

# Trade openness and unemployment: Empirical evidence for Nigeria

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## Abstract

In the wake of the global financial crisis, unemployment rates and openness to trade have been the subject of considerable research, especially in developing countries. This study analyses the impacts of trade policy on unemployment rates in Nigeria. Using time series data from 1970 to 2010, it adopts the vector error correction methodology. In order to explore the impact of a range of variables on the relationship between trade openness and national unemployment rates, these variables, in a system of equations, include measures of trade openness, public recurrent spending on education, foreign price shocks and real gross domestic product or alternatively income per capita. The findings reveal that in the long run, real output and income per capita lead to a decline in unemployment, but trade openness policy is associated with an increase in unemployment. Foreign policy shocks, as proxied by commodity prices, also exert a positive effect on unemployment rates and do not contribute subsequently to restoring the system to equilibrium. However, the initial impact of openness and foreign price shocks captured by short-term dynamics are observed to reduce unemployment.

**JEL Codes:** F13, E24, F43, E62

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**Keywords**

Cointegration, trade openness, unemployment rate, vector error correction model

**Introduction**

In the wake of the global financial crisis, rising unemployment rates (UNRs), on one hand, and greater openness to trade by developing countries, on the other hand, have often been subjected to a high level of scrutiny through research. Some major consequences of the financial crisis, especially in the US, are observed through the considerable negative impacts on business activities, financial markets, household consumption and uncertainty about the future. In particular, the spillover effects of the crisis on the economies of developing countries cannot be overemphasised. Matković et al. (2010) have argued that the spillover effects in developing countries were transmitted through a drastic fall in the demand for exports and a decline in the inflow of foreign capital and investment. Hence, given the peculiarities of such a crisis, its further impact is reflected in a drop in the productivity of labour, employment generation and overall economic performance (Choudhry et al., 2010). Moreover, considering the volume of world trade and greater openness in developing regions, studies of the labour market have sought to explain the growth trend in unemployment statistics. A question under consideration has been ‘Does opening up to international trade create or destroy jobs?’ (Davidson et al., 1999; Davidson and Matusz, 2005; Felbermayr et al., 2011).

Debates on trade openness and the economic performance of developing countries have equally been contentious. Theoretical proponents of trade posit the beneficial effects of trade openness on economic performance (Grossman and Helpman, 1991; Lucas, 1988; Romer, 1988). Grossman and Helpman (1991) in particular argue that trade enhances productivity by enlarging capital availability for intermediate goods, fostering technological innovations and generating increasing returns to scale. On the other hand, sceptics (Prebisch, 1950 [1962]; Singer, 1950) have maintained that the volatile nature of international prices of raw materials in the world market widens the disparity between the rich and the poor, since developing countries are primary-sector driven, and their comparative advantage lies in primary production. The United Nations Conference on Trade and Development (UNCTAD) in 2008 reported that the least-developed countries dependent on exports of primary products were vulnerable to price changes. Therefore, by implication, openness to trade exposes households to higher vulnerability<sup>1</sup> to external shocks, through factor markets<sup>2</sup> and a transmission mechanism on wages and unemployment (Winters et al., 2004). In this regard, Brecher (1974), Davis (1998) and Helpman et al. (2010) found a positive relationship between trade liberalisation and unemployment, while Felbermayr et al. (2011) found a negative relationship.

In Nigeria, the adoption of the Structural Adjustment Programme (SAP) of 1986 was one of the decisive initiatives leading to the opening of the country’s economy to international trade. For a labour-abundant country of 168 million<sup>3</sup> people (World Bank, 2012), the thrust of the SAP’s economic stance includes improvement in labour productivity, higher output, poverty reduction and a general transmission to reducing the unemployment induced by the economic crisis of the 1980s. One of the SAP’s aims, to promote foreign

investment in Nigeria, has not been entirely realised owing to the military leadership situation in the country. However, recently, Nigeria has put in place more incentives to encourage prospective domestic and foreign investors, despite the economic crisis of 2007–2008. Furthermore, since the crisis has resulted in job losses and a consequent rise in job seekers, especially in 2008 (National Bureau of Statistics (NBS), 2010), various policies and programmes have been put in place, aimed at repositioning the economy for development.

The available jobs are often low skilled or informal in nature, with about 60%–70% of the population engaged in farming activities, while about 45%–60% are in the informal and unorganised sectors. Hence, openness to trade could either destroy existing jobs in these sectors, thus leading to a high UNR, or create more opportunities through spillover effects. Moreover, while the growth rate of Nigeria's gross domestic product (GDP) has slightly risen in recent years from 6.2% in the 1970s to about 7.6% in 2010 (World Bank, 2012), the national UNR had also been increasing in double digits from 17% in 1999 to about 24% in 2011 (NBS, 2010). Therefore, despite the conventional wisdom that trade openness would spur greater economic output, thus reducing unemployment, recent Nigerian statistics have shown a contrary picture. In this respect, this study empirically examines the impact of the introduction of trade openness policies through the SAP on the UNR in Nigeria.

Given the difficulty of comparing countries with wide variation in characteristics ranging from population sizes and institutional arrangements to complementary economic policies, Srinivasan and Bhagwati (1999) posit that research on trade openness should be directed towards country-specific studies. Nigeria is the chosen case study in the research discussed in this article because of its status as one of the leading oil-producing countries and the largest economy in Africa (*Vanguard*, 2014). An investigation of the effects of national trade policies on the domestic economy is therefore likely to reveal considerable complexity in the relevant factors underlying and linking the extent of resource utilisation, unemployment reduction and economic growth. Variables used in this study include trade openness, foreign price shocks and public recurrent expenditure on education, where real gross domestic product (RGDP) and income per capita are used as alternative indicators. The findings reveal that in the long run, growth in real output and income per capita lead to a decline in the UNR, but trade openness policy is associated with an increase in unemployment. Therefore, this article offers a three-fold contribution to existing empirical work. First, to the best of our knowledge, a Nigerian case study has not yet been undertaken. Second, the data covering 1970–2010 adequately capture periods of both oil boom and SAP in the Nigerian economy. Third, the JMuLTi 4 statistical program for our time series analysis has been used due to its special feature of detecting structural changes and managing break dates in the data.

The next section presents a literature review of relevant literature and descriptive statistics relating to the Nigerian economy. The remaining sections focus on the study's methodology, empirical findings and conclusions.

## Review of literature

Unequivocally, trade has played a remarkable role in the global economy, considering that the growth of real trade has outstripped that of world output. Global trade expansion

during the 1995–2005 period was nearly 6% per year, almost twice as high as the growth in global GDP. The ratio of world exports of goods and services to GDP increased from 13.5% in 1970 to 32% in 2005 and many economies realised an excess of trade growth over output growth (Jansen and Lee, 2007). This fact is in line with the classical economists' position that specialisation and division of labour enhance productivity and that a comparative advantage is attainable from trade because of the easy movement of scarce resources from a point of abundance to a region of scarcity.

Trade patterns in the global market have been changing since the adoption of liberalisation policies. Even following the economic crisis, trade has been growing in leaps and bounds. This has prompted many theoretical and empirical studies, focusing on both developed and developing economies (Felbermayr et al., 2011; Moore and Ranjan, 2005; Nanthakumar et al., 2011; Porto, 2008). For example, Bernard et al. (2007) see trade liberalisation as a welcome development because in the short term, it increases labour turnover in terms of the reallocation of workers from shrinking to expanding sectors. This development, they argue, has the ability to improve a national economy, by increasing productivity and generating income from world economies. Empirically, Felbermayr et al. (2011) show that over the long term, greater trade openness is associated with a lower structural rate of unemployment. This conclusion is based on the outcome of panel and cross-sectional data analysis of 20 Organisation for Economic Co-operation and Development (OECD)-member countries. It presupposes that trade openness has a way of encouraging production, which in turn repositions the utilisation of labour, thereby reducing the level of unemployment.

Regarding developing economies, the question of the relationship between trade openness and unemployment has been explored with mixed results. In their study of Malaysia, Nanthakumar et al. (2011) find that an increase in the trade balance had negative Granger non-causality effects on the rigidity of unemployment dynamics. This implies that trade liberalisation is able to increase aggregate productivity in various sectors. Consequently, economic performance and efficiency raise the rate of labour utilisation. In Alawin's (2013) study of the trade balance and UNR in Jordan, using quarterly data for the 2000–2012 period, his major finding is the absence of a long-term relationship between the two factors. His results reveal that in the short-term, a trade balance deficit leads to unemployment and vice versa. Kim and Sun (2009) find that indicators of trade openness significantly play a role in labour market churning in most industries affected by the North American Free Trade Agreement (NAFTA) such as the automobile, chemicals and apparel sectors. This result buttresses the argument that trade openness promotes export and ushers in restructuring by some firms, often resulting in the decline of labour use in some sectors and its increase in others. The results of the study of India by Hasan et al. (2012) show no evidence of unemployment decrease due to trade reforms; on the other hand, urban unemployment falls with trade liberalisation in states with flexible labour markets and increases the employment share in net exporter industries. Their findings are similar to the cross-country estimation by Dutt et al. (2009) for 90 developing countries, even after excluding control variables. However, Dutt et al. (2009) also found a weak support for the Heckscher–Ohlin postulates that the relationship between trade openness and unemployment changes from negative to positive in labour-abundant and capital-abundant countries, respectively. A summary of the relevant empirical findings is presented in Table 1.

**Table 1.** Summary of relevant literature.

Author	Study	Period	Empirical methods	Dependent variable	Independent variable	Findings
Nanthakumar et al. (2011)	Dynamic causal relationship between trade balance and unemployment in Malaysia	1985–2010	Granger non-causality test analysis	Unemployed labour force	Trade balance	Rising trade balance shows a negative Granger non-causality on unemployment
Hasan et al. (2012)	Trade liberalisation and unemployment rate for India	1987–1988, 1993–1994, 1999–2000, 2004–2005	Basic regression model using ordinary least squares (OLS) on quinquennial surveys	State unemployment rates	Tariffs and trade measures	Trade openness led to a decline in urban unemployment rate in India for the time periods
Alawin (2013)	Trade balance and unemployment in Jordan	2000:Q1–2012:Q2	VECM and Granger causality methods	Unemployment rate	Trade balance	They found no evidence of long-run relation between unemployment rate and trade
Wamboye and Seguino (2012)	Economic structure, trade openness and gendered employment in sub-Saharan Africa (SSA)	1991–2010 for 38 SSA countries	Fixed effects and two-stage least squares	Female male employment ratio	Trade openness measure	Global integration by SSA shows no employment gap across gender
Dutt et al. (2009)	A cross-national evidence of trade and unemployment	1985–2004	Cross-national OLS estimations on 90 developing countries	Unemployment rate	Trade openness including other control variables	A fairly robust evidence shows that unemployment and trade openness are negatively related
Kim (2011)	The effects of trade on unemployment: evidence from 20 OECD countries	1961–2008	OLS	Aggregate unemployment rate	Trade (total trade, total imports from low-income and high-income economies as ratios of GDP)	A rise in trade openness results to an aggregate unemployment in an inflexible labour market institutions but tends to reduce aggregate unemployment in a flexible feature

VECM: vector error correction model; OECD: Organisation for Economic Co-operation and Development; GDP: gross domestic product.

Similar studies relating to Nigeria are still latent. Ogunkola et al. (2006) evaluated the impact of Nigeria's trade and investment policy reforms and reported the following findings. Trade and policy reforms do not have significant effects on aggregate output growth. The growth of investments, imports and foreign direct investments in the service sector significantly affect service output growth, while trade policy reform contributes significantly and positively to service export and import growth. However, with Nigeria's large market for all categories of goods and services, trade openness (an important attribute of globalisation) is expected to help bring an influx of businesses that will assist in reducing the high UNR.

## Overview of Nigerian economic performance

Nigeria has aspired in different ways to reposition her economy for development. This goal has compelled the country's leaders at different periods to embark on reforms and policy formulation in various sectors of the economy. Globalisation and trade liberalisation have aimed at increasing capital inflow, technology transfer, manufacturing capacity utilisation and unemployment reduction. Domestic events have considerably affected the extent to which the positive intentions of various leaders of the country have been realised. Tables 2–4 give an overview of how the Nigerian economy has fared in the recent past.

The total trade impact on GDP has shown a remarkable increase over the years, especially during the transition to civilian administration and its subsequent rule. Nigeria has also witnessed an increase in trade, resulting from globalisation and trade liberalisation of its economy (Table 2). This development can be inferred from the rising figures of the total trade of oil and non-oil, attributable to trade openness over the years. Agriculture has continuously contributed significantly to aggregate economic activity, as shown by the rising figures in the sector over the years (Table 3).

More attention and encouragement are required in the agricultural sector to optimise the utilisation of resources. The industrial sector's real output rose from 2003 to 2006, fell slightly till 2007, then declined somewhat again. There have been efforts to expand appropriate industries in the rural sector in order to help raise its output. Moreover, the service sector has shown remarkable improvement, basically due to the government's attention, while employment in this area is gradually rising. A positive change in real sector output was noted in 2010, resulting from government-intensified efforts. However, it is thought that the sectors mentioned would have achieved higher levels of performance those recorded, if not for the *Boko Haram's* increased terrorist attacks in the northern part of the country and infrastructural deficiency. Nevertheless, Nigeria has experienced high UNRs over the years, as shown by the figures in Table 4. The steady rise in the UNR from 1970 to date is caused by the huge number of school dropouts and an increase in job seekers every year, with very few trained to opt for self-employment. This situation is also a result of the low savings rate that does not generate sufficient levels of investment and economic activity to hire unemployed workers. Furthermore, the 2007–2008 economic crisis further increased the UNR, already in double digits since 2001. This case is reflected by the adverse consequences of the global financial crisis in terms of massive job losses and labour supply exceeding demand. Similarly, a sharp

**Table 2.** Import, export and average manufacturing capacity utilisation and real GDP and total savings as a ratio of GDP (in million naira), 2000–2010.

Year	Real GDP	Total savings as a ratio of GDP (%)	Average manufacturing capacity utilisation (%)	Total import (in million naira)	Total export (in million naira)	Total trade, oil (in million naira)	Total trade, non-oil (in million naira)
2000	319,178.7	8.4	36.1	985,022.4	1,945,728.3	2,117,181.1	789,027.6
2001	356,994.3	10.3	42.7	1,35,8180.3	1,867,953.9	2,077,052.1	1,149,082.1
2002	433,203.5	8.6	54.9	1,512,695.3	1,744,177.7	2,011,155.8	1,245,717.2
2003	477,533.0	7.7	56.5	2,080,235.3	3,087,886.4	3,392,032.3	1,776,089.4
2004	527,576.0	7.0	55.7	1,987,045.3	4,602,781.5	4,807,586.9	1,782,239.9
2005	561,931.4	9.0	54.8	2,808,56.3	7,246,534.8	7,937,877.9	2,109,513.3
2006	595,921.4	9.4	53.3	3,153,669.2	7,324,680.6	7,909,664.5	2,568,685.3
2007	634,251.1	13.0	53.6	3,984,888.4	8,309,758.3	8,887,263.1	3,407,383.7
2008	672,262.6	16.9	53.8	5,248,455.3	9,907,611.5	10,979,208.2	4,176,858.7
2009	716,949.7	23.3	54.0	5,022,162.6	8,837,413.8	9,606,806.0	4,247,770.4
2010	775,525.7	17.52	56.2	7,614,656.2	11,542,028.9	12,893,308.2	6,263,371.9

Sources: Central Bank of Nigeria (CBN, 2009, 2012).  
GDP, gross domestic product.

**Table 3.** Real output in activity sector of Nigerian economy, 2000–2010 (in million naira).

Year	Agriculture	Industry	Service
2000	117,945.1	121,956.6	39,881.5
2001	122,522.3	128,418.6	54,606.6
2002	190,232.4	122,553.5	64,880.9
2003	203,409.9	149,878.7	66,245.4
2004	216,208.5	156,486.8	79,175.4
2005	231,463.4	159,161.4	85,478.8
2006	248,599.0	155,165.5	93,327.1
2007	266,477.2	151,699.1	102,546.2
2008	283,175.4	146,519.6	113,165.8
2009	299,996.9	147,428.5	125,479.0
2010	317,281.7	158,190.5	140,331.8

Sources: Central Bank of Nigeria (CBN, 2009, 2012).

**Table 4.** National unemployment rate, Nigeria, 1970–2011 (average).

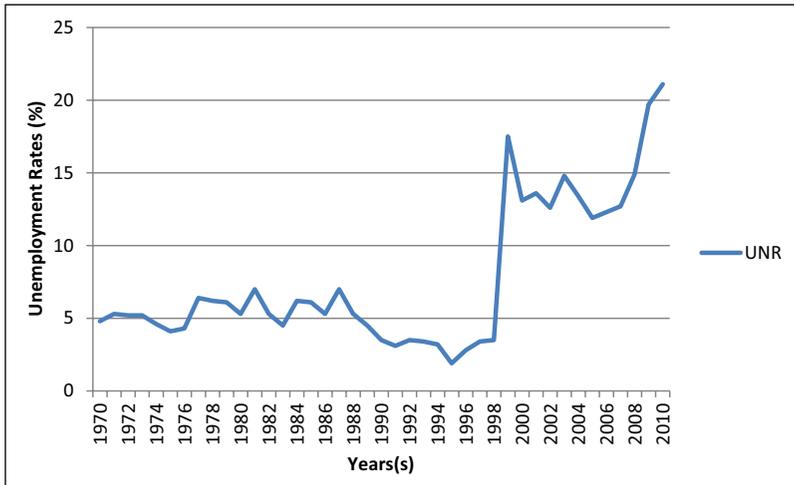
Year	Unemployment rate (%)
1970	4.8
1971–1980	5.2
1981–1990	5.4
1991–2000	5.5
2001–2006	13.1
2007–2009	15.7
2010	21.1
2011	23.9

Source: National Bureau of Statistics (NBS, 2011).

spike in the UNR from 1990s to 2010 can be observed in Figure 1. The impacts of the policy shocks of 1986 and the crisis of 2007–2008 have had significant effects on the trend in this variable. The government's efforts to tackle this macroeconomic problem are yet to achieve desirable results as unemployment continues to rise, reaching about 23.9% in 2011 (NBS, 2011).

## The data

This study is based on an examination of annual data from 1970 to 2010, sourced from the Central Bank of Nigeria's (CBN, 2009, 2012) Statistical Bulletin, NBS (2011) and the World Bank's (2012) development indicators dataset. The vector of variables included percentage changes in the UNR, the commodity price index (CPI), real recurrent government expenditure on education (RGE)<sup>4</sup> and the ratio of import and export to the RGDP as openness measures (OPEN). RGDP and per capita income (gross domestic product per



**Figure 1.** Unemployment rate (1970–2010).

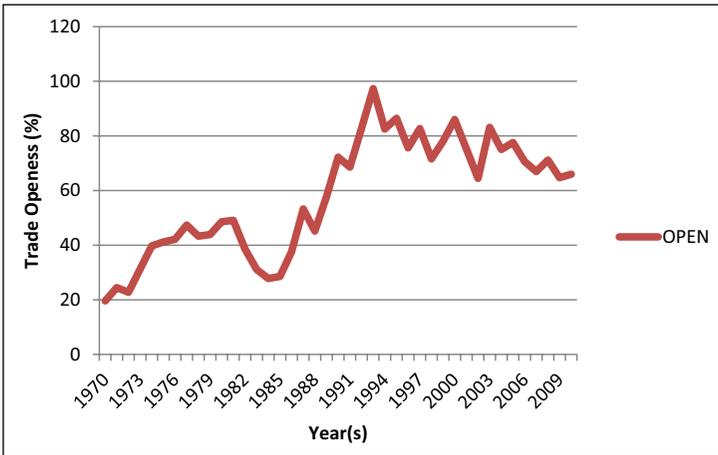
Source: plotted from data in National Bureau of Statistics (NBS, 2011).

UNR: unemployment rate.

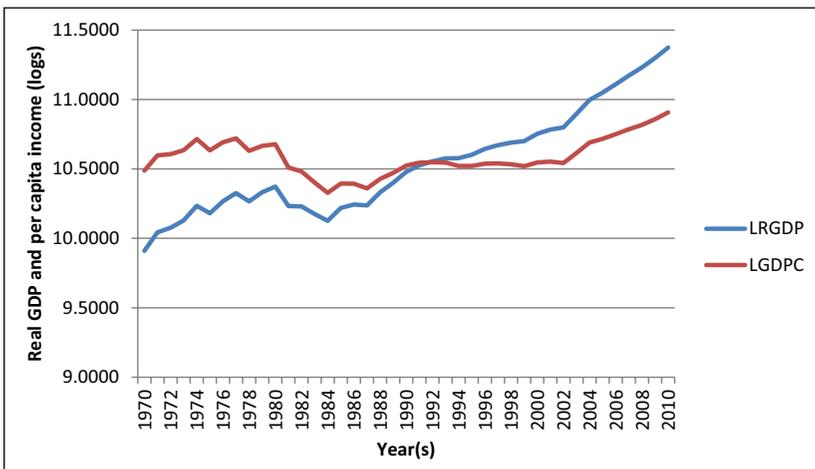
capita (GDPC)) were included as alternative variable; hence, two different equations were estimated. The CPI and RGE were included as control variables. The underlying assumption was that the former would capture variability in primary commodity prices, given that the Nigerian economy is primary-sector driven<sup>5</sup> (see Dollar and Kraay, 2004); hence, a variability in the foreign price shock would be transmitted more into the domestic economy, given the agrarian nature of the Nigerian economy. It was assumed that the latter variable would affirm that the increased public expenditure on education would improve the quality of human capital and, by extension, reduce unemployment.<sup>6</sup> All variables were in their natural log forms, while a dummy variable was applied within the deterministic terms, in order to capture the impacts of the introduction of the SAP in Nigeria. JMulTi4 was the statistical software used in the estimation and analysis.

Graphs of the key variables reveal certain peculiarities. A keen observation of the fluctuating behaviour of the UNR in Figures 1 and 2 shows the trade openness variable. From 1980 till about 1986, trade openness shows a downward trend, reflecting the trade situation before the introduction of the SAP (Figure 2). An upward movement of the variable is also seen after the introduction of the trade liberalisation policy that allowed trade flows, devoid of restrictions on some goods and services. In Figure 3, changes in real output and per capita income show similar patterns over the sampled period, especially the gradual upward movement of these variables. However, we can equally confirm a downward trend in the variables during the crisis episodes. The World Bank's (2013) development indicators show a recent growth in Nigeria's real output to about 7.3% per year, surpassing those of South Africa and Turkey at 2% and 4%, respectively.

In this respect, an investigation of the dynamic relationship among these variables calls for the need in determining whether the variables are integrated or not, which naturally lead to capturing the long-run equilibrium if any.



**Figure 2.** Trade openness measure (1970–2010).  
Sources: plotted from data in Central Bank of Nigeria’s (CBN, 2012) Statistical Bulletin.  
OPEN: trade openness measure, as defined in text.



**Figure 3.** Real gross domestic product and income per capita (1970–2010).  
Sources: plotted from data in World Bank’s (2012) development indicators.

### Methodology

A time series approach was applied, utilising the Vector Autoregressive Regression in investigating the relationship between trade openness and unemployment in Nigeria. This method was based on Jin’s (2000) article on openness and growth in East Asian countries. However, our study differs remarkably from Jin’s (2000) work by controlling for structural changes in the series while running the unit root and cointegration tests. Also, our study used different control variables and case study.

Therefore, in order to avoid spurious correlation among variables of interest which would affect our results and conventional statistical inference, the first concern is to determine whether the time series for the variables used are cointegrated processes. Since the sampled period includes economic policy changes in Nigeria, we are also concerned about the presence of structural breaks in the series. In this respect, the following section will describe the unit root tests employed that allow for structural changes.

## Unit root tests

Based on Nelson and Plosser's (1982) traditional view that most macroeconomic time series variables have a basic unit root property, the initial step would have been to test whether the mean and variance of the variables are constant or change over time, employing the testing procedure of the Augmented Dickey–Fuller (ADF) and Fuller tests (Dickey and Fuller, 1979; Fuller, 1976). However, in the presence of a shift in the level of the data-generating process that may arise due to structural breaks in the economy, an ADF test that ignores such shifts will have low power (Perron, 1989, 1997). In order to account for this, a shift function may be added to the deterministic term while testing for a unit root.<sup>7</sup> The shift function may be based on a simple shift dummy, such that  $d_{iT_B}$  captures the shift in the series by allowing  $d_{iT_B}=0$  for  $t \leq T_B$  and  $d_{iT_B}=1$  for  $t > T_B$ . If the coefficient of the dummy variable is statistically significant at a given significance level, it means that there is an instantaneous shift to a new level after the break date,  $T_B$ . Alternatively, as Lanne et al. (2002) and Saikkonen and Lütkepohl (2000) argue, the shift may be gradual, spreading over some periods of time, rather than being a simple shift: this then requires the estimation of a non-linear shift function. Hence, we applied the tests for the presence of unit roots, allowing for structural breaks in the series in the form of simple shifts or non-linear shifts. Should all variables be integrated in the same order, cointegration tests would also be conducted, allowing for these structural changes (Saikkonen and Lütkepohl (S&L) test) (Saikkonen and Lütkepohl, 2000).

## Vector error correction model

The presence of cointegration involves estimating a vector error correction model (VECM). The VECM particularly captures both long-run and short-run dynamic relationships, using the restricted, generalised least squares (GLS) method. These restrictions are performed to allow for precision and a more robust estimate. The model is represented as

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + \dots + \Gamma_\rho \Delta y_{t-\rho+1} + Cd_t + u_t$$

where  $\Pi = \alpha\beta'$ ;  $y_t = (UNR_t, CPI_t, OPEN_t, RGDP_C_T \text{ or } RGDP, RGE)$ ,  $\Delta$  being the differencing notation;  $d_t$  represents the deterministic terms such as constant, a trend variable and shift or impulse dummy variables, and  $u_t$  is the white noise stochastic disturbance term. Matrix  $\alpha$ , including the speed of adjustment parameters, is also estimated, while matrix  $\beta$  is the cointegrating matrix and  $\Gamma_i$  is the matrix of the short-run parameters and

**Table 5.** Unit roots tests allowing for structural breaks.

Variables	Shift functions	Lag length	Test statistics	5% critical value
$UNR_t$	Shift dummy	2	-1.737	-3.03
$CPI_t$	Shift dummy	0	-2.249	-3.03
$GDPC_t$	Shift dummy	0	-1.441	-3.03
$RGDP_t$	Shift dummy	2	-2.127	-3.03
$RGE_t$	Shift dummy	0	-1.857	-3.03
$OPEN_t$	Shift dummy	2	-1.737	-3.03
$\Delta UNR_t$	Impulse dummy	2	-5.005	-3.03
$\Delta CPI_t$	Impulse dummy	2	-4.042	-3.03
$\Delta GDPC_t$	Impulse dummy	0	-4.421	-3.03
$\Delta RGDP_t$	Impulse dummy	0	-4.525	-3.03
$\Delta RGE_t$	Impulse dummy	3	-3.323	-3.03
$\Delta OPEN_t$	Impulse dummy	2	-4.457	-3.03

Critical values based on Lanne et al. (2002) and  $\Delta$  is the differencing operator.

$C$  is the parameter for deterministic terms. In the set-up of the model, the first term shows the long-run relationship among the variables, such that  $y_t$  changes in response to one period lagged deviation from the long-run equilibrium or in response to stochastic shocks. Matrix  $\alpha$  is the speed of adjustment parameters. The matrix for deterministic terms also includes the dummy variable  $D_t = 0$  for  $T_B < 1986$  and  $D_t = 1$  for  $T_B \geq 1986$ , as well as a trend variable among the short-run parameters (not restricted to the long-run, cointegration equation). The variables real gross domestic product per capita (RGDPC) and RGDP are alternatively included in the equation.

Residual analysis of the model was tested for adequacy of the estimated model, especially for autocorrelation conditional heteroskedasticity (ARCH effects) and Lütkepohl (1991) and Chow tests for parameter stability (Hansen, 2003).

## Empirical analysis

A unit root test based on Lanne et al. (2002) and Saikkonen and Lütkepohl (2002) was conducted, allowing for both shifts and impulse dummies, respectively, and accounting for any structural break in the series. The summary of the test results is presented in Table 5.

All variables have a unit root at the levels (before taking the first differences) but became stationary after taking the first differences. Thus, all variables are integrated into order 1,  $I(1)$ . This implies that we need to check for the presence of cointegration relationships among the variables. The cointegration test results, allowing for structural breaks (Table 6), indicate one cointegrating relation in both equations, using GDPC and RGDP alternatively. Lag length was determined using the Hannan–Quinn and Schwarz information criteria.

## Estimation applying the VECM

Having established a single cointegration relationship among the variables, a VECM was estimated, based on rank  $r=1$  and three lagged differences, for the 1974–2010 sample

**Table 6.** S&L cointegration tests for level shifts,  $y_t = (UNR_t, CPI_t, GDPC_t, GE_t, OPEN_t)$ .

Variables	Deterministic terms	No. of lagged lengths	$H_0$	Test statistics	Critical value(s)	
					90%	95%
GDPC	c, t, sd 86	3	$r=0$	80.28	62.45	66.13
			$r=1$	38.33	42.25	45.32
RGDP	c, t, sd 86	3	$r=0$	78.99	62.45	66.13
			$r=1$	34.69	42.25	45.32

S&L: Saikkonen and Lütkepohl; GDPC: gross domestic product per capita; RGDP: real gross domestic product.

c: constant; t: trend; sd: shift dummy; based on Saikkonen and Lütkepohl (2000).

**Table 7.** Estimated long-run cointegration vector.

Using GDPC					
$UNR_{t-1}$	$CPI_{t-1}$	$GDPC_{t-1}$	$RGE_{t-1}$	$OPEN_{t-1}$	$D_{t-1}$
1.00	-2.943 (0.998) {0.003}	2.436 (0.592) {0.000}	-0.319 (0.211) {0.131}	-2.218 (0.482) {0.000}	4.024 (0.516) {0.000}
Using RGDP					
$UNR_{t-1}$	$CPI_{t-1}$	$RDPC_{t-1}$	$RGE_{t-1}$	$OPEN_{t-1}$	$D_{t-1}$
1.00	-3.943 (1.023) {0.000}	2.981 (0.648) {0.000}	-2.99 (0.216) {0.168}	-2.218 (0.486) {0.000}	4.024 (0.513) {0.000}

GDPC: gross domestic product per capita; RGDP: real gross domestic product.

Coefficients indicate significance at the 1% level. Figures in ( ) show standard errors while those in { } are the p-values.

period. All lag lengths were determined by minimising the information criteria of Hannan–Quinn criteria and Schwarz criteria. The estimated, long-run cointegration relationship is presented in Table 7.

As observed, the coefficient of the first variable is normalised to unity. Estimates of the error correction model in both equations show that recurrent expenditure is not significant in reducing national unemployment, while GDPC and RGDP have large impacts on unemployment, with a negative sign, and are highly significant in reducing unemployment. Trade openness increases unemployment, given the highly significant and positive sign of the estimated coefficients. This result is consistent with the findings of Helpman et al. (2010), Menezes-Filho and Muendler (2011) and Mitra and Ranjan (2007), where in frictional labour market conditions, trade openness leads to an economy-wide unemployment. Its significance is, however, minimal, at about 2.8% increase in unemployment. The dummy variables for 1986, capturing the structural change in the economy, also have significant negative impacts on the cointegration relationship. By

**Table 8.** Speed of adjustment coefficients for GDPC and RGDP (1974–2010).

Equations	GDPC	t-statistics	Equations	RGDP	t-statistics
	Coefficients, $e_{t-1}$			Coefficients, $e_{t-1}$	
			$\Delta RGE_t$	0.056	2.605
$\Delta GDPC$	0.010	1.747	$RGDP_t$	0.019	3.212
$\Delta GDPC$	0.122	9.357		0.019	7.482

GDPC: gross domestic product per capita; RGDP: real gross domestic product.

implication, the SAP's introduction in 1986 was effective in reducing unemployment in Nigeria as seen in both equations.

Considering the speed of adjustment parameters, the error correction term is said to be significant in the RGDP equation, except for CPI and UNR. This implies that for any discrepancy from the long-run equilibrium, these two variables are unresponsive in reverting the relationship to equilibrium. For the GDPC equation, only OPEN variable can react to return the system to equilibrium. The loading matrix estimates are reported in Table 8.

The estimates indicate that in the case of a discrepancy in one lagged period deviation from the long-run equilibrium, the most effective response to restore the system to equilibrium is trade openness, which will rise by about 12% and 1% in both equations, respectively. Also seen from the RGDP equation, RGDP and RGE will have to rise by about 2% and 6%, respectively, to bring the system back to equilibrium. It is also observed that the RGDP has not made a significant improvement in reducing unemployment, given the surging UNR in Nigeria, as previously reported in Table 4.

The short-run relationships further show that unemployment is significantly explained by its own first and second lags, while openness is significant in all lags, but with a negative relationship with unemployment in the first and second lags, then a positive relationship for the third and fourth lags, respectively, in both equations.

## Diagnostic tests

The diagnostic tests were based on residual analysis and the Chow test for parameter stability. In checking for the presence of any possible autocorrelation<sup>8</sup> in the residuals, we applied the Portmanteau test statistics under  $H_0; E(u_t, u_{t-1}) = 0$ , where  $i = 1, \dots, h$  against the alternative that autocorrelation is not 0. To check for higher-order autocorrelation, the Lagrange multiplier (LM) test was also considered, as displayed in Table 9. The test results confirm no autocorrelation in the residuals. Besides, the univariate ARCH-LM tests indicate no ARCH effects in the residuals.

The Chow (1960) tests were conducted for parameter stability under the null hypothesis of invariant coefficients and residual covariance matrices against the alternative (Doornik and Hendry, 2001; Hansen, 2003). However, Candelon and Lutkepohl (2001) proposed the use of bootstrapped values to accommodate small sample properties. The test results are presented in Table 10.

**Table 9.** Diagnostic test for VECM for GDPC and RGDP.

Test	GDPC			RGDP		
	$Q_{10}$	$Q_{10}^*$	$LM_3$	$Q_{10}$	$Q_{10}^*$	$LM_3$
Test statistics	200.11	236.23	78.09	192.24	226.60	74.19
p-value	0.773	0.164	0.38	0.919	0.383	0.504

$Q_{10}$ : Portmanteau test statistic at lag 10;  $Q_{10}^*$ : adjusted Portmanteau statistic for small samples;  $LM$ : LM-type test for autocorrelation with three lags; VECM: vector error correction model; GDPC: gross domestic product per capita; RGDP: real gross domestic product.

**Table 10.** Chow test for VECM for RGDP and GDPC.

	Break point	Test	Test statistics	Bootstrapped p-value
GDPC	2000	$\lambda_{CF}$	0.12	0.67
RGDP	2000	$\lambda_{CF}$	0.10	0.75

VECM: vector error correction model; GDPC: gross domestic product per capita; RGDP: real gross domestic product.

## Findings and recommendations

The empirical findings show that the cointegration relationship is significant where both the output and openness variables react to any disequilibrium in the long run. It is observed that recurrent expenditure on education in Nigeria could not properly explain changes in national unemployment. This could be due to the unstable nature of education funding in Nigeria, both at the formal and informal levels. Furthermore, an increase in both RGDP and per capita income is found to reduce unemployment at a minimal rate of about 1%. The magnitude of the coefficient appears insufficient and could be interpreted as representing the high UNR in Nigeria, despite the phenomenal growth rate in output over the years.

The foregoing results are not surprising, given the role of the Niger Delta crisis, a high crime wave such as kidnapping and the recent, incessant terrorist attacks by *Boko Haram*. This means that the government needs to employ more solid macroeconomic policies to prevent market failures, as well as undesired conditions such as terrorism. This solution necessitates the establishment of additional industries, especially in rural areas, with a view to harnessing idle resources. However, this remedy cannot work in isolation; the complement of other viable factors is also needed. The power sector must be tackled in all its ramifications.

Educational reform is also imperative to implement effective standards for admitting prospective students into areas of study in which they have high aptitudes and inclination. Skills development should be a major emphasis of education, not merely obtaining the certificate. Consequently, and over the long term, school graduates will be relevant in one sector or the other to minimise over-dependence on white-collar jobs that are not sufficiently available. The three tiers of the government have to plan job creation in line with graduations from schools.

Trade openness and commodity prices have raised the UNR instead of reducing it, contrary to expectations. Additionally, trade openness has increased the capital flight and brain drain from developing countries.

Furthermore, several factors arising from corruption, infrastructural deterioration and poor-functioning institutions could also pose a huge challenge to addressing the ever-increasing UNR. Improvement in the business environment through capital infusion will go a long way to encourage both domestic and foreign investors, thus optimising the utilisation of resources. Further efforts are also required to reduce the high degree of corruption in Nigeria. As Uma and Eboh (2013) pointed out, corruption is one of the greatest obstacles to the development of the Nigerian economy, as it has brought about high-level greed and misallocation of scarce resources.

Obviously, there is a high cost of governance in Nigeria, as well as considerable income disparity between the political office holders and other lower ranking employees of the government. It is necessary to reduce the remuneration of political executives to have more funds available for industrial establishments. Moreover, high import duties and multiple taxes should be eliminated in the Nigerian economy. Odusola (2006) pointed out that in addition to federal income tax, companies are subjected to a wide range of taxes, levies and rates at the state and local levels. This situation can be an obstacle to foreign investment in Nigeria.

## **Conclusion**

The main objective of this study was to empirically examine the impact of trade openness policy on nationwide unemployment in Nigeria over four decades (1970–2010), a crucial period in the country's economic history. The long time-scale of the sample allowed the investigation of the implications of the SAP introduced in 1986, which has been designed to attain sustained economic growth. The SAP was one of the initiatives for opening the economy to international trade, which (according to traditional wisdom) would help the transfer of resources, mainly labour, from low-productivity areas of production or the informal sector to highly productive sectors, such as manufacturing and tradable sectors, thus creating jobs for the unemployed. The sample also covered the global financial crisis, which spread rapidly within the globalised world, reducing the demand for international trade, savings and investments, and increasing unemployment. In the light of the above framework, the rising UNRs, despite the recent economic growth statistics in Nigeria, provide the motivation for exploring the impacts of the SAP's trade liberalisation policy on unemployment.

Following Davidson and Matusz's (2004) argument that studies of trade openness and unemployment constitute 'an empirical issue', we applied the VECM after establishing a long-run relationship using the Johansen method of cointegration. The estimated model suggests that trade openness policy and rising commodity prices had induced unemployment during the period under investigation. However, we also realised that the increase in output and per capita income had a significant effect in reducing unemployment. Our findings, including those of others in the literature review, relay some vital tendencies in developing countries.

First, despite the abundant human and natural resources such as those found in Nigeria, the effects of such an open trade policy are still minimal. This presents quite a

different picture from that in developed countries (see Yanikkaya, 2003). Second, the level of unemployment reduction expected from trade openness has not been achieved in Nigeria, owing to many factors which have adversely affected resource utilisation and retarded aggregate economic activity, in turn dampening output productivity. The existing weak institutions in the country, the low level of infrastructure, especially in the rural areas, and occasional crises, typical of developing countries, have hindered the economy from encouraging more trade and globalisation. Consequently, Nigeria has to embark on necessary reforms and adopt policies relevant for repositioning the economy before it can enjoy the benefits associated with trade openness. Furthermore, a more functional institutional arrangement needs to be established to guarantee the effective monitoring and supervision of trade flows in the economy. Among several factors of workforce development, one of the crucial considerations should be the improvement in human capital through skills acquisition.

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### Notes

1. Vulnerability leads to poverty with higher chances of falling below the poverty trap and lower wages.
2. It depends on the structure of the labour market. Winters et al. (2004) maintained that trade policy frameworks related to low-skilled jobs affect employment in this sector.
3. From 42 million people in 1960 to about 168 million in 2012, compared to Brazil and Ghana with a population of about 198 and 24 million (2012), respectively.
4. All of CPI and GE were included as control variables in the analysis. Furthermore, all variables were deflated, using implicit deflators and commodity price index (CPI) (2000 = 100).
5. Labys and Meizels (1993) considered the possibility that fluctuations in commodity prices leave a transmission effect from industrialised to developing countries through an indirect effect on wages and a higher unemployment rate.
6. See Birdsall and O'Connell (1999) and Galal (2002).
7. See also John et al. (2007) for detailed explanations of the various studies and findings related to unit root testing in the presence of structural breaks.
8. This test is peculiar to the Ljung–Box statistics for the univariate case.

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