Manchester: Manchester University Press
- Humphrey, J. (1995). Industrial reorganization in developing countries: from models to Trajectories, World Development, Vol. 23, No. 1, pp. 149-162
- Inter-American Development Bank (1990). Economic and Social Progress in Latin America, Washington, DC: IADB.
- IMF, (2010). Global Trade Liberalization and the Developing Countries
- Johansen, S. (1998). Statistical Analysis of Co integrating Vectors. *Journal of Economic Dynamics and Control*, Vol. 12, pp. 231-254
- and Juselius, K. (1990). Maximum Likelihood Estimation and Inference and Co-integration with Applications to the Demand for Money. Oxford Bulletin of Economics and Statistics, Vol. 5, pp. 169-210
- Jenkins, R. (1996). Trade Liberalization and Export Performance in Bolivia. Development and Change Vol. 27, No. 4, pp. 693-716
- Kim M. K. (1978). Foreign Trade Regimes and Economic Development: Anatomy and Consequences of Exchange Control Regimes, New York, National Bureau of Economic Research
- \_\_\_\_\_ and C. J. Park. (1985). The Utilization of Capital and Growth of Output in a Developing Economy. *Journal of Economic Development*
- Krueger, A. O. (1986). Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences. Cambridge, Massachusetts, Ballinger
- Krueger, A. O., (1995). Trade Policies and Developing Nations. Washington, DC: Brooking Institution
- \_\_\_\_\_ (2009). Trade Liberalization and Growth in Developing Countries, Paper Presented at American Economic Association meeting, January 4-6, New Orleans, pp. 1-14
- \_\_\_\_\_ and Tuncer, B. (1982). An empirical Test of the Infant Industry Argument. American Economic Review, Vol. 72, No. 5
- Kaplinsky, R. (1982). Computer Aided Design: Electronics, Comparative Advantage and Development, London: Frances Pinter
- Kaplinsky, R. (1984). Automation: the Technology and Society, Harmondsworth: Longman
- Kaplinsky, R. (1988). Industrial Property Rights in the Uruguay Round and Beyond, Journal of Development Studies, Vol. 25, No. 3, pp. 373-400
- Kaplinsky, R. (1990). The Economies of Small: Appropriate Technology in a Changing World, London: Intermediate Technology Press
- Kaplinsky, R. (1993). Export Processing Zones in the Dominican Republic: Transforming Manufactures into Commodities, World Development, Vol. 22, No. 3, pp. 1851-65
- King, R. G. and R. Levine. (1993a). Finance and Growth, Schumpeter Might be Right, Policy, Research and External Affairs Working Paper No 183, Washington, DC: World Bank
- King, R. G. and R. Levine (1993b). Finance, Entrepreneurship and Growth, Theory and Evidence, *Journal of Monetary Economics*, Vol. 32, No. 3, pp. 513-42
- Kwak, P. K. (1994). The Impact of Trade Liberalization on Manufacturing Sector Performance in Developing Countries. A Survey of Literature. Department of Economics Working Paper. University of Wollongong

- Leibenstein, H. (1978). General X-efficiency Theory and Economic Development, Oxford: OxfordUniversity Press
- Lucas, R. E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*, Vol. 22, NO. 1, pp. 3-42
- Matin, K. M. and W. F. Page. (1992). Openness and Economic Performance in Sub-Saharan Africa: Evidence from Time Series, Cross-Country Analysis. Working Paper 1025, World Bank, Washington, D. C.
- Mankiw, N. G., D. Romer and D. N. Weil. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, CVII, No. 2, pp. 407- 437
- Nadvi, K. (1996). Small Firms and Industrial Districts in Pakistan, DPhil Thesis, University of Sussex
- Nelson, R. R. (1993). National Innovation Systems: A Comparative Analysis, New York: OxfordUniversity Press
- Odosola, D. and N. Akinlo. (1995). Trade Liberalization and Industrial Growth in Pakistan: A Co integration Analysis. Working Paper, Centre for South Asian Studies. Sydney, Australia.
- Okamoto, W. R. (1994). Foreign Trade Regimes and Economic Development. World Bank Research Observer, Vol. 2, No. 2.
- Oyejide, T. A. (2003). Trade Reform for Economic Growth and Poverty Reduction World Bank Development Outreach
- Pack, W.T. (1998). Openness, Trade Liberalization and Growth in Developing Countries, *Journal of Economic Literature*, Vol. 31, pp. 1358-1393
- Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competition, New York: Free Press
- Porter, M. E. (1985). Competitive Advantage: Creating and Sustaining Superior Performance, NewYork: Free Press
- Porter, M. E. (1990). The Competitive Advantage of Nations, London: Macmillan
- Prebisch, R. (1959). Commercial Policy in the UDCs, American Economic Review Papers andProceedings
- Pyke, F., G. Becattini. and W. Sengenberger. (1990). Industrial Districts and Inter-firm Cooperation in Italy, Geneva: International Institute for Labour Studies
- Pritchett, A. W. (1996). Openness and Growth: A Time Series, Cross-Country Analysis for Developing Countries. NBER Working Paper 5221, Cambridge, Massachusetts.
- Ploser W. W. and F. A. Schwart (1978). Industry in Developing Countries Theory, Policy and Evidence. London Routledge
- Ricardo, D. (1817). The Theory of comparative Advantage
- Rodrick, D. (1995). Developing Countries after the Uruguay Round. CEPR Discussion Paper, No. 1084, London
- Saxenian, A. (1996). Regional Advantage, Cambridge, Mass.: Harvard University Press
- Schmitz, H. (1995a). Collective efficiency: growth path for small-scale industry, *Journal of Development Studies*, Vol. 31, No. 4, pp. 529-66.
- Shahbaz, M. (2012). Does trade openness affect long run growth? Cointegration, causality and forecast error variance decomposition tests for Pakistan. *Economic Modelling*, Vol. 25, pp. 2325-2339.
- Smith A. (1776). Absolute Advantage Theory
- Stevens, C. (1996). Trade openings and development co-operation, in CeSPI, A New Transatlantic Partnership: The Third Castelgandolfo Colloquium on Atlantic Affairs, Rome:
- Stevens, C. and A. Young. (1997). The Impact of the Single Market Programme on Conditions of Access of Third Countries Products to the EC Market, London: Kogan Page for the EC Commission

Stewart, F. (1979). *Technology and Underdevelopment*, London: Macmillan, 2nd edition

Storper, M. and R. Walker. (1989). *The Capitalist Imperative: Territory, Technology and Industrial Growth*, Oxford: Basil Blackwell

Sutcliffe, R. B. (1971). *Industry and Underdevelopment*, London: Addison-Wesley

Syrquin, M. and H. Chenery. (1989). *Patterns of development: 1953 to 1983*. World Bank Discussion Paper No 41, Washington, DC: IBRD

Soludo C. C. and G. Oji. (2003). *Does Trade Openness make sense at this time in Nigeria? A Proposal Prepared for the Trade and Macroeconomic Working Group*, TRADEMAC

Tharaken, P. K. N. (ed.) (1983). *Intra-industry Trade: Empirical and Methodological Aspects*, Amsterdam: North-Holland

Tybout, N. S. (1992). *Openness, Productivity and Growth. What Do We Really Know*, *The Economic Journal*, Vol. 108, pp. 383-398

Umoru, D. (2013). *Employment and International Trade Flows In Nigeria: VECM Analysis*. International Affairs and Global Strategy, United States of America. ISSN 2224-574X (Paper) ISSN 2224-8951 (Online), Vol. 8, pp. 1-18 [March Issue]

Wade, R. (1990). *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*, Princeton: Princeton University Press

Weiss, I. (1990). *Industry in Developing Countries Theory, Policy and Evidence*. London Routledge.

World Bank (1987). *World Development Report*, Oxford: Oxford University Press

World Bank (1988). *Caribbean Exports: Preferential Markets and Performance*, Report No 7207-CRG, International Economics Dept, Policy, Planning and Research, Washington, DC: World Bank

World Bank (2012). *World Development Report*, Washington, DC: World Bank

World Trade Organization (2002). *International Trade: Trends and Statistics*, Geneva

Yoffie, D. B. (1983). *Power and Protection: Strategies for the Newly Industrialising Countries*, New York: Columbia University Press

**Appendix A1: Unit root test results**

SECTION A: AUGMENTED DICKEY-FULLER TEST RESULTS @ 5 PERCENT		
Variables	ADF Test Statistic*	Critical Value @ 5%
$\Delta \text{Log}[GNG^{NGRT}]$	-5.89, I[1]	-3.259
$\Delta \text{Log}[CAK^{SOCK}]$	-4.53, I[1]	-3.259
$\Delta \text{Log}[LAB^{FOCK}]$	-5.75, I[1]	-3.259
$\Delta \text{Log}[HMC^{CAPK}]$	-5.29, I[1]	-3.259
$\Delta \text{Log}[EXR^{RATE}]$	-7.79, I[1]	-3.259
$\Delta \text{Log}[DMV^{DMMY}]$	-5.35, I[1]	-3.259
$\Delta \text{Log}[TRA^{LBZI}]$	-4.55, I[1]	-3.259
SECTION B: PHILIPS-PERRON TEST RESULTS @ 5 PERCENT		
Variables	PP Test Statistic*	Critical Value @ 5%
$\Delta \text{Log}[GNG^{NGRT}]$	-10.35, I[1]	-3.637
$\Delta \text{Log}[CAK^{SOCK}]$	-9.39, I[1]	-3.637
$\Delta \text{Log}[LAB^{FOCK}]$	-13.55, I[1]	-3.637
$\Delta \text{Log}[HMC^{CAPK}]$	-15.59, I[1]	-3.637
$\Delta \text{Log}[EXR^{RATE}]$	-9.39, I[1]	-3.637
$\Delta \text{Log}[DMV^{DMMY}]$	-15.35, I[1]	-3.637
$\Delta \text{Log}[TRA^{LBZI}]$	-22.59, I[1]	-3.637

NOTE: \* indicates difference stationary series @ 5% for both the ADF and PP

**Appendix A2: Co-Integration test results**

<i>Eigen Value</i>	<i>Likelihood Ratio</i>	<i>Max-eigen Value</i>	<i>1% Critical Value</i>	<i>No. of Co-integrating Equations</i>
0.59	58.65*	57.35*	54.46	At most 1
0.53	35.53**	49.93**	33.65	At most 2
0.09	13.38***	33.75***	5.55	At most 3

\*, \*\*, \*\*\* denotes 1, 2, 3, co-integrating vectors at 1% significance level respectively.

**Appendix A3: System error correction results**

<i>Industrial Growth Model</i>		<i>Generalized Method of Moments</i>	
<i>Variables</i>		<i>Coefficients</i>	<i>T-Statistic</i>
<i>C</i>		-0.02	-1.89
$\Delta \text{Log}[CAK^{SOCK}]_{[-1]}$		-0.29	-1.05
$\Delta \text{Log}[CAK^{SOCK}]_{[-2]}$		-0.02	-1.26
$\Delta \text{Log}[CAK^{SOCK}]_{[-3]}$		-0.05	-1.33
$\Delta \text{Log}[LAB^{FOCK}]$		1.02	5.99*
$\Delta \text{Log}[LAB^{FOCK}]_{[-3]}$		1.39	9.35*
$\Delta \text{Log}[HMC^{CAPK}]$		0.05	3.67**
$\Delta \text{Log}[GNG^{NGRT}]_{[-1]}$		2.53	13.67*
$\Delta \text{Log}[EXR^{RATE}]$		-0.29	-2.97***
$\Delta \text{Log}[DMV^{DDMMY}]$		0.23	1.35
$\Delta \text{Log}[TRA^{LBZT}]$		1.55	5.53*
$\Delta \text{Log}[TRA^{LBZT}]_{[-1]}$		1.09	5.55*
$\Delta \text{Log}[TRA^{LBZT}]_{[-2]}$		1.23	3.29**
$ECM_{[-1]}$		-0.89	-5.98*
<i>Model Diagnostic Results</i>			
<i>Measure</i>		<i>Statistic</i>	<i>Probability</i>
<i>R-Squared(Adjusted R-squared)</i>		0.89(0.85)	0.00
<i>F-Ratio</i>		293	0.00
<i>S.E. of Regression</i>		0.02	0.00
<i>Sum Square Residual</i>		0.09	0.00
<i>Log likelihood</i>		3.05	0.00
<i>Durbin-Watson Statistics</i>		2.03	0.00

\*, \*\*, \*\*\* indicates statistical significance @ 1%, 5%, 10% respectively

**Appendix A4: Correlation matrix**

	$GNG^{NGRT}$	$CAK^{SOCK}$	$LAB^{FOCK}$	$HMC^{CAPK}$	$EXR^{RATE}$	$DMV^{DDMMY}$	$TRA^{LBZT}$
$GNG^{NGRT}$	1.000	0.629	0.882	0.604	0.222	0.126	0.962
$CAK^{SOCK}$	0.629	1.000	0.229	0.892	0.162	0.256	0.422
$LAB^{FOCK}$	0.882	0.229	1.000	0.906	0.028	0.859	0.568
$HMC^{CAPK}$	0.604	0.892	0.906	1.000	0.276	0.662	0.668
$EXR^{RATE}$	0.222	0.162	0.028	0.276	1.000	0.898	0.522
$DMV^{DDMMY}$	0.126	0.256	0.859	0.662	0.898	1.000	0.866
$TRA^{LBZT}$	0.962	0.422	0.568	0.668	0.522	0.898	1.000



**Appendix A5: Results of test of hypotheses**

$$\text{Test Equation: } t = \frac{r_{xixj} \sqrt{N-2}}{\sqrt{1-n^2}}$$

$$H_0^4 : r_{xixj} = 0$$

$$H_1^4 : r_{xixj} \neq 0$$

	$GNG^{NGRT}$	$CAK^{SOCK}$	$LAB^{FOCK}$	$HMC^{CAPK}$	$EXR^{RATE}$	$DMV_y^{DMM}$	$TRA^{LBZT}$
$GNG^{NGRT}$	0.000***	2.222	4.762***	2.434	1.672	1.679	8.532***
$CAK^{SOCK}$	2.222	0.000***	1.262	3.452**	0.032	0.325	1.562
$LAB^{FOCK}$	3.562**	1.262	0.000*** **	5.586	0.006	6.649***	2.028
$HMC^{CAPK}$	2.434	3.452**	5.586***	0.000***	0.004	2.828	2.046
$EXR^{RATE}$	1.672	0.032	0.006	0.004	0.000***	5.029	2.782
$DMV_y^{DMM}$	1.679	0.325	6.649***	2.828	5.029	0.000***	6.245***
$TRA^{LBZT}$	8.532***	1.562	2.028	2.046	2.782	6.245***	0.000***

**Note:** \*\*\*(\*\*) signifies significance @ 1%(5%) level. Figures along the principal diagonal of the matrix are probably values