Vol. 11(3), pp. 24-37, April 2019
DOI: 10.5897/JEIF2019.0967
Article Number: 20CB51D60895
ISSN 2006-9812

http://www.academicjournals.org/JEIF

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Journal of Economics and International Finance

*Full Length Research Paper*

# Government education expenditure and primary school enrolment in Nigeria: An impact analysis

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Received 26 February, 2019; Accepted 8 April, 2019

**This study investigated the impact of government education expenditure on primary school enrolment in Nigeria by applying the bounds testing (ARDL) approach to cointegration for the period of 1970 to 2017. The model was constructed to identify the relationship between the two variables while also considering the interaction with control variables; per capita income, remittances, investment and population growth. The bounds tests suggest that the variables of interest are bound together in the long-run when primary school enrolment is the dependent variable. Interesting observations were made which are explained by government low spending on education. It was observed that an insignificant relationship exists between government education expenditure on primary school enrolment while a positive relationship exists between remittances and primary school enrolment. Population growth has positive relationship in the short run, but a negative relationship in the long run. The speed of adjustment to equilibrium is 88% within a year when the variables wander away from their equilibrium values. The study recommends that government policies directed at improving the expenditure towards education should largely increase, and money meant for the education sector should be disbursed with high degree of transparency.**

**Key words:** Autoregressive distributed lag, error correction, government education expenditure, primary school enrolment, remittances.

## INTRODUCTION

Primary school education is the initial part of the compulsory, free basic education every Nigerian child must have. It is an essential component of human capital and plays an important role in the economic growth and development of a country. Primary school education helps to increase the number of persons with the skills, experience, and education required for increasing a country's gross domestic product and standard of living. It is the starting process from childhood to adulthood, and very vital for any enterprise or society that wishes to survive under the stiff challenges of an emerging world (Adebiyi, 2006).

Enrollment in schools represents the largest component of the investment in human capital in most society (Schultz, 2002). Empirical evidence on the positive growth effect of human capital seems to be quite strong. Studies of the rates of returns to education attribute a positive value to the rate of returns to primary education (Arif et al, 1999). This means that by acquiring primary education one can increase one's earnings. If this relation holds true, primary education generates a positive externality and should be subsidized. Secondly, it

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is often claimed that the presence of financial constraints prevents children from achieving basic education, so that public intervention in primary education will give a larger share of the population access to primary education, leading not only to more growth but also to more equality in the long run.

Primary school enrollment in Nigeria was the direct result of the Universal Primary Education (UPE) scheme launched in September 1976. It marked the dawn of an educational revolution with pervasive social and economic implications (Bray, 1981). The political expectations were that universal free primary education would enable the nation to overcome the hurdles caused by unbalanced educational and economic development which resulted in southern dominance and educational imbalances of urban opportunities over the rural, and the preponderance of male over female enrollment in schools.

Since 1991, revenues of the local governments have been the main source of funding for primary education. Almost all of the income of these governments is derived from their statutory share of the federation account. For an individual local government, the income is based first on the overall (vertical) share for local governments (currently 20 percent) and then on the (horizontal) principles of allocation between local governments. For each local government, sufficient funds to pay all of the primary school teachers within their boundaries are first subtracted from their allocation before the remainder is distributed to them. These subtracted funds have then been placed with each State Primary Education Board (SPEB) through the recently re-named Universal Basic Education Commission (UBEC). Very few local governments allocate additional recurrent funds to education, though some make capital expenditures (Hinchliffe, 2002).

Government spending on education includes direct expenditure on educational institutions as well as educational related public subsidies given to households and administered by educational institutions. This indicator shows the priority given by governments to education relative to other areas of investment, such as health care, social security, defence and security. It is fundamental for sustainable development that is why United Nations, Copenhagen Declaration of 1996 and 2000 Dakar conference, all emphasized the need for increased spending on human capital development in developing countries.

Several factors are expected to influence primary school enrolment. The wealthier a country, the larger the share of agents willing and able to invest in education and enrolment rates should depend on the price of primary school education. It is also expected that countries with higher government spending to exhibit higher enrollment rates. Some countries which allocate lower than the regional average proportions of gross domestic product (GDP) to primary and secondary education achieve good education outcomes (Kaur and Misra, 2003) in other countries, higher than average spending results in poorer outcomes (Hanushek, 1996). Anyanwu and Erhijakpor (2007) argued that there may be a slightly stronger link between resources and achievement in developing countries, because education systems in developing countries tend to be so severely under-resourced compared to developed countries, that marginal increases in resourcing are likely to have much larger impacts on education outcomes than in developed countries. The level of infrastructure and investment will also show different impact on school enrolment in developed and developing countries.

The role education expenditure play on school enrolment continues to attract the attention of many, however, despite decades of intensive study, there is no general consensus regarding the effectiveness of monetary educational inputs for student outcomes. In particular, studies that conclude the relationship often advocate conflicting views. For example, Obi et al. (2016), Anyanwu and Erhijakpor (2007), Krueger (2003), Brossard and Gacougnolle (2001), Greenwald et al. (1996) and Card and Krueger (1996) are in favour of the effectiveness of public education expenditures; Hanushek (1986, 1997, 2003), Betts (1996) and, and Al-Samarrai (2003, 2006) cast doubt on the conclusion of these researchers.

Data on federal government expenditure on education in Nigeria from the World Bank (2017) show that between 1970 and 2017, expenditure on education increased by 95.6 while 5% of 15-24 year olds have not completed primary education in Nigeria. 30% of children of official primary school ages are out of school; approximately 29% of boys of primary school age are out of school compared to 35% of girls of the same age. The biggest disparity for children of primary school age in Nigeria can be seen between the poorest and the richest children. The two major indicators that provide a sense of the progress a country is making towards universal primary education and which is also a key UN Millennium Development Goal is a country's primary net enrollment rate and primary completion rate. It was 64 and 76% in 2016 for Nigeria. The goal of this paper is to examine whether differences in primary school is as a result of differences in education expenditure, including the level of investment, transfers received from non-residents, social well-being of Nigerians, population growth and inflation rate. This paper proceeds as follows: In the next section we review some previous research regarding enrollment and education expenditure in Nigeria; section three presents the methodology and findings; while section four concludes with a discussion of our findings.

## LITERATURE REVIEW

Obi et al (2016) investigated the impact of public education spending, recorded that public spending has a

positive effect on education which was measured by primary enrolment rates using the ordinary least square method. Included in this study was the effect of per capita income, urbanization and public spending on health, which had a weak positive relationship with primary enrolment rates. Okeke (2014) studied the impact of government expenditure on total school enrolment and under-5 mortality rate in Nigeria in the period 1980-2010 using vector error correction mechanism (VECM). The study found that government health expenditure significantly reduces under-5 mortality rate while government expenditure on education did not significantly affects total school enrolment. Ude and Ekesiobi (2014) applying fixed effects and random effects in their study on the relationship between states social spending and social outcomes with specific emphasis on education in Nigeria employed panel data from 36 states of the federation between 2009 and 2013. Each of the education outcomes were modelled against states spending on education and controlled for states spending on health and states per capita expenditure. Their results show that states spending on education have a significant impact on total primary enrolment, total secondary enrolment and adult literacy enrolment in Nigeria using fixed and random effects but significant using only fixed effect on total tertiary enrolment in Nigeria.

Anyanwu and Erhijakpor (2007) in their study found that indicators selected to monitor the MDG and EFA goals have close, consistent relationship to levels of government expenditure across Africa and the SANE countries, including Nigeria. The share of government education expenditure in GDP is statistically significant at a level of 1%. A 10% increase in government education expenditure increases primary education enrolment in Africa by 21 to 28% while increasing secondary education enrolment by 33 to 42%. Jayasuriya and Wodon (2003) in their study used stochastic frontier analysis (SFA) to estimate health and education efficiency frontiers for a sample of 76 countries between 1990 and 1998. The study utilized primary enrolment rate as the output variable and real GDP per capita, adult illiteracy, and education expenditure per capita (private and public) as input variables. The findings suggest that neither education expenditure nor regional differences have a statistically significant impact on net primary school enrolment. Baldacci et al. (2003) found that social spending is an important determinant of education outcomes. The study found that the effect of social spending on education outcomes is stronger in cross-sectional samples than when the time dimension is also added. They also found that education spending has a greater effect on social indicators than health outlays. This is in line with Gupta et al. (2002).

McMahon (1999) found a negative and significant relationship between per pupil expenditures (PPE) and the primary gross enrolment rate, and a positive and significant impact of total education expenditure as a proportion of GNP. The findings suggest that increasing primary education expenditures has a positive and significant impact on the primary gross enrolment rate. Gupta et al. (1999) used ordinary least square and two stages least squares regression on a cross section of data from 50 developing and transitional economies. Their findings indicate that greater public spending on primary and secondary education has a positive impact on widely used measures of education attainment such as gross enrolment in primary and secondary education, gross enrolment in secondary education and persistence through grade four. Regression estimates showed that performance in the education sector is also affected by other factors such as per capita income, urbanization and adult illiteracy, access to safe sanitation and water, and immunization. They also found that urban population is important in explaining both primary and secondary education enrolment in the African continent.

The studies mentioned above vary in their findings on the relationship between government expenditure and enrolment rates. This can be explained by the different measure used as a proxy for education outcomes and government spending, and the time frame in consideration. The result in some countries shows a negative relationship between governments spending and education outcomes such as completion rate, international test scores and gross enrolment (which is relevant to this study).

## Government expenditure on education

Education in Nigeria over the years has been more of a public enterprise until recently when private schools started becoming the order of the day. The Nigeria government has also formulated different education policies that have affected the expenditure level. Data on federal government expenditure on education in Nigeria from the World Bank show that between 1970 and 2017, expenditure on education increased by 95.6% while population increased by 70.6%. The federal government spent a total of N185,714,200 million in 1970. By 1980, total educational expenditure increased to N2,028,570,000 billion, from N1,080,053,000 in 1979. 1979 figure represented 11.9% decrease from 1978 figure.

An appreciable growth of 66% was recorded in 1972 at N376,130,000 million relative to a negative growth of 45.4% in 1971. By 1993, an unprecedented negative growth of 96% was observed. However, years of positive growth were associated with democracy regime except in 1982 (20.7), 1983 (59.4), 2001 (0.5), 2009 (24.5) and 2015 (18%) that recorded negative growth as seen in Figure 1.

The average growth rates over the periods 1977–1985 (Pre–SAP) and 1986–1998 (SAP and POST–SAP) indicate

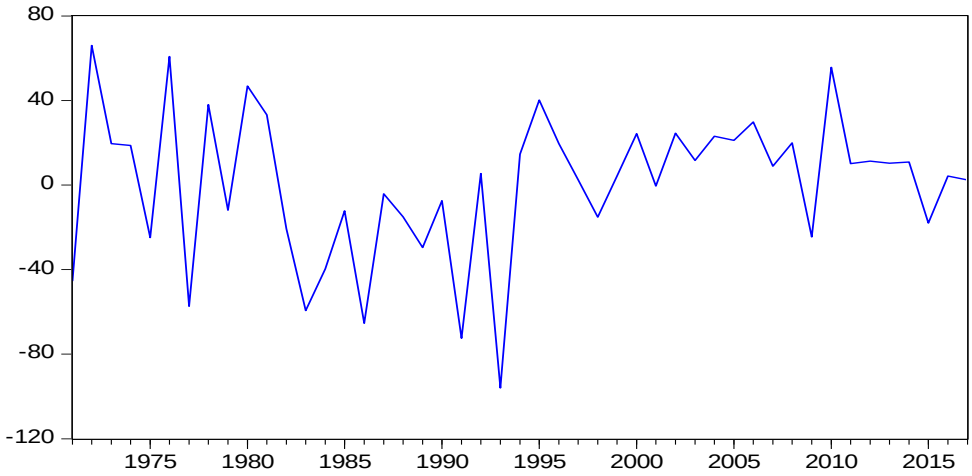


**Figure 1.** Growth rate of government expenditure in Nigeria (1970-2017).
Source: World Bank (2018).

that growth rate of government expenditure was negative 9.2 and 17.1% respectively. What we can learn from this is that the rate of inflationary increase in Nigeria hampers education and development of human capital growth; a characteristic of poor and under-developed country. Inflation averaged 15.1% during the pre-SAP period and 31.8% during the POST-SAP era.

Inflation rate averaged 18.5% during the period of study. Data from the World Bank (2018) show that Nigerian population increased from 55,981,400 million people in 1974 to 190,886,311 million people in 2017 representing an increase of 70.7%, while per capita income increased from N160.8 in 1970 to N51411.03 representing a 99.9% increase. Investment increased by 99.9% while primary school enrolment rate increased by 55.5%.

It is believed that remittance has a relationship with enrolment rates through the household income channel. As household income rise through transfers received from non-residents of a country, the relative cost of enrolling children into school is reduced, willingness to enroll in basic education programme such as primary and secondary education increases, suggesting that higher income is associated with increasing enrolments (Colclough, 2003). Remittance from abroad increased from $12,693,665 (N9,012,501.83) in 1970 to $20,580,392,500 (N6,293,484,026,500.00) in 2017 representing 99.9% increase.

GDP per capita income is a key indicator of the general social well-being of a country. Increasing per capita income ultimately drives up government spending and increases the likelihood for education and enrolment rates (Mankiw et al., 1992). The relationship between per capita income and enrolment rate is also established to be statistically significant (Blejer and Khan, 1984). The relationship between population growth and enrolment rate is negative as increasing population places strain on available resources in developing countries (Barro, 1995).

Figure 1 does not show corresponding increase between enrollment rate and government expenditure on education. The study is also interested in empirically investigating the relationship that exist between enrolment rate and other macroeconomic variables such as per capita income, workers' remittances, investment and population growth which are considered to be of relevance in this study.

## ECONOMETRIC METHODOLOGY

The method of study deals with the fundamental principles and techniques that guild the ensuing empirical analysis. We agree with the view of Udida et al. (2008) that the importance of methodology is underscored by the fact that it is a necessary condition or sine qua non for validating the results of studies such as the present one.

### Scope of study

This study uses annual data for the period 1970-2017 collected from the CBN Statistical Bulletin (2017) and World Bank databank. Primary school enrolment is the explained variable. Education expenditure, remittances, per capita income, inflation rate, investment, and population growth rate are included in the model to present a robust interpretation and justification for public spending on education. These variables are newly introduced based on the socioeconomic structure of Nigeria characterized by high immigration and steadily growing population rate. These variables according to literature have direct impacts on enrolment rates on primary education. The Data description, definition and sources are given in Table 1.

### Method of data analysis

Specifically, the autoregressive distributed lag (ARDL) estimation technique put forward in Pesaran and Shin (1999) and Pesaran et al. (1996, 2001) also known as the bounds testing cointegration technique is employed in this study to determine the long-run relationship between primary school enrolment, education

**Table 1.** Data to be used.

| Variable | Description | Expected sign | Source |
|---|---|---|---|
| Primary school enrolment ratio | The ratio of children of the official primary school age who are enrolled in primary school to the total population of the official primary school age. | - | https://data.worldbank.org |
| Gross fixed capital formation | It refers to spending on land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; the construction of roads, railways, private residential dwellings, and commercial and industrial buildings. It is a proxy for investment. | Positive | CBN Statistical Bulletin (2017) |
| Inflation | Inflation, as mentioned, is the rate a price rises, and essentially how much the dollar is worth at a given moment with regards to purchasing. The idea behind inflation being a force for good in the economy is that a manageable enough rate can spur economic growth without devaluing the currency so much that it becomes nearly worthless. | Negative | CBN Statistical Bulletin (2017) |
| Education expenditure | General government expenditure on education (current, capital, and transfers). It includes expenditure funded by transfers from international sources to government. General government usually refers to local, regional and central governments. | Positive | https://data.worldbank.org |
| Remittance | Transfers received from non-residents of a country | Positive | https://data.worldbank.org |
| Population growth rate | It measures the increase in the number of people that reside in a country. | Positive | https://data.worldbank.org |
| GDP per capita income | GDP per capita income is a key indicator of the general social well-being of a populace | Positive | https://data.worldbank.org |

expenditure, remittance, inflation, per capita income, investment and population growth rate. The choice of this technique became vital and most appropriated because it has three advantages in comparison with other previous and traditional cointegration methods. The first one is that the ARDL does not need that all the variables under study must be integrated of the same order and itcan be applied when the under-lying variables are integrated of order one, order zero or fractionally integrated. The second advantage is that the ARDL test is relatively more efficient in the case of small and finite sample data sizes. The last and third advantage is that by applying the ARDL technique we obtain unbiased estimates of the long-run model (Harris and Sollis, 2003). However, as noted by Quattara (2004), the presence of 1(2) variables renders the computed F-statistics of the bounds test invalid since they are based on the assumption that the variables are either I(0) or I(1) and in some cases, mutually cointegrated.

#### Unit root test

In order to avoid estimating spurious regression, the stochastic properties of the series must be tested for stationarity. For this purpose, the conventional augmented Dickey-Fuller (1981) test will be applied. The ARDL bounds test is based on the assumption that the variables are I(0) or I(1). So, before applying this test, we determine the order of integration of all variables using the unit root tests. The objective is to ensure that the variables are not I(2) so as to avoid spurious results. In the presence of variables integrated of order two, we cannot interpret the values of F statistics provided by Pesaran et al. (2001). The general form of the ADF is estimated by the following regression.

$$\Delta y_t = ao + a_1 y_{t-1} + \sum_{i=1}^{n} a\Delta y_1 + e_t \quad (1)$$

$$\Delta y_t = ao + a_1 y_{t-1} + \sum_{i=1}^{n} a_1 \Delta y_1 + \vartheta_t + e_t \quad (2)$$

Where: $y_t$ = time series, it is a linear time trend, $\Delta$ = First difference operator, $ao$ = constant; $n$ = optimum number of lags in dependent variable; $e_t$ = random error term.

### Model specification

Following Ang and McKibbin (2007), the ARDL version of the vector error correction model (VECM) can be specified as:

$$\Delta \ln Y_t = \beta_0 + \beta_1 \ln Y_{1t-1} + \beta_2 \ln X_{2t-1} + \beta_3 \ln X_{3t-1} + \beta_4 \ln X_{4t-1} + \beta_5 \ln X_{5t-1} + \beta_6 \ln X_{6t-1} + \beta_7 \ln X_{7t-1}$$
$$\sum_{j=0}^{p} \delta_j \Delta \ln X_{1t-j} + \sum_{1=0}^{q} \varphi_1 \Delta \ln X_{2t-1} + \sum_{m=0}^{q} \delta_m \Delta \ln X_{3t-m} + \sum_{n=0}^{q} \eta_n \Delta \ln X_{4t-n} + \sum_{a=0}^{q} \mu_a \Delta \ln X_{5t-a} +$$
$$\sum_{u=0}^{q} \sigma_u \Delta \ln X_{6t-u} + \sum_{f=0}^{q} \sigma_u \Delta \ln X_{7t-f} + \varepsilon_t \quad (3)$$

**Table 2.** ADF unit root test result.

| Variable | Test for unit root | ADF test | Critical value | | | Result |
|---|---|---|---|---|---|---|
| | | | 1% | 5% | 10% | |
| LPSER | Level | -3.43 | -3.58 | -2.92 | -2.60 | Stationary I(O) |
| LEDEXP | Level | -1.00 | -3.58 | -2.93 | -2.60 | Not Stationary |
| | 1st Difference | -7.41 | -3.58 | -2.93 | -2.60 | Stationary I(1) |
| INF | Level | -4.25 | -3.58 | -2.93 | -2.60 | Stationary I(O) |
| PCAPEXP | Level | -0.22 | -3.58 | -2.93 | -2.60 | Not Stationary |
| | 1st Difference | -6.01 | -3.58 | -2.93 | -2.60 | Stationary I(1) |
| LRMIT | Level | -0.11 | -3.58 | -2.93 | -2.60 | Not Stationary |
| | 1st Difference | -3.27 | -3.58 | -2.93 | -2.60 | Stationary I(1) |
| POPGR | Level | -2.34 | -3.58 | -2.93 | -2.60 | Not Stationary |
| | 1st Difference | -4.02 | -3.58 | -2.93 | -2.60 | Stationary I(1) |
| LGFCF | Level | -0.55 | -3.58 | -2.93 | -2.60 | Not Stationary |
| | 1st Difference | -10.1 | -3.58 | -2.93 | -2.60 | Stationary I(1) |

**Table 3.** VAR lag order selection criteria.

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -352.1388 | NA | 0.020174 | 15.96172 | 16.24276 | 16.06649 |
| 1 | -30.59523 | 528.7606 | 1.14e-07 | 3.848677 | 6.096968* | 4.686817* |
| 2 | 15.86338 | 61.94480 | 1.49e-07 | 3.961628 | 8.177174 | 5.533141 |
| 3 | 90.27263 | 76.06280* | 7.60e-08* | 2.832327* | 9.015128 | 5.137213 |

*Lag order selected by the criterion.

In Equation 3, $X_1$ is primary school enrolment ratio, $X_2$ is education expenditure, $X_3$ is remittance, $X_4$ is inflation rate, $X_5$ is per capita income, $X_6$ is population growth rate, $X_7$ is investment and ε is the error term. Using the ARDL approach we regress the dependent variable being primary school enrolment on the dependent variables.

## EMPIRICAL RESULT AND ANALYSIS

### *Unit root*

In order to validate the choice of technique for this study, it became imperative to test for the order of cointegration to ensure that there is no I(2) co-integrating equation in the series. Thus a unit root test would provide important information to justify the choice of the ARDL estimation technique for this study. Interestingly the ADF test statistic result as shown in Table 2 revealed that the order of cointegration among the variables, comprise of I(0) and I(1) series, making the choice of ARDL technique an appropriate estimation technique for this study.

Table 2 reveals those primary school enrolment ratio and inflation rates are stationary at their level while education expenditure, per capita expenditure, remittance, population growth rate and investment are nonstationary at their first-difference.

### *Optimal lag order check*

The issue of finding the appropriate lag length for each of the underlying variables in the ARDL model is very important because we want to have Gaussian error terms (that is, standard normal error terms that do not suffer from non-normality and non-stability). According to Bahmani-Oskooee and Brooks (2003), selecting the appropriate model of the long run underlying equation, it is necessary to determine the optimum lag length (k) by using proper model order selection criteria such as; the Akaike information criterion (AIC), Schwarz information criterion (SIC) or Hannan-Quinn information criterion (HQC). The appropriate lag length to be used is presented in Table 3.

From Table 3, lag 3 has the lowest AIC value which is also smaller than the SIC value at lag 1, hence model (Lag 3) is selected to estimate Equation 3. Cointegration result is presented below.

### *Cointegration test*

To check if the variables are cointegrated in the long run, the applicable hypothesis is that the null hypothesis of no long-run relationship, such as:

$H_0$: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$ (no long-run relationship)

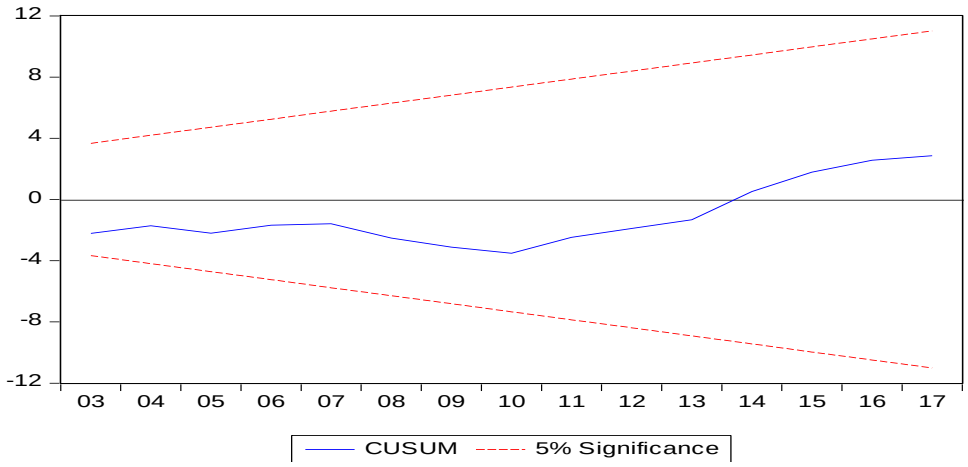


**Figure 2.** Stability Test of the Dynamic Model

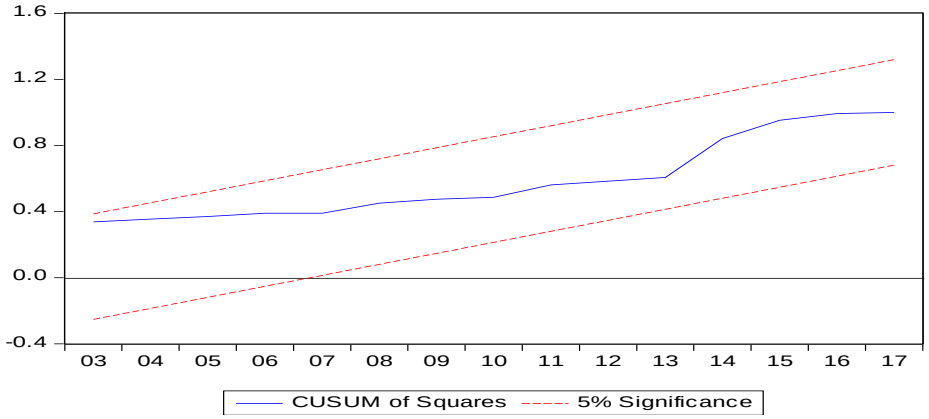


**Figure 3.** Cusum of squares plot.

$H_1$: $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0$ (there exist long-run relationship)

To ensure that there is no serial correlation in the long-run model, the null hypothesis that there is no serial correlation is tested with a guideline to accept the null hypothesis ($H_0$) if probability is greater than 5%. The result reported in Table 5 reveals that there is no serial correlation. In the same vein, the stability test result as reported in Figures 2 and 3 reveals that the cusum and cusum of squares plots did not cross the 5% critical lines, indicating that the model is stable.

Proceeding with the ARDL technique to cointegration analysis as advanced by Pesaran et al. (2001), the null hypothesis of non-existence of a long-run relationship among all stationary series included in Equation 3 is to be tested. The main interest here is to find where the Wald test computed F-statistic of the long-run model using OLS estimation technique falls. The calculated F-statistic for the bounds tests are presented in Table 6, which also include the critical values for the upper and lower bounds provided by Pesaran and Pesaran (2001). The calculated F-statistic is 3.630369 which is greater than both the upper and lower bound critical values at 5 and 10% levels of significance using no intercept and no trend. This implies that the null hypothesis of no cointegration can be rejected, and that there is a long-run relationship between education expenditure and primary school enrolment.

The result of the estimates of the long-run coefficient in Table 4 based on the ARDL model specified in Equation 3 reveals that the coefficient of primary school enrolment ratio has a positive but insignificant relationship on schooling outcome when lagged up to the third year in the long run. The coefficient of population growth is significant at 5% and negative when lagged by two years which is very interesting. Other results are equally interesting. For example, primary school enrolment is sensitive to change in its past value; a 1% change in the past value of LPSER will bring about 62% negative change in primary school enrolment ratio. The other explanatory variables included in the model were not

**Table 4.** The estimation results of the cointegration (long run) equation (ordinary least squares technique).

| Variable | Coefficient | Std. error | t-statistic | Probability |
|---|---|---|---|---|
| C | 1.972988 | 0.905432 | 2.179056 | 0.0457 |
| D(LPSER(-1)) | 0.202498 | 0.186903 | 1.083438 | 0.2957 |
| D(LPSER(-2)) | 0.230166 | 0.237358 | 0.969699 | 0.3476 |
| D(LPSER(-3)) | 0.115554 | 0.209058 | 0.552737 | 0.5886 |
| D(INF(-1)) | -0.002503 | 0.001473 | -1.699099 | 0.1099 |
| D(INF(-2)) | -0.000413 | 0.001069 | -0.385716 | 0.7051 |
| D(INF(-3)) | -0.001126 | 0.000861 | -1.308207 | 0.2105 |
| D(LEDEXP(-1)) | 0.075287 | 0.066385 | 1.134104 | 0.2746 |
| D(LEDEXP(-2)) | -0.082739 | 0.048578 | -1.703223 | 0.1092 |
| D(LEDEXP(-3)) | -0.077924 | 0.049880 | -1.562238 | 0.1391 |
| D(LGFCF(-1)) | 0.098070 | 0.070508 | 1.390896 | 0.1845 |
| D(LGFCF(-2)) | 0.091864 | 0.058039 | 1.582790 | 0.1343 |
| D(LGFCF(-3)) | 0.130400 | 0.045970 | 2.836625 | 0.0125 |
| D(POPGR(-1)) | -0.251262 | 0.258540 | -0.971847 | 0.3465 |
| D(POPGR(-2)) | -0.725167 | 0.277588 | -2.612385 | 0.0196 |
| D(POPGR(-3)) | -0.031179 | 0.351282 | -0.088758 | 0.9304 |
| D(LGDPPCAP(-1)) | -0.249534 | 0.137951 | -1.808853 | 0.0906 |
| D(LGDPPCAP(-2)) | -0.096231 | 0.102911 | -0.935090 | 0.3646 |
| D(LGDPPCAP(-3)) | -0.079123 | 0.095412 | -0.829275 | 0.4200 |
| D(LREMT(-1)) | -0.030227 | 0.022821 | -1.324517 | 0.2052 |
| D(LREMT(-2)) | -0.018678 | 0.022055 | -0.846878 | 0.4104 |
| D(LREMT(-3)) | -0.000340 | 0.020617 | -0.016505 | 0.9870 |
| LPSER(-1) | -0.615169 | 0.159999 | -3.844832 | 0.0016 |
| INF(-1) | 0.002175 | 0.001964 | 1.107321 | 0.2856 |
| LEDEXP(-1) | 0.015365 | 0.044619 | 0.344348 | 0.7354 |
| POPGR(-1) | 0.289669 | 0.266462 | 1.087093 | 0.2942 |
| LGDPPCAP(-1) | 0.146943 | 0.098565 | 1.490817 | 0.1567 |
| LREMT(-1) | 0.002390 | 0.019164 | 0.124727 | 0.9024 |
| LGFCF(-1) | -0.142772 | 0.085797 | -1.664060 | 0.1168 |

R-squared=0.84; Adjusted R-squared=0.55; Prob. (F-statistic) =0.018; DW=2.01.

**Table 5.** Serial correlation test.

| | | | |
|---|---|---|---|
| F-statistic | 0.735229 | Prob. F(3,12) | 0.5509 |
| Obs*R-squared | 6.831783 | Prob. Chi-Square(3) | 0.0775 |

**Table 6.** Bounds test for co-integration analysis.

| Critical value | Pesaran et al. (2001) | Lower bound value | Upper bound value |
|---|---|---|---|
| 5% | | 1.97 | 3.18 |
| 10% | | 1.70 | 2.83 |

Calculated F-statistics = 3.630369, k=7.

statistically significant at all traditional levels 1, 5 and 10%. However, the result of the joint test reported in Table 4 reveals that jointly, all explanatory variables included in the estimated long-run model are statistically significant at one percent level, meaning that jointly, the explanatory variables influence change in EG.

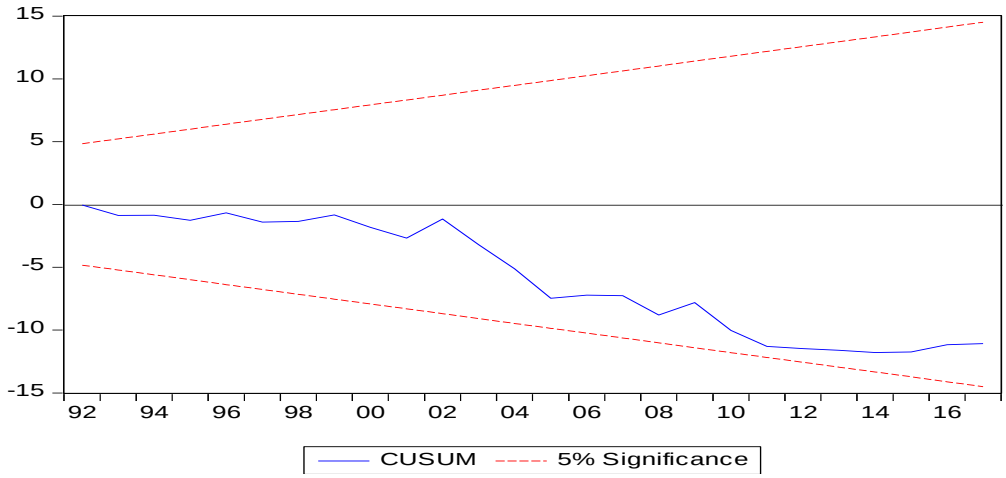


**Figure 4.** Stability test of the dynamic model.

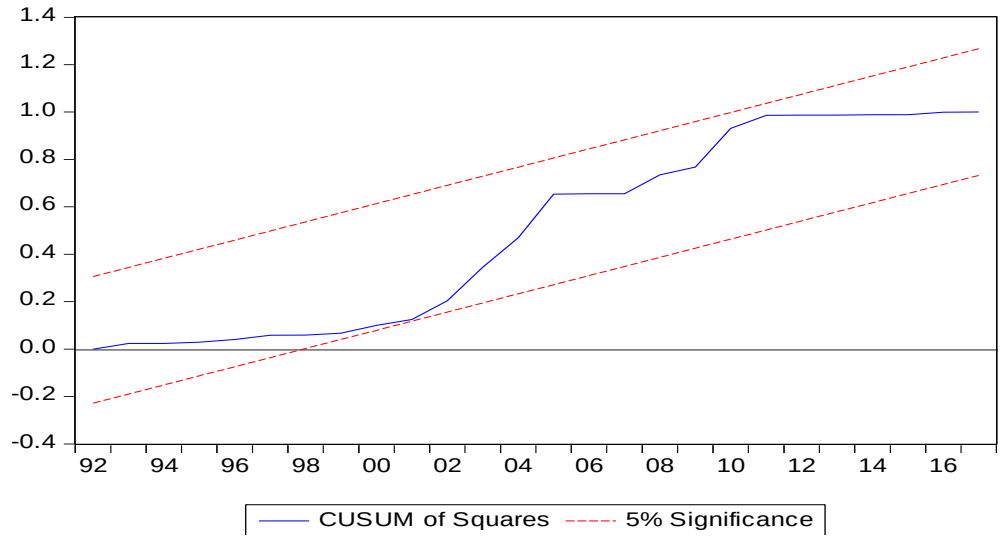


**Figure 5.** Cusum of squares plot.

### *The error correction model*

The model is specified as follows:

$$\sum_{j=0}^{p}\delta_j \Delta \ln X_{1t-j} + \sum_{1=0}^{q}\varphi_1 \Delta \ln X_{2t-1} + \sum_{m=0}^{q}\delta_m \Delta \ln X_{3t-m} + \sum_{n=0}^{q}\eta_n \Delta \ln X_{4t-n} + \sum_{a=0}^{q}\mu_a \Delta \ln X_{5t-a} + \sum_{u=0}^{q}\sigma_u \Delta \ln X_{6t-u} +$$

$$\sum_{f=0}^{q}\phi_u \Delta \ln X_{7t-f} + \alpha ECT_{t-1} + \varepsilon_t \quad (4)$$

The result of the estimates of the error correction model presented in Equation 4 is reported in Table 6. The estimated error correction model provides information on the short-run relationship among LPSER and LEDEXP LGFCF LREMT LPOPGR LREMT. These variables are reported in their (lagged) difference. The one-lagged error-correction term $ECT_{t-1}$, which measures the disequilibrium between the actual and equilibrium LPSER is statistically significant at 5% level of significance and has the correct sign. According to the estimated

**Table 7.** Error correction model.

| Variable | Coefficient | Std. error | t-statistic | Probability |
|---|---|---|---|---|
| C | 0.005944 | 0.016061 | 0.370070 | 0.7143 |
| D(LPSER(-1)) | 0.625469 | 0.202717 | 3.085431 | 0.0048 |
| D(LPSER(-2)) | -0.342780 | 0.167040 | -2.052082 | 0.0504 |
| D(LPSER(-3)) | 0.061721 | 0.152414 | 0.404955 | 0.6888 |
| D(LEDEXP(-1)) | 0.031592 | 0.036512 | 0.865246 | 0.3948 |
| D(LEDEXP(-2)) | -0.054205 | 0.033660 | -1.610365 | 0.1194 |
| D(LEDEXP(-3)) | 0.049184 | 0.034989 | 1.405700 | 0.1717 |
| D(LGFCF(-1)) | -0.053130 | 0.045626 | -1.164446 | 0.2548 |
| D(LGFCF(-2)) | 0.055304 | 0.041928 | 1.319023 | 0.1987 |
| D(LGFCF(-3)) | -0.045932 | 0.041850 | -1.097545 | 0.2825 |
| D(POPGR(-1)) | 0.242105 | 0.164705 | 1.469928 | 0.1536 |
| D(POPGR(-2)) | -0.127585 | 0.192604 | -0.662421 | 0.5135 |
| D(POPGR(-3)) | 0.508173 | 0.188136 | 2.701090 | 0.0120 |
| D(LREMT(-1)) | -0.017779 | 0.017252 | -1.030599 | 0.3122 |
| D(LREMT(-2)) | 0.026498 | 0.014722 | 1.799869 | 0.0835 |
| D(LREMT(-3)) | 0.010489 | 0.014349 | 0.731038 | 0.4713 |
| ECT(-1) | -0.883743 | 0.402822 | -2.193878 | 0.0374 |

R-squared=0.63; Adjusted R-squared=0.40; Prob (F-statistic) =0.010; DW=2.05.

**Table 8.** Serial correlation test of the dynamic model.

| | | | |
|---|---|---|---|
| F-statistic | 0.268029 | Prob. F(3,23) | 0.8477 |
| Obs*R-squared | 1.452512 | Prob. Chi-Square(3) | 0.6933 |

coefficient for $ECT_{t-1}$, ΔLPSER takes about 0.88 yearly (that is, one divided by the estimated coefficient of $ECT_{t-1}$) to converge to a long-run steady state. Moreover, the estimated results suggest that the model has a reasonable good fit with robust diagnostic tests for error processes such as absence of serial correlation and normality.

The result presented above shows that the coefficient of lag of primary school enrolment up to the second year is positively related to primary school enrolment and statistically significant at 1% level for the first year and 5% in the second year. This implies that holding other variables constant, a percentage change in lag of primary school enrolment in the first year will result in 0.62% change in primary school enrolment. This is consistent with our a priori expectation that increased enrolment in the previous year will lead to increase in enrolment of primary school pupils in the current year.

There is no significant relationship between education expenditure and primary school enrolment. This should not be true of Nigerian situation, in view of billions of naira expended in the launch and implementation of Universal Basic Education (UBE) in Nigeria during the early years of the return to democratic rule. Apart from the federal UBE, states of the federation in Nigeria also launched and implemented State Universal Basic Education (SUBEB). There was also huge capital expenditure on the building of Almajari schools in the northern part of the country. This findings is very disturbing but the level of fraud that go on in most SUBEB offices where they are referred to as oil companies of their various states, where contracts are awarded and not completed. In most cases, contracts are awarded to cronies and relations of the governor, and then employment of teachers are based on who you know and not competence. The free feeding programme of the federal government is not regular and does not cover the entire country. Some pupils are feed for less than two weeks while money is allocated for the whole term. This implies that increasing education expenditure without proper implementation will not improve the enrolment rates into the primary schools.

Investment rate has a negative and statistically insignificant impact on primary school enrolment in Nigeria. This shows the level of infrastructure decay in our schools where some pupils learn under trees due to lack of classrooms with many of the schools lacking portable water and health facilities. The coefficient of lag three population growth rates has a positive and statistically significant impact on primary school

enrolment in Nigeria. Holding other variable constant, a percentage change in population growth rate would culminate to about 0.51% increase in primary school enrolment. This finding is in line with our a priori expectation because all things being equal, an increase in population is expected to result in an increase in primary school enrolment.

Another interesting finding of this study is the negative and insignificant relationship between lag one remittances and primary school enrolment. What this entails is that remittance of the previous year does not affect primary school enrolment in the current year. This is contrary to the a priori expectation of the study, but it should be noted that there are reports that most migrant remittances to the South East are used to start-up micro enterprises, leading to increased out-of-school children who resort to apprenticeship without formal primary school enrolment. However, when the returns from the micro enterprises increase, parents and guardians now send their pupils to school that is why the lag two remittances has a positive and significant relationship with primary school enrolment.

The stability of the long-run coefficient is tested by the short-run dynamics. Once the ECM model given by Equation 7 has been estimated, the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests are applied to assess the parameter stability (Pesaran and Pesaran, 1997). The cusum and cusum of squares plots did not cross the 5% critical lines, indicating that the model is stable.

## Conclusion

The paper examines the role education expenditure play in primary school enrolment in Nigeria for the period of 1970-2017. ARDL model to cointegration was used to investigate the existence of a long and short run relation among the above noted series. The topic merits special importance due to the measure of the state of primary education in any country, is the enrolment ratio because majority of pupils who don't make it into secondary school, don't do so because of passing the entrance examination, rather, funding. Research has shown that there is a positive relationship between government expenditure and primary school enrolment, which is why economists advocate greater government expenditure on primary education.

The study empirically shows no evidence of beneficial impact of such expenditure on primary school enrolment in Nigeria both in the short and long run. The findings show that the share of primary school in the total education allocation is not something to write home about. Primary schooling is managed through the SPEB which receive funds mainly from the local governments (indirectly through deducting teacher salaries from their entitlement from the Federation Account) and from the state governments (again from 'deductions at source'). Overall, around 86% of the funds for primary education are derived from the local governments' allocation from the Federation Account. Most of this is for teacher salaries. Only very small amounts are provided by the federal government, while the state government contributions appear to be around 10–12%. But in a situation where state governors appoint local government chairmen and those that head the SPEB, it goes a long way to show that state governors are in charge of primary education in Nigeria.

The result also shows that parents/guardians play more role than the government in providing primary education in the country. Looking at the factors that determine enrolment into primary education and the state of our primary schools, one will agree with the findings of this study. Nigeria's PPE and pupil teacher ratio (PTR), which indicates a country's commitment to education at each school level and a proxy for learning quality and resource availability indicator show that In Nigeria, the PPE in 2014 according to the World Bank was 14% (total number of pupils/total education budget). PTR in primary education is 37.6, meaning that on average there is one teacher for every 37.6 primary school students. This is higher than the median PTR in primary for lower middle income countries, which is 29.

The study also reveals that population growth has a negative and significant relationship with primary school enrolment in the long run but positive relationship in the short run. This is line with the statement released by UNICEF as reported by Eweniyi (2018), that Nigeria's population growth has put pressure on the country's resources, public services and infrastructure. With children under the age of 15 accounting for 45% of the 171 million populations, the burden on education has become overwhelming. And while primary school enrolment has increased in recent years, net attendance is only about 70% which translates to Nigeria having over 10.5 million out-of-school children. 60% of those children are in northern Nigeria. The increase in enrolment rates has created challenges in ensuring quality education, as resources are spread more thinly. It is not rare to see cases where there are 100 pupils for one teacher, or where students learn under trees because of a lack of classrooms. The relationship between remittance and primary school enrolment is positive and statistically significant in the second year. The findings reveal that primary school enrolment increase by 0.3% when remitter is increased by 1%. Most families in the eastern part of the country depend on relations abroad to pay for house rent, school fees for their children and feeding. The findings also suggest that our per capita income is not adequate to improve the standard of living of most Nigerians.

No fewer than 10.27 million children have been enrolled in public primary schools in the North West and North Central Zones of the country in the last one year. A

survey by the News Agency of Nigeria reveals a sharp increase of up to 20% in some states in the school enrolment figure, with the number of girls enrolled at 4,582,706. Stakeholders attributed the increase in enrolment in the last one year to the home-grown school feeding programme, free tuition and the provision of infrastructure and other facilities to ease teaching and learning. In Imo state, many parents withdrew their children from private primary schools to public schools when free tuition was introduced. To achieve compulsory primary education for every Nigerian child, this paper recommends that government policies directed at improving the expenditure towards education should largely increase and money meant for the education sector should be disbursed with high degree of transparency.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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**Annex 1.** Data used for the study.

| Year | Population (Millions) | Remittance (Billions) | Remittance ($ Billions) | Total education expenditure(B) | Inflation | Gross fixed capital formation | Primary school enrolment | Per capita income |
|---|---|---|---|---|---|---|---|---|
| 1970 | 55981400 | 9012502 | 12693665 | 185714200 | 13.8 | 12215.0 | 40.9 | 160.8 |
| 1971 | 57295210 | 8657202 | 12367432 | 127752200 | 16.0 | 1283.0 | 44.3 | 181.3 |
| 1972 | 58662600 | 8279004 | 12543945 | 376130000 | 3.5 | 1401.0 | 48.4 | 188.7 |
| 1973 | 60110430 | 9263203 | 14035156 | 468001300 | 5.4 | 2615.0 | 50.4 | 204.4 |
| 1974 | 61673560 | 7451719 | 11828125 | 575574100 | 12.7 | 3167.0 | 48.9 | 317.4 |
| 1975 | 63373570 | 6858750 | 11062500 | 461360600 | 34.0 | 5513.0 | 59.7 | 361.4 |
| 1976 | 65226230 | 8347500 | 13250000 | 1178125000 | 24.3 | 8107.0 | 75.9 | 437.0 |
| 1977 | 67215810 | 13000000 | 20000000 | 748970000 | 15.1 | 9420.0 | 89.1 | 497.7 |
| 1978 | 69293550 | 1830000 | 3000000 | 1208267000 | 21.7 | 9386.0 | 94.6 | 518.0 |
| 1979 | 71391290 | 4400000 | 8000000 | 1080053000 | 11.7 | 9095.0 | 102.5 | 601.9 |
| 1980 | 73460720 | 12100000 | 22000000 | 2028570000 | 10.0 | 11431.0 | 112.2 | 685.4 |
| 1981 | 75482550 | 9760000 | 16000000 | 3038154000 | 20.8 | 18220.6 | 113.3 | 685.4 |
| 1982 | 77472900 | 12060000 | 18000000 | 2516300000 | 7.7 | 17145.8 | 111.1 | 692.3 |
| 1983 | 79462280 | 10080000 | 14000000 | 1578398000 | 23.2 | 13335.3 | 105.6 | 727.8 |
| 1984 | 81497740 | 9120000 | 12000000 | 1130221000 | 17.8 | 9149.8 | 93.7 | 788.4 |
| 1985 | 83613300 | 8900000 | 10000000 | 1007268000 | 7.4 | 8799.5 | 89.1 | 880.1 |
| 1986 | 85818500 | 8080000 | 4000000 | 608941200 | 5.7 | 11351.5 | 84.8 | 871.3 |
| 1987 | 88101630 | 12060000 | 3000000 | 584650600 | 11.3 | 15228.6 | 83.1 | 1274.1 |
| 1988 | 90450280 | 9080000 | 2000000 | 508345700 | 54.5 | 17562.2 | 86.5 | 1636.0 |
| 1989 | 92844350 | 73900000 | 10000000 | 392461200 | 50.5 | 26825.5 | 85.6 | 2465.1 |
| 1990 | 95269980 | 80400000 | 10000000 | 365400600 | 7.4 | 40121.3 | 89.1 | 2951.3 |
| 1991 | 97726320 | 654060000 | 66000000 | 211962000 | 13.0 | 45190.2 | 93.7 | 3361.0 |
| 1992 | 100221600 | 968800000 | 56000000 | 223987300 | 44.6 | 70809.2 | 93.7 | 5541.4 |
| 1993 | 102761700 | 17485650000 | 793000000 | 114262700 | 61.3 | 96915.5 | 89.1 | 6974.4 |
| 1994 | 105355800 | 29810000000 | 550000000 | 133731900 | 76.8 | 105575.5 | 78.3 | 8955.3 |
| 1995 | 108011500 | 65890690000 | 803545000 | 223774100 | 51.6 | 141920.2 | 93.7 | 18583.0 |
| 1996 | 110732900 | 79511779200 | 946568800 | 278435400 | 14.3 | 204047.6 | 98.5 | 25336.5 |
| 1997 | 113522700 | 163222525000 | 1920265000 | 285482600 | 10.2 | 242899.8 | 95.6 | 25591.1 |
| 1998 | 116385800 | 130656193000 | 1574171000 | 248014300 | 11.9 | 242256.3 | 97.5 | 24100.8 |
| 1999 | 119327100 | 120594880640 | 1301056000 | 258926600 | 0.2 | 231661.7 | 99.5 | 27722.5 |
| 2000 | 122352000 | 142119352860 | 1391826000 | 342022300 | 14.5 | 331056.7 | 100.5 | 38561.1 |
| 2001 | 125463400 | 130590883100 | 1166615000 | 340363800 | 16.5 | 372135.7 | 100.5 | 38948.7 |
| 2002 | 128666700 | 146247770230 | 1208959000 | 450664900 | 12.1 | 499681.5 | 101.5 | 55270.8 |
| 2003 | 131972500 | 137486524560 | 1062821000 | 509967100 | 23.8 | 865876.5 | 92.8 | 66171.2 |
| 2004 | 135393600 | 303409989000 | 2272734000 | 662893800 | 10.0 | 863072.6 | 83.9 | 85819.4 |
| 2005 | 138939500 | 1934686572000 | 14640080000 | 840489700 | 11.6 | 804400.8 | 84.8 | 105873.5 |
| 2006 | 142614100 | 2178319811000 | 16932140000 | 1196690000 | 8.6 | 1546525.7 | 84.8 | 130613.8 |
| 2007 | 146417000 | 2266755726900 | 18014430000 | 1314125000 | 6.6 | 1936958.2 | 90.0 | 142914.2 |
| 2008 | 150347400 | 2592448200000 | 19203320000 | 1639735000 | 15.1 | 2053006.0 | 91.8 | 164390.5 |
| 2009 | 154402200 | 2705071559700 | 18368110000 | 1316803000 | 13.9 | 3050575.9 | 93.7 | 162754.8 |
| 2010 | 158578300 | 2932283911900 | 19744690000 | 2970410000 | 11.8 | 9183000.2 | 90.0 | 351512.3 |
| 2011 | 162877100 | 3145931245100 | 20616890000 | 3305684000 | 10.3 | 9897918.7 | 91.8 | 392385.5 |
| 2012 | 167297300 | 3209426640800 | 20542960000 | 3728857000 | 12.0 | 10282280.3 | 91.8 | 433653.0 |
| 2013 | 171829300 | 3271596520300 | 20797130000 | 4158514000 | 8.5 | 11478397.8 | 91.8 | 469770.7 |
| 2014 | 176460500 | 3302464903500 | 20829170000 | 4669330000 | 8.1 | 13596000.0 | 90.9 | 508896.5 |
| 2015 | 181181700 | 4052728668000 | 21059700000 | 3956580000 | 9.0 | 14112000.0 | 91.8 | 524394.7 |
| 2016 | 185989600 | 4977420639300 | 19635570000 | 4128320250 | 18.6 | 15104000.8 | 91.8 | 551281.0 |
| 2017 | 190886311 | 6293484026500 | 20580392500 | 4228186063 | 18.7 | 16,908.000.13 | 91.8 | 514011.0 |

Source: As defined in Table 1.