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Revisiting the Trade and Unemployment Nexus: Empirical Evidence from the Nigerian Economy

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Stephen T. Onifade
Department of Economics, Selçuk University Konya,Turkey.
Email: stephentaiwo.onifade@lisansustu.selcuk.edu.tr

Ahmet Ay
Department of Economics, Selçuk University Konya, Turkey.
Email: ahmetay@selcuk.edu.tr

Simplice A. Asongu
African Governance and Development Institute,
P. O. Box 8413, Yaoundé, Cameroon.
Emails: asongusimplice@yahoo.com
/ asongus@afridev.org

Festus V. Bekun
Faculty of Economics Administrative and Social sciences,
Istanbul Gelisim University, Istanbul, Turkey.
Email: fbekun@gelisim.edu.tr

Abstract

The recent exacerbation of unemployment crisis in Nigeria stands to be a serious threat to both socio-economic stability and progress of the country just as the report from the nation's bureau of statistics shows that at least over 8.5 million people had no gainful employment at all as at the last quarter of the year 2017. It is on the above premise, that the present study explores the link between trade and unemployment for the case of Nigeria with the intention of exploring how the unemployment crisis has been impacted within the dynamics of the country's trade performance. The empirical evidence shows that the nation's terms of trade were insignificant to unemployment rate while trade openness and domestic investment, on the other hand, have significant opposing impacts on unemployment in Nigeria over the period of the study. Further breakdowns from the empirical analysis also revealed that the Philips curves proposition is valid within the Nigerian economic context while the evidences for the validity of Okun's law only exist in the short-run scenario. Based on the empirical results, we recommend that concerted effort should be geared toward stimulating domestic investment by providing adequate financial and infrastructural facilities that will promote ease of doing business while utmost precautions are taken to ensure that unemployment crisis is not exacerbated when combating inflation in the economy in the wake of dynamic trade relations.

Keywords: Nigeria; Unemployment; Trade; Phillips Curves; Okun's law.

***JEL Classification*:** E23; F21; F30; O16; O55

1. Introduction

The benefits of trade to economic growth and development have been highlighted in a bulk of literature and these benefits have been upheld by empirical evidences that are repleted in a great number of studies on the trade discourse[1]. However one of the big questions that is still open to extensive discussion is whether free trade has helped to create more jobs or on the contrary if it is detrimental to job creation, going by the rising unemployment rate and job losses that have cut across various segments of the labor force in some countries despite the continued decline in unemployment rate on the global level in the wake of changing trade dynamics and supports for free trade? In 2018, the global unemployment rate stood at 5% with over 170 million people estimated to be unemployed with another 140 million people falling under the category of the underutilized labor in the same year (ILO, 2019).

Since unemployment is a major social-economic crisis ravaging many economies, its rate has turned out to be one of the most widely utilized indicators in labor analysis. However, the parameters for measuring this rate often vary from one nation to another (NBS, 2018). The peculiarity of each nation vis-à-vis the components and structure of labor market combine with factors within the political and economic environments often affect the general employment situations and working conditions thereby influencing what unemployment rate would look like. While some people within the official active labor force in a country may be complaining about being forced to work below their full capacity, there may be some other categories whose complaints might be hinged on dissatisfactions with their current jobs even if they are engaged in full a time basis. In other words, even when there is no ideal well-functioning labor

[1]The study of Sachs and Warner (1995) revealed that economic reformations that give room to more openness can pave ways for better economic growth performances especially in developing countries although their work has attracted various criticisms from many other studies especially that of Rodríguez and Rodrik (2001) on the ground of the appropriateness of the measurement of openness and general issues that border on endogeneity problems. However, studies like that of Irwin and Tervio (2002) appear to have corroborated the findings of Sachs and Warner (1995) as they noted that nations that have larger trade to GDP ratios have higher incomes even after they have controlled for trade endogeneity in their studies using data spanning from the pre-World War 1 to Post World War.

market, choosing to be unemployed may not be an ideal option for a vast majority of people who are ready to engage in any kind of jobs even if they are low paying jobs with little or no social benefits in order to earn a living and escape from worrisome poverty conditions. For instance, a sizeable proportion of the employed population in Africa is working in arrangements characterized by insecurity, low pay and lack of social protection (ILO, 2019).

In some other circumstances, there may be groups of people who by the reasons of a couple of factors have nothing at all to do as a legitimate job. They may include the categories of first-time school leavers and those who have lost their jobs whether recently or in a much longer period in the time past and have been unable to secure any job over a period of time. Available insights from the Nigerian Bureau of Statistics have shown that the challenges of dealing with unemployment in Nigeria especially with respect to the proportion of people in the latter case has exasperated in recent times. As of the last quarter of the year 2017, over 8.5 million people were reported to have nothing to do as a legitimate means of livelihood (NBS, 2018).

Can trade ameliorate unemployment challenges in the Nigerian economy or can we say the dynamics of the international trade have contributed as a panacea to the unemployment crisis that is ravaging the Nigerian economy? Fugazza et al. (2014) noted that the impacts of trade on unemployment are ambiguous and in such a case, there is a need to look at empirical evidence from available data. Thus, this present study revisits the unemployment and trade nexus for the case of Nigeria where there is little or no detailed empirical study using the adopted methodology for the current study in a relevant multivariate setting. The extant literature (Dritsaki & Dritsaki, 2012; Manu *et al*. 2018) which is conducted in a bivariate framework is argued to be flawed with specification bias, considering country's peculiarities. However, the current study added more key macroeconomic indicators like inflation, terms of trade and economic

growth to circumvent the issue of omitted variable bias in order to capture more dynamics in the Nigeria context, beyond the traditional investigation of the unemployment-inflation nexus. This is pertinent, bearing in mind that there is an urgent need to revisit the unemployment menace of which the Nigerian economy is plagued with huge unemployment and terms of trade statistics. This study also simultaneously accounts for both short and long-run dynamic among the outlined variables to arm policymakers and stakeholders alike. Conclusively, in this study, we want to take a critical look at the unemployment menace in the Nigerian economy with an empirical lens within the context of the nation's trade performances thereby creating an extension to the discussion on the unemployment trade literature nexus from the Nigerian economy.

The remainder of this study proceeds thus. Section 2 focuses on a synopsis of unemployment in Nigeria. Section 3 details the related literature on the theme while section 4 renders the data and methodological procedure. Finally, section 5 concludes the study and presents policy directions.

2. Unemployment and Trade Growth in Nigeria

The component of labor statistics and the exact meaning of unemployment often vary from one country to another depending on certain factors out of which political and social-economic factors like religion and culture play important roles to a large extent. The term unemployment in the Nigerian context captures people in the labor force age range (that is officially recognized as age 15 to 64) who are ready for work or are searching for jobs but cannot secure any job at a given point in time (NBS, 2018). By extension, we can say that people who are below the age of 14 and those who are above the age of 64 are not to be included in the unemployment estimate as they are not part of the officially recognized active labor force in the country. There are some other groups of people who are disenfranchised from working by the reason of

physical disability and those who voluntarily decided not to engage in official paid jobs such as full housewives are also excluded from the unemployment estimates. In the Nigerian context, the standard minimum working hours to be regarded as being fully-employed is 40 hours per week while those who cannot secure a job that will engage them to work up to at least 20 hours weekly and those who cannot find any job to do at all are jointly categorized as the unemployed. Furthermore, there are people who could secure a job that can only engage them for less than 40 hours but more than 20 hours per week and this proportion of the labor force is categorized as the underemployed.

Table 1: Unemployment Statistics in Nigeria (2010-2017)

Year	Labor Force Population	Total Under-employed	Total Unemployed	Under-unemployment rate	Unemployment rate
2010	65,170,629	10,645,900	3,318,425	16.3	5.1
2011	67,256,090	12,041,275	4,006,220	17.9	6.0
2012	69,105,775	11,605,546	7,301,634	16.8	10.6
2013	71,105,800	10,518,868	7,078,454	14.8	10.0
2014	72,931,608	13,052,219	4,672,449	17.9	6.4
2015	76,957,923	14,415,714	8,036,102	18.7	10.4
2016	81,151,885	17,026,342	11,549,310	21.0	14.2
2017	86,537,538	17,700,866	17,671,142	20.5	20.4

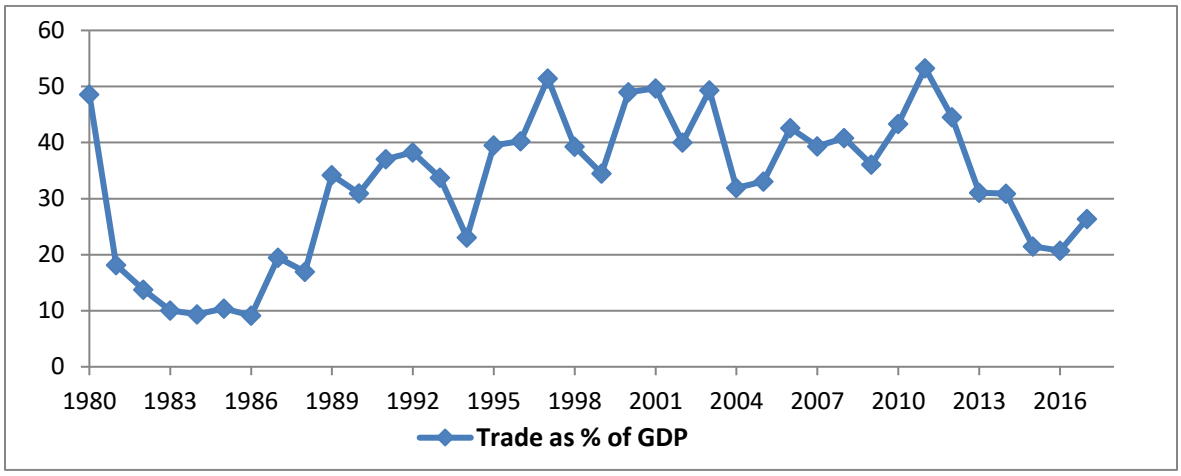
Source: Labor Force Statistics, NBS (2018)

From Table 1 above, a greater proportion of people who can be viewed as unemployed are of those in the underemployed categories. The labor force population has been on the increase over the years. As of 2017, the labor force had grown to over 86.5 million from its previous value of approximate 65.2 million in 2010 representing an average growth of about 31.24% within seven years. In Nigeria, both unemployment and underemployment figures have increased significantly over the years and much of these changes have become more noticeable in the years after the global economic crisis of 2008. In 2010, the official labor force stood at 65.17 million and 16.3% of the labor force which

represents a total of 10.64 million people was reported to be underemployed. About 5.1% of the labor force which represents 3.31 million people could be regarded as unemployed and out of them were 2.04 million people who could not even get a job that could engage them for at least 20 hours a week and the other 1.26 million people had nothing to do at all thereby, making the combined unemployment and underemployment rates to be 21.4% with a total of 13.95 million people in the same year. However, as of the last quarter of 2017, the national underemployment rate had dramatically risen from 16.3% in 2010 to 20.5% translating to an average of over 17.7 million people with no full gainful employment compared to the 10.64 million people in 2010. This implies that a substantial number of people must have probably lost their jobs over these periods or it might also be that the labor force has been growing at a pace that obviously surpasses the average rate at which jobs are being created in the economy. Furthermore, in the last quarter of 2017, the unemployment rate had risen from 5.1% in 2010 to 20.42% which represent a total of about 17.6 million people out of which about 8.6 million people were reported to have nothing at all to do in an estimated labor force of 86.53 million people (NBS, 2018). This implies that as at the end of 2017, over 35 million people from the total labor force of 86.53 million were either having nothing to do at all or being left to only manage with having to work below their capacities. A combined unemployment and underemployment rate of about 40.9% from a huge labor force that is as large as 86 million people calls fora drastic and urgent intervention by the government[2].

On the aspect of trade in Nigeria, the story is however slightly different as trade volume vis-à-vis the size of the economy has taken diverse paths over the years.

[2] For further information about the Nigerian labor statistics especially with respect to age distribution, see recent figures from the National Bureau of Statistics (2018): Unemployment Report.



Source: World Development Indicator (2018) data

In the 1980s, trade volume as a share of gross domestic product in the Nigerian economy plummeted from about 48.57% in 1980 to about 9.13% in 1986. However, the rate started witnessing some substantial recovery which saw it rise to as high as 51.46% by the end of the 1990s. Although the rate has witnessed regular fluctuations in the 2000s, however the share of trade in Nigerian GDP has remained relatively high as it stood at an average rate of about 38% between year 2000 and 2017. As of the last quarter of 2017, major export destinations in terms of share of Nigeria's total export are India, the U.S, Netherlands, France, and Spain, respectively. These nations account for a total of about 56.7% of the country's export with India accounting for 15.7%, the U.S 12.8%, Netherlands 10.6%, France 10% and Spain 7.6% (NBS, 2018). On the other hand, Nigeria's leading import partners as at the last quarter of 2017 are China with about 22% of total imports, Belgium with about 9% of total import, the U.S with about 8.9% of total import, India with about 6.4% of total import and Netherlands which accounts for about 5.9% of total imports. As at the end of 2017, these five nations jointly account for about 52.2% of the total imports that came into Nigeria (NBS, 2018). Crude oil export, manufactured goods, petroleum products, raw material goods, agricultural products, solid mineral goods, and energy goods accounted for about 54.04%, 21.01%, 14.36%, 5.27%, 4.52%, 0.65% and 0.16% of the total

trade (NBS, 2018). We would like to reexamine if the trade relations of Nigeria with other nations have impacted as a panacea to the unemployment crisis in the nation over the years.

3. Review of Related Literature

International trade has been viewed as an important factor from which many nations can benefit immensely from and especially the developing nations (Schneider, 2005; Büthe and Milner, 2008). Studies on the nature of the relationship between international trade and economic growth have received a substantial amount of attention in recent times and the assertion that trade can be beneficial to growth can be supported with numerous empirical evidence depending on the peculiarity of various nations across the globe. Trade could be beneficial to economic growth on diverse bases which includes promotion of output expansion that in turn encourages higher income as identified by Frankel and Romer (1999) and Irwin and Tervio (2002). Trade also encourages growth through technological transfer as identified by Grossman and Helpman (1991).

Furthermore, policies that are designed to stimulate trade such as lower tariff policies have also been noted as factors that can stimulate growth and productivity as identified in some studies such as those of Topalova and Khandelwal (2011) and Yu (2014) in India and China respectively. There is no doubt that numerous empirical evidences are available to show that trade has transformed and kept some nations on the growth path in recent times. However, there is still a need to further examine how trade relations have specifically impacted the labor structure in terms of job creation or job losses in many nations including Nigeria considering the unemployment crisis in recent times.

Generally, there is evidence that substantiates the average consensus that trade has certain effects on unemployment based on available studies. However, those evidences have come out to be mixed as findings have shown that trade may impact unemployment in various directions and in some cases some researchers have even maintained that trade has no effects on unemployment. Mesquita and Najberg (2000) from a study of the impacts of trade liberalization on the level of employment within the context of the Brazilian labor structure discovered that trade had a negative short-term impact on the employment level as their studies revealed a decline of about 32.4% and 13.3% in capital-intensive and labor-intensive employment respectively over the 1990-1997 period. This implies that trade liberalization combined with some other factors within the macro-economic conditions of Brazil have increased unemployment over the period of their study. In another study, Egger and Kreickemeier (2009) incorporated fair wages into a general equilibrium framework while studying the effects of trade liberalization on the labor market and firm heterogeneity and established that trade liberalization exacerbates unemployment. In addition, there are arguments that trade could inhibit a nation's targeted employment level and that a trade expansion policy, especially lower import tariffs could exacerbate unemployment challenges. This is partly because imports will be made cheaper thereby making domestic products to be exposed to greater competition in which some local manufacturers might be forced out of business when such competition becomes unfavorable thereby exposing more people to unemployment. A more recent study by Pierce and Schott (2016) attributed the decline in the manufacturing sector employment in the U.S following the year 2000 to the trade policy that is aimed at eliminating higher import tariffs on Chinese products.

However, on the other hand, openness to trade may be part of the panacea to unemployment challenges as shown by some studies. Felbermayr et al. (2008) from their study find out that trade liberalization reduces unemployment and

that openness to trade has a significant negative impact on unemployment in the long-run. Hasan et al. (2011) from their study found out that unemployment decreases significantly with rising trade liberalization in the case of India.

Although the unemployment crisis in Nigeria has drawn the attention of many researchers over the years, most of the available studies have focused more on the impacts of unemployment on the growth of the economy with the exception of a few that have viewed unemployment challenges from the trade perspective. Nwaka et al. (2015) in their study adopted the vector error correction technique (VECM) in analyzing time series data from Nigeria between 1970 and 2010 and their results showed that trade openness is associated with rising unemployment in Nigeria. Furthermore, some studies have also focused on investigating the determinants of unemployment within the context of the Nigerian economy for instance; Orji et al. (2015) investigated the unemployment inflation relationship in Nigeria and obtained a significant positive relationship among these two variables. In a different study, Ogbeide et al. (2016) while examining the determinants of unemployment in Nigeria applied the ECM approach and concluded that factors like resource dependence and high cost of financial intermediation exacerbate labor unemployment in the country. Considering the size of the Nigerian economy and the current unemployment challenges that are facing the nation despite being a potential trade hub among the Sub-Saharan African countries and in Africa at large, redressing the unemployment crisis within the trade discourse is particularly relevant.

4. Data and Empirical Analysis

In this study, our focus is to analyze the unemployment challenges in Nigeria from the nation's trade perspectives. Perhaps based on past studies, it is easy to deduce that trade might have some impacts on growth and productivity and consequently on employment situations in a country. However, making the right

judgments with regards to how trade impacts on unemployment situations would require having a careful look at what the available data are saying within each country's peculiarities. We set up a simple representation of our empirical relationships in model (1) in natural logarithm form as:

$$\mathrm{LnUNEMP} = \gamma_0 + \gamma_1 \mathrm{LnTOPEN} + \gamma_2 \mathrm{LnTOT} + \gamma_3 + \mathrm{LnINFLAT}\,\gamma_4 + \mathrm{LnDOMINVS} + \gamma_5 \mathrm{LnRGDPC} + \mu_t (1)$$

Where:

LnUNEMP: National Unemployment rate

LnTOPEN: Trade Openness, measured as the sum of total imports and exports as a ratio of the GDP

LnTOT: Terms of trade, measured as the percentage ratio of the export unit value indexes to the import unit value indexes, calculated relative to the base year 2000.

LnINFLAT: Annual consumer price index inflation rate.

LnDOMINVS: Domestic Investment proxied by real gross capital formation measured as percent of the GDP.

LnRGDPC: Real gross domestic product per capita.

In order to achieve our goal, two major indicators for trade performances were used in this study; namely trade openness (TOPEN) and terms of trade (TOT). Trade openness is a widely used indicator in trade research. It is a common indicator for the performances of trade policies and it is a general reflection of the extent to which an economy is liberalized or exposed to international trade. Lutz and Singer (1994) have noted that considerations should also be given to terms of trade when trade liberalization issues are being assessed. The level of domestic investment was also factored into the model as it usually has crucial effects on unemployment situations in most economies. Furthermore, it is expected that domestic investment would not just create a

multiplier effect on output alone but also on the aggregate employment level. Lastly, real gross domestic product per capita (RGDPC) and annual inflation rates (INFLAT) were also incorporated into the model[3]. Relevant secondary data have been sourced from the Nigerian National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN) Statistical Bulletin, the World Bank World Development Indicators (WDI) and the International Monetary Fund (IMF), datasets. In order to understand our data with regards to the choice of appropriate methodology for the empirical analysis, we carried out a unit root test on all the variables.

4.1 Unit Root Test

Going by the submissions of Pesaran et al. (2001), pre-testing for unit root may not be necessary however a unit root test was carried out in order for us to fully understand our data and their statistical properties with respect to their orders of integration. Hence, in the light of contemporary literature (Asongu, 2014; Uzuner et al., 2017; Asongu et al., 2019) we applied the Augmented Dickey-Fuller (ADF, 1979) and Phillip-Perron (PP, 1997) unit root tests on all the data and the corresponding results are reported in Table 2.

[3]There is a general tendency for unemployment to be high when an economy is moving downward away from an expected growth path and inflation is often believed to be negatively relatedto unemployment. The former assertion about unemployment and economic growth is commonly referred to as the Okun's law while the latter statement with regards to the relationship between inflation and unemployment is popularly known as the Phillips curves.The annual inflation rates were incorporated to review the validity of the Philips curves assertion within the unemployment scenario of Nigeria. Based on theoretical foundation from the Philips curves, wage rates are expected to be lower during high unemployment periods thereby translating into a negative a-priori relationship between unemployment and inflation. Also, following Fugazza et al. (2014) we utilized real GDP per capita in our model as a measure of economic growth as they have noted that this variable can act as a proxy to capture real wage effects while also controlling for the business cycle. By so doing, we are trying to examine the validity of Okun's law in the context of the Nigerian economy. See Knotek (2007) for further information on the Okun's law.

Table 2: Unit Root Test Results

Levels					
Variables	**ADF**		**PP**		**CONCLUSION**
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
UNEMP	0.9531	0.0816	0.9985	0.2067	
TOPEN	0.3597	0.6834	0.3597	0.7362	
TOT	0.0415**	0.2279	0.0479**	0.2650	I (0)
INFLAT	0.0061***	0.0095***	0.0153**	0.0522**	I (0)
DOMINVS	0.5881	0.1017	0.5647	0.1065	
RGDPC	0.7910	0.8126	0.9304	0.1107	
First Difference					
Δ (UNEMP)	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	I (1)
Δ (TOPEN)	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	I (1)
Δ (TOT)	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	
Δ (INFLAT)	0.0000 ***	0.0000 ***	0.0000 ***	0.0002 ***	
Δ (DOMINVS)	0.0000 ***	0.0002 ***	0.0000 ***	0.0000 ***	I (1)
Δ (RGDPC)	0.0071 ***	0.0371 **	0.0091 ***	0.0493 **	I (1)

Note: the superscript *,** and *** represents statistical rejection level at 10%, 5% and 1% levels of significance respectively. Variables label's UNEMP denotes the National Unemployment rate while TOPEN is Trade Openness, measured as the sum of total imports and exports as a ratio of the GDP. TOT denotes Terms of trade, measured as the percentage ratio of the export unit value indexes to the import unit value indexes, calculated relative to the base year 2000, and INFLAT denotes Annual consumer price index inflation rate. DOMINVS is Domestic Investment proxied by real gross capital formation measured as percent of the GDP and RGDPC Real gross domestic product per capita. The symbol Δ represents the first difference operator and all variables are in their natural logarithm form.

On the unit root table, all variables remain as previously defined. Thus, UNEMP, TOPEN, TOT, INFLAT, DOMINVS, and RGDPC represent national unemployment rates, trade openness, terms of trade, annual consumer price index inflation rate, domestic investment and real gross domestic product per capita respectively. Unit root test was carried out on all our variables in their natural log form using the t-statistics and the corresponding probability values for the test statistic are reported in the table.*,** and *** represent the rejection of the null hypothesis of that our variables have unit root at 10%, 5% and 1% levels of significance, respectively. We reported the unit root test result under unit root test models with

a constant parameter first and then we proceeded to report the general model form where trend is introduced into each model. Evidences from the unit root test suggested that two of our variables namely inflation (INFLAT) and terms of trade (TOT) were stationary at level and therefore they are characterized by an integrated order of zero. However, all other variables were found to be stationary at first difference and therefore they are I (1) variables or integrated in the first order.

4.2 ARDL Model and Bound Test Approach for Co-integration

Given adequate considerations to the available data and their properties, the bound test approach to co-integration was applied to test the existence of long-run relationships among our variables in this study. Thao and Hua (2016) and Folarin and Asongu (2019) have highlighted some inherent benefits in the ARDL approach to include; its applicability in co-integration test given a relatively small sample size, possibilities of accommodating variables at different lags and the benefit of being able to obtain both short-run and long-run coefficients. In addition, Nwaka and Onifade (2015) and Ghouse et al. (2018) have also noted that the ARDL model has other desirable properties as it can be a useful approach in dealing with issues of spurious regression. The simple ARDL (1, 0, 0, 1, 0, 1) as selected by the AIC information criterion is represented in a model as given in equation (2) as follows:

$$\Delta UNEMP_t = \alpha_0 + \beta_1 UNEMP_{t-1} + \beta_2 TOPEN_{t-1} + \beta_3 TOT_{t-1} + \beta_4 INFLAT_{t-1} + \beta_5 DOMINVS_{t-1} + \beta_6 RGDPC_{t-1} \sum_{i=1}^{p} \alpha_1 \Delta UNEMP_{t-i} + \sum_{i=0}^{q} \alpha_2 \Delta TOPEN_{t-i} + \sum_{i=0}^{q} \alpha_3 \Delta TOT_{t-i} + \sum_{i=0}^{q} \alpha_4 \Delta INFLAT_{t-i} + \sum_{i=0}^{q} \alpha_5 \Delta DOMINVS_{t-i} + \sum_{i=0}^{q} \alpha_6 \Delta RGDPC_{t-i} \mu_t \quad (2)$$

From equation (2), the α_0 coefficient represents the intercept while all other α parameters denote the coefficients for each short run variable. The μ_t is the error term and all our variables remained as previously defined. We applied the critical values of the bound test as provided by Pesaran et al. (2001) to test the null hypothesis that the coefficients of the long run variables $UNEMP_{(t-1)}$, $TOPEN_{(t-1)}$, $TOT_{(t-1)}$, $INFLAT_{(t-1)}$, $DOMINVS_{(t-1)}$ and $RGDPC_{(t-1)}$] are jointly insignificant. Furthermore, a system of equations for the error correction is given in equation (3) as follows:

$$\Delta UNEMP_t = \gamma_0 + \sum_{i=1}^{p} \gamma_1 \Delta UNEMP_{t-i} + \sum_{i=0}^{q} \gamma_2 \Delta TOPEN_{t-i} + \sum_{i=0}^{q} \gamma_3 \Delta TOT_{t-i} + \sum_{i=0}^{q} \gamma_4 \Delta INFLAT_{t-i} + \sum_{i=0}^{q} \gamma_5 \Delta DOMINVS_{t-i} + \sum_{i=0}^{q} \gamma_6 \Delta RGDPC_{t-i} + \theta_1 ECM_{t-1} + \varepsilon_t \quad (3)$$

From equation (3), the ECM is the error correction variable while its coefficient θ_1 is expected to be negative and significant as it measures the speed of adjustment of our model to equilibrium. The results for the bound test are provided in Table 3 while those of the long-run coefficient and error correction models are provided in Tables 4 and 5, respectively.

Table 3: Bounds Test Results to cointegration

Equations	Lags (AIC)	F-Statistics	Decision
(2)	1	6.79	Cointegration
Critical Values for (F-Statistics)	Lower bound at 1% = 3.06	Upper bound at 1% = 4.15	

The bound test result was conducted with the critical values of the F-statistics for the ARDL bound test as provided by Pesaran et al. (2001). Our test results support the existence of a long-run equilibrium among our variables since the estimated

F-statistics is higher than the upper bound critical values for the bound test even at 1% level of significance.

Table 4: Long-run Estimates

Variables	Coefficients	t-statistics	P-Values
C	4.9528	2.4668**	0.0212
TOPEN	0.4106	3.0087***	0.0061
TOT	-0.3577	-1.4269	0.1665
INFLAT	-0.2662	-2.7505**	0.0111
DOMINVS	-1.2997	-5.3811***	0.0000
RGDPC	-0.2166	-0.4745	0.6394

Note: The superscript *,** and *** represents statistical rejection level at 10%, 5% and 1% levels of significance respectively. Variables label's UNEMP representsthe National Unemployment rate while TOPEN is Trade Openness, measured as the sum of total imports and exports as a ratio of the GDP. TOT denotes Terms of Trade, measured as the percentage ratio of the export unit value indexes to the import unit value indexes, calculated relative to the base year 2000, and INFLAT denotes annual Consumer Price Index inflation rate. DOMINVS is Domestic Investment proxied by real gross capital formation measured as percent of the GDP and RGDPC Real gross domestic product per capita and all variables are in their natural logarithm form.

From Table 4 above, TOPEN, TOT, INFLAT, DOMINVS, and RGDPC represent trade openness, terms of trade, annual consumer price index inflation rate, domestic investment and real gross domestic product per capita respectively. Our estimated long-run coefficients would be interpreted in percentages since all our variables are in their log forms. From the estimated long-run coefficients, openness to international trade has a positive and significant impact on unemployment in the economy over the period of our study. In fact, the coefficient of trade openness shows that a 1% rise in openness of the economy is associated with about 0.41% increase in the rate of unemployment. On the other hand, terms of trade were found to be negatively related to unemployment in the country as an increase in the nation's terms of trade by 1% is expected to reduce unemployment by about 0.35%. However, this relationship was found to

be insignificant. Typically, favorable terms of trade should be an indicator that a nation's export values are higher compared to its imports and such is a desirable situation as it may be an indicator of a functioning real sector or manufacturing-based economy. However, such is not the case in most developing countries since a significant proportion of these nations are mainly resource-based economies where export earnings are basically from the crude exports of natural resources. Most of the resources that ought to be put to use domestically for creating employment are often exported in crude form to other economies. Of course, Nigeria is not an exception in this category and therefore our finding is not a surprise to us. In addition to the foregoing, many lower or middle-income nations like Nigeria have turned out to be import-dependent with huge importations that often induce pressure on local manufacturers who are sometimes exposed to unhealthy competition from foreign products and this situation often aggravates unemployment crisis when such manufacturers are forced out of business.

The coefficient of the domestic investment variable followed the right expectation as there is a negative and significant relationship between domestic investment and unemployment in the country. A percentage increase in domestic investment in the country is found to be associated with a reduction in unemployment by about 1.29%. Furthermore, the impact of inflation on unemployment is found to be negative and significant. Based on the findings, when inflation increases by 1%, unemployment is expected to decrease by an approximate 0.27%. This finding supports the theoretical assertions of the negative relationship between inflation and unemployment as given in the Philips curves. Lastly, our long-run estimates show that that there is a negative but insignificant relationship between real gross domestic product per capita and unemployment rate in Nigeria.

Table 5: Error Correction and Short-run Estimates

Variables	Coefficients	t-statistics	P-Values
Δ (TOPEN)	0.1729	2.2055**	0.0372
Δ (TOT)	-0.0871	-1.0443	0.3067
Δ (INFLAT(-1))	-0.0634	-1.8746*	0.0731
Δ (DOMINVS)	-0.5518	-2.7769**	0.0105
Δ (RGDPC(-1))	-2.7145	-4.8543***	0.0001
ECM(-1)	-0.5996	-6.8042***	0.0000
R2	0.63		
Adjusted R2	0.57		
DW-stat	2.08		
F-Statistic	8.44		
P-Value	0.0000		

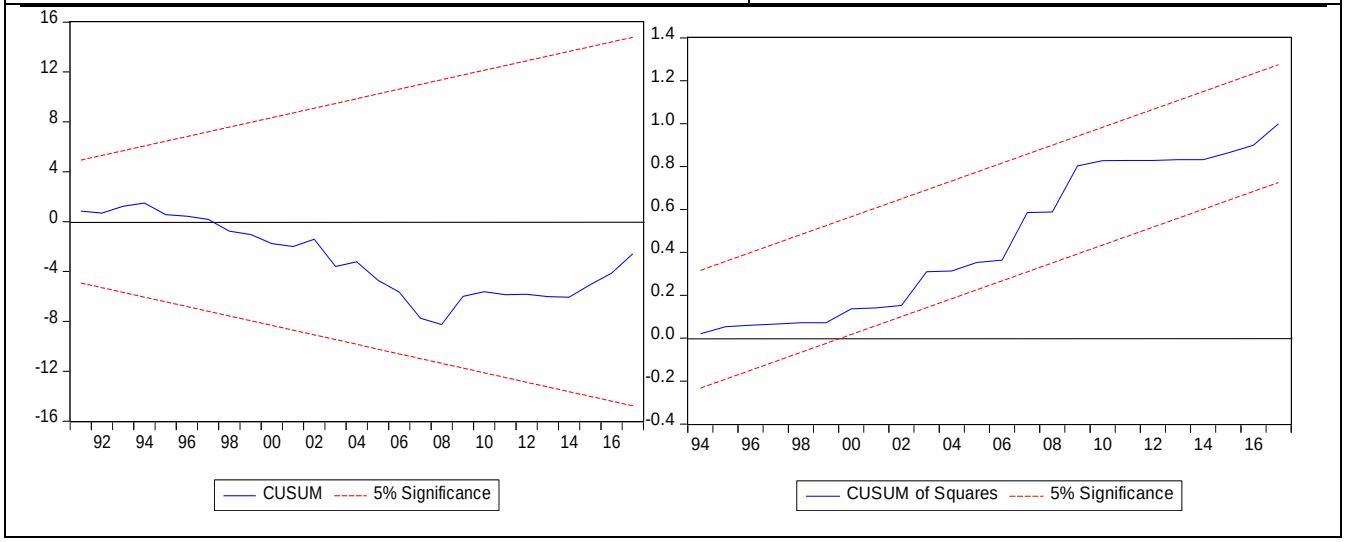
Note: The superscript *,** and *** represents statistical rejection level at 10%, 5% and 1% levels of significance respectively.The variables label's UNEMP means National Unemployment rate, and TOPEN is Trade Openness, measured as the sum of total imports and exports as a ratio of the GDP. TOT denotes Terms of trade, measured as the percentage ratio of the export unit value indexes to the import unit value indexes, calculated relative to the base year 2000, and INFLAT means Annual Consumer Price Index inflation rate. DOMINVS is Domestic Investment proxied by real gross capital formation measured as percent of the GDP and RGDPC Real gross domestic product per capita. All variables are in their natural logarithm form and the symbol Δ means difference operator while ECM (Error correction term) depicts the speed of adjustment term to the equilibrium path.

From Table 5 above, INFLAT and RGDPC represent annual consumer price index inflation rate, and real gross domestic product per capita respectively. From the error correction model, the short-run estimates show that both inflation and real GDP per capita have significant negative impacts on unemployment in the short run relationship. Our findings have revealed that both the Philips curves and the Okun's law assertions are found to be valid in the short-run scenario. In addition, the impacts of domestic investment and trade openness as observed in the long-run were also affirmed by the short-run coefficients and this finding has further supports the diametric impacts of trade openness and domestic investment on unemployment in the case of the Nigerian economy. The error correction term is negative and highly significant. The coefficient of the error correction variable (ECM) shows that there will be adjustment to equilibrium at

an average speed of about 59.9% per annum. Some diagnostic tests have been carried out on our model to ensure that the residuals from the estimated model are normally distributed without serial correlation or heteroscedasticity problems and the model has passed the tests. The diagnostic tests for serial correlation and heteroscedasticity were carried out using the Breusch-Godfrey test while the Jarque-Bera test was conducted for the issue of normality. We also applied the CUSUM test to our model to ensure that they are structurally stable. The results for the diagnostic test are provided in Table 6.

Table 6: Residual Diagnostic Test Results

Test Statistics	P-value
Breusch-Godfrey Serial Correlation LM Test:	0.5599
Breusch-Godfrey Test Heteroscedasticity	0.3615
Jarque-Bera Normality Test	0.5973
Note: The fitted model satisfactory pass all the residual diagnostic test. Thus, the model is suitable for policy direction	



5. Conclusion, Recommendations and Future Directions

This study has critically reviewed the unemployment trade nexus in the Nigerian economy with the use of annual data covering a period of 37 years from 1981 to 2017. The bound test approach to cointegration was applied to test for the presence of level relationship among our variables after which autoregressive distributed lags (ARDL) models were applied to obtain the long-run and short-run coefficients. Our findings reveal that openness to trade and domestic investment are significant to unemployment in Nigeria over the period of the study. Openness to trade was found to be impacting positively on unemployment thus exacerbating unemployment challenges in the country whereas domestic investment has a negative impact on unemployment over the period of the study. Furthermore, the validity of the Philips curve was also confirmed.

While we are not undermining the importance and significance of trade liberalization, we are of the opinion that caution must be taken in order for the nation to be able to maximize the opportunities from trade in the framework of liberalization policies. Currently, based on our findings, it appears as though the cost outweighs the benefits from trade within the context of the unemployment crisis over the period of the study. The government must be ready to make the right decisions and take bold steps towards stimulating domestic investments in the economy. Exporting crude natural resources alone may not be the needed solution to the unemployment crisis especially when returns from such exports are not invested into the real sector to boost productivity and create employment. We thereby recommend that the value chain of the local resources should be improved upon by providing necessary financial and infrastructural facilities that will ensure better ease of doing business in the country. In addition to that, the government can also go into a workable public-private partnership deal in

providing basic incentives for small and medium scale businesses (SMEs) such as credit and subsidies.

Going by the confirmation of the inflation unemployment trade-off relationship within the context of the Nigeria economy, it is also highly imperative for policymakers to take adequate measures to ensure that the unemployment crisis is not exacerbated while containing inflationary pressure in the economy. Inflation targeting should not be an exercise that will be carried out arbitrarily, but on the contrary, there should be an adequate understanding of the nation's macroeconomic environment through extensive consultations on both local and international standards. Lastly, we recommend that the government should ensure a regular and meticulous assessment of trade policies vis-à-vis their effects on key macroeconomic indicators in order to timely identify some possible trade policies that may be putting local manufacturers in disadvantageous positions. By so doing, the nation can be better positioned to maximize the potential benefits from trade liberalization.

Future research can be tailored to investigate how the established nexuses in this study can be engaged simultaneously with complementary macroeconomic indicators in view of stimulating employment and mitigating unemployment. In order to make the suggested assessment, interactive regressions can be taken on board in accordance with recent literature (Asongu & Odhiambo, 2020a). Furthermore, for the variables used in this study, it is also worthwhile to provide specific critical masses at which these variables positively and/or negatively influence unemployment in Nigeria, in accordance with contemporary threshold literature (Asongu & Odhiambo, 2020b).

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List of Tables

Table 1: Unemployment Statistics in Nigeria (2010-2017)

Year	Labor Force Population	Total Under-employed	Total Unemployed	Under-unemployment rate	Unemployment rate
2010	65,170,629	10,645,900	3,318,425	16.3	5.1
2011	67,256,090	12,041,275	4,006,220	17.9	6.0
2012	69,105,775	11,605,546	7,301,634	16.8	10.6
2013	71,105,800	10,518,868	7,078,454	14.8	10.0
2014	72,931,608	13,052,219	4,672,449	17.9	6.4
2015	76,957,923	14,415,714	8,036,102	18.7	10.4
2016	81,151,885	17,026,342	11,549,310	21.0	14.2
2017	86,537,538	17,700,866	17,671,142	20.5	20.4

Source: Labor Force Statistics, NBS (2018)

Table 2: Unit Root Test Results

Levels					
Variables	**ADF**		**PP**		**CONCLUSION**
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
UNEMP	0.9531	0.0816	0.9985	0.2067	
TOPEN	0.3597	0.6834	0.3597	0.7362	
TOT	0.0415**	0.2279	0.0479**	0.2650	I (0)
INFLAT	0.0061***	0.0095***	0.0153**	0.0522**	I (0)
DOMINVS	0.5881	0.1017	0.5647	0.1065	
RGDPC	0.7910	0.8126	0.9304	0.1107	
First Difference					
Δ (UNEMP)	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	I (1)
Δ (TOPEN)	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	I (1)
Δ (TOT)	0.0000 ***	0.0000 ***	0.0000 ***	0.0000 ***	
Δ (INFLAT)	0.0000 ***	0.0000 ***	0.0000 ***	0.0002 ***	
Δ (DOMINVS)	0.0000 ***	0.0002 ***	0.0000 ***	0.0000 ***	I (1)
Δ (RGDPC)	0.0071 ***	0.0371 **	0.0091 ***	0.0493 **	I (1)

Note: the superscript *,** and *** represents statistical rejection level at 10%, 5% and 1% levels of significance respectively. Variables label's UNEMP denotes the National Unemployment rate while TOPEN is Trade Openness, measured as the sum of total imports and exports as a ratio of the GDP. TOT denotes Terms of trade, measured as the percentage ratio of the export unit value indexes to the

import unit value indexes, calculated relative to the base year 2000, and INFLAT denotes Annual consumer price index inflation rate. DOMINVS is Domestic Investment proxied by real gross capital formation measured as percent of the GDP and RGDPC Real gross domestic product per capita. The symbol Δ represents the first difference operator and all variables are in their natural logarithm form.

Table 3: Bounds Test Results to cointegration

Equations	Lags (AIC)	F-Statistics	Decision
(2)	1	6.79	Cointegration
Critical Values for (F-Statistics)	Lower bound at 1% = 3.06	Upper bound at 1% = 4.15	

Table 4: Long-run Estimates

Variables	Coefficients	t-statistics	P-Values
C	4.9528	2.4668**	0.0212
TOPEN	0.4106	3.0087***	0.0061
TOT	-0.3577	-1.4269	0.1665
INFLAT	-0.2662	-2.7505**	0.0111
DOMINVS	-1.2997	-5.3811***	0.0000
RGDPC	-0.2166	-0.4745	0.6394

Note: The superscript *,** and *** represents statistical rejection level at 10%, 5% and 1% levels of significance respectively. Variables label's UNEMP representsthe National Unemployment rate while TOPEN is Trade Openness, measured as the sum of total imports and exports as a ratio of the GDP. TOT denotes Terms of Trade, measured as the percentage ratio of the export unit value indexes to the import unit value indexes, calculated relative to the base year 2000, and INFLAT denotes annual Consumer Price Index inflation rate. DOMINVS is Domestic Investment proxied by real gross capital formation measured as percent of the GDP and RGDPC Real gross domestic product per capita and all variables are in their natural logarithm form.

Table 5: Error Correction and Short-run Estimates

Variables	Coefficients	t-statistics	P-Values

Δ (TOPEN)	0.1729	2.2055**	0.0372
Δ (TOT)	-0.0871	-1.0443	0.3067
Δ (INFLAT(-1))	-0.0634	-1.8746*	0.0731
Δ (DOMINVS)	-0.5518	-2.7769**	0.0105
Δ (RGDPC(-1))	-2.7145	-4.8543***	0.0001
ECM(-1)	-0.5996	-6.8042***	0.0000
R2 Adjusted R2 DW-stat F-Statistic P-Value	0.63 0.57 2.08 8.44 0.0000		

Note: The superscript *,** and *** represents statistical rejection level at 10%, 5% and 1% levels of significance respectively.The variables label's UNEMP means National Unemployment rate, and TOPEN is Trade Openness, measured as the sum of total imports and exports as a ratio of the GDP. TOT denotes Terms of trade, measured as the percentage ratio of the export unit value indexes to the import unit value indexes, calculated relative to the base year 2000, and INFLAT means Annual Consumer Price Index inflation rate. DOMINVS is Domestic Investment proxied by real gross capital formation measured as percent of the GDP and RGDPC Real gross domestic product per capita. All variables are in their natural logarithm form and the symbol Δ means difference operator while ECM (Error correction term) depicts the speed of adjustment term to the equilibrium path.

Table 6: Residual Diagnostic Test Results

Test Statistics	P-value
Breusch-Godfrey Serial Correlation LM Test:	0.5599
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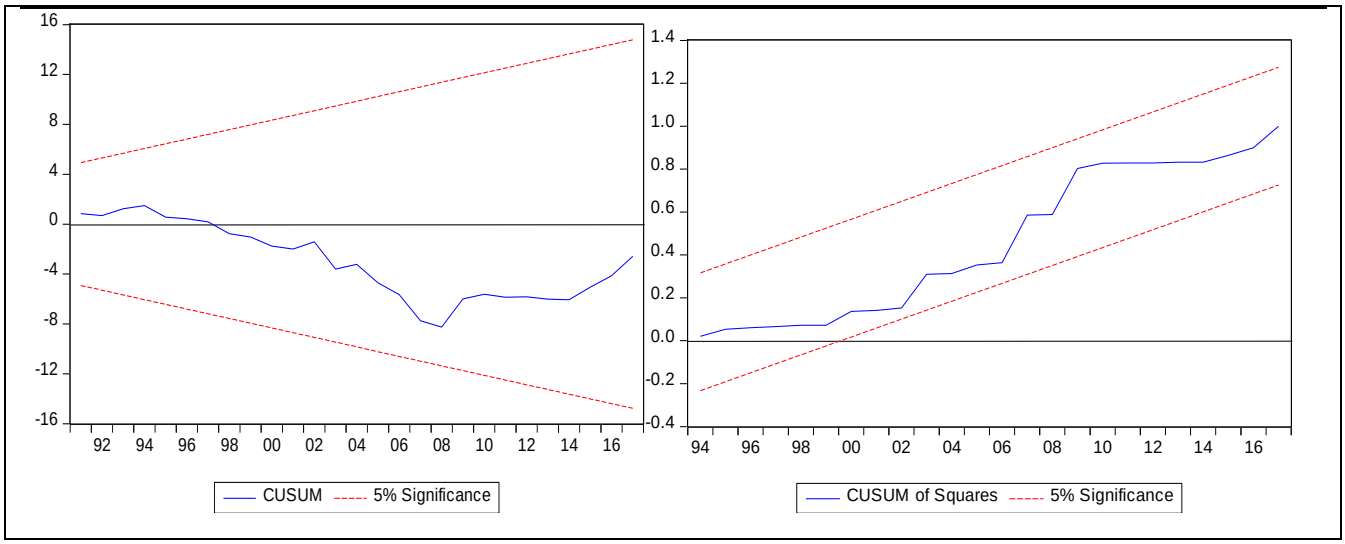
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CUSUM of Squares
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