Chapter 14
Trade Liberalization and Poverty Alleviation in Nigeria: The Complementary Role of Institutions

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1 Introduction

There has been a renew interest in global economic integration, in particular trade liberalization as a development strategy by most policy makers. This was based on the intuition that both international and national equality will be achieved through trade increasing relative wages in labor-abundant economies and lowering them in labor-scarce countries. Above all, it raises real income of trading countries and ensuring the efficient allocation of nations and world's resource endowment (Todaro & Smith, 2011). The traditional trade theory is of the view that long-term effect of trade policy (in particular tariff) aimed at improving the welfare of the poor either in a capital-endowed economy, exporting capital-intensive goods or labor endowed country, exporting labor-intensive goods will result into higher rate of return to capital or labor as the case may be. The higher rate of return to factors will be in the short-run impact the relative price of imported goods (specifically in the import competing sector) positively and encouraging transfer of capital and labor from the export sector to the import sector in the long run. The reallocation of factors between sectors specifically in a capital-rich economy will ensure higher capital–labor ratio in both sectors, resulting in long-term effects of higher marginal product of labor and declining marginal product of capital in both sectors. The increase in marginal product of labor will translate into increase in real wage rate for workers that form the bulk of the poor and a declining return on capital in real term (Sodersten & Geoffery, 1994).

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However, the present growth experience of many developing countries creates doubt in the above prediction of neoclassical trade theories and provides evidence in support of the opposing view. They argued that through redistribution, trade liberalization policy could actually result to growth in income but fail to ensure increase in wages of unskilled labor even in a labor-abundant country, thereby widening the gap of inequality between the rich and the poor, as well as increasing rate of poverty in developing economies (Topalova, 2007). The above assertion vividly portrayed the present poor state of development in African continent most especially Nigeria with a considerable level of economy openness.

Nigeria is an oil-rich economy and a labor abundant with oil proceeds accounting for the largest percentage of its total GDP. Although at independence and early 1970s, Nigeria's major exports were non-oil agricultural produce. Between 1970 and 1985, crude oil exports surpassed this feat and the sector accounted for about 93% of the total exports, and by 1998, it is increased to 96.05, by 2012 it experienced an insignificant decline in its figures by 1.05%. Despite all efforts toward diversifying the economy away from oil, the total of value of crude oil export in the country still remains high with a figure of 79.9% as at second quarter of 2016. Over this period, the share of non-oil exports declined to 4.0% in the same year. Within the non-oil exports, cocoa accounted for about 61.1% in the 1970s, and between 1986 and 1998, its share declined to 30.0%, (Mordi et al., 2010; NBS, 2017; Index Mundi, 2017). Overall, the non-oil export performance was discouraging. More disappointing was the total exists of some products such as groundnuts, cotton, hides and skin and palm oil among others. While the exports basket has been on the increase due to oil and gas exports, the import basket has been following the same trend. Most importantly, between 1980 and 1984 before the introduction of SAP, the importations of consumer goods top the list of imports. The import bill which averaged US$ 5899 million in 1986 increased to US$ 18,172.86 million by 2007. As at the end of the second quarter of 2016, the total import bill rose by 38.1% from the preceding year value.

In order to curtail this trend, a number of trade policy measures have been introduced in Nigeria targeted at restricting import volume to the available foreign exchange earning along with supply-side measures to boost exports, a strategy that has been dynamic. The dynamic nature of the external trade policy takes the form of a tightened exchange control from 1976 to 1979, between 1980 and 1986 the policy thrust was in favor of trade liberalization, and by early 1990 the policy was abandoned. Again, in July 1996 a liberalized trade regime became the policy thrust of the government. In the recent time, the trade policy adopted was contained in a circular released in June 23, 2016, by the Central Bank of Nigeria excluding importers of some foods and agricultural items from accessing forex at the official rate of exchange (Export.gov, 2016; Mordi et al., 2010).

On the whole, it can be said that Nigeria keys into the wave of trade liberalization as a condition for financial aid from international financial institutions. This was required to overcome its poor state of the macroeconomic environment necessitated by the global economic crisis in the 1980s (Mordi et al., 2010). Also, the adoption of common external tariff (CET) under the Economic Community of West African States (ECOWAS) in 2005 which came into effect in 2015 marked another era of a new

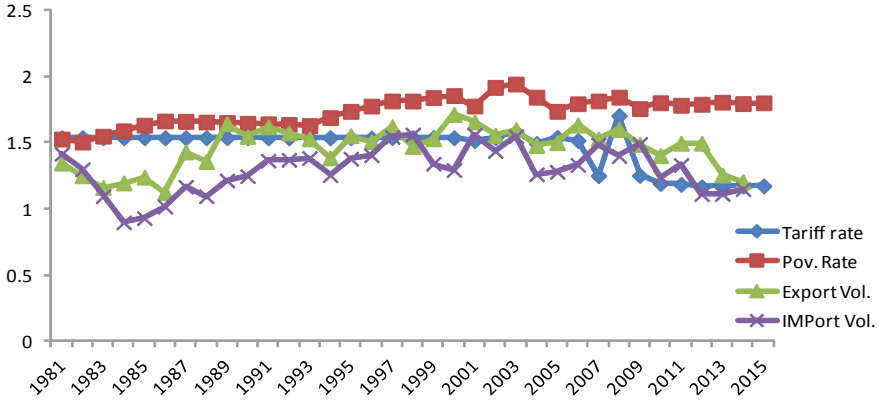

Fig. 1 Trend of annual consumer tariff rate, trade volume and poverty rate in Nigeria (1981–2015). *Source* Authors Computation using Data from World Bank, (2014), World Bank, WITS 2016 NBS, Various Issues. **Note* Data have been transformed into log values

trade policy regime in the country. The outcome of the above is an increasing degree of openness of the economy, with very poor macroeconomic outcomes, making an oil-rich country one of the poorest economies of the world. For instance, the trend of Nigeria imports tariff rates, which stood at 150% in 1999 reduced to 50% and 35% by 2008 and 2013, respectively, while weighted average tariff rate on consumer goods also experienced the same trend, declining from 38.28 to 17.82% and 14.87% over the same periods (World Bank, WITS 2016). Disappointedly, the worsened standard of living of most households only experienced a marginal improvement with percentage of the population below the poverty line declining from 64.2% in 2004 to just 62.0% in 2010 (see Fig. 1) while its level of inequality continues to get worsened as shown by Gini coefficient figures of 40.6 in 2003, increasing to 42.97 in 2009 (UNDP, 2015).

In the same vein, commencing from 1991, import price has been on the increase, in most cases higher than export prices, a scenario that has resulted in falling standard of living due to increasing level of consumer prices (see Fig. 2). Statistics available pointed to the fact that the marginal improvement achieved in the rate of poverty will be unsustainable and that a disappointing situation is evident in the near future to come. For example, between the years 2002 and 2011, the country recorded an average unemployment rate of 51.2% of the total population, higher than the rate in other countries in the region (UNDP, 2012). A careful look at the country-specific level of unemployment among the low- and middle-income countries portrays a clearer picture of worsening state of employment with Nigeria, having a rate of unemployment that is higher than that of Libya at 23.95, Malaysia 3.7%, Brazil 6.4% and Egypt at 11.85 in 2011 (UNECA, 2012; WDI, 2013).

The above scenarios create uncertainty on the postulates of trade theories, leaving the question of how trade liberalization impacts poverty at the mercy of empirical investigation. Empirical literature examining the effect of trade liberalization on

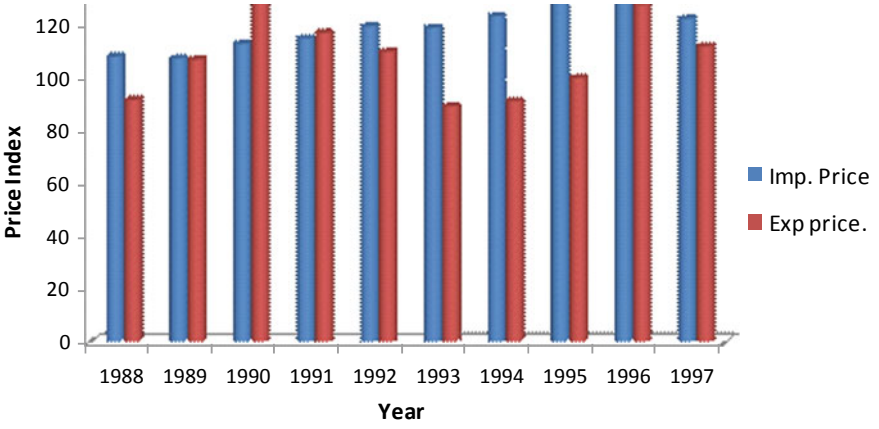

Fig. 2 Figure showing Trend of Import and Export prices in Nigeria (1988–1997). *Source* Author's Computation using Data from World Bank (2016)

poverty is highly debated, and the empirical evidences are conflicting (see Geoferrey & Kamau, 2001; Pineopi & Nina, 2004; Topalova, 2007; Goff & Singh, 2012; Imran & Imran, 2013) and specifically on Nigeria are Olofin, Adenikinju and Iwayemi (2001), Nwafor et al. (2005), Adeoye (2008), Ayinde, (2013), Uexkull and Shui (2014) and Eric (2015). One noticeable gap in previous studies with the exception of Goff and Singh (2012) is that the scholars assumed the link between trade and poverty to be direct. In actual sense, the impacts of trade policy on poverty may act through other complimentary factors like institution and level of education indicating an indirect relationship (Winters, 2004 as cited by Goff & Singh, 2012). Examining this relationship, the possibility of nonlinearity was not considered, a situation that might impair the validity of inferences, and this provides an intuition for the present study.

Also, previous empirical papers (Nwafor et al., 2005; Adeoye, 2008; Ayinde, 2013; Eric, 2015) assumed the link between trade deregulation and poverty to be static, whereas policy and economic activities change overtime and as such their shock is dynamic with varying intensity, a situation in which a technique based on static analysis could not be handled. This gap is covered in this study by estimating a time-varying parameter (TVP) based on state-space model using Kalman filter approach**.** Therefore, the present study examined the impacts of trade liberalization on poverty taking into consideration the likelihood of structural breaks in the behavior of the series. Specifically, the paper intends to investigate the responses of poverty to shocks in trade liberalization as well the impact of its complementary factors on poverty in Nigeria. To achieve these objectives, the paper has been divided into various sections. Following this section is the review of relevant literature, Sect. 3 dwells on methodology while Sect. 4 contains data analysis, and Sect. 5 concludes and proffers recommendations.

2 Literature Review

2.1 Review of Theoretical and Empirical Literature

Defining liberalization as it relates to trade is as difficult as measuring the extent of liberalization itself. This is due to the fact that even if all restrictive policies are known, the knowledge of the depth of implementation may not be known. In view of this, trade liberalization could be taken to be reduced or partial removal of the institutional barriers to trade, which alter prices of both foreign and domestic goods, ensuring an unvarying policy treatment between different economic activities and allowed for competitive market (Winters, 2000a).

As difficult as it is in defining liberalization so also the concept of poverty. Poverty could be likened to a situation in which an individual was deprived of the basic necessities of life required for a minimally acceptable standard of living. These include needs for food and other basic necessities of life like health, education and essential public goods (Kankwenda et al., 2000). For the purpose of this study, poverty will be viewed from the perspective of income, therefore an individual is considered to be poor if his or her consumption falls short of a predetermined poverty line and as such, he or she does not have sufficient income to achieve a certain level of well-being.

Theories explaining the trade–poverty link can be grouped into two main strands; mainstream theory of trade and new trade theory, each with different explanations about the trade internal distributional effects and how it impacts the poor. For instance, Stopler-Samuelson (1941), Samuelson (1948, 1949) theorem on long-term effect of tariff based on assumption of a capital-endowed economy, an offshoot of Heckscher-Ohlin neoclassical orthodox trade model, states that in a two inputs (capital and labor), two countries and two commodities model, a country will have relative opportunity in relatively intensive goods produced through relatively abundant factor (*capital-intensive good*s). The comparative advantage enjoyed in the form of higher rate of return to capital due to increase in the relative price of imported goods (specifically in the import competing sector) resulting into optimum reallocation of factors between sectors and thus a higher marginal product of labor and declining marginal product of capital. The increase in the marginal product of labor will translate into increasing real income of the factor with which the country is well endowed and a decrease in that of the scarce input, thereby resulting increasing income and declining trend of poverty (Samantha & Nicollete, 2006).

The new trade theory as developed by Winters (2000a, b) and further expanded by McCulloch et al. (2001) extends orthodox neoclassical trade theory and posits that understanding the trade–poverty link goes beyond providing restrictive assumption but required detailed knowledge of three different transmission channels through which trade can be linked to poverty. These channels are price mechanism channel, enterprise channel and government policy channel (McCulloch et al., 2001).

Explaining the price transmission channel, Winters (2000b) used as a case study, a household operating on both sides of the market in an economy, (consumer and

producer) in which trade liberalization is expected to affect the prices of export goods as well as import substitutes. The overall impacts depend on either the underprivileged is a final consumer or producer of commodities whose price has been affected. A rise in the price of good of which the household is a final producer and a decline in the price of which is a final consumer will definitely result in increase welfare and vice versa (PRUS, 2001).

Providing for the role of institutions, Winters (2000b) opined that the price pass through might not be direct due to the way channel of distribution is set up in the absence of effective institutions. In an economy, tradable goods have to pass through different borders, adding to the production cost at each stage, thus reducing the price reduction benefit expected to be gained by the poor. In other cases, a net producer of exported goods might not experience any increase in price due to liberalization if the middlemen retain the increase in price as a profit. Also, in a situation where economic liberalization eliminates certain market institutions (Marketing Board), creating a missing market and leaving small farmers at the mercy of private agents, the poor farmers can completely be isolated both in the existing market and new market opportunities. Therefore, efficient institutions are required to remove administrative bottlenecks that can add to cost, safeguard poor producers from exploitation of private gents and market failure (McCulloch et al., 2001). Mukhopadhyay (2002) submits that unguided liberalization without adequate government policies and strong institutions to safeguard the system against market failure can result into doom for the poor in the periphery. This was the case in South Africa, where liberalization was associated with declining rate of employment, increasing prices of commodities that are basically for the underprivileged.

Tracing the impact of trade on poverty through enterprise channel as it affects wages and employment, the theory posits that the elasticity of labor supply determines the extent at which fluctuations in prices of goods jointly produced by a firm and others will result into changes in wages and employment (Winters, 2000b). If the supply of labor in a liberalized economy is perfectly inelastic, a change in price will only be reflected in increase wages but not in employment level because works compete with leisure (Branson, 1989). Conversely, in a state of perfectly elastic supply of labor, the impact will be purely employment-driven based since wages are assumed to be sticky downward as argued by the Keynesians. Increased prices encourage higher output, real wage remains unchanged, and this translates into an increase rate of employment, thereby reducing poverty rate, but with a neutral wage effect (Bannister and Thugge, 2001).

In the third channel, trade liberalization may impact government expenditure through tax revenue. The increasing government spending on social safety net and transfer through increased tax revenue will influence positively household income. A liberalized trade with a declining impact on government spending due to dwindling revenue could end up making the poor worse off. On the other hand, in order to compensate for the loss in revenue, an attempt by the government to increase charges and other taxes like value-added tax might be considered; if these taxes affect goods consumed by the poor, the outcome will be poverty inducing (Winters, 2000b). Providing a counter argument on the above submission, Bannister and Thugge (2001)

submit that lower tariff rates due to trade liberalization may increase trade volume, reduce incentives for smuggling, thereby increases total traded goods and consequently also increases revenue. This preposition may be far from reality in most developing countries most especially in Nigeria characterized by economic rigidity where reduction in tariff due to trade Liberalization might have a declining impact on revenue. Therefore, the nature of the influence in various countries depends on the types of the markets (perfect or imperfect), the strategic behavior of the firm, the nature of the institution of a country and the level of diversification among others.

Providing an empirical evidence in support of various channels through which trade could impact poverty as postulated by the new trade theory, Yoon and Nguyen (2006) using simple descriptive statistics as method of data analysis conclude that the effects of trade liberalization on poor households in Vietnam could be transmitted through economic growth, enterprises, market and government. The study further revealed that the import substitution policy has failed in improving the welfare of the poor. This is because the increased level of industrialization achieved is insufficient to generate increased labor demand and the most important economic resources owned by the poor.

Hala (2012) examines the link between trade openness and poverty reduction in Egypt, using simple descriptive statistics to analyze data covering a period of 1999–2012. The paper revealed that the removal of trade restriction alone could not ensure an optimum declining impact of openness on poverty. Therefore, trade liberalization needs to be combined with relevant policies related to infrastructure and institutional development, safety nets, adequate financial support and labor mobility in order to reduce the number of the poor.

Using an historical data covering a period of 1974–2001, Guillermo and Marcelo (2006) investigate whether the impacts of trade on skill premium depend on other complementary policies in Argentina**.** It was confirmed that education, governance (proxy for institutions), labor market and firm entry flexibility have a positive significant influence on poor income both as a variable and when interacted with the openness. The paper concludes that the impact of liberalized trade is dynamic over the different periods and policy complementarities in the form of education, access to credit, strong institutions among others can ensure that the underprivileged gained from poverty reducing trade reforms. Dahai and Shantong (2014) investigated the impact of globalization (through its influence on the exchange rate) on welfare of Chinese households' consumption. The authors adopted feasible generalized least squares method to evaluate the effects of the renminbi appreciation on domestic prices and consumption. The results confirm that appreciation of renminbi is negatively related to prices of consumer goods in China. However, the poor households do not benefit much from the currency appreciation compared to that of the wealthy families.

In an Africa-related study, Dorosh and Sahn (1999) looked at the linkage between trade and exchange rate liberalization on poverty and income among some selected African countries using social accounting matrices (SAMS) for the period 1989–1993. Findings revealed that openness and liberalization of exchange rate benefit the low-income families, both in urban and rural areas. Producing the same result is a

study by Decalawe et al. (1999) on the impact of export crop prices and import tariff on the level of poverty among African, the result of computable general equilibrium shows that reductions in import tariffs positively influence alleviation of poverty.

Building on the methodological approaches of earlier studies, Olayinka (2014) carried out a research on the nexus between domestic prices and wages and their combine effects on household welfare in Nigeria. Feasible generalized least square (FGLS) based on cross-sectional time series was used to estimate different models including interacting term (distance and tariff). The result revealed that tariff reduction benefits the consumers of agricultural products through the ECOWAS CET. This benefit tends to decline as they interact distance with tariff, and that households that are closer to the ports greatly benefit more. In relation to the wage-earning channel, the result further revealed that the country wage rate is not associated with falling domestic prices.

Examining the prospects of the ECOWAS CET in relation to changes in tariff and its impact on total export and revenue for Nigeria using a trade model based on partial equilibrium with imperfect substitution between imports under three scenarios. Uexkull and Shui (2014) simulation results revealed, that the whole setup of CET based on removal of import restriction will result in significant improvement in Nigerian consumer's welfare with a reduction in consumption prices with about 2.4%. Contrary to the above, imposition of ban and tariffs on certain imports and applying CET on non-prohibited goods will result into increasing prices and further worsened the welfare of the poor. On the job creation impact of CET, it was revealed that the employment creation rate of regional exporters is faster than that of global and domestic exporters. Providing support for the role of institutions, Eric (2015) using FMOLS concludes that there exists a significant negative relationship between trade liberalization and level of development in Nigeria, while both export and import impact growth positively. The paper recommends for strong institutions capable of eradicating corrupt practices.

Following a different approach, Akinlo et al. (2013) adopted GMM technique to analyze time series data over a period of 1980–2009 with focus on the effect of trade openness on poor household in Nigeria. The findings revealed that trade liberalization does not significantly reduce poverty, with the exception of trade openness that marginally exerts a downward trend on poverty rate. These findings were later refuted by Ogungbowa and Eburajolo (2014) with empirical evidence obtained from their error correction model indicating that globalization will result into a significant declining trend in the poverty rate in Nigeria.

2.2 Theoretical Framework

The basic theoretical model for this study follows Mcculloch et al. (2001) and Arne et al. (2007) with little modification. The framework identifies three basic channels (enterprise, distribution and government channels) through which trade impacts

welfare of the poor and incorporates institutional and educational factors as endogenous factors which serve as complements to trade liberalization. Trade policy in the form of tariffs or taxes will have a short-run impact, firstly on boarder prices and then on retail prices through distribution channels. The nature of the impact depends on the objective behind the imposition of tariffs. A reduction in tariffs on import is expected to have declining impact on boarder prices with its multiplier effects on retail prices (Fig. 3).

Tracing the effect of tariff and tax policies, the figure shows a lower tariff rate will affect the boarder price of factors (in particular goods produced by the poor) resulting in lower cost of production and firm's (producer's) profitability. Tax policy informs of tax holidays will also exert the same impact on the production cost through the government channel. The pass-through effects of both channels (distributional and government channels) will result into increasing levels of investment, employment opportunities and income.

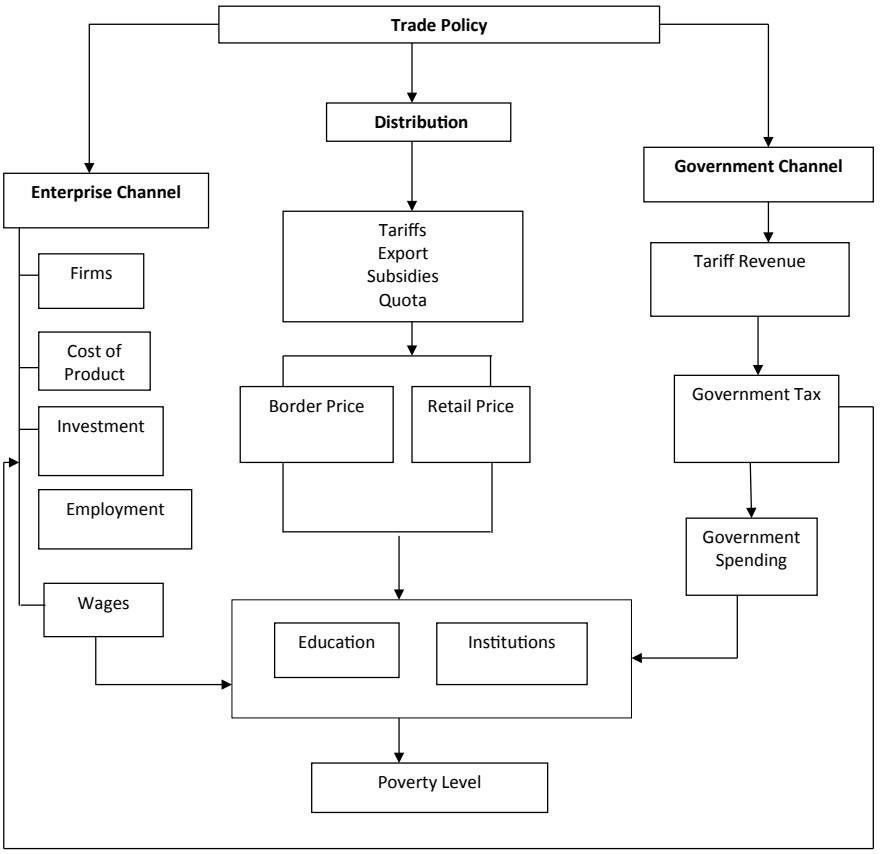

Fig. 3 Trade policy and poverty interaction. *Source* Author's Concept

The long-run objectives behind trade liberalization using tariffs and taxes as instruments are to improve the welfare of the poor as a consumer from the consumption side and as producers from the factors market. Therefore, trade liberalization changes the prices (boarder and retail prices) that the poor face both as consumers and producers. It also ensures improved incomes for the poor since they are mostly a supplier of human efforts. The figure shows that the long-run benefits of trade liberalization might not be automatic, but depends on the complementary roles played by institutions and quality of education of the set of people that the policy is meant to benefit. In an environment of weak institutions, the price reduction benefits that are expected to be gained through distributional channel may be missing if the poor are left at the mercy of the profit maximizing agents. Also, the employment and increasing wage benefits as a result of falling production cost might fail to benefit the poorly educated workers. This is particularly so in the world of technology innovation that requires professional skills. In conclusion, the nature of the long-run impact of trade policy on the poor depends on both the educational and institutional qualities that are available.

3 Methodology

3.1 Data Sources and Description of Variables

Annual time series data for the period 1981–2015 were used in the study. A broad investigation of the literature shows different proxies that have been used as a measure of trade liberalization. This has been grouped into outcome-based captured by trade data and incidence-based measures using tariff data (Spilimbergo et al., 1999; Calderón et al., 2005 as cited by Golf & Singh, 2012). For the present study, trade liberalization will be measured both as outcome-based and incidence-based (Marta et al., 2009). As incidence-based, weighted average tariff on consumer goods source from World Bank (World Bank, WITS 2016) was used, and this is predicated on the fact that significant period of study falls within the periods of structural adjustment program (SAP) during which policy of deregulation was adopted and the introduction of ECOWAS CET that compel all members' countries to remove almost all tariffs on intra ECOWAS trade. Although ECOWAS market for Nigeria remains insignificant when compared to the global trading partners, the fact that regional exporters just like the domestic firms create more job opportunities and thus increase sources of income compared to the global exporter (Uexkull & Shui, 2014) makes this a significant factor**.** Also, developing countries are major producers of primary products of which Nigeria is not an exception. The producers of these commodities are significantly farmers; therefore, a change in the rate of tariff on any of the products will impact significantly the earnings of both producers and consumers of such commodities. Globalization has been found to typically increase the volume of trade and ensure availability of varieties of goods which presents consumers the freedom

to make choices among competing goods at a cheaper price. Consequently, trade liberalization is also measured as the value of exports plus imports as a percentage of GDP (Akinlo et al., 2013). Poverty headcount index has been defined as number of household members that fall below the poverty line (Kankwenda et al., 2000), and in the present study it is measured as percentage of the total population below poverty line sourced from World Bank mega data line 320 (2014).

Level of education is proxy by secondary school enrollment measured in percentages. It is expected that the level of education of workers in a country determines the rate at which such worker acquired new skills needed to meet up with modern day labor demand due to globalization. Monetary policy proxy by the rate of inflation is considered more appropriate compared to interest rate, due to its relative influence on consumer goods prices, mostly patronized by low-income groups. Also, a larger percentage of this group of people resides in the rural areas with little access to financial facilities, thus, they care less about the rate of interest. The financial development which determines the capacity of a country to absorb financial inflow due to openness is captured by broad money as ratio of the total GDP source from World Bank (2014). In order to measure the effect of level of economic development on poverty, real growth in income proxy by real GDP is considered to be appropriate.

Quality of service delivery proxy by electricity consumption (in kilowatts) per capita was used as a measure of institutional quality (Ndebbio, 2006; Udah, 2010), source from World Bank (2014). The use of this indicator is considered more appropriate and free from criticisms of subjectivity mostly associated with the use of indexes. Also, the indicator is considered more superior to other institutional indicators based on three major reasons. First, the effectiveness of policy implementation determined by the quality of social institutions and the level of public acceptance of this policy can be evaluated based on the indicators. Also, the availability of energy has a great bearing on the sources of income as well as the overall welfare of the poor. In light of this, the ability to provide essential public services achievable through strong institution is germane in determining the poverty level in a country. For annual weighted average tariff on consumer goods and other variables, four years moving average figure were used for years in which data were unavailable.

3.2 Model Specification and Estimation Procedure

In other to capture the responses of poverty to shocks from trade policy on one hand, and how liberalization impacts poverty on the other, the following baseline model in its dynamic nature was specified and estimated with two distinct techniques: state-space model and fully modified OLS.

$$\text{pov} = \beta_0 + \beta_i \text{X}i + \sum_{i=-p}^{p} \delta_i \Delta \text{X}_{t-i} + \varepsilon_i \tag{1}$$

where β_0 and δ_i,δ_p are parameters to be estimated, and ε_i is the error term assumed to be normally and identically distributed. X is a vector of regressors, and Δ is the lag operator. Expressing Eq. (1) in terms of the regressors in an estimable form, we have

$$\text{pov} = \beta_0 + \beta_1 \text{tlib} + \beta_2 \text{opens} + \beta_3 \text{rgdp} + \beta_4 \text{ins} + \beta_5 \text{edu} + \beta_6 \text{fdep} + \varepsilon_t \quad (2)$$

Introducing the interacting term in Eq. (2) gives Eq. (3)

$$\begin{aligned} \text{pov} = \beta_0 + \beta_1 t\text{lib} + \beta_2 \text{opens} + \beta_3 rgdp + \beta_4 f\text{dep} \\ + \beta_5 \text{edu} + \beta_6 \text{ins} + \beta_7 t\text{lib} * \chi_{5-6} + \varepsilon_t \end{aligned} \quad (3)$$

where POV represents poverty, and TLIB and OPENS denote trade liberalization (proxy by average tariff rate and openness index, respectively). inf, rgdp, edu, fdep, ins and ε_t represent inflation, real GDP, level of education, financial development, institutions and error term that is expected to be white noise, respectively, while $\chi_{5\text{-}6}$ are the set of variables interacted with trade liberalization. This is grounded on the intuition that the poverty reducing impacts of trade might not be direct but operate or be impaired through the quality of institutions and level of education in the country. $\beta_1 \ldots \beta_7$ are the coefficients to be estimated. In order to guide against problems of serial autocorrelation and heteroskedacitiy in the model, all the variables were transformed into their natural log with the exception of openness and inflation that were expressed in rates (Jalilian et al., 2007).

The estimation of Eq. (2) commenced with the test of stationarity of the series is used in the model. Two traditional and one modern unit root tests were employed; the traditional tests used in the paper are and Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF). The two traditional tests were used to test for consistency and where conflicts exist, to decide on the most appropriate option (see Hamilton, 1994). Confirming the stationarity of the series through unit roots test with structural break becomes imperative in a model set out to explain the dynamics between trade policy and household welfare that may likely be affected through structural changes. This is important, because the correct assessment of any policy that can result in significant structural changes depends on the knowledge of the break dates (Piehl et al., 1999). In view of the above, Perron (1997) framework which deals with unit roots with structural breaks was estimated to further investigate the stationarity of the variables employed.

The test of unit root was immediately followed by test of co-integration. Following the Johansen et al. (2000) test procedure, we accounted for the possible breaks in the model before the conclusion was drawn. The technique involves an extension of the standard vector error correction model (VECM) which takes into account the probable exogenous breaks (in the form of dummy) in the levels and trends of the deterministic components of a vector-valued stochastic process.

Using the response surface method, it generates the probability value with likely break dates based on the asymptotic distribution of the likelihood ratio (LR) or trace

statistic for co-integration. The confirmation of the existence of co-integration was followed by estimation of Eq. (3). Conventionally, if series is co-integrated, static OLS is consistent, but one shortcoming associated with the technique is that it is prone to produce non-Gaussian asymptotic distribution estimates, display asymptotic bias and are functions of non-scalar nuisance parameters. To make up for the shortcomings, we adopted fully modified OLS (FMOLS) developed by Phillips and Hansen (1990). The techniques do away with problems caused by correlation between the co-integrating equation and stochastic regressors in the long run through the employment of semiparametric correction.

In an attempt to investigate the responses of poverty due to shocks in trade liberalization and other explanatory factors, the state-space model (SSM) solved by Kalman filter (1960) was estimated. The state-space model originally developed by engineers to control linear systems enclosed most of classical linear and Box–Jenkins models. The model has been used extensively in the representation of autoregressive integrated moving average model (ARIMA), modeling of unobservable components as well as estimating time-varying parameter (TVP). Authors like Nelson and Kim (1988) and Pavel and Annia (2008), Moshen and Rafiel (2014) have used the latter approach in modeling time series data; the same approach is adopted for the present study.

Estimating a state-space model (SSM), two equations need to be specified, i.e., state and observed equations. The measurement (observed) equation defines the linkage between observed variables and unobservable state variables. For instance, taking X^t as a function of the random variables $\beta_t = \beta_{\text{it}}, \beta_{2t}, \ldots \beta_{nt}$. where $\beta_t =$ vector of state variables, which occur at (t), but (t) is unobservable (latent). Then we have the following measurement or observation equation,

$$\text{Observation equation:} X_t = y_t \beta_t + \varepsilon_t \tag{4}$$

where ε_t is i.i.d, white noise sequence with zero mean and variance $\varepsilon_t \sigma_\varepsilon^2$.
The state equation will be specified as

$$\beta_{t+1} = F\beta_t + \eta_{t+1} \tag{5}$$

where $\eta_t \sim$ i.i.d. N (0,Q), $E(\varepsilon_t, \eta_t.) = 0$(mutually independent) and F is a vector of constant with order K X K. Equation (4) describes how the observation depends on the state vector while Eq. (5) shows the external shocks that entered into the system. This can be changed in policy shift at time t (Moshen and Rafiei, 2014).

In Eq. (4), X_t is a vector of 1×1 and represents the explained variable in our case poverty, which is measured at the time t. β_t is a vector of $K \times 1$ unobservable state variable. y_t is a vector $1 \times k$of observed exogenous variables (TLIB, EDU, GDPPC) that connect the observable vector X_t with the unobservable vector β_t; the ε_t of order 1×1 and the vector η_t of order $k \times 1$ stand for residuals in the observed and unobserved equations, respectively, that are independent and normally distributed with zero mean.

It is assumed that the state vector element $\beta_{1t} = \beta_{1(t-1)} + \beta_{2(t-2)} + \eta_t$ is a moving average (MA) of its pass values making the new state vector a linear combination of the previous state vector and of process of error. Using Eq. (2), expressing a long-run association between poverty, trade liberalization, education and real GDP per capita in its dynamic form, we re-specified the model by attaching "t" as an index to each of the coefficients. This results in Eq. (6) as specified below:

$$\text{pov}_t = \beta_{0t} + \beta_{1t}\text{tlib} + \beta_{2t}\text{edu} + \beta_{3t}\text{rgdp} + \beta_{4t}\,\text{inf} + \varepsilon_t \tag{6}$$

Therefore, $\beta_{1t} \ldots \beta_{4t}$ are state variables that are unobservable. Estimating the state-space model required that the series are I (1) and co-integrated. Also, the presence of deterministic variable is important for establishing a long-run relationship, and this was captured by independent term which also varies with time (Pavel & Annia, 2008). Equation (6) is then expressed in a state-space representation as follows:

Observed equation:

$$\text{pov}_t = \begin{bmatrix} 1 & \log & \text{tlib} & \log & \text{edu} & \text{rgdp} & \text{inf} \end{bmatrix} \begin{bmatrix} \beta_{0t} \\ \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \\ \beta_{4t} \end{bmatrix} + \varepsilon_t$$

State equation

$$\begin{bmatrix} \beta_{0t} \\ \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \\ \beta_{4t} \end{bmatrix} = \begin{bmatrix} \alpha \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} + \begin{bmatrix} 0 \\ \delta_t \\ \eta_t \\ \omega_t \\ \phi_t \end{bmatrix}$$

We should note that the coefficients of $\beta_{1t} \ldots \beta_{4t}$ exhibit random walk behavior and with a permanent disturbances term. If β_t tends to zero, then the coefficient will be said to be constant and not dynamic in nature.

4 Result and Discussion

4.1 Pre-estimation Results

The results of both the conventional unit root tests and that of unit root test with structural break are presented in Table 1 panel A and B, respectively. The results indicate

Table 1 Unit root tests

Panel A: Traditional unit root test results (with intercept and trend)				
At level			At first difference	
Variable	ADF	PP	ADF	PP
LOGTLIB	−0.8703 (0.9474)	−3.8038** (0.0286)	−7.6875*** (0.0000)	−12.8434*** (0.000)
OPENS	−2.3862 (0.3797)	−2.3294 (0.4078)	5.3418*** (0.0012)	−10. 4310*** (0.0000)
LOGPOV	−2.1041 (0.5252)	−2.0262 (0.5666)	−6.1001*** (0.0001)	−12.5491*** (0.0000)
LOGINS	−3.2552 (0.0941)	−3.4051 (0.0674)	−8.6673*** (0.000)	−8.9042* (0.0000)
LGDPPC	−2.6529 (0.2611)	−2.6471 (0.2634)	−5.3781*** (0.0001)	−5.4032*** (0.000)
INF	−3.45187 (0.0661)	-2.7634 (0.2197)	-5.7469*** (0.0002)	-10.5522*** (0.0000)
EDU	-1.8007 (0.6825)	−2.0509 (0.5535)	−4.7997*** (0.0026)	−4.7372*** (0.0031
M2/GDP	−2.5001 (0.3261)	−2.5405 (0.3080)	−5.3801*** (0.0006)	−5.8779*** (0.0002)

Panel B Unit root tests with structural break						
	Innovative Outlier Model			Additive Outlier Model		
Variable	*t*-statistics	Break date	Lag	*t*-statistics	Break date	Lag
LOGTLIB	−17.4636	2006	7	−4.8628 (0.051)	1996	0
OPENS	−4.0656 (0.3319)	2009	0	−3.5453 (0.6648)	2007	0
LOGPOV	−3.7906 (0.5062)	2003	0	−3.9269 (0.4186)	2003	0
LOGINS	4.6472 (0.0831)	1996	0	−3.9362 (1786)	2004	0
LGDPPC	−3.4433 (0.4384)	1999	0	−2.9905 (0.9142)	1992	0
EDU	−3.3649 (0.7697)	2004	8	−3.1462 (0.8643)	2010	4
M2/GDP	0.8082 (>0.99)	2009	0	−4.9667** (0.0365)	1999	8
ΔLOGTLIB	18.5410*** (<0.01)	2007	8	−4.9519*** (<0.01)	1996	8
ΔOPENS	−6.6817*** (<0.01)	2003	8	−8.4347*** (<0.01)	2001	0
ΔLOGPOV	−6.4872*** (<0.01)	2004	0	−7.5839*** (<0.01)	2005	0

(continued)

Table 1 (continued)

Panel B Unit root tests with structural break

	Innovative Outlier Model			Additive Outlier Model		
Variable	*t*-statistics	Break date	Lag	*t*-statistics	Break date	Lag
ΔLOGINS	−10.1961*** ((<0.01)	2002	1	−9.3385*** (<0.01)	1999	0
ΔLGDPPC	−7.0508*** ((<0.01)	2003	0	−7.0847*** (<0.01)	2005	0
ΔEDU	−5.3134** (0.0118)	2000	0	−5.5695*** (<0.01)	2000	0
ΔM2/GDP	−3.3716 (0.4592)	2001	0	−5.775*** (<0.01)	1998	0

Note *** and ** indicate significant at the 1% and 5% levels, respectively. The asymptotic critical values of Vogelsang (1993) unit root test for model C (in Panel B) at 1%, and 5% are −5.719131 and −5.175710, respectively

Source Authors' computations

that all the variables were difference stationary. More importantly, the estimation of stationarity tests with unknown break dates revealed that there were significant structural breaks in the trend of the series in 1995, 1998 and in 2001 through 2008. During these periods specifically between 1995 and 2001, there were tariff reforms aimed at ensuring optimum allocation of resources in which the country has comparative advantage, while in 2002 export promotion strategies were adopted for an enlarge market through product diversification (Mordi et al., 2010). Above all, the conclusion that could be drawn from both approaches is that on the average, all the series were not level stationary but difference stationary.

The stationarity of the series at I (1) provides the theoretical bases for the test of co-integration using Johasen et al. (2000) approach. In this respect, an ordinary VAR model was first estimated in order to ascertain the optimum lag length and reliability of the model based on stability, serial autocorrelation and heteroskedacity tests, the result of which provides evidence in support of the robustness and stability of the model (see Table 1D, Panel A-D of the appendix). The result of the optimum lag selection indicates an optimum lag of one as shown in Table (1C), consequently the test for co-integration was carried out. Doing this, correct intervention dummies were introduced to account for the break dates identified in the results presented in Table 1 panel B. The co-integration test results presented in Table 1E of the appendix adopting Jahansen et al. (2000) suggest the acceptance of alternative hypothesis, indicating the existence of a long-run association between the series in the model. The results show that there are at least three co-integrating vectors at 1% level of significance.

4.2 Analysis of the Inferential Statistics Results

Having confirmed the existence of co-integration among the series in the model, we estimated a FMOLS model and the estimated co-integrating coefficients are as shown in Table 2.

Table 2, model (1), represents the result of our base line Eq. (2). From the result, trade liberalization measured as incidence based has positive, but insignificant impact (LOGTLIB) while as outcome-based measures (OPENS) its exhibits positive significant impact on poverty at 1% level of significance in consistent with the work of Goff and Singh, (2012), Beck et al. (2007) but refuting the work of Yoon and Nguyen (2009) and that of Olayinka (2014). This implies that greater trade openness measured either in terms of tariff reduction or increased volume of goods and services is not a declining function of level of poverty. Quality of institution measured as quality of service delivery indicates an insignificant negative impact on the level of poverty.

Table 2 Fully modified OLS regression results

Dep. variable: POV	Model 1		Model 2		Model 3	
Variable	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
Constant	1.621777*	1.688509	–	–	–	–
OPENS	0.49811***	4.538754	0.54274***	4.95828	0.514677***	5.15824
LOGTLIB	0.151278	0.783291	1.48626***	2.88461	1.627303***	3.49186
EDU	0.01635***	2.521316	0.07040***	2.88461	0.01856***	3.13194
LOGINS	−0.07776	−0.26927	0.06372	0.20264	0.83938*	1.81198
LGDPPC	−0.241879	−0.77005	−0.48025	−1.60328	−0.365636	−1.30955
M2_GDP	0.000149	0.043059	–	–	–	–
INF	–	–	−0.00099	−0.98311	−0.000374	−0.40872
LOGTLIB_ED			−0.036482**	−2.39869	–	–
LOGTLIB_INS			–	–	−0.71728**	−2.81313
Diagnostics						
R^2		0.613133		0.5542		0.61873
Adjusted R^2		0.527163		0.4551		0.5339
S.E. of regression		0.071580		0.07683		0.0711
Long-run variance		0.007660		0.00714		0.00588
Hansen LC Statistics		3.7977 (0.001)		0.914992 (0.0545)		0.930662 (0.0508)
Jarque Bera		1.23717 (0.5387)		0.5853 (0.7463)		0.8284 (0.6608)

Note ***, ** and * denote significant at the 1%, 5% and 10% levels, respectively
Source Authors' computations

The insignificant of the impact may be alluded to the fact that institution on its own cannot engineer the process of a declining rate of poverty, but can only act as complimentary factors for poverty reduction policy. Real income per capita (LGDPPC) is negative, but insignificant, indicating that the more developed an economy is, the lower the level of poverty in such economy (Goff & Singh, 2012). The insignificant impact of the variable under consideration reflects the reality of the Nigeria growth experience where growth in income has been confirmed to be non-inclusive and thus not pro-poor.

Level of education also has a significant poverty-inducing effect against our a priori and in line with the earlier empirical result of Guillermo and Marcelo (2006). It is expected that higher level of education should be able to equip an individual with necessary skills which increases worker mobility and easy adaptation to modern day labor requirement, thereby increases job security. But disappointedly, the quality of education in Nigeria has experienced a declining trend in the last decade, making graduate unemployable in the labor sector. Increasing level of education devoid of entrepreneurship skills in an environment that is not investment friendly would not have a declining impact on poverty. This assertion is supported by the data released by the National Bureau of Statistics which show that poverty is more among the family head with higher levels of education (NBS, 2012). Financial development has a positive insignificant impact on poverty, indicating that the level of financial development in the country has not evolved to such a level that can be pro-poor. Worthy of note is the facts that a lot of services provided by the financial intermediaries have not been pro-poor. A pro-poor financial service should be able to make available for the poor loan at a cheaper rate. This is predicated on the belief that easier access to cheaper credit may allow the poor to benefit more from trade liberalization.

Model (2) and (3) presented results with the interaction terms, the results of which provide evidence in support of trade policy complementarity: Looking at trade openness, the results mimicked its earlier behavior exhibited in Model (1) indicating that both measures of trade liberalization are not significantly poverty reducing in line with Goff and Singh (2012), Beck et al. (2007) and Kpodar and Singh (2011). They suggest that openness cannot be linked to either lower or higher levels of poverty. Following the same trend is the coefficient of level of education which also indicates that increasing rates of poverty are associated with a higher level of education. Further into the result, quality of institutions and levels of economic development is insignificantly associated with lower levels of poverty. The coefficient of inflation tends to suggest that price level is poverty reducing corroborating the earlier findings by Carmen and Ganoza (2014).

Interacting trade liberalization with level of education resulted in change in sign and significant levels of the effect of liberalization complimented with level of education. The result revealed that a unit change in LOGTLIB_ED would result into 4% fall in poverty rates, providing empirical support for earlier researches. The conclusion that could be drawn is that effort toward poverty alleviation using trade policy will remain elusive except in an economy where the right mix of education is present. It should be noted that for an economy to optimize the benefits that will present itself through trade policy, qualitative education becomes imperatives. This is in line

with the result of Guillermo and Marcelo (2006), in which openness interacted with education positively impact and level of real income of the poor.

In Model (3), there is no significant difference in the relationship between the two proxies of trade liberalization, inflation, financial development and poverty from their earlier behaviors. The behavior of institutional variable proxy by quality of service delivery continues to modulate between positive and negative impacts. In the present study, institution tends to be a positive function of poverty at 10% level of significance. Surprisingly not, the nature of the institution in the country has been extractive rather than inclusive overtime, which encourages rent seeking behavior among public office holders and thus poverty inducing. Interacting institutional variables with trade liberalization provides an interesting result. The result revealed that trade liberalization in an environment characterized by an efficient institution will result into about 7.0% fall in the rate of poverty. It is believed that for gains from trade to translate into a reduction in poverty rate, such gains must be evenly distributed among the citizens, the achievement of which will be elusive in the absence of qualitative institutions. Therefore, strong institutions are critical for the effectiveness of poverty reducing trade impact. The changed in sign when interacted with trade liberalization indicates that the impact of trade on poverty might be indirect operating through qualitative and efficient institutions. Therefore, institutions remain a complementary variable for the gain from trade to be pro-poor, providing an empirical support for the argument advanced by McCulloch et al. (2001). They argued, in a situation where trade liberalization allows for the operation of the price mechanism and leaving small farmers at the mercy of private agents, the poor farmers can completely be isolated or exploited both in the existing market and new market opportunities. This could only be avoided only in an economy where there is strong institution which ensures protection of property rights; otherwise the positive impact of trade reform on poor farmers will be negligible or become worse off.

The goodness of fits of all the models estimated is adequate. On the average, the explanatory variables employed in the models account for about 55, 55 and 61% change in poverty level for model one to three, respectively. The Hansen stability tests also indicate that the alternative hypothesis of existence of co-integration among the series could not be rejected while the standard error of the regressions is also adequate. The insignificant Jarque–Bera statistics also indicate normality of the model (Table 3).

The time-varying parameter estimate when interpreted based on the nature of the relationship between the series mimics the earlier result obtained in model (1) using fully modified OLS. The results revealed that trade liberalization and level of education are positive function of poverty, although the coefficient of education turns to be insignificant using this approach. Level of economic development and inflation rate maintained their behaviors in relation to the level of poverty with a significant poverty reducing impact of real GDP. It is expected that an increase in per capita income of an individual will definitely translate into higher purchasing power and ability to provide for the basic necessities of life, like health services, feeding, clothing, decent shelter and qualitative education among others. All of which ensures improved standard of living and reducing levels of poverty.

Table 3 Result of time-varying parameters

Space-state model result				
Coeeficient	Final State	Root MSE	*z*-Statistic	Prob
LOGTLIB	11.27***	866.0254	13.62000	0.0000
EDU	40.34	866.0254	0.466853	0.6406
LGGDPPC	−25.28***	866.0254	−2.988651	0.0028
INFL	−55.57***	866.0254	−11.06732	0.0000
Log likelihood	−1099	Akaike info criterion		615.72
Parameters	0	Schwarz criterion		624.81
Diffuse priors	4	Hannan–Quinn criteria		613.70

***represent significant at 1%
Source Authors Computation using Eviews 9.

The paper goes further to estimate one period ahead forecast of the response of poverty to socks in policy as shown in Fig. 4. The poverty models with time-varying coefficients show how poverty is responding to shocks from other variables, thus a suitable approach for representation of structural changes. The figure revealed that throughout the forecast periods, trade policy tends to produce a negative result in an effort toward alleviating poverty, thus coefficient of the poverty remains negative. The figure explains the years where poverty experienced a sharp upward movement and a mild reduction in poverty rates. Between 1985 and 2000, the parameter varies slightly and so the rate at which level of poverty fluctuates could be said to be

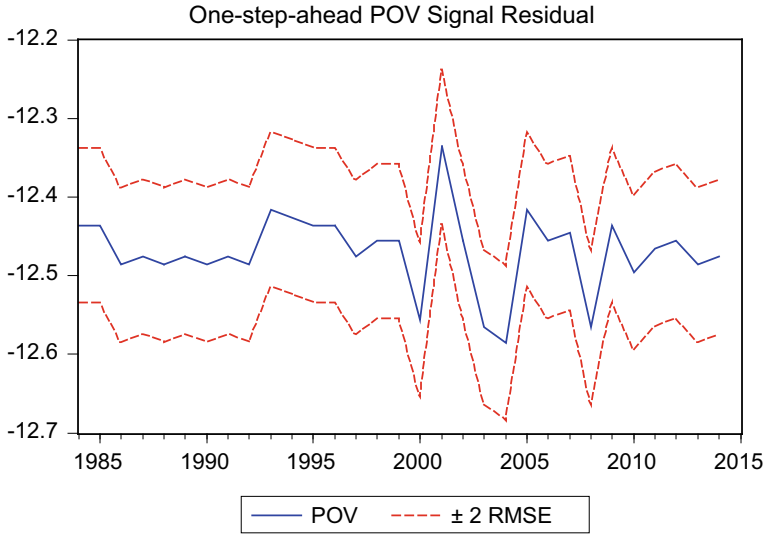

Fig. 4 One period ahead forecast error of the Kalman filter estimate 1981–20. *Source* Authors' Computation using Eviews 9.0

relatively stable. It should be noted that during these periods, specifically between 1995 and 2001, there were different tariff reforms which aimed at protecting certain sector of the economy over which the country enjoys relative advantage and ensures optimum distribution of resources. During the period, the weighted average tariff for the country experienced a declining trend. The rate fell from 34.3% in 1988 to 20.4% in 1998. The bulk of these tariffs were for manufacturing sector capable of generating employment opportunities and income. During this period, it could be said that the policy had been able to keep a check at least on the rate of poverty in the country.

A further analysis of the figure shows that in the year 2000, the poverty rate was highly volatile with a very sharp rise and fall between 2000 and 2006 and the trend continued until around 2009 when it becomes relatively stable. It should be noted that during the period, 2002–2007, export promotion policies were adopted to provide support for exporters and encourage diversification. In 2006, destination inspection of goods was introduced that was relatively imported restrictive in nature. The period also marked the era of a substantial reduction in tariffs on chemicals ranging from 15 and 80% based on the strategic importance attached to chemical products (Mordi et al., 2010). Overall, various tariff policies adopted during the period aimed at improving Nigeria balance of trade through discouragement of non-essential imports and generate revenue. These inconsistencies in policies provide an explanation behind sharp movements in response of poverty to shocks from policies. On the whole, going by Fig. 4, trade liberalization has failed in reducing the rate of poverty, but rather modulating between the negative values over the forecast period.

5 Summary and Conclusion

Adopting fully modified ordinary least squares (FMOLS) as a method of data analysis along with state-space model solved with Kalman filter, the paper explores the impacts of trade liberalization on the level of poverty with an emphasis on Nigeria, for the period 1981–2015. Also, there exists among the variables, a long-run equilibrium association.

The result of the empirical analyses of this study suggests that trade reform in terms of liberalization has a long-run beneficial impact on the poor. Level of education, quality of institution and financial development are also poverty inducing with the exception of inflation that tends to drag down poverty rate, though insignificant in its impacts. The result further revealed that the direct influence of trade liberalization on poverty will remain insignificant except when complimented with strong institutions and qualitative education, thus indicating an indirect impact. The adoption of a liberal trade policy through tariff reduction should be based on a holistic approach to combat poverty. Gains from trade in terms of availability of goods at lower prices, employment opportunity, increase return on labor most especially in the labor-intensive sector, improved terms of trade and efficient and equalization of

resource distribution capable of expanding opportunities for the poor will not be optimized unless complimented with other relevant factors like qualitative institution and education. It is thus concluded that in Nigeria, trade liberalization has been poverty inducing rather than reducing the number of the poor and the impact of the former on the latter is statistically significant. The result of the time-varying parameter estimate also mimics the results obtained from FMOLS, with poverty responding to shocks from trade policy negatively.

Therefore, to optimized the benefits of trade liberalization in alleviating poverty, it is recommended that efforts toward improving the quality of education in the country become imperatives and this should be pursued along with building a qualitative institution.Specifically, overhauling of the educational curricula capable of instilling in an individual skill in identifying opportunities and venture into risk where others do not as well as improvement in service delivery by the government are required. In this context, the integration and consistency of trade policy with all complimentary variables are germane to guarantee a significant reduction in the number of the poor. On a final note, trade policies that are selective in nature which could ensure availability of cheaper commodities specifically those consumed by the poor and inputs for the real sector of the economy in order to expand productivity and employment opportunities should be encouraged.

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