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Trade openness channels and labour market performance: evidence from Nigeria

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Abstract

Purpose – The implications of trade on developing economies have generated substantial debates with most studies focussed on "openness in the policy". Hence, the purpose of this study is to focus on "openness in practice".

Design/methodology/approach – This study uses two models and employed the vector error correction model and structural vector autoregression, first, to examine the sectoral effects; second, to investigate the efficacy of neoclassical and new trade theories; and third, to analyse the effect of trade openness shock on Nigerian labour market performance.

Findings – The results of the first model showed that trade openness has an adverse effect on employment and wages in both the agriculture and manufacturing sectors. Likewise, the study concludes that the new trade theory explains trade's behaviour on employment and wages in Nigeria. The second model showed that the effect of error shock from trade openness affected wages more than employment.

Research limitations/implications – The study ignores the distributional effects due to unavailability of data.

Practical implications – The study suggested, amongst others, the need for policies mix on the labour market via a coherent set of initiatives in other to increase the competitiveness of Nigeria in the international market.

Originality/value – Most studies focussed on openness in policy through the channels identified in the literature. However, this study investigates these channels in "openness in practice" and investigates trade theories' efficacy on manufacturing and agricultural sectors in Nigeria, which has been neglected in the literature.

Keywords Trade openness, Wages, Employment, VAR, Nigeria

Paper type Research paper

AQ: 6 ## 1. Introduction

AQ: 7 International trade has been seen as the engine for growth and overall welfare for developed and developing economies. It creates a market for efficient allocation of resources and a basis to increase income and reduce poverty (Harrison, 2005; Viet, 2014). The relationships between openness and labour market performance have been studied extensively in the literature, however, with more attention given to openness in policy (Uprety, 2017). Likewise, trade implications for developing economies have generated substantial debates (Asaleye *et al.*, 2017). Theoretically, the combination of Heckscher and Ohlin (1933) and Samuelson (1948),
AQ: 8 HOS framework, shows that trade can be beneficial through the comparative advantage. On the other hand, the new trade theory pointed out that trade's benefit cannot be limited to the comparative advantage but rather the competitive advantage (Krugman, 1980). According to the new trade theory, trade can worsen the labour market in developing economies if the countries have a lower competitive advantage in the international market compared to the

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developed economies. There is no consensus on the theoretical perspectives on the implication of trade most especially on developing economies.

Empirically, some studies have argued that openness can promote growth, increase income and reduce poverty (Dollar and Kracy, 2000; Harrison, 2005; amongst others), while others argued it has an adverse effect on the economy (Easterly and Kraay, 2000; Moreira and Najbery, 2000). The direct labour policies that can be used to promote employment opportunities and improve wages are geared towards increasing aggregated output as a prerequisite to promote employment and increase income. A strand of literature views the steady increase in output as a remedy for unemployment and low-income problems. Theoretically, Okun (1962) stated that an inverse relationship exists between unemployment and output. When output increases, employment will increase and the wage will consequently increase. For empirical work, along with these views, see Olopade *et al.* (2019) and Viren (2001).

The Nigerian economy has witnessed an increase in growth rate before the recession in the second quarter of 2016, while the unemployment rate has been increasing for decades (Popoola *et al.*, 2019; Central Bank of Nigeria CBN, 2016; Oladipo *et al.*, 2019a, b). Different scholars have also identified Nigeria's wage structure not to have addressed the people's basic needs (Asaleye *et al.*, 2020). The Nigerian government has introduced different policies and programmes to improve this situation (Asaleye *et al.*, 2017). Examining the impact of trade on employment and wages can help map out a strategy to maximise the benefit from trade and promote pro-poor growth.

Consequently, four main channels amongst others have been identified in the literature in which trade affects employment and wages, namely as sectoral effects, distributional effects, technology transmission and shock effects. Although numerous empirical studies have examined the channels identified, most of these studies examine the policy aspect, also known as trade liberalisation. Albeit, trade-in policy or trade liberalisation can help determine the appropriate policy to promote growth and development but does not show real trade exposure on the economy. Trade-in practice measured empirically by the inflow of goods relative to nominal gross domestic product reflects the real exposure of trade on the economy (Asaleye *et al.*, 2017). The sectoral effects of trade explain how different sectors have been due to trade (Jarmillo and Tovar, 2006; Helpmen and Itsthoki, 2011). The distribution effects mean the impact of trade on skilled and unskilled factors (Turrini, 2002). Likewise, the presence of trade is presumed to spur innovation through technological progress to increase aggregate output and lower cost of production in the long run (Aldieri and Vinci, 2018; Piva and Vivarelli, 2018). Finally, the removal of trade protection causes demand shock, which alters relative prices and movement of resources from one channel of production to another (Jaramillo and Tovar, 2006; Peluffo, 2013). Due to this effect, trade causes shock on the economy.

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In light of these issues' importance in practice, this study examines the efficacy of trade theories on the Nigerian economy. A methodology was also developed to incorporate the channels identified, including the sectoral effects and shock effects focussing on the manufacturing and agriculture sectors. This study did not consider the distribution effects and technological transmission because of the unavailability of data. However, this work contributes to the existing literature in threefold: First, this study investigates the sectoral effects on the Nigerian economy and establishes the joint short- and long-run causality by using the vector error correction model (VECM). Likewise, restrictions were imposed to establish long-run equations for output, employment and wages. Second, we use the structural vector autoregressive (SVAR) model to investigate trade's shock effects on Nigerian labour market performance. The variance decomposition table and impulse response function from Monte Carlo estimation were used to interpret the effects. Third, this

study investigates the relative efficacy of HOS and new trade theories in explaining trade openness on Nigeria's labour market performance.

This study is structured as follows: After the introductory section, Section 2 presents the literature review, while Section 3 explains the methodology outline. Section 4 presents the empirical result and discussion of findings. Finally, Section 5 concludes.

2. Literature review

The neoclassical trade theorists documented that both developed and developing economies gain from trade through the comparative advantage; this was documented in the HOS framework. The new trade theorists emphasise the importance of competitive advantage over the comparative advantage. Abel-Koch *et al.* (2011) pointed out that international trade on labour market performance is one of the main challenges in international trade, most especially in developing economies. Empirically, recent studies have been carried out to test the efficacy of trade theories. Few amongst others include Uprety (2017) who examined the impact of international trade on emigration in developing counties. The findings of Uprety (2017) indicated a strong incentive for the movement of skilled workers in developing economies to developed economies, while no effect on trade was noted for the movement of low-skilled workers. Likewise, Cigno *et al.* (2017) constructed a two-period model of the world economy to examine the impact of trade liberalisation on skill premium and the labour market in developing economies. The scholars' findings showed a negative relationship between trade openness and child's labour and a positive relationship with skill premium. The scholars concluded that there would be a higher demand for skilled factor from abroad relative to unskilled labour.

The study by Helpman *et al.* (2011) also investigated the connection between trade and the labour market in a model setting where the firms were assumed to be heterogeneous in productivity and the allocation of factors' inputs subjected to matching frictions and searching. The scholars' findings showed that openness increases the wage gap where there is high and low productivity. Hazarika and Otero (2011) investigated the effect of North American Free Trade Agreement on return to skill in North-South, Mexico. The proposition of HOS was tested by scholars. Their findings showed that openness in developed nations might lower returns to skill in developing nations; this was in line with the HOS theorem.

Strands of literature have shown that transmission on trade on wage and employment is through four main channels, namely, sectoral effects, distributional effects, shock effects and technological transmission (as indicated in the schematic analysis of openness–labour market nexus in Figure A1, see the Appendix section). The distributional effects of trade show how openness affects the skilled and unskilled factors; how gains from trade can be transmitted amongst the developed and developing countries concerning income (OECD, 2005; Turrini, 2002 amongst others). The sectoral effects of trade indicate how different sectors have been affected due to engagement in trade as documented in the literature (Helpmen *et al.*, 2011; Jaramillo and Tovar, 2006; Turrini, 2002, amongst others). For shock effects, see Aldieri and Vinci (2018), Jaramillo and Tovar (2006), Peluffo (2013). Finally, a strand of the literature shared the perspective that trade spur technological progresses through innovation (Santacreu, 2015; Aldieri and Vinci, 2018). However, most studies in the literature examined the sectoral, distributional and shock effects in "openness in policy" with studies on "openness in practice" still growing. Empirical studies on technological transmission have been discussed extensively in the literature; few studies, including Marszk and Lechman (2018), investigate the connection between openness and innovation in Japan and South Korea. The scholars reported that both countries had been affected by the diffusion of innovation. However, the stage and period differ, it happened in Japan at the early stage and to South Korea when the country was much closer to expected maximum saturation.

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A similar study by Santacreu (2015) stressed that as a result of trade, innovation grows at a different rate. According to the scholar, the growth of innovation in developing economies results from domestic activities. Another study by Buryi and Lahira (2019) examines the impact of tariffs on private and public investment on research and development (R&D). The scholars reported that tariff reduction lower the investment in R&D in the private sector but increases in the public sector. Rubini (2014) constructed a model to analyse the connection between innovation and trade elasticity. The scholar concluded that absence of innovation causes aggregate trade to be lower. The study by Senser and Delican (2019) also documented that trade impacts innovation in developing and developed economies.

Consequently, Aldieri and Vinci (2018) examine the impact of openness shock resulting from the 2006 economic crisis on the labour market outcome of high-tech and low-tech companies in the USA, Japan and Europe. The scholars documented that openness shock through innovation has a negative effect on employment before the world economic crisis; however, it was positive afterwards in 2006. Piva and Vivarelli (2018) analyse the nexus amongst technological change, openness and employment in 11 European countries using generalised method of moments system and least square dummy variable corrected estimator. The scholars observed a connection between R&D and openness with no significant effect on the low-tech sector.

McCulloch *et al.* (2001) divided the examination of trade into two categories: openness in practice and openness in the policy. The openness in policy is most times referred to as trade liberalisation. This measurement involves a reduction in tariff and other trade instruments to encourage trade. On the other hand, openness in practice measures the degree of exposure resulting from trade on the economy computed by total inflows of goods divided by the nominal GDP (United Nation, 2007; Asaleye *et al.*, 2017). Although trade liberalisation helps determine the most appropriate policy to stimulate growth and development, it does not reflect an economy's actual exposure. "Openness in practice" has the advantage that reflects the actual exposure of an economy and is easily measurable.

On methodological issues, empirical analysis of trade-in policy is often performed using computable general equilibrium (CGE) models and agent-based model (ABM) (see: Burstein and Vogel, 2012; Felipe and Fisher, 2003; Tokarick, 2011; amongst others). Some scholars believed that the ABM is more appropriate than regional CGE (Authur and Stiglitz, 1989). The literature has also documented that the ABMs are most useful in analysis involving industrial policy due to the long-run dynamics, innovation and other complex issues that might not be accounted for in other techniques (Tesfatsion, 2003). The CGE models are employed mostly in recent times because of the advantage it has over econometric techniques of estimation. The ILO (2011) pointed out that despite its flexibility and efficient, it has limitation if it is wrongly interpreted and has been criticised as work of friction that different models give different results. Turrini (2002) supported this argument, and the scholar stressed that his work's motivation is due to some of the unsatisfactory result from CGE's models. Also, most of the CGE models need social accounting matrix (Sam) which may be constructed for a particular purpose and objective of a study and may not be appropriate for other studies, resulting to inconsistent result.

On the other hand, the econometric approach in the literature is used to examine the trade in practice. Robinson and Davarajan (2002) emphasised that trade has wide impacts on the economy due to its complementary nature, and it is efficiently analysed by using an economy-wide model. The ILO (2011) stated that reverse causality and omitted variables are the problems associated with the econometric approach. In a similar study by OECD (2005), it was documented that most econometric approaches give similar results in studying of trade openness and labour market indicators.

Interestingly, a similar study by Asaleye *et al.* (2019) focussed on the effect of financial integration proxy by financial openness, which is the sum of total foreign inflows (foreign

direct investment and portfolio investment) divided by nominal GDP. Asaleye *et al.* (2019) study the long impact, causal effects and shock impact of financial integration on employment and wages in Nigeria. Likewise, the study by Asaleye *et al.* (2017) examines the impact of trade openness on employment using the VECM. However, Asaleye *et al.* (2017) ignored the openness channels documented in the literature and wages' effects. This study can be distinguished from previous studies by focussing on the impact of openness channels on employment and wages in Nigeria. Based on this, the following three hypotheses were tested: Openness does not have a significant sectoral effect on labour market performance in Nigeria; shocks from trade openness do not significantly affect labour market performance in Nigeria and the HOS/new trade theory does not explain the impact of openness on Nigeria's labour market performance. The trade openness was proxy by the sum of import and export goods divided by the nominal GDP. Besides, we test for the efficacy of trade theories on labour market performance by examining the impacts of trade openness on agricultural and manufactural sectors that have been neglected by previous studies in Nigeria. We also employed structural VECM, which has an advantage over the VECM by imposing long-run restrictions based on the theory to identify the reduced forms of economic structure.

3. Model specification

Two models are estimated to achieve the objectives of this study. The first model, referred to as Model A, was used to examine the sectoral effects and efficacy of the trade theories. The second model, referred to as Model B, was used to examine trade openness shock on aggregate output, employment and wages.

3.1 Sector effects and efficacy of HOS and new trade theory (Model A)

The theoretical framework of this paper is built on the competitive labour market by Revenga (1992). The labour demand is given in first differenced form as follows:

$$d\ln LAB_t = d\,OBF_t^1 \prod + \theta_1 \ln P - DOM_t - \theta_2\, dIn\ WG_t + v_{1t} \tag{1}$$

where LAB_t is the demand for labour in the industry, OBF_t^1 is the observable factors that cause a shift in labour demand, $P - DOM_t$ is the effect of trade proxy by import price in the home currency, WG_t is the value of wage in the industry, v_{1t} is the error term and $\prod$ is the vector of parameters. Assuming a normal supply function is given as follows:

$$d\ln LAB_t = c.\,d\ln WG_t + d\,OBF_t^2 \prod + v_{2t} \tag{2}$$

where OBF_t^2 is the observed factor that can cause a shift in the labour supply curve and v_{2t} is the error term. The labour market is in equilibrium at clearing price, given by the quasi-reduced form equations as follows:

$$d\ln LAB_t = \gamma_1 d\ OBF_t^1 \prod + \gamma_2 d\ln P - DOM_t + \gamma_3 d\ OBF_t^2 \prod + u_t \tag{3}$$

$$d\ln WG_t = \beta_1 d\ OBF_t^1 \prod + \beta_2 d\ln P - DOM_t + \beta_3 d\ OBF_t^2 \prod + \varepsilon_t \tag{4}$$

The error terms (u_t and ε_t) are the unmeasured components of variation in labour and wage; both are the combinations of the shocks from demand and supply of labour. Two sectors, agricultural and manufacturing sectors, are being considered in this study to examine the sectoral effects and the efficacy of HOS and new trade theories on Nigeria's labour market performance. In this study, the observable factors are represented by the exchange rate, interest rate and inflation rate, where the effect of trade is represented by trade openness. Hence, to achieve the objective of this study, the implicit functions are given as:

3.1.1 Agriculture sector.

$$LBA_{1t} = f(AGDP, EXC, INT, TROP, INF) \quad (5)$$

$$WG_{1t} = f(AGDP, EXC, INT, TROP, INF) \quad (6)$$

3.1.2 Manufacturing sector.

$$LBA_{2t} = f(MGDP, EXC, INT, TROP, INF) \quad (7)$$

$$WG_{2t} = f(MGDP, EXC, INT, TROP, INF) \quad (8)$$

In the presence of non-stationary series and at least evidence of one cointegration relation amongst the series, the VECM is more appropriate than the first differenced vector autoregression (VAR) (Asaleye *et al.*, 2020). The VECM is given as:

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \alpha\beta Y_{t-1} + \mu_t \quad (9)$$

In equation (9), Y_t represents the variables used in the study, $\alpha\beta Y_{t-1}$ is the long-run relationship that explains the cointegration relation amongst the series and μ_t is the error term. This study estimated the VECM for Model A. Model A consists of four equations (Equations (5)–(8)), referred to as Models 1, 2, 3 and 4 in Section 4. This study examined the joint short- and long-run causality for the stated equations. The joint short- and long-run causality is examined by following the approach outlined by Masih and Masih (1996). The joint long-run causality is estimated by the least square method from the VECM system of equations. According to Masih and Masih (1996), the ECM shows another channel in which causality can be measured.

According to Masih and Masih (1996), the causality can be examined through the error term's lag. The ECM's significance with a negative sign indicates the joint long-run causality of the explanatory variables' lags. The joint short-run causality is examined by the Wald test statistics. The significance of the restrictions on the coefficients of the lag of the independent variables indicates joint short-run causality. In the literature, three approaches, amongst others, are identified to examine joint short- and long-run causality. The first approach is called nonparametric approach (Lewis and Reinsel, 1985). The second approach follows a finite order VARMA model using maximum likelihood and nonlinear least square, require nonlinear optimisation. Several scholars have pointed out that these approaches might not be feasible because the number of parameters can increase quickly (Dufour and Pelletier, 2003). The third approach overcomes this problem by assuming a process that follows a finite order model, which can be estimated by the least square method. In this study, Masih and Masih's (1996) approach was adopted.

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3.2 Effect of trade openness shock (Model B)

According to Pesaran and Shin (2001), the VECM is presented as follows:

$$\Delta Z_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{\rho-1} \Gamma_i \Delta Z_{t-i} + \prod Z_{t-i} + e_t \quad (10)$$

In equation (10), $\{\Gamma_i\}_{i-1}^{\rho-1}$ represent the short-run response matrices, e_t represent the white noise vector of error terms, $\prod$ represents the long-run multiplier matrix and Z_t is the vector of dependent variables such as GDP, EXC etc. The long-run multiplier matrix in equation (10) can be rewrite as follows:

$$\prod = a\beta Z_{t-1} \quad (11)$$

where β represent the long-run cointegration parameter, $a\beta Z_{t-1}$ represent the long-run relationship between the variables moving together. The VAR is converted into SVAR given as follows:

$$\prod(L)Z_t = \varepsilon_t \tag{12}$$

where $\prod(L) = \ln - \sum_{i=1}^{k} \prod_i L^i$ and $\varepsilon_t \sim VWN(0, \sum)$, ε_t is the error term of the structural model. The VECM and SVAR are related through the following equation:

$$\Delta(L)Z_t = v_t = \beta\varepsilon_t \tag{13}$$

where $\Delta(L) = A + \sum_{i=1}^{k} A_i L^i, u_t \sim VWN\,(0, \Omega)$, $e_t \sim VWN\,(0, I_n)$ and $\Omega = B\beta^1$. The analysis involves two estimations: imposing contemporaneous restrictions on the short-run behaviour and imposing long structural restrictions, the restrictions in the long-run were imposed using economic theory. It was pointed by Pesaran and Shin (2001) that the cointegrating relating using Johansen's autoregressive VEC and Phillips's (1995) triangular vector correction model imposed restrictions on mathematical convenience. The short-run just identified restrictions in the seven-variable model are ordered as follows:

$$\begin{pmatrix} GDP_t \\ INT_t \\ TROP_t \\ EXC_t \\ INF_t \\ WG_t \\ LAB_t \end{pmatrix} = \alpha Y_t + C_1 \begin{pmatrix} GDP_{t-1} \\ INT_{t-1} \\ TROP_{t-1} \\ EXC_{t-1} \\ INF_{t-1} \\ WG_{t-1} \\ LAB_{t-1} \end{pmatrix} + C_2 \begin{pmatrix} GDP_{t-2} \\ INT_{t-2} \\ TROP_{t-2} \\ EXC_{t-2} \\ INF_{t-2} \\ WG_{t-2} \\ LAB_{t-2} \end{pmatrix} + \begin{pmatrix} \mu_t^{GDP} \\ \mu_t^{INT} \\ \mu_t^{TROPEN} \\ \mu_t^{EXC} \\ \mu_t^{INF} \\ \mu_t^{WG} \\ \mu_t^{LAB} \end{pmatrix} \tag{14}$$

AQ: 14 In equation (14), C_i is the coefficient to be estimated, $\mu_t s$ are the residual that explain the innovation of the structural shocks in the system and Y_t is the constant term. The impulse response function and variance decomposition explain the effects of trade openness shock on wages and employment. The short-run SVAR combines identifying restrictions of various types, preferably derived from theory, to identify the contemporaneous relationship within the series. Because a VAR is written without any explicit contemporaneous imposed on the series in the equations system, those parameters are embedded in the random disturbance's covariance matrix. The restrictions in the SVAR make it possible to decompose the covariance matrix in a way that solves for those parameters. The applicable of restrictions on the equation system in 15 allows identifying the structural shocks; the restrictions imposed are contemporaneous restrictions (Asaleye *et al.*, 2019). However, over-identifying restrictions can be imposed on the system of equations; nevertheless, since the objective of the study is to investigate the effect of trade openness shock on labour market performance and to use impulse response function and variance decomposition for interpretation, we imposed just identifying restrictions for this purpose as follows:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 & 0 \\ a_{71} & a_{72} & a_{74} & a_{75} & a_{76} & a_{77} & 1 \end{pmatrix} \begin{pmatrix} GDP_t \\ INT_t \\ TROP_t \\ EXC_t \\ INF_t \\ WG_t \\ LAB_t \end{pmatrix} = C_{ij} \begin{pmatrix} GDP_t \\ INT_t \\ TROP_t \\ EXC_t \\ INF_t \\ WG_t \\ LAB_t \end{pmatrix} \tag{15}$$

The restrictions on the long-run behaviour are imposed on the number of cointegrating vectors in the system. The long-run matrix is given as $\prod = \alpha\beta^{1}$ was transformed to $r \times r$ a non-singular matrix. Let assume that the matrix is represented by T. Then T is given as $T = \alpha Q Q^{-1}\beta = \breve{\alpha}\breve{\beta}$, $\breve{\alpha}$ and $\breve{\beta}$ explain αQ and $Q^{-1}\beta$, respectively (Juselius, 2006). On matrix $T, r-1$ just identified restrictions were imposed on each cointegrating equation(s). This study imposed long-run structural identifying restriction on the vector as shown in Table 1. T1

For example, in the presence of three cointegrating vectors identified in this study, exact identification for this structural equation requires imposing at least three restrictions per vectors (or one sign restriction and two exclusion restrictions), accomplished by one normalisation restriction each. Four types of restriction are relevant in the process: restriction on the rank of the long-run matrix, restriction on the short-run dynamic coefficients, restriction on the long-run cointegrating vectors and restriction on the loading parameter (Johansen, 1995; Phillips, 1995; Pesaran and Shin, 2001). With the three cointegrating vectors identified in the study, we established long-run GDP equation, WG equation and LAB equation for output, wage and employment, respectively.

3.3 Source of data

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Source of data presented in the Table 2. AQ: 16T2

4. Presentation of results

Preliminary tests of the unit root and cointegration test were performed on the series. Evidence from both the Dickey and Fuller and Phillips and Perron unit root tests show that all variables were integrated of order one. The Johansen trace and maximum eigenvalue tests suggested that at 5% significance level, only one cointegrating vector is found in Models 1, 2, 3 and 4 [1]. Based on the unit root and cointegration test findings,

Table 1. Structural long-run cointegrating vectors

	GDP	INT	TROP	EXC	INF	WG	LAB
β_1^*	β_{11}	β_{21}	β_{31}	β_{41}	β_{51}	β_{61}	β_{71}
β_2^*	β_{12}	β_{22}	β_{32}	β_{42}	β_{52}	β_{62}	β_{72}
β_3^*	β_{13}	β_{23}	β_{33}	β_{43}	β_{53}	β_{63}	β_{73}

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Table 2. Description of data, measurement and source

Description of data and measurement	Source
Output: Manufacturing contribution to GDP, agriculture contribution to GDP and aggregate GDP	Central Bank of Nigeria (CBN) statistical Bulletin, 2016
Wages proxied by government expenditure on wages and salaries, computed from recurrent expenditure minus transfers and other expenses	Central Bank of Nigeria (CBN) statistical Bulletin, 2016
Exchange rate	CBN statistical Bulletin, 2016
Interest rate	CBN statistical Bulletin, 2016
Inflation rate	World Bank, world development indicators database
Employment (labour data)	Nigerian national Bureau of statistics (NBS) various issues

Note(s): *Data are obtained from 1982 to 2016

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this study rejected the unrestricted vector autoregression and estimated the restricted vector autoregression.

4.1 Results of joint short- and long-run causality for Model A

T3 Evidence from Table 3 showed that the null hypotheses of no joint short- and long-run causality are rejected for Models 1 and 2 at 5% significance level. For long-run causality, the coefficient has to be negative and significant at 5%. The coefficients for short-run causality are C (2) to C (13) and C (4) to C (15) for Models 1 and 2, respectively. Evidence from the Wald statistics showed that the hypotheses of C (2) to C (13) = 0 and C (4) to C (15) = 0 are rejected at 5% significance level since the probability value is less than 5%.

T4 Table 4 presents the joint short- and long-run causality in the manufacturing sector; evidence from the result showed that the null hypotheses of no joint short- and long-run causality are rejected for Model 3 (when using wages as the dependent variable in the manufacturing sector). In Model 4, there is no evidence of joint long-run causality; the probability value is greater than 5%. Hence, the hypothesis of joint long-run causality is rejected at the 5% significance level. Though, in Model 4, there is evidence of joint short-run causality. The coefficients for short-run causality are C (3) to C (13) and C (4) to C (15) for Models 3 and 4, respectively.

4.2 Result of the normalised cointegrating equations for Model A

T5 Table 5 presents the normalised equations for wages and employment; the study confirmed the existence of one cointegrating equation in Models 1, 2, 3 and 4 [2] From Table 4, it can be depicted that output (AGDP) has a negative impact on wages (WG), and trade openness (TROP) has a negative impact on employment in the agriculture sector. However, TROP has a positive impact on wages in the sector where the output (AGDP) on employment is not statistically significant at the level of 5%. Consequent in the manufacturing sector, trade openness has a negative impact on wages and employment, while the output is not statistically significant at the level of 5%. The signs of interest and exchange rate are both positive and negative in the two sectors.

Dependent variable: wages				
Joint long-run causality				
C(1) value	Cointegrating equation(s)	No of lags	Probability value	Outcome of result
−0.340239	1	2	0.0002	LR
Joint short-run causality (Wald test)				
C(2):C(13) = 0	Chi-square value	df	Probability value	Outcome of result
	37.07364	12	0.0002	SR
Dependent variable: employment				
Joint long-run causality				
C(1) value	Cointegrating equation(s)	No of lags	Probability value	Outcome of result
−0.967903	3	2	0.0065	LR
Joint short-run causality (Wald test)				
C(4):C(15) = 0	Chi-square value	df	Probability value	Outcome of result
	27.05294	12	0.0076	SR

Note(s): LR indicates evidence of long-run causality; SR indicates evidence of short-run causality
Source(s): Authors' computation from Eviews 9.5

Table 3.
Joint short- and long-run causality in agriculture sector

Dependent variable: wages				
Joint long run causality				
C(1) value	Cointegrating equation(s)	No of lags	Probability value	Outcome of result
−0.899243	1	2	0.0000	LR
Joint short-run causality (Wald test)				
C(3):C(13) = 0	Chi-square value	df	Probability value	Outcome of result
	54.20542	12	0.0000	SR
Dependent variable: employment				
Joint long-run causality				
C(1) value	Cointegrating equation	No of lags	Probability value	Outcome of result
−0.069181	1	1	0.5091	No LR
Joint short-run causality (Wald test)				
C(4):C(15) = 0	Chi-square value	df	Probability value	Outcome of result
	13.83094	12	0.0316	SR

Note(s): LR indicates evidence of long-run causality; SR indicates evidence of short-run causality
Source(s): Authors' computation from Eviews 9.5

Table 4.
Joint short- and long-run causality in manufacturing sector

4.3 Impulse response function analysis for trade openness for Model B

The main analysis of the impulse response function and forecast error variance decomposition focusses on the shocks from trade openness on other variables' variability (GDP, interest rate, inflation rate, exchange rate, wages and employment).

Figure 1 presents the impulse responses of trade openness to aggregate output (GDP), interest rate (INT), exchange rate (EXC), inflation rate (INF), wages (WG) and employment (LAB). Almost half the response of GDP is negative; the value fluctuates around the zero lines. Response to EXC shows a negative trend in the short-run; positive in the medium-run trend and fluctuates around zero. Response to WG has noticeable fluctuations; it has the highest negative effect in the short-run and highest positive in the medium-run. Response to INT is negative and positive in the medium-run. Response to INF has a smooth fluctuation; negative in the short-run, negative and positive in the medium-run. Response to LAB fluctuates in the short-run, with the highest negative in Period 2 and highest positive in Period 3. F1

4.4 Forecast error variance decomposition analysis for Model B

In Table 6, trade openness shocks to employment and wages have a trivial effect in Period 2 but an increase in Period 3. The trade openness shocks have a dominant effect in keeping fluctuations in the interest rate and exchange rate from Periods 1 to 10. Shocks to GDP, INF, WG and LAB cause fluctuations within the periods of 3–10. The effect of the error shock from trade openness affects WG more than LAB within 3–10. Variation in TROP shock explained up to 4% in variabilities of Periods 9 and 10 in LAB, while explaining approximately 5% in WG. Fluctuations in TROP in Period 10 explained mainly by its own self; however, its decrease from lower period to higher period. T6

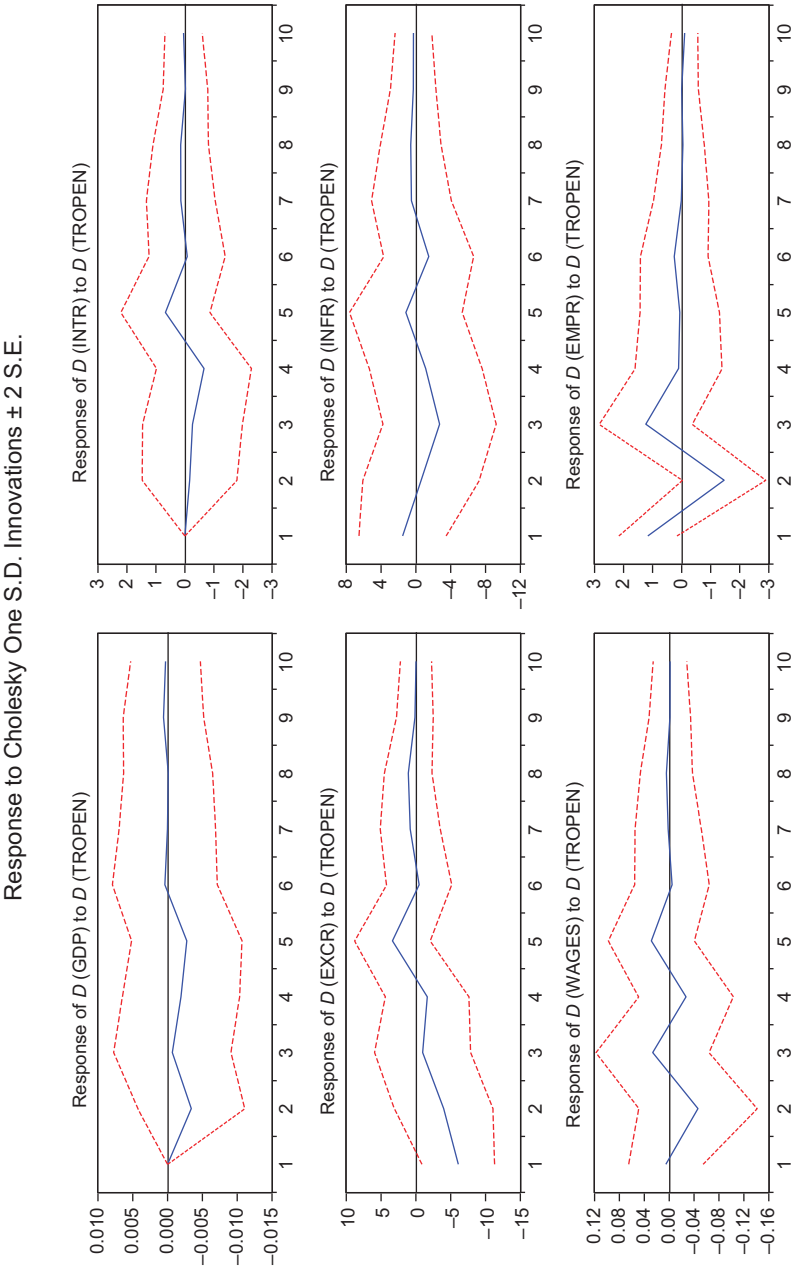
4.5 Structural long-run cointegrating vectors result for Model B

The Johansen cointegration shows the presence of three cointegrating vectors amongst GDP, TROP, WG, LAB, INT and INF; just identified restrictions are imposed on the vectors. The result is as follows:

Table 5. Normalised cointegrating equations of wages and employment

Agriculture sector					
LAB	*AGDP*	*EXC*	*INT*	*TROP*	*INF*
1	−18.53067 (10.0338)	−0.126679* (0.03311)	0.818279* (0.17558)	13.45599* (3.61285)	−0.340876* (0.04048)
WG	*AGDP*	*EXC*	*INT*	*TROP*	*INF*
1	0.76381 (3.84261)	0.032858* (0.01289)	−0.392423* (0.06638)	−4.712810* (1.38143)	0.130135* (0.01556)
Manufacturing sector					
LAB	*MGDP*	*EXC*	*INT*	*TROP*	*INF*
1	3.667339 (7.96657)	−0.184608* (0.02600)	0.821645* (0.18162)	14.26191* (3.78038)	−0.377472* (0.04295)
WG	*MGDP*	*EXC*	*INT*	*TROP*	*INF*
1	10.65284 (6.04576)	0.982007* (0.19561)	−6.659075* (1.36280)	50.20869* (20.4613)	2.981822* (0.33119)

Note(s): Standard error in parentheses, *indicates significant at a level of 5 per cent
Source(s): Author’s computation from Eviews 9.5



Source(s): Authors'Computation from Eviews 9.5

Figure 1.
Impulse response of trade openness for Model B

Period	S.E	GDP	INT	TROP	EXC	INF	*WG*	LAB
1	0.000154	5.073481	7.465845	87.46067	0.000000	0.000000	0.000000	0.000000
2	0.000206	2.824675	34.40186	51.19549	7.142040	0.052260	2.701924	1.681752
3	0.000217	3.180143	31.11042	48.19326	6.501282	3.094116	4.397563	3.523217
4	0.000226	5.214747	29.67566	44.74702	9.458647	3.426703	4.071826	3.405395
5	0.000229	5.320391	29.02721	44.13888	10.15489	3.947879	3.992363	3.418389
6	0.000231	5.581178	28.66433	43.47764	10.95438	3.870240	4.106533	3.351684
7	0.000234	5.882276	28.06392	42.47368	10.72153	4.816740	4.424091	3.617768
8	0.000236	6.001607	27.70414	41.94986	10.69193	4.931759	5.071659	3.649638
9	0.000236	6.289199	27.61546	41.74827	10.64654	4.907952	5.124733	3.667853
10	0.000237	6.560055	27.53060	41.54618	10.63322	4.889654	5.112754	3.727539

Source(s): Authors' computation from Eviews 9.5

Table 6. Variance decomposition table of trade openness

$$\underset{}{\mathrm{GDP}} = \underset{(0.11839)\ [-4.14028]}{-1.204169\mathrm{INT}} + \underset{(1.60079)\ [5.56977]}{8.916048\mathrm{TROP}} - \underset{(0.18211)\ [-3.16169]}{0.575790\mathrm{EXC}} \quad (16)$$

$$\underset{}{\mathrm{WG}} = \underset{(0.00561)\ [-28.4045]}{-0.159260\mathrm{INT}} + \underset{(8.53689)\ [2.57836]}{22.01118\mathrm{TROP}} - \underset{(0.00971)\ [-4.10401]}{0.039858\mathrm{EXC}} \quad (17)$$

$$\underset{}{\mathrm{LAB}} = \underset{(0.16970)\ [-28.3527]}{-4.811440\mathrm{GDP}} + \underset{(12.8373)\ [1.43789]}{18.45854\mathrm{TROP}} - \underset{(0.14598)\ [-3.18517]}{0.464962\mathrm{EXC}} \quad (18)$$

Equations (16)–(18) present the result of the long-run cointegrating vectors of trade openness equations; the chi-square value is 98.80994, and probability value is 0.108980. Equation (16) explains the GDP equation. It shows that the interest rate is negative and significant; the coefficient of trade openness is positive and significant, but the exchange rate is negative and significant. Going by *a priori,* the sign of exchange rate can be either positive or negative. Also, from the result, trade openness has a positive impact on the Nigerian's economy. Equation (17) explains the WG equation – the coefficients of INT and EXC are all negative and significant. The interest rate sign is in line with the theory, while the exchange rate has a negative impact on wages. Equation (18) presents the LAB equation – the coefficients of GDP and EXC are negative, while there is a positive relationship between LAB and TROP but not significant at the level of 5%.

4.6 Discussion of result

4.6.1 Evaluation of hypotheses.

H1. Openness does not have a significant sectoral effect on labour market performance in Nigeria.

Conclusion: Evidence from the normalised equations (Table 5) showed that trade openness negatively impacts employment in the agricultural and manufacturing sectors. Therefore, it can be concluded that trade openness has not improved employment performance in Nigerian agricultural and manufacturing sectors. These findings align with OECD's (2005) study, which shows that openness negatively affects employment in the OECD. Consequently, Casacuberta and Vailant (2002) and Galiani and Sangoinetti (2003) show

a negative relationship between trade and employment in Uruguay. More so, Helpman *et al.* (2011) show that trade has a negative impact on wages. The findings contradicted Uslu and Polat's (2012) study that showed that an impact of trade on labour market performance is positive in Turkey. Mrabet and Lanouar (2012) argued that many works had shown that openness has the opposite effect on developing countries than in developed countries. The scholars pointed out that differences in developing countries' characteristics are vital to explain this puzzle. The mixed result in developed and developing countries could be due to differences in liberalisation and differences in human capital endowments.

AQ: 17

H2. Shocks from trade openness do not significantly affect labour market performance in Nigeria.

Conclusion: The variance decomposition (in Table 6) shows that trade openness's error shock affected wages more than employment. Trade openness shock has a dominant effect in keeping fluctuation in the interest rate from Periods 1 to 10. Trade openness shock increases the sensitivity of interest rate; these findings are in line with the studies of Far *et al.* (2011) and Hayo and Uhlenbrock (2005). However, it contradicts Peersman and Smets (2005) who instead find that trade openness does not affect the interest rate.

H3. The HOS/new trade theory does not explain the impact of openness on Nigeria's labour market performance.

Conclusion: Evidence from the result in Table 5 has shown that this study cannot reject the null hypothesis that HOS does not explain the impact of openness on labour market performance rather the new trade theory does.

In the HOS framework, the return to the relatively abundant factor is suggested to increase. Since Nigeria is abundant in labour rather than capital, labour returns are expected to increase during trade liberalisation The new trade theories have argued that trade benefits are based on competitive advantage rather than on comparative advantage. International competition is the main driver; it stimulates the search for lower-cost labour as firms to compete on absolute unit costs rather than relative costs. Employment and wages do not need to increase as predicted by the neoclassical theory; it depends on competitiveness in the international market. Trade may worsen the labour market performance if a country cannot compete in the international market.

Likewise, in Model A, there is evidence of joint short- and long-run causality between wages (WG) and other variables in the agricultural sector except in Model 4, where there is no joint-run causality. The results suggested that the independent variables jointly explained the dependent variables in both the short and long run for most models. The study performs a series of diagnostic tests on Model A on the established models' stochastic properties. The tests include stability test, check for heteroskedasticity and multicollinearity. Model B was also tested for stability. The models for this study satisfy all other stated conditions.

5. Conclusion

This study examines the impact of trade openness through the channels identified in the literature on labour market performance in Nigeria. In Nigeria, unemployment and underemployment are some of the most critical problems the country is facing. They have hindered sustainable economic growth and development, despite the endowment of resources. Scholars have also argued that the Nigerian wage structure needs to be improved to increase welfare and address workers' basic needs. Given this, the study examines the relationship between trade openness channels and labour market performance.

In the literature, analysis of trade and labour market is in two categories. That is, examining the relationship in practice (this approach involved examining the degree of openness, which can be computed using total inflows of goods/capital relative to GDP for trade). The second is examining the relationship in policies that have been the main focus of most studies through the channels identified. Trade-in policy involves the use of changes in tariff and other trade instruments to facilitate liberalisation. In the former approach, the econometric approach is most suitable, while in the latter approach, methodologies such as CGE and AGMs were used. Although trade liberalisation helps determine the most appropriate policy that can help stimulate growth and development, it does not reflect an economy's actual exposure. The openness measured with the empirical formation (inflow of goods and capital relative to gross domestic product) has the advantage that reflects the actual exposure of an economy. This study used wages and employment as metrics for labour market performance.

Four major channels are identified in the literature in which trade affects the economy: sectoral effects, shock effects, technology transmission and distributional effects. Also, there is no consensus on theoretical perspectives on trade implication, most especially for developing economies. The neoclassical trade theory stressed the benefit through the comparative advantage, while the new trade theory stressed the benefit through competitive advantage. Most of the literature studies based on the channels identified have focussed on "openness in policy"; this study examined the "relationship in practice". Three hypotheses were tested for sectoral effects, shock impact and trade theories' efficacy on the Nigerian economy; the distributional and technological effects are ignored due to data unavailability. Two models are estimated in this study; the first model examines the sectoral effects and the efficacy of HOS and new trade theories on wages and employment in Nigeria. The second model investigates the effect of trade openness shock on wages and employment in Nigeria. The normalised equations showed that trade openness has an adverse effect on employment and wages in both the agriculture and manufacturing sectors. Also, it was concluded by the study that the new trade theory explains the behaviour of trade on employment and wages in Nigeria. Favourable competition in the international market is the main driver. The variance decomposition results show that the effect of error shock from trade openness affected wages more than employment.

Based on these findings, the study suggested that policies mix on labour via a coherent set of initiatives targeting the interest and exchange rate to increase Nigeria's competitiveness in the international market. Also, there is a need to promote employment opportunities through the agriculture sector; this can be addressed through many ways; few include commercialisation of agricultural, encouraging value chain by linking employment in the sectors and redesign policies to promote the agricultural employment sector. The Nigerian government should provide diversification into the agriculture sector based on the comparative and competitive advantages of targeted sub-sectors and markets' availability. Likewise, ensure sustainable increase in agricultural productivity to support industry and provide a stable income for the workers. Finally, Nigeria needs to ensure consistency and transparency when promoting investment in agriculture and manufacturing sectors.

Notes

1. Cointegration and stationary results are available from the authors upon request.
2. The study normalised on wages and employment; the signs are reversed due to the normalisation process.

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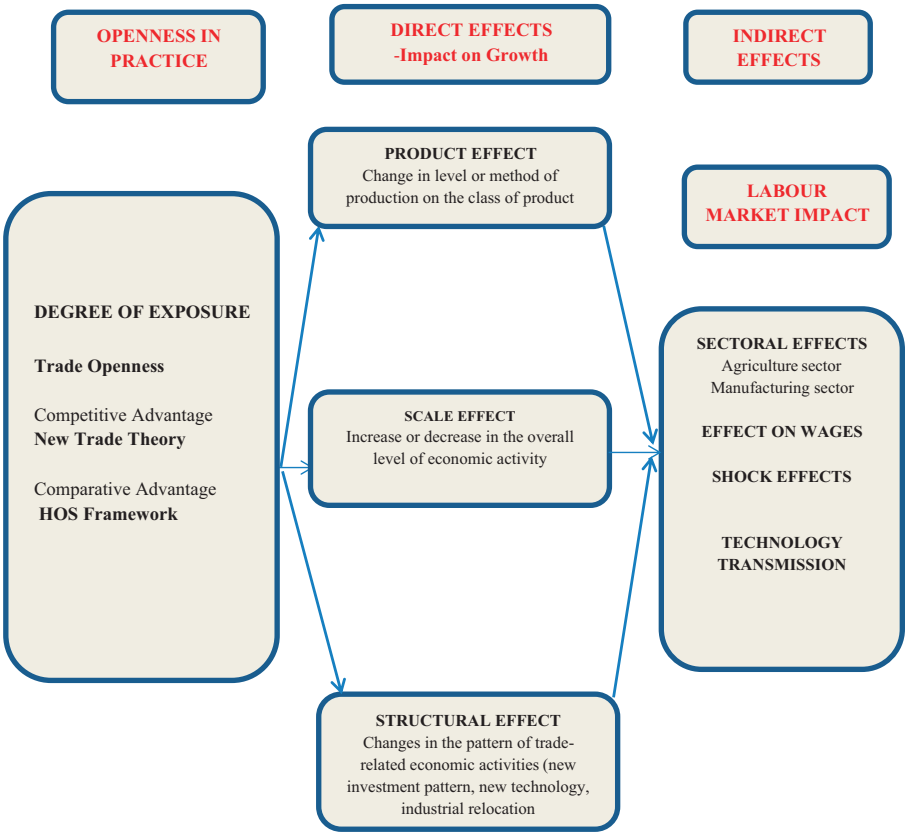
Appendix



Source(s): Authors' compilations based on the growth model concerning trade and labour market

Figure A1. Schematic analysis of trade openness–labour market performance nexus

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