

## **A QUANTITATIVE ECONOMICS OF SEASONALITY IN BUS PATRONAGE IN NIGERIA**

**KENNETH U. NNADI**

### **ABSTRACT**

*Seasonal variation is a well-known phenomenon, in many endeavours and enterprises. Passenger of patronage of road transportation by bus is generally implicated as exhibiting excessive seasonality. The study thus set out to empirically investigate the myth or reality of the thesis that trip generation and trip attraction can be significantly season-determined. Collecting time series data over a three-year period from the most respectable and scientifically managed bus service in the Nigerian private sector, seasonal variations were computed after necessary validation precautions had been taken to obviate the infiltration of biases. Deseasonalised figures; in the form of a matrix were generated and juxtaposed to the unadjusted original data. Findings led logically to the upholding of the governing hypothesis that bus patronage by a high incidence of seasonality. Apposite recommendations were then made, sequel to highlighting of policy implications of findings.*

*Keywords: seasonality, bus patronage.*

### **INTRODUCTION**

By far, road transport is the most important mode of movement in Nigeria. Using data based on the evacuation of goods to Nigerian ports, Dike (1991:257) estimates that the percentage share of road

transport in total inland freight of Nigeria was 50 in 1960, 65 in 1975, 70 in 1985 and 60.5 in 1987. As of 2003, it is held that road transport accounts for more than 90 percent of the country's goods and passenger movements (Filani 2003)

A vast number of commuters depend on road transport, which has been held largely responsible for the centralization of retailing office and industrial activities and the sprawling of suburbs (Tolley and Turton, 1995). This more so in the urban areas where, for instance, twenty-five percent of wages and salaries earned in Lagos is spent on transport (Egbeoluwa, 2001). With respect to transport facilities available for use by urban dwellers in third world cities, Armstrong Wright (1993:2) estimates that motorized modal split would generally fall within the following ranges;

Buses and minibuses	50-70 percent
Para transit	5-20 percent
Rail/motor	10-20 percent
Private cars and taxi	15-30 percent

In the specific Nigerian situation, Omiunu and Onokerhoroarye (1995; 225-226) hold the conclusion that "of all the modes of transport" this one accounted for its "location fluidity". This fluidity is principally accounted for by the dominance of buses among the variety of motorized means of road transport.

The bus mode as a section of the road mode of transportation consist of motor buses or trolley-buses carrying fare-paying passengers. Bus modes are the most often used mass transit modes in the world. According to Ogwude (1993) buses have the advantage of flexibility in meeting urban transport demand and in adjusting to changes in the

shape of city developments. An index of their economic significance is their capability to carry between 1000 and 2400 passengers per bus per day.

The flexibility of buses and their strategic importance as a form of mass transit has also been recognized by government. The Lagos State Government is a front in this respect in 1986/87; it allocated N33 million to procure 278 buses. In the same years, 100 unserviceable buses were refurbished. In 1989, another N20 million was set aside to procure buses and spare parts. Yet, the traffic carriage of the Lagos State Transport Corporation mass transit system declined from 82 million in 1979 to 53 million passengers in 1983 before rising to an estimated 60-65 million in 1987 (Filani, 200:13).

But the passenger traffic carried by buses, especially along intercity routes, is characterized by much seasonal variation. A major protagonist of this view is Okoli (2003), who asserts that intercity transport demand is higher during festive occasions, particularly during Moslem festive periods. It is the problem of seasonality in bus patronage that the article addresses. The objective pursued in the paper is to investigate empirically, the theoretical tradition of season – determined trip generation and trip attraction.

### **Hypothesis Of The Study**

The study is governed by the following hypothesis “there is significant seasonality in bus patronage”

### **METHODOLOGY**

Statistical data relating to number of carried on a quarter-by-quarter basis for the years 2000, 2001 and 2002 were sourced from a leading

bus company with ten operational bases across Nigeria and headquarters in Owerri. The first stage in processing the data consisted of checking the statistics for any secular trend with a view to eliminating same mathematically. Having established the trend - free status of the data, the seasonal variations were calculated after the intermediate stage of computing the quarterly totals, the quarterly means. The last stage in the data processing was to derive a matrix of deseasonalised figures for comparison with the unadjusted figures as a basis for inferential reasoning. This approach is non-parametric.

### **Limitation**

Bus operators, through their membership of the Luxury Bus Owerri Association of Nigeria (LUBOAN) and especially, the National Union of Road Transport Workers (NURTW), an affiliate of the Nigerian Labour Congress (NLC), can be classified as belonging to the organized private sector. Yet, records kept by them in the area of passenger movement can only be used with much reservation. Most of them do not operate scheduled services. But, the data, which forms the basis for this work, was sourced from a bus company known for scheduled operations. In view of this, finding made cannot easily be of general applicability to just all bus operators.

### **THEORETICAL ISSUES**

Seasonality, as a phenomenon, is a recurrent issue in many spheres of life and human endeavours. In the biological sciences, seasonal variations are the major explanatory factor for much of the migratory and navigational characteristics exhibited by certain animals in their bid to remain in consistently favourable environments (Levy, 1977). In

Agricultural production, Adamu and Johnson (1974) observe that periods of harvest coincide with very low agricultural prices while cropping seasons invariably have the characteristic of high prices.

In economics, cyclical behaviour and fluctuations have been associated with such matters as utilization of installed industrial capacity, stock market indices and even domestic liquidity and cash flow. Specifically in the area of petroleum economics, Nnadi (2002) has found that international oil prices exhibit a pattern of variability in their up and down swings of which the principal implicated causative factors are the lengths of the winter and the duration and severity of the summer.

A number of major theoretical traditions have arisen supportive to, or rebuttal of the subject of Business Cycles which has acquired the status of a sub-discipline in its own right. From this standpoint, one of the most useful theoretical tributaries is the Business Economy set of theories of which the most well known protagonists are W.C. Mitchell, A.C. Pigou, and J.M. Keynes. In trying to account for the causation of business cycles, the Business Economy theories adopt the position that trade cycles of depression – recovery – boom – recession are an inherent attribute of any industrial business economy.

This is the theoretical framework to which this article subscribes.

**Table 1: Presentation Of Data**

Number of passengers carried (2000-2002)

Year/Quarter	March	June	September	December	Total
2000	84,724	84,411	101,144	103,270	373,549
2001	101,221	120,331	132,331	123,490	477,582
2002	115,658	123,114	130,469	122,261	491,502

**Table 2: Matrix Of Data Analysis**

	<i>QT</i>	<i>QM</i>	<i>QM-GM</i>	<i>SV</i>
March	01,603	100534.3333	-11351.75	-11352
June	328,065	109355	-2531.0833	-2531
September	362,944	12134.6667	9428.5834	+9429
December	349,021	116,340.33333	4454.25	+454
Grand Total	=	1342633		
Grand Means =		111886.0833		

QT = Quarterly Total  
 QM = Quarterly Mean  
 GM = Grand Mean  
 SV = Seasonal Variations

**Table 3: Presentation Of Results**

Seasonal variation for Quarters

March	-11352
June	-2531
September	+9429
December	+4454

These results are now applied to the unadjusted raw data presented above. This harmonization process yields the matrix of deseasonalised figures for passenger patronage presented below.

**TABLE 4: MATRIX OF DESEASONALISED PASSENGER PATRONAGE**

Year/Quarter	March	June	September	December	Total
2000	9607686942	91715	98816	3735749	
2001	112,573	123071	122902	119036	477582
2002	127010	121040	11807	117807	491502

**FINDINGS AND DISCUSSIONS**

The results indicate a significant up and swing in passenger patronage of bus travels from quarter to quarter. Focusing on the magnitude of the bus seasonal variations, the results show that the downward variation in bus patronage reaches a trough bottom in the first quarter, beginning in January and ending in March while the upward swing attains a peak level in the third quarter, commencing in July and ending in September.

Further perusal of the figures also indicates there were a total of eighteen (18) seasonal variations across the three year time series,

adjusted and unadjusted flow of passengers as well as between the upward swing and the downward swing.

In specific terms, inspection of the unadjusted data given in Table 1 shows a total of six increases in September and December 2000, in June and September 2001, and June and September 2002. There were three decreases, in June 2000, December 2001 and December 2002. With respect to the adjusted passenger turnover presented in Table 4, adjusted by reason of the process of deseasonalisation through which the figures have been passed, we find again there were nine seasonal fluctuations, made up of three increases and six decreases. The increases occurred in September and December 2000, and in June 2001. The decreases, on the other hand, were recorded in June 2000, September and December 2001, and in June, September and December 2002.

The first major finding from this study is that the highest intensity of bus patronage is not in the last quarter of the year, as widely held but rather in the third quarter. The myth of excessive flow of passengers, ostensible included by the festivities of the also the 'theory' that accident rates escalate and road fatalities increase sharply during the "ember months" of the quarter due to the frenzy of travels ignited by high passenger flows. The theory is not corroborated by this study.

If it can be substantiated that road accidents and fatalities actually exacerbate during the 'ember' months, then causative analysis might implicate other factors, such as the complex known as 'Road Accident Immunity Delusion Syndrome (RAIDS)'. Another interesting finding from the analysis is that a secular trend of growing yearly demand for bus transportation.



## **CONCLUSION**

The governing hypothesis of the study is hereby both on the basis of the results presented and the findings articulated therefrom. Thus the study is supportive of the hypothesis that bus patronage exhibits a high degree of seasonality.

The analysis results, findings and conclusions thereupon are self-validating. Summation of results of seasonal variations (Table 3) yields zero. This confirms the absence of any secular trend capable of introducing a bias, and thus indicates that original time series (Table 1) data has trend calling for formal removal or mathematical elimination. Further validation emanates from the equalization of totals for both the original series in Table 1 and the matrix of deseasonalised figures in Table 4, showing correctness of analysis, methodological adequacy and logical consistency.

## **RECOMMENDATIONS AND POLICY IMPLICATIONS**

It is recommended that bus operators should increase their fleet size yearly to take advantage of the secular trend of growing annual demand for bus travel. The growing demand is a correct sign of increasing societal affluence.

Bus operators also need to bear in mind that high seasonality in passenger demand for bus travels implies the existence of so-called off-seasons, characterized by a lull in business activities. At such times, the gullible bus manager is susceptible to reductions in bus operations. But this will prove dysfunctional in the long-run and turns out to be a zero option. What is recommended in such off-seasons is the development of strategies to retain one's own already existing market share. In this case, market share retention strategies would include offering incentives

and bonuses to travelers, fare rebates and discounts, and any legitimate undertaking to secure consumer loyalty.

There are also peak seasons. At such times, the atmosphere is conducive to profit maximization. This is attainable through increasing passenger carrying capacity either by increasing total outlay of buses or redoubling the turnaround frequency, bearing in mind the security implications of this latter option. Revenue yield could also be heightened by raising fares marginally, give that price elasticity of demand would be low at such times.

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