

IMPACT OF AIR TRANSPORT ON POVERTY REDUCTION IN NIGERIA

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Abstract: The study is focused on examining the air transport, economic growth and poverty reduction in Nigeria. The overall objective of the study is empirically to evaluate the relationship between air transport, economic growth and poverty in Nigeria. Specifically, the study intends to; examine the impact of air transport on poverty reduction in Nigeria; examine the impact of economic growth on poverty reduction in Nigeria; evaluate the impact of the moderating effect of air transport and economic growth on poverty reduction in Nigeria; determine the causality relationship between air transport, economic growth and poverty reduction in Nigeria. Ex Post Facto research design was adopted for the present study. The methodology is essentially as it will examine the impact of air transport (explanatory variable) on economic growth (dependent variable) in Nigeria. The dependent variable is poverty reduction which is proxied by household consumption per capital while the independent variables are air transport value added, real gross domestic product, exchange rate, inflation rate and foreign direct investment. The findings of the study reveals that regulatory air transport value added, government social expenditure, inflation rate, exchange rate, foreign direct investment are above 0.05 percent level of significance; this implies that air transport value added, government social expenditure, inflation rate, exchange rate and foreign direct investment are not significant variable to determine household consumption per capital in Nigeria. While real gross domestic product has significant impact on household consumption per capital. The study also reveals that real gross domestic product, and exchange rate has positive relationship on the household consumption per capital while air transport, government social expenditure, inflation rate and foreign direct investment has negative relationship on the household consumption per capital. The study also revealed that the rate at which the independent variables explained what happened on the dependent variable is 44.6245% which is believed to be statistically significant to the researcher. The study recommends that there is need for increased air transport businesses and operations in Nigeria. The current state of air transport business in Nigeria has not led to reduction in poverty levels as is shown by the positive relationship between air transport and poverty reduction in the study.

Keywords: Air Transport, Economic Growth, Poverty Reduction, inflation rate, foreign direct investment, government social expenditure

Introduction

Transportation refers to the movement of people and goods from one location to a destination. Transportation is essential to the functioning of any society. It influences the location and range of productive and leisure activities; it affects the location of residence; it influences the range and provision of goods and services available for

consumption. It invariably influences the quality of life. Indeed, it has been argued the developments in society can be closely correlated with the introduction of new or improved transport technology (Abdullahi, Adesogan, & Alhaji, 2018). There are different ways of measuring air transport's impact on an economy. They include: the jobs and spending generated by airlines and their supply chain, the flows of trade, tourism and investment resulting from users of all airlines serving the country, and the city pair connections that make these flows possible. All provide different but illuminating perspective on the importance of air transport (IATA, 2018).

Airlines, airport operators, airport on-site enterprises (restaurants and retail), aircraft manufacturers, and air navigation service providers employ 20,000 people in Nigeria. In addition, by buying goods and services from local suppliers, the sector supported another 35,000 jobs. On top of this, the sector is estimated to support a further 16,000 jobs through the wages it pays its employees, some or all of which are subsequently spent on consumer goods and services. Foreign tourists arriving by air to Nigeria, who spend their money in the local economy, are estimated to support an additional 169,000 jobs. In sum, 241,000 jobs are supported by air transport and tourists arriving by air (IATA, 2018).

The air transport industry, including airlines and its supply chain, are estimated to support US \$600 million of GDP in Nigeria. Spending by foreign tourists supports a further US \$1.1 billion of the country's GDP, totaling to US \$1.7 billion. In total, 0.4 percent of the country's GDP is supported by inputs to the air transport sector and foreign tourists arriving by air (IATA, 2018). The most important benefits from air transport go to passengers and shippers and the spillover impacts on their businesses. The value to passengers, shippers and the economy can be seen from the spending of foreign tourists and the value of exports (though note these figures include all modes of transport). A key economic flow, stimulated by good air transport connections, is foreign direct investment, creating productive assets that will generate a long-term flow of GDP (IATA, 2018).

Demand for air transport services has increased the influence of air transport in the nation and global economy, thereby enhancing rapid movement of passengers, goods and services to the domestic and world market. This in effect helps to generate higher revenue to the economy by way of fast in and out flow of goods and services. The aviation industry plays an important role in the aspect of work and leisure to people around the globe. The sector helps to promote and improve quality of life, living standards of people within the nation. All this helps to generate economic growth and poverty alleviation by way of providing employment opportunities, increasing revenues from taxes. The employment opportunities would be generated through supply chain transformation from the airports (Nwaogbe, Wokili, Omoke, & Asiegbe, 2013).

The rate of poverty in Nigeria is 74.5% (NBS Report, 2017). Both the quantitative and qualitative measurement attests to the growing incidence and depth of poverty in the country (NBS, 2017). Reports from the National Bureau of Statistics (2022) showed that sixty-three percent of people-133 million- are multidimensionally poor. The National Multidimensional Poverty Index is 0.257, showing that poor people in Nigeria experience just over one quarter of all possible deprivations. Over half of the population are multidimensionally poor and deprived in cooking fuel (National Bureau of Statistics, 2022). High deprivations are also apparent in sanitation, time to

healthcare, food insecurity and housing. Multidimensional poverty is higher in rural areas, where 72% of people are poor, compared to 42% of people in urban areas. Approximately 70% of Nigeria's population live in rural areas, yet rural areas are home to 80% of poor people, and their intensity of poverty is also higher 42% in rural areas compared to 37% in urban areas (National Bureau of Statistics, 2022). Sixty five percent of poor people-86 million live in the North, while 35%- nearly 47 million-live in the South. Poverty levels across States vary significantly with the incidence of multidimensional poverty ranging from a low of 27% in Ondo to a high of 91% in Sokoto (National Bureau of Statistics, 2022).

However, this situation presents a paradox considering the vast human and physical resources that the country is endowed with. It is very surprising that despite the huge human and material resources that have been devoted to poverty reduction by successive government, through many different programs such as National Accelerated Food Production Program (NAFP) and the Nigerian Agricultural and co-operative Bank (NACB) in 1972, Operation Feed the Nation (OFN) to teach the rural farmers how to use modern farming tools in 1976, Green Revolution Program (GRP) to reduce food importation and increase local food production in 1986, Family Support Program (FSP) and the Family Economic Advancement Program (FEAP) in 1993, National Poverty Eradication Program (NAPEP) to replace the previously failed Poverty Alleviation Program (PAP); no noticeable success has been made.

Against these backdrops, it is discernible that apart from the individual contributions of both air transport and economic growth towards poverty reduction, both variables can have joint impact on poverty reduction in Nigeria. The essence of the present study is to provide an empirical evidence that links air transport, economic growth and poverty reduction in Nigeria. This is based on the premise that a growing air transport sector will benefit the economy in various ways towards enhancing economic growth and subsequently reducing poverty in Nigeria.

Statement of the Problem

The air travel sector also supports the economic growth, accessibility to product and services, capital management and connecting people with other segments. Economic progression of a country promotes the development of tourism by strengthening the infrastructure, aviation connectivity and standards of living. It is mentioned by many scholars, that the air travel contributed towards the economy in three main ways, direct, indirect and catalytic, therefore the growth of air travel can support the growth of tourism and then the economy (PWC, 2015).

The graph below shows the trend of real GDP growth rate for the period 1982-2022. A cursory look at the graph shows that the peak growth rate occurred in year 2002, while the lowest growth rate of real GDP occurred during the period of the first economic recession in Nigeria between 1980 -1986. The growth rate of real GDP was below -10 per cent in 1984. Another period of economic downturn occurred in 1993 and 1994 during the Gulf War in the middle East. There was another economic decline 2016 and 2017, and then 2020 to 2021. Apart from these mentioned periods, the Nigerian economy witnessed positive growth.

Research Questions

- (i) What is the impact of air transport on poverty reduction in Nigeria?

(ii) What is the moderating effect of air transport and economic growth on poverty reduction in Nigeria?

Objectives of the Study

The overall objective of the study is empirically evaluate the relationship between air transport, economic growth and poverty in Nigeria. Specifically, the study intends to:

(i) Examine the impact of air transport on poverty reduction in Nigeria

(ii) Evaluate the impact of the moderating effect of air transport and economic growth on poverty reduction in Nigeria

Hypotheses of the Study

(i) Ho: Air transport has no significant impact on poverty reduction in Nigeria

(ii) Ho: moderating effect of air transport on economic growth has no significant impact on poverty reduction in Nigeria

Scope of Study

This study focused on air transport economic growth and poverty reduction in Nigeria. The study will select some states that undergoes but local and internal flight such as Enugu, Lagos and Calabar for feasibility reasons. The study will work under the time frame of 1982-2022. The study will use household consumption expenditure as the dependent variable whereas air transport value added, real gross domestic product, interaction of air transport value added and real GDP and government social expenditure as the independent variables.

LITERATURE REVIEW

Air Transport

Air Transportation is the transportation of passengers and cargo by aircraft and helicopters. It is a transport system that involves the movement or carriage by air of persons or goods using airplanes and helicopters (WIE, 2011). It has become the primary means of common carrier traveling. Greatest efficiency and value are obtained when long distances are involved and high value payloads are moved, although, the time and cost efficiencies obtained decreases as distances traveled is reduced, air transport is often worthwhile even for relatively short distances. It also provides a communication link, which is sometimes vital, between the different groups of people involved (WIE, 2011).

Air transportation is one of the most important components of the world's transportation system. Not only does it provide the major means of long-distance travel in the world, but its economic impacts on global and national economies is substantial. In addition, because of the very nature of aviation infrastructure (for example, airports) and the current technology for flight (for example, jet engines that consume fuel and emit air pollutants), air transportation plays an important role in efforts to improve environmental quality and promote sustainable development. The major components of the air transportation system include airports, air traffic control systems, aircraft, and airlines. Changes in each of these components will have important consequences for the future of the aviation industry.

Theoretical Literature

Theories of Transport

There are several theories that help explain the dynamics and implications of air transport. These theories provide insights into the factors influencing air transport development, its impacts on the economy and society, and the behavior of actors within the industry. Here are some prominent theories of air transport:

Air Transport Led Growth Hypothesis.

The "Air Transport-Led Growth" hypothesis was proposed by Tae Hoon Oum in a seminal paper titled "Air Transport and Economic Development: A Typology of Linkages," published in the Journal of Transport Economics and Policy in 1992 (Oum, 1997). This publication laid out the framework for understanding the relationship between air transport development and economic growth, highlighting the various channels through which air transport can contribute to economic development. The policy stance derived from the "Air Transport-Led Growth" hypothesis suggests that policymakers should recognize and leverage the potential of air transport to stimulate economic development. Based on these notions, it can be argued that air-transport is a sector which is capable of generating employment, product and services, stimulating growth and subsequently poverty reduction. Therefore, empirically investigating its impact of air transport and poverty reduction in this study is a worth-while task. Applying the theory of air transport-led growth hypothesis in a study on air transport, economic growth, and poverty reduction in Nigeria enhances the theoretical underpinning of the research, informs policy discussions, guides empirical analysis, and facilitates a deeper understanding of the potential impact of air transport development on poverty alleviation efforts in the country.

The theory implies that air transport is viable business that needs adequate government attentions as it drives the economic growth of the country through tourism, international investment and foreign direct investment of the private foreign investors.

Endogenous Growth Theory

While neoclassical theory assumes the notion that long term investment is a great determinant of the economy growth of the country, endogenous growth model theory explains that physical investment is not a measure of economy growth of a country but the effectiveness and efficiency in the use of these investments. Economic models of endogenous growth have been applied to examine the effects of FDI on economic growth through the diffusion of technology. (Barro, 1991). Romer, (1990) argues that FDI propels economic growth through strengthening human capital, the most essential factor in R&D effort; while Grossman & Helpman, (1991) emphasizes that an increase in competition and innovation will result in technological progress and increase productivity and, thus, promote economic growth in the long run. From the analyses made under this theory, it can be discovered that the theory suggests a better relationship between the FDI and economy growth of the developing countries.

The theory emphasizes the need for foreign direct investment which air transport is a major contributor to. When a foreigner invest in the country, it brings home other countries resources back to our country and invariably promote the economy of the host country.

Empirical literature

Asep, Daniel, and Sudarno (2006) examined the relationship between economic growth and poverty reduction by differentiating growth and poverty into their sectoral compositions and locations in Indonesia. The study employed Consumption Module of Susenas and questionnaire. The finding revealed that growth in the rural services sector reduce poverty in all sectors and locations. However, in terms of elasticity of poverty, urban services growth has the largest for all sectors except urban agriculture. The study that rural agriculture growth strongly reduces poverty in the rural agriculture sector, the largest contributor to poverty in Indonesia. The study therefore recommended that the most effective way to accelerate poverty reduction is by focusing on rural agriculture and urban services growth. In the long run, however, the focus should be shifted to achieving robust overall growth in the services sector.

Temesgen (2016) examined the relation of government expenditure with economic growth and poverty reduction in Ethiopia using time series data over the period 1980 to 2013. Employing modern time series econometric techniques such as unit root tests, bound test co-integration approach and error correction techniques within an ARDL framework which yields more robust estimates. It is found that government spending affects economic growth positively and significantly by increasing real private investment. Findings emerge from this study that government expenditure is significant and has short run impact on poverty reductions in its lag form. The study suggested policies that the role of government should be extended to ensure the magnitude and quality of private investment as high as possible.

Oyegoke and Wasiu (2018) examined the effect of economic growth on poverty reduction in Nigeria from 1980-2016. The study employed Johansen Cointegration tests and VAR. The result shows that Government expenditure is positively related to poverty incidence. This suggests that the poor are not benefitting from the economy at large, especially from total government expenditure. The GDP coefficient (a proxy for economic growth) conforms to the a-priori expectation, which depicts a negative relationship between economic growth and poverty incidence, while unemployment relates positively to poverty reduction.

Sodik, and Istiqomah (2019) examined the relationship between economic growth and poverty in Java Island in the period of 2000-2017. The methods used in this study are path analysis and multiple linear regression. The results show that employment opportunity perfectly mediates the relationship between poverty and economic growth. This study also found that dependency ratio and education had a significant effect on poverty, while infrastructure had a negative, but insignificant effect on poverty. The perfect mediating effect implies that economic growth will reduce poverty only if the economic growth is able to generate employment opportunities.

Research Design

Ex Post Facto research design was adopted for the present study. The analysis done on this study involves the use of historical time series data in establishing the cause-and-effect relationship among variables. This design makes use of published secondary time series data on the belief that these data contain information on the behaviour of these variables over time. The methodology is essentially as it will examine the impact of air transport (explanatory variable) on economic growth (dependent variable) in Nigeria.

Theoretical Framework

The central hypothesis of the present study is the validation of Air Transport Led-Growth Hypothesis propounded by Tae Hoon Oum in 1992. The Air Transport-Led Growth hypothesis serves as a conceptual framework that informs the design, analysis, and interpretation of studies examining the impact of air transport, economic growth, and poverty reduction in Nigeria. By integrating this hypothesis into their research, scholars can generate insights into the complex interplay between air transport development, economic dynamics, and poverty outcomes, thereby contributing to evidence-based policymaking and sustainable development strategies.

Method of Data Evaluation

Pre-estimation Test

Unit Root Test of Stationarity

A stochastic process (time series) y_t is stationary if its mean and variance are constant over a period of time, and the co-variance between two values from the series depends on the length of time separating the two values, and not on the actual times at which the variables are observed.

Consider that the series $\Delta y_t = y_t - y_{t-1}$ is stationary if, as assumed the random error v_t is purely random. Series like y_t , which can be made stationary by taking the first difference, are said to be integrated of order one, and denoted $I(1)$. Stationary series are said to be integrated of order zero, $I(0)$. In general, if a series must be differenced d times has to be made stationary and it is integrated of order d or $I(d)$. To achieve this purpose, we carry out the tests for stationarity. This is to eliminate seasonal influences and errors in the time series variables.

The testing procedure follows an examination of the student-t ratio for δ . The critical values of the test are all negative and larger in absolute terms than standard critical t-values, so they are called DF and ADF statistics. If the null hypothesis cannot be rejected then the series Y_t cannot be stationary.

Decision Rule:

Reject H_0 , if the absolute DF or ADF t-statistic $> 5\%$ critical values. If otherwise, accept H_0 .

The Model

In order to pursue the objectives of the present study, the study adopts the interaction modeling technique to express the individual and combined impacts of air transport and gross domestic products on poverty reduction in Nigeria. This study mirrors the model used by Mogess, et al (2020) and Madurapperuma and Higgoda (2020). Mogess et al (2022) examined the relationship between economic growth and poverty reduction in Sub-Saharan Africa, while Madurapperuma and Higgoda (2020) examined the intreractive effect of tourism, air transport and

economic growth in Sri-Lanka. The study used the Fully Modified Ordinary Least Square (FMOLS) technique and the Granger causality analysis to estimate the parameters.

Decision Rule:

If the probability value is less than 0.05, the alternative hypothesis is accepted otherwise the null hypothesis is accepted.

Sources of Data

The time series data for Real GDP, Air transport, government social expenditure, and poverty variables were sourced from the Central Bank of Nigeria Statistical Bulletin 2023 edition.

Econometrics Software

Eviews 9 software was used for data analysis. This software is equipped with programs that can generate basic statistical test and can perform long run and short run analysis using the technique of ARDL

The Preliminary Tests

Unit Root Test Results

ADF Test result for Unit Root

Variables	LEVEL FORM		FIRST DIFFERENCE		Order of Integration
	ADF test Statistics	5% critical Value	ADF test Statistics	5% critical Value	
POV	-3.283753	-3.523623	-9.420617	-3.526609	I(1)
AT	1.229178	-1.951687	-1.997310	-1.951687	I(1)
RGDP	-2.295329	-3.536601	-3.586009	-3.526609	I(1)
GSXP	-3.412139	-3.595026	-3.266947	-1.949319	I(1)
EXR	-1.785630	-1.954414	-3.369224	-1.949856	I(1)
INF	-2.882074	-2.981038	-6.115872	-2.936942	I(1)
FDI	-2.110944	-3.523623	-5.280840	3.529758	I(1)

In table 4.1 above: all the identified variables (poverty rate, air transport value added, real gross domestic product, government social expenditure, exchange rate, inflation rate and foreign direct investment) are stationary at first difference. Therefore, since all the variables are not stationary at level form, there is need to conduct a co-integration test to determine if they have a long run relationship.

Johansen Test of Cointegration test

Having observed that the time series variables are not stationary at levels, the result of the integration indicates order one for all the variables hence it necessitate the adoption Johansen test of cointegration. The Result of the cointegration result is presented in Table 4.2 below.

Result of Johansen Test of Cointegration

Date: 03/21/19 Time: 17:13

Sample (adjusted): 1983 2022

Included observations: 40 after adjustments

Trend assumption: Linear deterministic trend

Series: POV AT RGDP GSXP EXR INF

FDI

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized	Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.805752	162.5881	125.6154	0.0000
At most 1 *	0.570549	97.04324	95.75366	0.0406
At most 2	0.473495	63.23334	69.81889	0.1497
At most 3	0.314800	37.57356	47.85613	0.3210
At most 4	0.240694	22.45178	29.79707	0.2740
At most 5	0.232689	11.43774	15.49471	0.1860
At most 6	0.020859	0.843201	3.841466	0.3585

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized	Max-Eigen	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.805752	65.54488	46.23142	0.0002
At most 1	0.570549	33.80990	40.07757	0.0142
At most 2	0.473495	25.65978	33.87687	0.3418
At most 3	0.314800	15.12178	27.58434	0.7385
At most 4	0.240694	11.01404	21.13162	0.6459
At most 5	0.232689	10.59454	14.26460	0.1757

At most 6 0.020859 0.843201 3.841466 0.3585

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: *Eviews 9 Output for the Result of Johansen Cointegration*

The result of the trace statistics in the Johansen test of cointegration indicates that the residual has at least two cointegration. More so, the result of the Max-Eigen statistics conforms the value of the race statistics of one cointegration in the model. Therefore, we reject the null hypothesis of no cointegration. This implies that there is a long run relationship among the variables in the linear model.

Error Correction Model

Result of Error Correction Model

Dependent Variable: D(POV)

Method: Least Squares

Date: 03/21/19 Time: 18:11

Sample (adjusted): 1983 2022

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-477.0825	657.9083	-0.725150	0.4736
D(AT)	46.13517	77.16732	0.597859	0.5541
D(RGDP)	1.145762	0.330503	3.466718	0.0015
D(GSXP)	-10.88950	7.504643	-1.451035	0.1565
D(INF)	-0.678005	27.76749	-0.024417	0.9807
D(EXR)	25.35861	15.38990	1.647743	0.1092
D(FDI)	-0.007091	0.011292	-0.628008	0.5345
ECT(-1)	-0.651019	0.171159	-3.803590	0.0006

R-squared	0.446245	Mean dependent var	987.9625
Adjusted R-squared	0.325111	S.D. dependent var	3380.152
S.E. of regression	2776.851	Akaike info criterion	18.87288
Sum squared resid	2.47E+08	Schwarz criterion	19.21065
Log likelihood	-369.4576	Hannan-Quinn criter.	18.99501
F-statistic	3.683893	Durbin-Watson stat	1.947480

Prob(F-statistic) 0.004984

Source: Author's EViews 9 computations.

From table 4.4 above, the magnitude of the short run disparity is -0.651019%, that is to say the degree of the short run dynamics is 65.1019%. This showed a relatively low speed of adjustment to equilibrium after a shock. From the result of the ECM, the adjustment to equilibrium after shock is significant.

Table 4.5 Result of Parsimonious Regression Model

Dependent Variable: D(POV)

Method: Least Squares

Date: 03/21/19 Time: 18:11

Sample (adjusted): 1983 2022

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-477.0825	657.9083	-0.725150	0.4736
D(AT)	46.13517	77.16732	0.597859	0.5541
D(RGDP)	1.145762	0.330503	3.466718	0.0015
D(GSXP)	-10.88950	7.504643	-1.451035	0.1565
D(INF)	-0.678005	27.76749	-0.024417	0.9807
D(EXR)	25.35861	15.38990	1.647743	0.1092
D(FDI)	-0.007091	0.011292	-0.628008	0.5345
ECT(-1)	-0.651019	0.171159	-3.803590	0.0006
R-squared	0.446245	Mean dependent var	987.9625	
Adjusted R-squared	0.325111	S.D. dependent var	3380.152	
S.E. of regression	2776.851	Akaike info criterion	18.87288	
Sum squared resid	2.47E+08	Schwarz criterion	19.21065	
Log likelihood	-369.4576	Hannan-Quinn criter.	18.99501	
F-statistic	3.683893	Durbin-Watson stat	1.947480	
Prob(F-statistic)	0.004984			

Source: Author's EViews 9 computations.

The result of the parsimonious regression model of the relationship between the dependent (POV) and the independent variables (AT, RGDP, GSXP, INF, EXR, FDI). As expected by economic theory, the relationship between the observed independent variables on the dependent variable is partly positive and partly negative.

The relationship between air transport value added (AT) and household consumption per capital (POV) is positive as is seen on table 4.5 above. One per cent increase in air transport value added leads to 46.13517 percent increase in household consumption per capital on the average. In addition, the probability value of the coefficient for air transport value added is 0.5541 and is greater than 0.05 benchmark, and therefore, it is statistically insignificant. The relationship between real gross domestic product and household consumption per capital is positive. A unit increase in real gross domestic product leads to 1.145762 percent increase in household consumption per capital on the average. Moreover, the probability value of the coefficient for real gross domestic product (RGDP) is 0.0015 and is less than 0.05 benchmark, and therefore, it is statistically significant.

The relationship between government social expenditure (GSXP) and household consumption per capital is negative. A unit increase in government social expenditure leads to -10.88950 percent decrease in household consumption per capital on the average. Moreover, the probability value of the coefficient for government social expenditure is 0.1565 and greater than 0.05, and therefore, it is statistically insignificant.

The relationship between inflation rate and household consumption per capital over the period under study is negative. This implies that a unit increase in inflation rate will lead to -0.678005 percent decrease in household consumption per capital on the average. In addition, the probability value of the coefficient for inflation rate, (INF) is 0.9807 and greater than 0.05, and therefore, it is statistically insignificant.

The relationship between exchange rate (EXR) and household consumption per capital is positive. This implies that a unit increase in exchange rate will leads to 25.35861 percent increase in household consumption per capital on the average. Moreover, the probability value of the coefficient for exchange rate, (EXR) is 0.1092 and greater than 0.05, and therefore, it is statistically insignificant.

The relationship between foreign direct investment (FDI) and household consumption per capital is negative. This implies that a unit increase in foreign direct investment will leads to -0.007091 percent decrease in household consumption per capital on the average. Moreover, the probability value of the coefficient for foreign direct investment, (FDI) is 0.5345 and greater than 0.05, and therefore, it is statistically insignificant.

Overall, the probability of the F-statistic ($0.004984 < 0.05$) indicates that jointly all the explanatory variables are statistically insignificant in determining household consumption per capital over the period under study.

Evaluation Based on Statistical Criterion

R^2 –Result and Interpretation (Measure of Goodness of Fit)

This subsection applies the R^2 , the t-test and the f-test to determine the statistical reliability of the estimated parameters. These tests are performed as follows;

The coefficient of determinations, R^2 , from the regression result is given as 0.446245. This implies that 44.6245% of the variation in household consumption per capital is being explained by the variations in the identified explanatory variables. Hence, the variables have a better goodness of fit.

t-Test Result and Interpretation

The study also employs the 95% confidence interval or 5% level of significance (i.e. $\alpha=0.05$) and $df = n-K = 42-7 = 35$ as the degrees of freedom.

From the distribution table, $t_{0.025(17)} = 2.024$

The result of the t-test of significance is shown in table 4.5 below:

The result of the t-test is presented below and evaluated based on the critical value (2.042) and the value of calculated t-statistics for each variable.

Result of t-Test of Significance

Variables	t-computed (t*)	t-tabulated ($t_{\alpha/2}$)	Inference
AT	0.597859	2.024	Insignificant
RGDP	3.466718	2.024	Significant
GSXP	-1.451035	2.024	Insignificant
INF	-0.024417	2.024	Insignificant
EXR	1.647743	2.024	Insignificant
FDI	-0.628008	2.024	Insignificant

Source: Author's compilation using EViews 9.

Significant (Reject H_0 ; accept H_1),

Insignificant (Accept H_0).

From the t-test result above, for AT, $t^* < t_{\alpha/2}$, therefore, the null hypothesis is accepted. Hence, air transport value added has no significant impact on household consumption per capital.

For RGDP, $t^* > t_{\alpha/2}$, therefore, the null hypothesis is rejected. Thus, real gross domestic product has no significant impact on household consumption per capital.

For GSXP, $t^* < t_{\alpha/2}$, therefore, the null hypothesis is accepted. Thus, government social expenditure has no significant impact on household consumption per capital.

For INF, $t^* < t_{\alpha/2}$, therefore, the null hypothesis is accepted. Thus, inflation rate has no significant impact on household consumption per capital.

For EXR, $t^* < t_{\alpha/2}$, therefore, the null hypothesis is accepted. Thus, exchange rate has no significant impact on household consumption per capital.

For FDI, $t^* < t_{\alpha/2}$, therefore, the null hypothesis is accepted. Thus, foreign direct investment has no significant impact on household consumption per capital.

Result and Interpretation of f-Test of Significance

The degree of freedom for the numerator (V_1) and for the denominator (V_2) are given as K-1 and N-K

Where

N= sample size

K= number of parameters including the constant term.

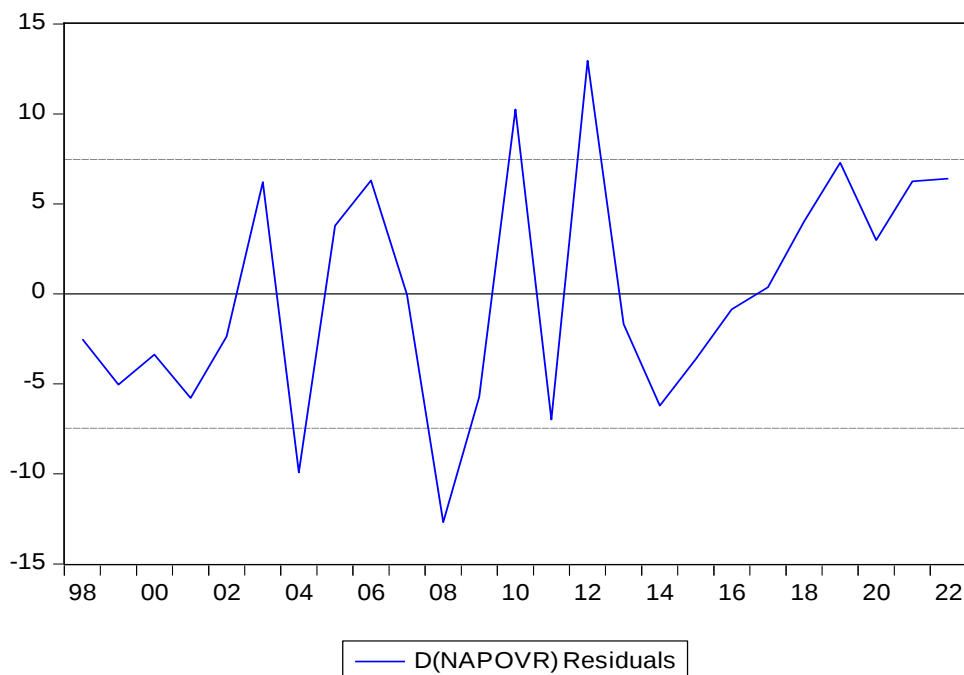
$V_1=7-1=6$, $V_2=42-7=35$, $df = (6,35)$ at 5% level of significance and $df = (6,35)$, $f_{0.05} = 2.03$ and $F^* = 3.683893$. Since $f^* < f_{0.05}$, the null hypothesis is accepted. Hence, the study concludes that the variables (AT, RGDP, GSXP, INF, EXR, FDI) have joint influence on household consumption per capital. This implies that the entire regression plane is significant.

Result of f-Test of Significance:

Computed f-ratio value	Critical f-ratio value	Result
3.683893	2.03	Statistically Significant

Source: Author's compilation using EViews 9.

RESIDUAL GRAPH



The graph of the residual diagnostic reveals that the residual of the observed variables are normally distributed. This is evident from the fluctuating movement of the trend around the zero mean.

Evaluation Based on Econometric Criterion

In this subsection, the following econometrics tests are used to evaluate the result obtained from the model: autocorrelation, normality, granger causality test.

Result and Interpretation of Autocorrelation Test

Using the Durbin-Watson statistic, the region of no autocorrelation (positive or negative) is given as follows:

$$d_u < d^* < (4 - d_u)$$

$$d_u = 1.786$$

$$d^* = 1.947480$$

$$(4-d_u) = 4 - 1.786 = 2.214$$

By substitution, the region becomes:

$$1.786 > 1.947480 > 2.214$$

Autocorrelation Test Result

d_u	d^*	$4-d_u$	Result
1.786	1.947480	2.214	Autocorrelation absent

Source: Author's compilation using EViews 9.

The result shows that there is no presence of autocorrelation problem in the model as the computed Durbin-Watson statistic fall within the zero autocorrelation regions.

Normality Test Result and Interpretation

The Normality test was done using the Jarque-Bera test of normality. Jarque-Bera test of normality is hinged on the hypothesis that K is close to or exactly 3 and S is close to or exactly 0, thus making the JB value close to or equal to 0, which is the condition for normal distribution.

Result of Normality Test

Skewness	Kurtosis	Jarque-Bera	Probability	Inference
0.346992	2.910067	0.816171	0.664922	ND

Source: Author's compilation using EViews 9.

Conclusion:

From the normality table, the probability value (0.305592) Jarque-Bera is greater than 0.05. Hence, the residuals are normally distributed.

Test of serial Correlation

Brush Godfrey Test of Serial Correlations LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.768139	Prob. F(2,30)	0.4728
Obs*R-squared	1.948585	Prob. Chi-Square(2)	0.3775

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 03/21/19 Time: 18:12

Sample: 1983 2022

Included observations: 40

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	82.96029	670.8703	0.123661	0.9024
D(AT)	-25.06738	81.73330	-0.306697	0.7612
D(RGDP)	-0.028133	0.338905	-0.083013	0.9344
D(GSXP)	-1.705464	7.868991	-0.216732	0.8299
D(INF)	-3.881817	28.16649	-0.137817	0.8913
D(EXR)	0.902590	15.58909	0.057899	0.9542
D(FDI)	0.001877	0.011485	0.163460	0.8713
ECT(-1)	-0.404601	0.411267	-0.983792	0.3331
RESID(-1)	0.460620	0.463642	0.993482	0.3284
RESID(-2)	-0.368927	0.304778	-1.210478	0.2355
R-squared	0.048715	Mean dependent var	4.66E-13	
Adjusted R-squared	-0.236671	S.D. dependent var	2515.331	
S.E. of regression	2797.192	Akaike info criterion	18.92294	
Sum squared resid	2.35E+08	Schwarz criterion	19.34516	
Log likelihood	-368.4588	Hannan-Quinn criter.	19.07560	
F-statistic	0.170698	Durbin-Watson stat	1.958943	
Prob(F-statistic)	0.995703			

From the result of the test of serial correlation, the probability of the observed chi-square is seen to be greater than 0.05 level of significance which indicates that the residual is not serially correlated with each other within the time series.

Granger Causality Test Result

The Granger causality analysis technique was used to test the existence of causality relationship among the variables in the model. The Granger causality technique follows F-distribution. The null hypothesis of no causality relationship is rejected when the probability of the F-statistic lies below 0.05. The result of Granger Causality analysis estimation is given in table 4.5 below.

Result of Granger Causality Analysis

Pairwise Granger Causality Tests

Date: 03/21/19 Time: 18:13

Sample: 1981 2022

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
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AT does not Granger Cause POV	40	3.53431	0.0400
POV does not Granger Cause AT		5.18612	0.0107
RGDP does not Granger Cause POV	40	0.98433	0.3838
POV does not Granger Cause RGDP		0.87300	0.4266
GSXP does not Granger Cause POV	40	1.70416	0.1967
POV does not Granger Cause GSXP		0.76892	0.4712
INF does not Granger Cause POV	40	0.19862	0.8208
POV does not Granger Cause INF		1.94581	0.1580
EXR does not Granger Cause POV	40	2.84053	0.0719
POV does not Granger Cause EXR		0.64527	0.5306
FDI does not Granger Cause POV	40	0.85311	0.4348
POV does not Granger Cause FDI		10.1889	0.0003

Source: Author's Eviews 9 computations

The granger causality result in table 4.11 above indicates that there is bi causality relationship between AT and POV. The result further reveals that RGDP and POV has no causality relationship. GSXP and POV has no causality relationship. The result also indicates that no causality relationship exists between INF and POV while EXR and POV has no causality relationship. Finally, FDI and POV has a uni-directional causality relationship.

Discussion of the Results

The result of this study indicates that the coefficients of the t-statistic for the air transport value added, government social expenditure, inflation rate, exchange rate, foreign direct investment are above 0.05 percent level of significance; this implies that air transport value added, government social expenditure, inflation rate, exchange rate and foreign direct investment are not significant variable to determine household consumption per capital in Nigeria. While real gross domestic product has significant impact on household consumption per capital.

The study also reveals that real gross domestic product, and exchange rate has positive relationship on the household consumption per capital while air transport, government social expenditure, inflation rate and foreign direct investment has negative relationship on the household consumption per capital.

Conclusion

Present study is based on the premise that there is dearth of empirical studies on the relationship between air transport, economic growth and poverty reduction in Nigeria. The argument put forth in this research underscores the necessity to investigate the moderating influence of air transport and economic factors on poverty reduction in Nigeria. The objective of this study is to examine the empirical nexus among air transport, economic growth

and poverty reduction in Nigeria, using time series variables obtained from the Central Bank of Nigeria Statistical Bulletin for the period 1981-2022. Three null hypotheses guided the study. After an exhaustive literature review, the Ex Post Facto research design was adopted for the study. Moderation modelling procedure was employed to express the linear relationship which specified poverty as a function of air transport, economic growth, the interaction of air transport and economic growth, and government social spending. Preliminary tests on the time series variables were done using descriptive statistics, correlation analysis, Augmented Dickey-Fuller unit root test and Johansen cointegration techniques. The econometric techniques of Fully Modified ordinary Least Squares and the Granger causality analysis were used to estimate parameter estimates of the model. Findings revealed that air transport value added does not lead to poverty reduction in Nigeria over the period under study. Second, economic growth (LRGDP) exerts a positive and significant impact on poverty reduction. The moderating effect of air transport on economic growth on poverty reduction was found to be negative in the present study. In terms of causality relationship among the variables, it was found that there is a uni-directional causality relationship running from poverty reduction to air transport in Nigeria. In addition, there is a uni-directional causality relationship running from economic growth to poverty reduction in Nigeria.

Recommendations

Based on the findings in this study, the following recommendations are made:

- (iii) The findings indicate that the augmentation of goods and services, accompanied by heightened air transport activities, holds the potential for diminishing poverty in Nigeria. To capitalize on this potential, there is a requisite for substantial job creation initiatives by the government. Additionally, essential measures include the development of infrastructure (such as power, roads, railways, and water), fostering a business-friendly environment, and encouraging private sector investments. These concerted efforts are expected to generate employment opportunities and, consequently, contribute to the alleviation of poverty in the country.
- (iv) Economic growth and poverty reduction are twin tools that brings about change in air transport activities as shown the result of the Granger causality analysis in the study. Government should intensify its efforts in reducing poverty in the country through aggressive investment in agriculture and real sector initiatives.

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