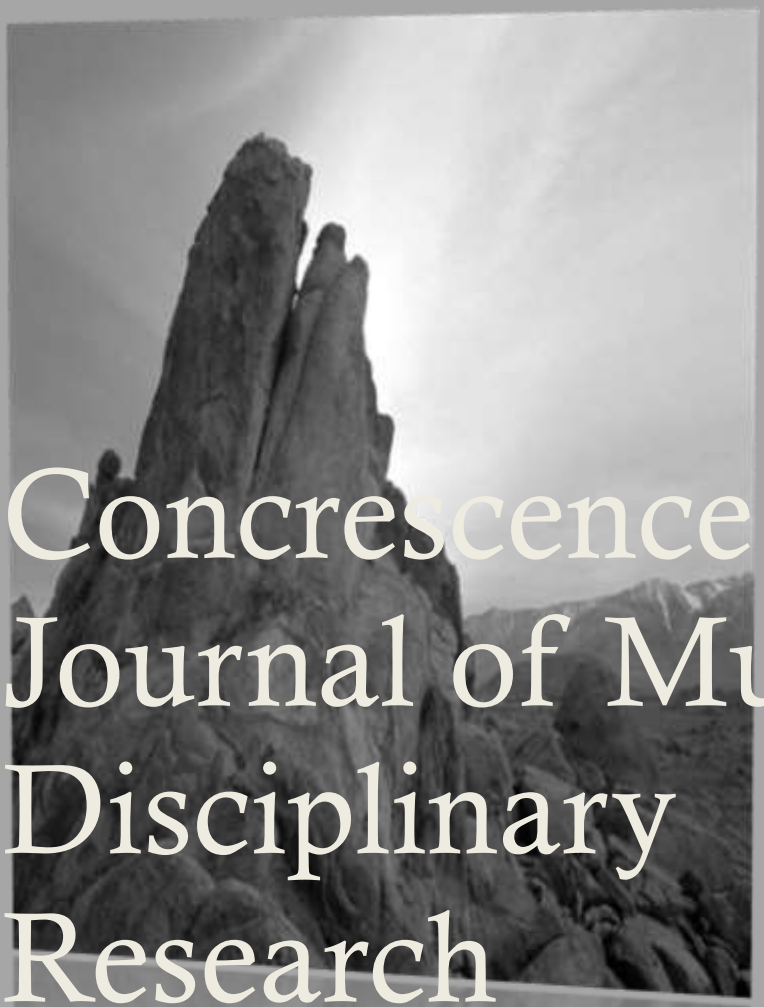

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A Trend Analysis of Road Traffic Crashes, Fatalities and Economic Growth in Nigeria

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Abstract
There is a growing concern about the rising trend in injuries and fatalities from road traffic crashes in developing countries due to their effect on health care resources and budgets. Nigerian families are directly or indirectly affected by road traffic crash. Based on this, the study examines the nexus road crashes, fatalities and economic growth in Nigeria using graphical trend analysis. The study employs annual data sourced from World Development Indicator (online version) and Federal Road Safety Commission (FRSC). Results show that the trend relationship among economic growth, road traffic crashes, fatalities and injuries revealed a cyclical movement. The results follow the growth shocks due to economic fluctuations and safety interventions during the study period.

1. **Introduction**

Road traffic crash is becoming a threat to public health as it has responsible for 1.25 million deaths and up to 50 million injuries globally. This challenge is more evident in low and middle income countries of the world where over 90% of the victims were found (Peden et

al., 2010). The trends of crashes in developed countries had witnessed a rapid reduction observed last three to four decades compared to a number of developing countries including Nigeria(Mohan, 2002;Kopit and Cropper, 2003) The problem may further be exacerbated due to rising motorisation occasioned by developing countries economic progress (Kopit and Cropper, 2003). Road transportation system remains the most patronised means of transportation in Nigeria as over 80 percent of goods and passengers are conveyed through it (Sumaila 2013). The objective of this paper, therefore, is to examine the trend of road traffic crashes, injuries and fatalities as the Nigerian economic progresses during pre and post Udoji period. The paper also looked into the pattern of road traffic safety in relation to the growth in the economy during the study period.

In the pre-colonial era, Nigeria witnessed inefficient land transportation systems. The use of human and animal as a means of transportation limited the amount of goods that could be carried and the distance that could be covered at that time, (Onakomaiya, 1981). Road infrastructural deficiencies resulted in increased costs and a direct effect on trade and other economic activities thereby reducing the competitiveness of the country's product in both local and international markets. Economic growth sustainability is often permissible in an environment of a well-developed transportation infrastructure such as road, air and water transport systems. Availability of good transportation also enhances both absolute and comparative cost advantages in the production and distribution of goods and services within and among nations of the world (Onakomaiya, 1981). However, this transportation bottleneck was alleviated during the colonial era with the construction of roads and rail networks in the country.

Road transportation system is the most widely utilised means of mobility though with significant related costs and benefits. The major environmental and social costs of transportation are carbon emission and crash fatalities (Golob and Henscher, 1998). Despite the immense benefits accrued from road transportation, the associated costs in terms of road crash fatalities are enormous. Road traffic crash occurs when a moving vehicle collides with another vehicle(s), pedestrians, animal or other objects. This results in injury, loss of lives and property.

The first road traffic crash was recorded in 1906 and it has progressively increased due to the pace of economic growth and development. However, with the discovery of crude oil and subsequent increase in oil prices at the international market, there was an unprecedented increase in the country's Gross Domestic Product (GDP). This led to an increase in the disposable income of an average Nigerian worker and an increased demand for automobiles. However, the existing road infrastructures could not meet the demand of the number of vehicle ownership arising from the oil boom in the 1970s hence, the intensity of road traffic crashes became a serious problem.

This sudden increase in car ownership resulting from Udoji Award put pressure on the available road infrastructures (Anyanwu, 1997). In addition, the economic recession that followed in 1980s hindered the then government from maintaining the existing roads let alone building new ones. The situation was also worsened because of near absence of alternative modes of transportation resulting from the collapse of rail system and the concomitant pressure on the available road network resulted in the intensity of road traffic crashes on Nigeria roads.

2. Literature Review

Komba (2006) describes the trends of motor related casualties in Kibaha district in Tanzania. The study discussed the risk factors which are associated to the cause of road traffic accidents in Kibaha. Using qualitative and quantitative approaches within a framework of a case study approach between 2001 and 2004, the study revealed that the pattern and trends of road traffic accident increased on yearly basis with pedestrians and passengers the most casualties. The study identified age, sex, over speeding, reckless driving, being a pedestrian, or a motor cyclist as risk factors to motor vehicle crashes. The study submitted that enforcement and education accompanied by public information campaigns should be intensified. Aderamo (2012) assessed the trends of road traffic accident casualties using the Statistical Package for the Social Sciences (SPSS) to develop regression models for predicting death and injuries on Nigerian roads between 1975 and 2009. The study observed the effort of law enforcement agencies to reduce crashes on Nigerian roads but traffic safety still remains a crucial issue in the country. The study showed that though the establishment of the Federal Road Safety Commission has a significant impact on the rate of casualties, the study recommended enforcement, education and research funding in order to reduce deaths and injuries.

Atubi (2010) examined the variation in patterns of road traffic accident in Lagos State between 1970- 2001. Using secondary data obtained from the Nigeria police force and Federal Road Safety Commission, the study found lack of familiarity of temporal and spatial distribution of road traffic accidents by traffic officers and therefore suggested that they should know when and where road traffic accidents are most frequent. As lack of these constitutes a serious problem and impedes rapid improvement of the safety standards. Atubi and Gbadamosi (2015) examined the global positioning and socio-economic impact of road traffic accidents in Nigeria. Developing countries especially Nigeria has a serious road accident problem and road safety measures are needed in order to prioritized actions geared towards road safety improvements. The study identified the priority actions to include appropriate accident information system for research and evaluation and well-trained road safety teams that are capable of coordinating and integrating of road safety improvement programmes. Sumaila, (2013) investigated traffic accidents and safety management in Nigeria. The study focused on trends in road crashes and a critical review of road safety approaches aiming at identifying their level of effectiveness in solving the traffic accident problems in the country. The results showed a high rate of traffic accidents in Nigeria with the driver as the main culprit. The study also revealed the functional limitations of Federal Road Safety Commission (FRSC), a lead agency in road safety matters, to include operational and administrative difficulties in the driver licence and vehicle registration schemes, Nigerian poor driving culture resulting from weak traffic education, public awareness and weak enforcement of traffic rules and regulations.

Ukoji (2014) also examines the patterns and trends of road traffic crashes and fatalities in Nigeria during 2006 and 2014 using Nigeria Watch database. The study revealed that significant number of lives were lost to fatal road crash occurrences. According to the study, Lagos recorded the highest deaths while Federal Capital Territory, Abuja has the highest fatality rates. On the regional level, descriptive trend analysis revealed that more people died in fatal road crashes in the Souththan in the North. Ohakwe,Iwueze and Chikezie. (2011) investigated the increasing level of road traffic crashes in Imo State and the resultant injuries and deaths. Road traffic crash data were collected from the Motor Traffic Division (MTDRTR) of the Nigerian Police Force. Using the methods of time series

decomposition and chi-square test of significance, the study found that road traffic crashes exhibit upward trend and significant seasonal influences.

Agyemamg (2013) examined the statistical evidence on the relationship between road traffic accidents and population in Ghana using time series data from 1990 to 2012. The study revealed that there was a significant increase in traffic accident and population during the period. Implying that increase in population corresponds to increase in road crashes however the study failed to give the number of vehicles per inhabitant in Ghana during the study period. Hamza (2005) examined the characteristics and details of road accidents that occurred in Libya between 1966 and 2000. The results indicated traffic accidents are the most common cause of fatalities and injuries in Libya due to poor infrastructure development, non-existence of road safety design, rickety vehicles and lack of adequate road side clinics.

Dharmaratne et al. (2015) analysed the trends of road traffic crashes, injuries and fatalities in Sri Lanka between 1938 and 2013. Data obtained from the police were used for trend and regression analysis. The study found a significant increase in road traffic crashes, injuries and fatalities between 1938 and 2013. The Join point method of analysis showed large fluctuations in crashes and injuries over time but a continuous increase in fatalities. The fluctuation was as a result of variations traffic law enforcement and improved public transportation effect on crashes, fatalities and injuries. Though, growth in the number vehicles contributed to increase in crashes and injuries, road traffic crashes, fatalities and injuries in Sri Lanka are associated with political changes, economic and traffic policy.

In China, Shengchuan (2006) studied road traffic crashes trend and their characteristics during 2000 and 2005. Employing descriptive statistics, he found that fatalities are prevalent among inexperienced drivers, increase in the number of deaths on expressway, and more fatalities observed in rural areas with less high-grade roads. Also, the study by Al-Reesi *et al*. (2013) described and analysed the trend of road traffic injuries in relation to motorisation rates and economic growth in Oman during the period of 1985- 2009. Linear regression analysis was carried out using data on number vehicles, road traffic crashes and fatalities. Smeed (1949) and Koren and Borsos's (2010) models were used to predict the relations between motorisation and road traffic fatalities in Oman.

Gkegkes, Mamais and Christos (2013) investigated road crash trends and the social economic changes over the last two decades in Greece. The study employed descriptive statistics and Spearman correlation tests on data from year1994 to 2011. The result showed that decrease in road traffic fatalities was due to traffic law enforcement and roads infrastructural upgrade. Harper, Charter and Strumpf (2015) using negative binomial regression on mortality and population data examined the trends of road traffic crash and death rate and educational inequalities in United States of America between 1995 and 2010. They study found a large decrease in mortality among highly educated and some evidence of mortality increases among the least educated. Despite a downward trend observed in the crash fatality rates, the socioeconomic disparity in road death was witnessed throughout this period.

3. Data and Methodology

The data used in this analysis were sourced from World Development Indicator (WDI), Nigeria Bureau of Statistics (NBS) and Federal Road Safety Commission (FRSC) Annual

Reports between 1970 and 2016. The use of fatality as a measure of road traffic safety in this study is unique especially in Nigeria as fatalities data are more reliable because traffic officers are mandated by law to have crashes involving death reported in case of litigation.

4. Data Analysis

4.1 Trend Analysis of Road Traffic Crashes in Nigeria between 1970 and 2016

In figure 1A, there were 16,666 road traffic crashes recorded in Nigeria in 1970, representing 1.6% of the total crashes recorded (figure 4.1B) and the crashes gradually increased to 28,893 in 1974 (figure 1A), representing 2.1% growth rate of the total crashes recorded in the study period (figure 1B). This trend was, however, abated in 1975 with road crashes dropping to 23,651(1.65%) (Figure 1A & (1B)) reflecting the impact of the establishment of the National Road Safety Commission (NRSC) established in 1974. The impact of the commission on road traffic safety could not be sustained, and therefore in 1977 the then Oyo state military administrator established the Oyo State Road Safety Corps known as *Majamaja* which was disbanded in 1983 by the federal government (Adekunle, 2010). The success recorded was limited to Oyo state alone as road traffic crashes were occurring in other parts of the country.

This lack of coordinated attention to road safety issues increased road carnage in 1976 to 40,881 (figures 1A), accounting for 2.85%, the highest during the study period (figure 1B). However, it reduced to 29,271(2.04%) in 1979 with a negative growth till 1989 (figure 1A & 1B). The reduction could be explained by the economic downturns witnessed in the early 80s with the attendant decrease in motorization (Anyanwu,1997). This global economic recession that culminated in the Structural Adjustment Programme reduce the value of Nigerian Naira in the international market. This devaluation of the Nigerian Naira made automobiles and their component parts so expensive leading to a low rate of motorisation at this period.

The road traffic crashes in Nigeria again rose to 37,094 (2.58%) in 1982 and later the country witnessed a reducing trend until 2001 when it recorded a relatively higher number of crashes of 20,530 (1.43%) (Figure 1A (1B)). The reducing trend may be a reflection of the establishment the Federal Road Safety Commission (FRSC) through Decree No. 45 of the 1988 as amended by Decree 35 of 1992. Referred to in the statute books as the FRSC Act cap 141 Laws of the Federation of Nigeria (LFN) and passed by the National Assembly as Federal Road Safety Corps (establishment) Act 2007.

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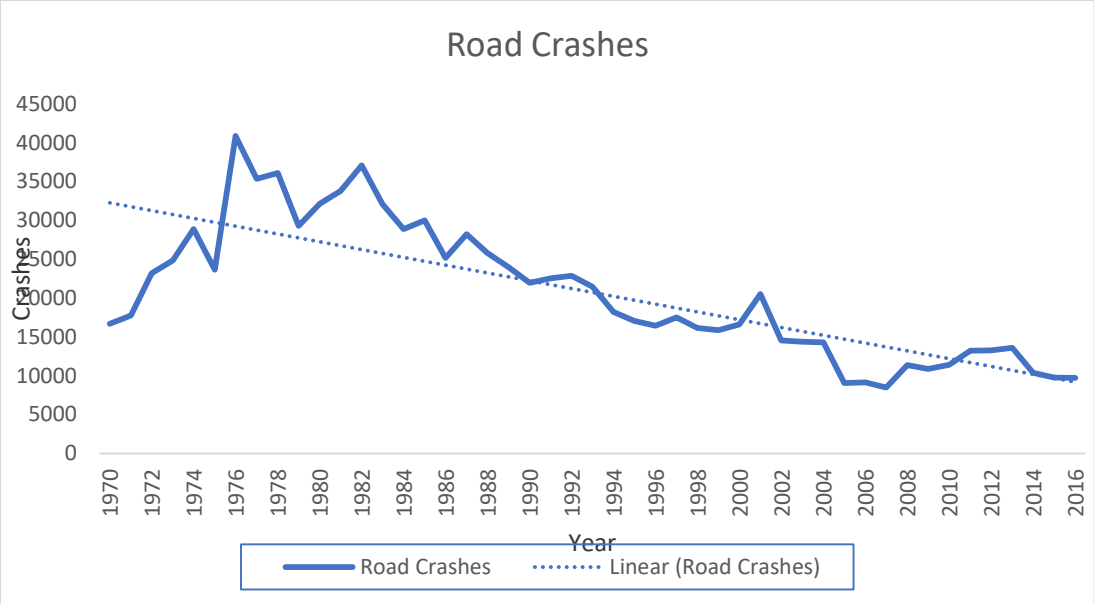

Figure 1A: Trends of Crashes from 1970-2016

Source: Author, 2019

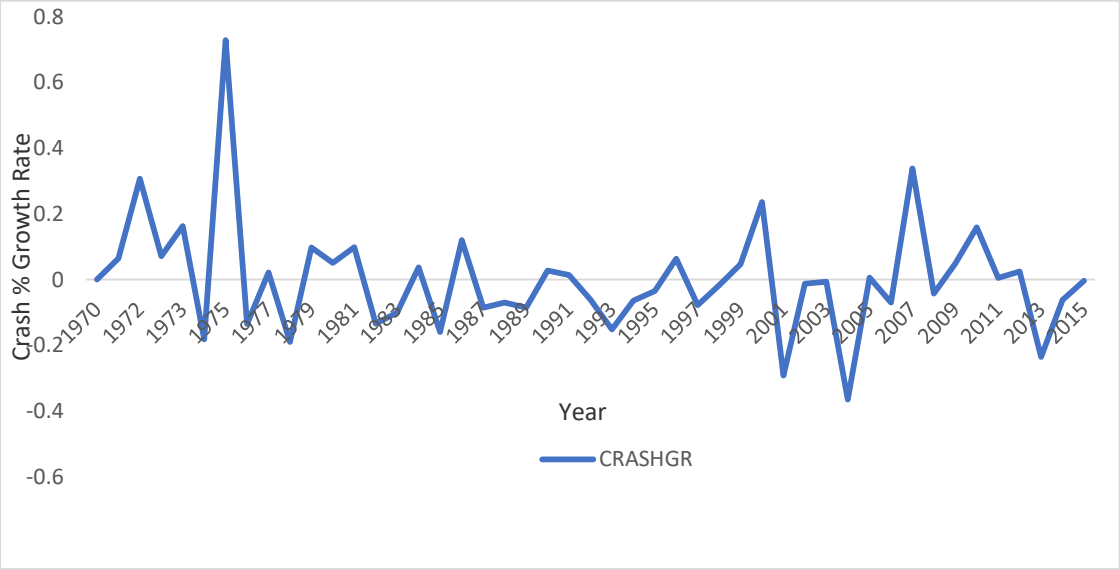

Figure 1B: % Growth Rate of Crashes from 1970-2016. Source: Author, 2019

4.2 Trend Analysis of Road Traffic Casualties in Nigeria between 1970 and 2016

Casualties are the total numbers of deaths and injuries recorded from a road traffic crash. A crash may be minor, serious or fatal. A minor crash is a situation where no injury or death is recorded aside from damage to vehicles and road infrastructures. A serious crash has one or more of the people involved sustaining one degree of injury or the other but no death is

recorded. A fatal crash is when one or more of victims die on the spot or as being rescued to the hospital or at the hospital within thirty days.

The injuries recorded in Nigeria within the study period are as depicted in Figure 2. There was a sharp increase of 1.28% (figure 2B) in the number of crash injuries from 1970 (13,154) to 1977 (30,023) (figure 2A), reflecting the unprecedented increase in the country Gross Domestic Product and Udoji Award at that time (Adekunle, 2010). The increase in vehicle ownership underscored increase in disposable income and more cash to hard drink, which might influence a driver and subsequently cause increase in crash injury.

The total injury was kept below the 1977 peak until 2008 when it rose again to 17,794 representing 1.61% of the total injuries recorded during the period figure 2A &2B). The decreasing trend of injuries could be explained by the economic downturn witness in the early 80s coupled with the hostile foreign economic policies against the then military rule which adversely affected importation of vehicles and their components. This rising was climaxed in 2011 when 41,165 injuries representing 3.73% and the highest recorded during the studied period (figure 2A & 2B). The sharp increase witnessed in 2011 resulted from risky driving occasioned by the premonition of using car fitted with safety gadgets. The gadgets could not foreclose the occurrence of crashes and injuries but the severity could be reduced. Obviously, the rate of injury has been kept low in most of the period except in 2011.

The crash fatalities also followed an upward trend from 1970 (2,893) till the highest level in 1982 (11,382) representing 293% increase in this period (figure 3A &3B). This could also be as a result of increase in worker's salaries due to the Udoji Award by the government. Increased car ownership that was witnessed during this period put undue pressure on the available road infrastructures and safety personnel and consequently increased road death. Aside from occasional sharp increases though not up to 1982 (3.43%) level (figure 4.3B) especially in 2001 as a result of the influx of "Okada" as a mode of transportation and the corresponding fatalities due to head injuries (Arosanyin,*et al*., 2012), death resulting from road crashes has reduced tremendously owning to the establishment emergency rescue units in all the major corridors of the Nigeria highways by the Federal Road Safety Commission (FRSC) and some state governments. This initiative allowed for prompt response to crash sites and rescue of crash victims.

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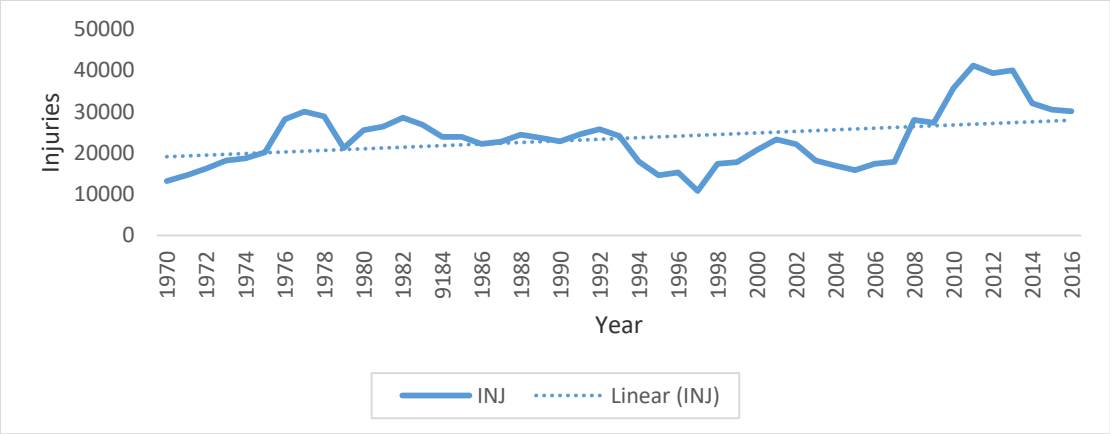

Figure 2A: Trends of Crash Injuries from 1970-2016

Source: Author, 2019

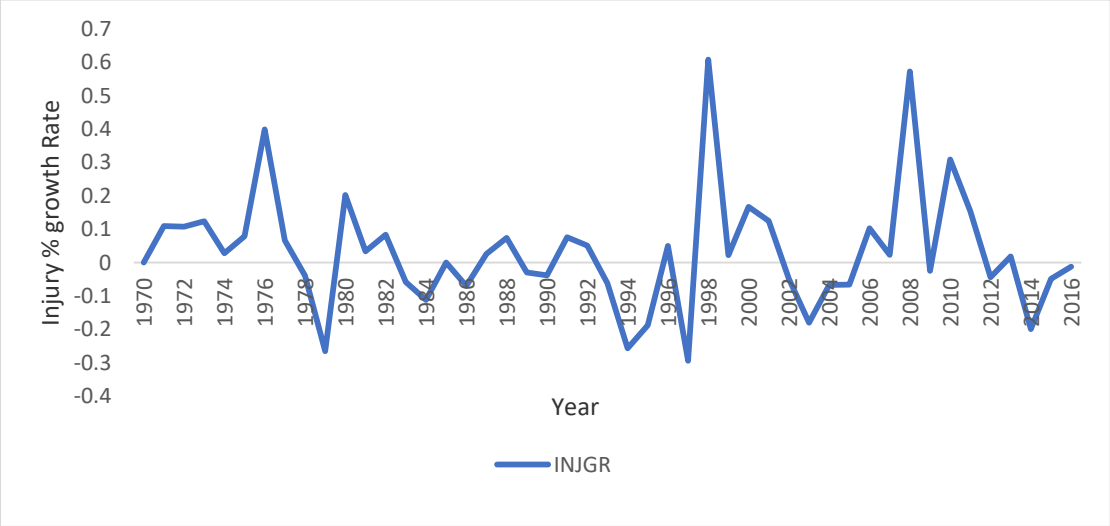

Figure 2B: % Growth Rate of Crash Injuries from 1970-2016

Source: Author, 2019

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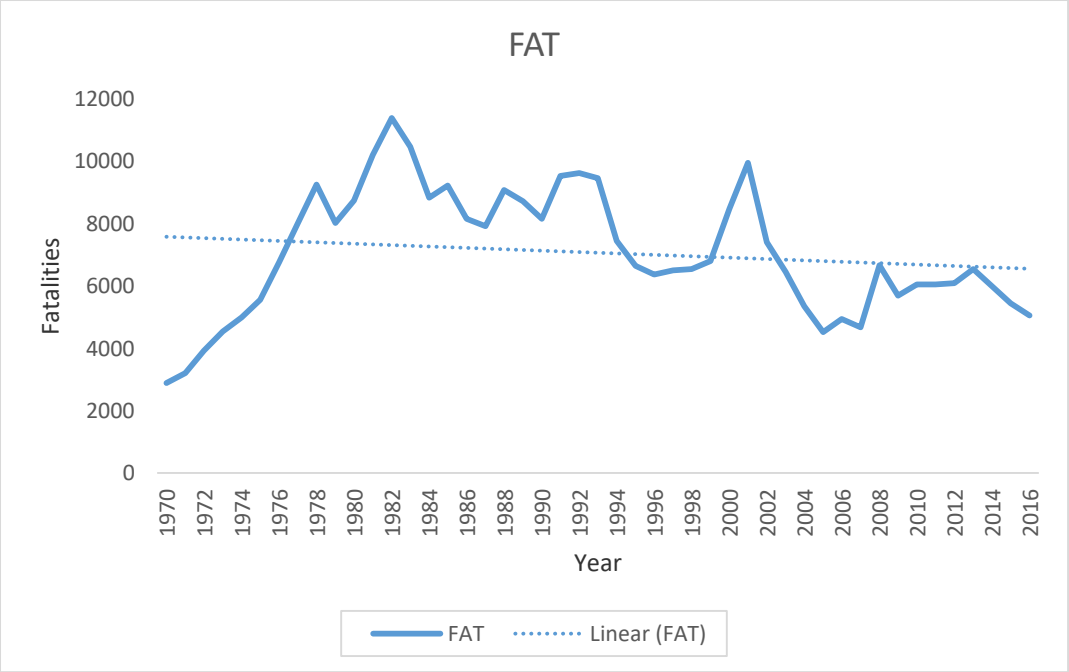

Figure 3A: Trends of Crash Fatalities from 1970-2016

Source: Author, 2019

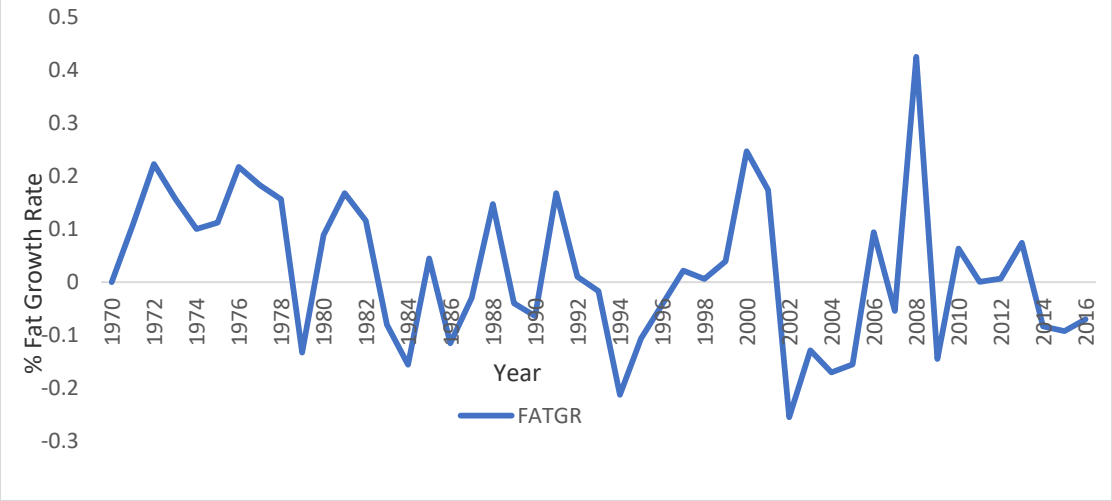

Figure 3B: % Growth Rate of Crash Fatalities from 1970-2016

Source: Author, 2019

4.3 Trends of Road Crashes, Injuries and Fatalities Compared

Comparatively, from figure 4A, fatalities stood below total crashes and injuries as witnessed throughout the study period. Road crashes, injuries and fatalities followed the same trend at early stage of the period with crashes over and above fatalities and the number of injuries (1970 – 1988). However, from 1988 to 2016, injury rate was over and above total crashes and fatalities except between 1994 and 1998. Obviously, the reduction in road crashes recorded after the oil boom was not reflected in the fatality rate for those years. Also, a decline in road crashes between 1982 and 1985 was not corresponding to the fatality rate of this period. This therefore challenge the reliability of these data as it could be realised that crashes involving death are better reported than non-fatal crashes. Thus, fatality data seems to be more reliable since police and traffic officers are mandated by law to have crashes involving death reported in case of litigation that may ensue (Asogwa, 1982).

Generally, the trend of crashes, injuries and fatalities especially from 1988 could be as a result of road safety interventions and other macroeconomic indicators such as inflation and exchange rate regime associated with this period. The reduction in the total number of crashes and fatalities could be as a result of the establishment of Federal Road Safety Commission (FRSC), a lead agency in traffic management. One of the major successes of the commission was the inculcation of the use of safety belt and the enforcement of this and other crash causing offences, which have not only reduced road crashes, but also crash fatalities and injuries. Therefore, the advent of vehicles with safety gadgets most especially airbag in Nigeria has also contributed to low fatality recorded during the study period.

Similarly, from figure 4B, it could be inferred that there existed a very high growth rate at the initial stages of the study period with road crashes recording the highest, followed by injuries and then road fatalities. The three increased though at different rates because of increase in income from oil boom. The increase workers' salaries without a corresponding increase in road infrastructures, traffic regulation and enforcement culminated in the high growth rate crashes, injuries and fatalities.

The growth rates of crashes, injuries and fatalities as depicted in figure 4B saw fatalities taking the lead between 1981 and 1993. The death rate was higher because of the prevailing economic reality of this period. The period witnessed global economic recession which latter resulted in the devaluation of the country currency. This devaluation raised the prices of automobiles and their component parts. This resulted in the importation of fairly used cars known as "Tokunbo" as many people could no longer afford brand new cars. This led to the occurrence of fatal crashes from tyre bust, steering lock and road obstruction by broken down vehicles. This was further aggravated by the lack of road maintenance due to the economic situation and thus made available road network a death trap. Though the Gulf war increased the demand for the nation's oil but the effect of this could not be felt in the economy.

The growth rate of crashes, injuries and fatalities at the later period of the study is similar to the earlier period. Aside from 2005 to 2008 when they witnessed negative growth rate as a result of global financial crisis, the growth rate was positively increasing between 2009 and 2013. This period witnessed a progressive increase in the country gross domestic due to increased oil prices at the international market. The growth entered negative in 2014 and persisted to the end of the study period (figure 4B).

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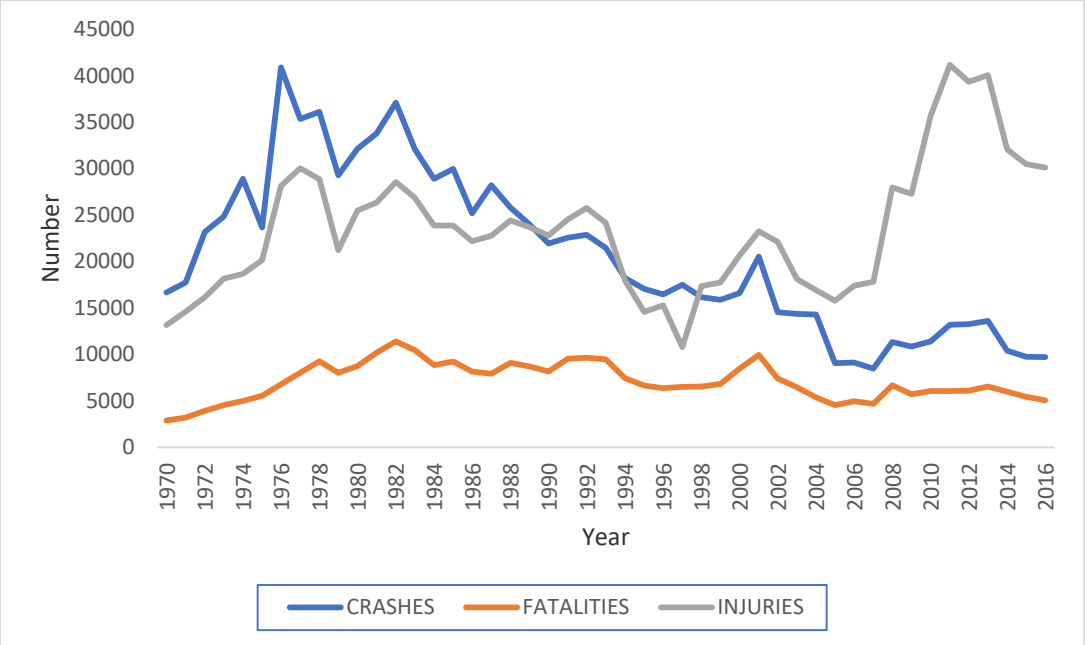

Figure 4A: Trends of Crash, Fatality and Injury Compared from 1970-2016

Source: Author, 2019

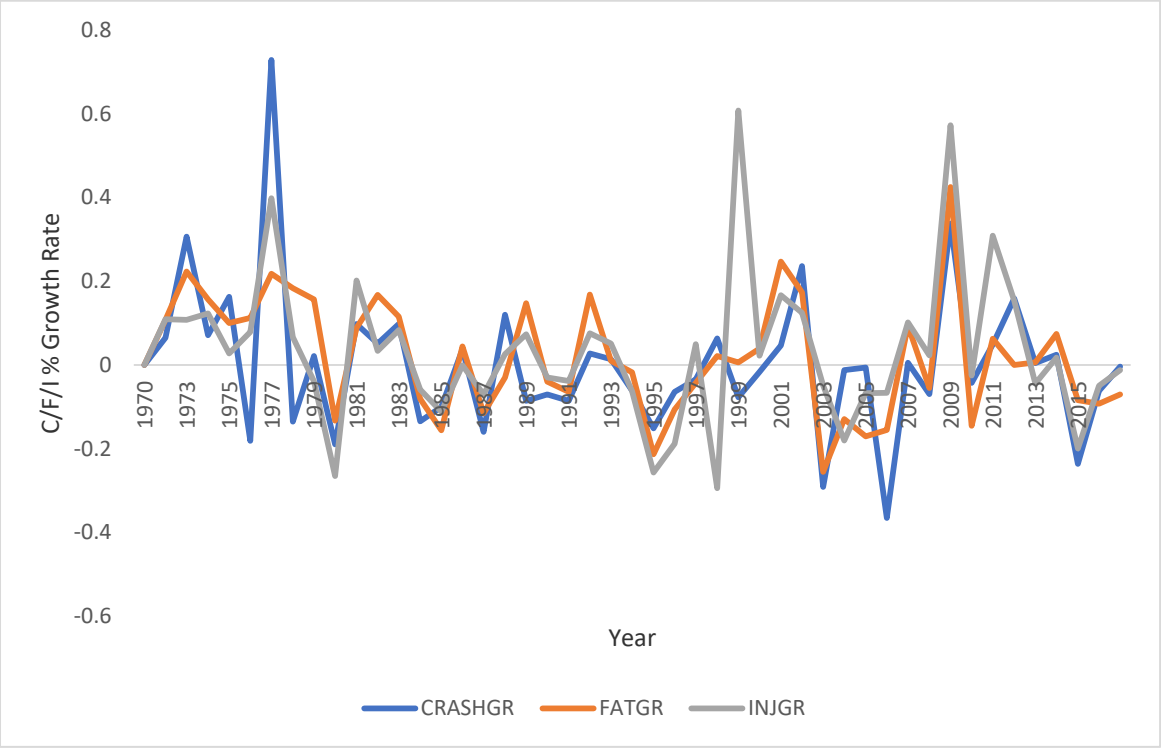

Figure 4B: % Growth Rate of Crash, Fatality and Injury Compared from 1970- 2016

Source: Author, 2019

4.4 Trend of Road Traffic Crash Fatality, Motorization and Economic Growth in Nigeria between 1970 and 2016

Increased households' disposable income from a sustained economic growth increases the purchasing power of economic agents. This therefore allows them to afford more goods and services, which they hitherto could not afford during the period of stable and declining economic conditions. Income is a strong determinant of vehicle ownerships as vehicle ownership increase at about the same rate as income. Significantly, motor vehicle prices affect individuals' decisions to own a vehicle which may in turn be dependent on foreign exchange rate and inflation. The increase in motorisation coupled with the near collapse of rail system and high cost of air travels in Nigeria have put quite a lot of pressure on the country's road transport system. This has caused increase in road traffic crashes in the country.

Improvement in the economy will translated to increase per capita GDP and increased disposable income of an average consumer and also increase peoples' ability to purchase more vehicles. The increase in vehicles ownership due to increase in purchasing power will not only put pressure on available road infrastructures, but also allow for untrained and unlicensed drivers on the road (Tay, 2003). This will then lead to frequency of road traffic crashes fatalities at the initial stage of economic growth (Kopits& Cropper, 2005). However, given a sustainable economic growth, a further increase in disposable income will afford people to purchase vehicles fitted with safety gadgets. Government may also later realised the destructive effect of roads traffic crashes and decide to invest in road traffic safety activities. This will eventually bring a reduction in road traffic crashes and fatalities.

The trend of Per Capita Gross Domestic Product (PGDP) used as proxy for economic growth in this study was not stable throughout the period of study as its pattern reveals the prevailing economic realities at these period. From figure 5, the prosperity of the nation through oil boom of the 70s was translated to increase per capita income. The PGDP rose from 160 in 1971 to 807 dollars in 1981 representing roughly 404% increase (figure 5A &4B respectively). However, there was a downward trend witnessed from 1982 to 1986. Within this period, the PGDP dropped from $661 to $241 (figure 5A) representing a decrease of 174% (figure 5B). This decline was as a result of the economic downturn witnessed in the early 80s since the oil windfall needed to stand as shock absorber has been mismanaged by the then government (Anyanwu, 1997). From 1986 to 2000, the variations in per capita GDP ranges from less than 10% to less than 50% (figure 5B). Aside from a decrease in 2009 from $1,377 to $1,092 (20.7%), there was a consistent increase in PGDP in the year 2001, from $350 to $3,203 in 2014 representing 815% within the period (figure 5A &4B respectively). This period coincides with the regime of increase crude prices at the international market, the Nigeria crude was sold as high as over $140 dollars per barrel. The economic recession witnessed at close of year 2014 resulted in 17.6% and 23.3% decline in PGDP in 2015 and 2016 respectively.

Similarly, motorisation (MOT), a measure of vehicle ownership followed the same trend of Per Capita Gross Domestic Product because of its influence on the purchasing power of every economic agent. Therefore, from figure 4.6A the oil boom period of 70s and the economic downturn followed in 80s positively and negatively influenced motorisation. The increasing trend of motorisation between 1996 and 2005 was relatively low compared to a sharp increase witnessed from 2006 to 2013 after which the trend subsided. The reason for this was as a result of the prevailing economic realities as they affected the per capita GDP, as explained above, vis-à-vis the disposable income. Thus, the absolute trend and growth

rate indicated an increase during the oil boom and decrease as result of economic recessions. The trend and the growth rate later witness increases due to increase in oil prices at the international market (figure 6A &6B).

On the fatality per population (FPOP), a proxy for road traffic safety, the trend was a little bit different. As depicted in figure 7A, fatalities per population increased from 5.17 per 100,000 of the population to 14.69 per 100,000 of the population representing an increase of 184% (figure 7B) from 1970 to 1982. The trend indicated the unprecedented increase in vehicle ownership that followed the Udoji Award. Hence, reckless and drunk driving which led to unimaginable road traffic fatalities. It, however, witnessed a declining trend after the year 1982 with occasional increases in 1991, 1992, 1993 and 2001 but not up to 1982 level. In 2016, it recorded the lowest value of 2.68 per 100,000 of the population. The growth rate of FATPOP oscillated between positive and negative, the highest positive growth occurred during the oil boom of 1970s and the period of global increase in oil prices of 1998 to 2013 and the debt relief of 2005 (figure 7B). The trend of FPOP is in tune with the literature as income increase people tends to shift to safer vehicles, which are adequately equipped with safety gadgets (Iwata, 2010). In addition, more resources are allocated for the provision of road infrastructures and road safety institutions and more fund allocated to education and enforcement of road safety rules and regulations.

The rate of change of Per capita Gross Pomestic Product (PGDP), Motorisation (MOT) and Fatalities per 100,000 thousand of the Population (FPOP) was depicted in figure 4.8. In figure 8, the percentage rate of motorisation (MOT) was the highest, followed by per capita Gross Domestic Product (PGDP), then fatality per population (FATPOP). This shows that the prosperity brought by the oil boom of 1970s translated to increase rate of vehicle ownership. However, between 1978 and 1991 FATPOP growth rate was above the growth rate of motorisation, but the growth rate of PGDP oscillated during this period. The increase in the growth rate of FATPOP was as a result of the prevailing economic situation that preceded the oil boom.

This period is characterized with the global economic recession that culminated in the Structural Adjustment Programme (SAP) of 1986. As explained in the comparison of the trend of road crashes, injuries and fatalities above, the devaluation of the Nigerian currency reduced motorisation rate in Nigeria. Since the citizens could no longer afford a brand-new vehicle, they were left with no other option than fairly used vehicles. This resulted in lots of fatal crashes due to mechanically deficient vehicles and inadequate road maintenance.

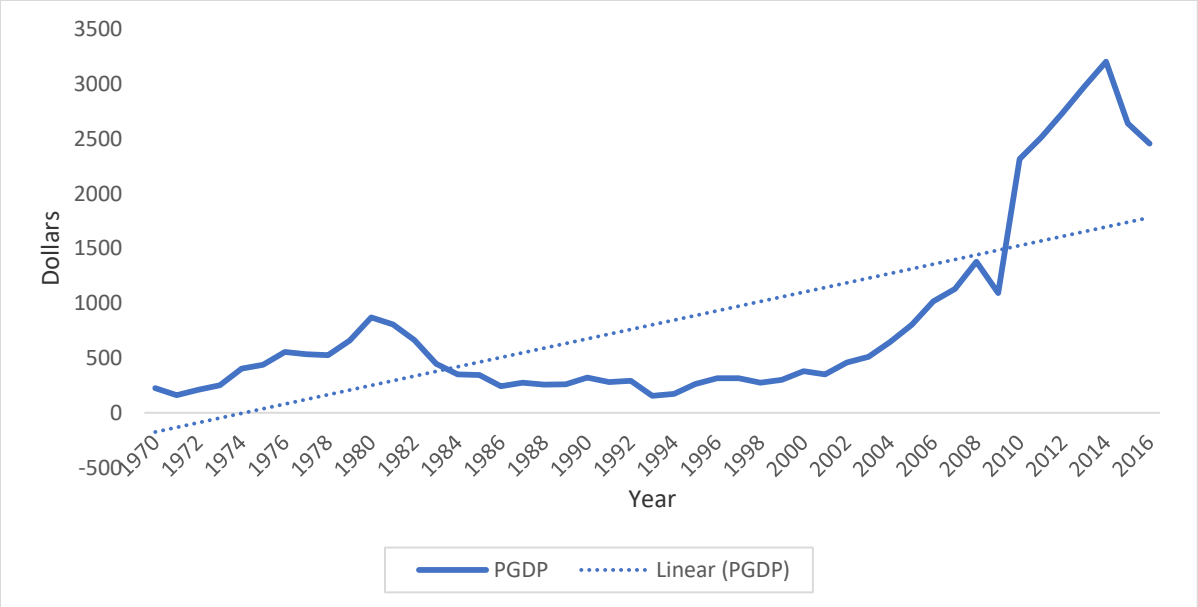

Figure 5A: Trends of PGDP from 1970-2016
Source: Author, 2019

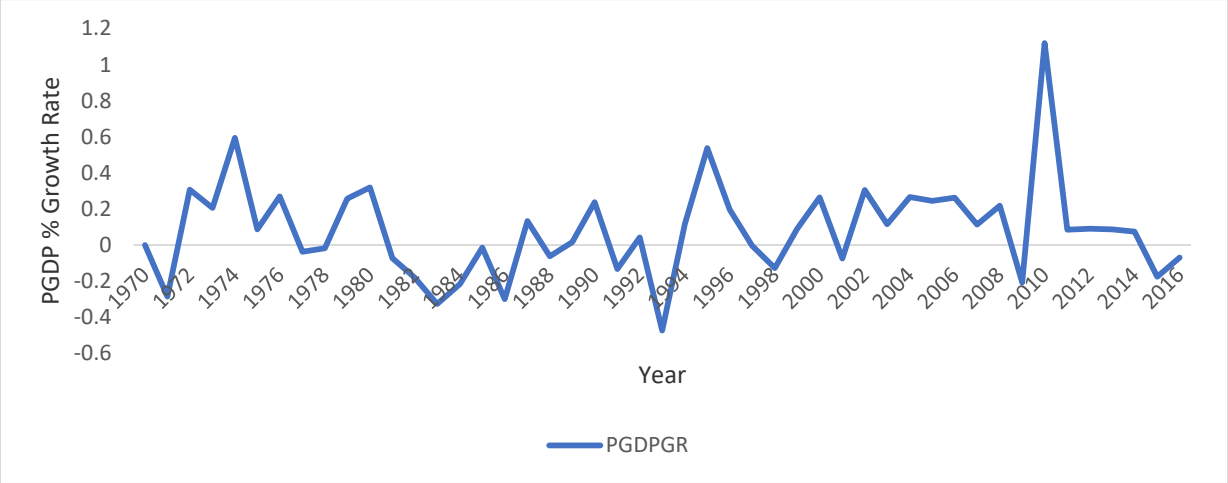

Figure 5B: % Growth Rate of PGDP from 1970-2016
Source: Author, 2019

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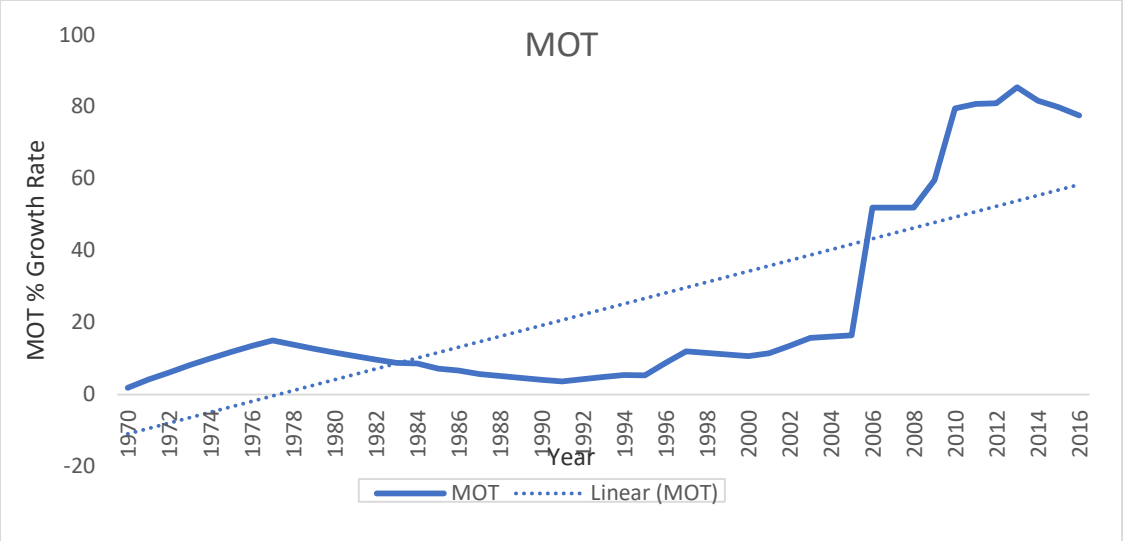

Figure 6A: Trends of Motorisation from 1970-2016
Source: Author, 2019

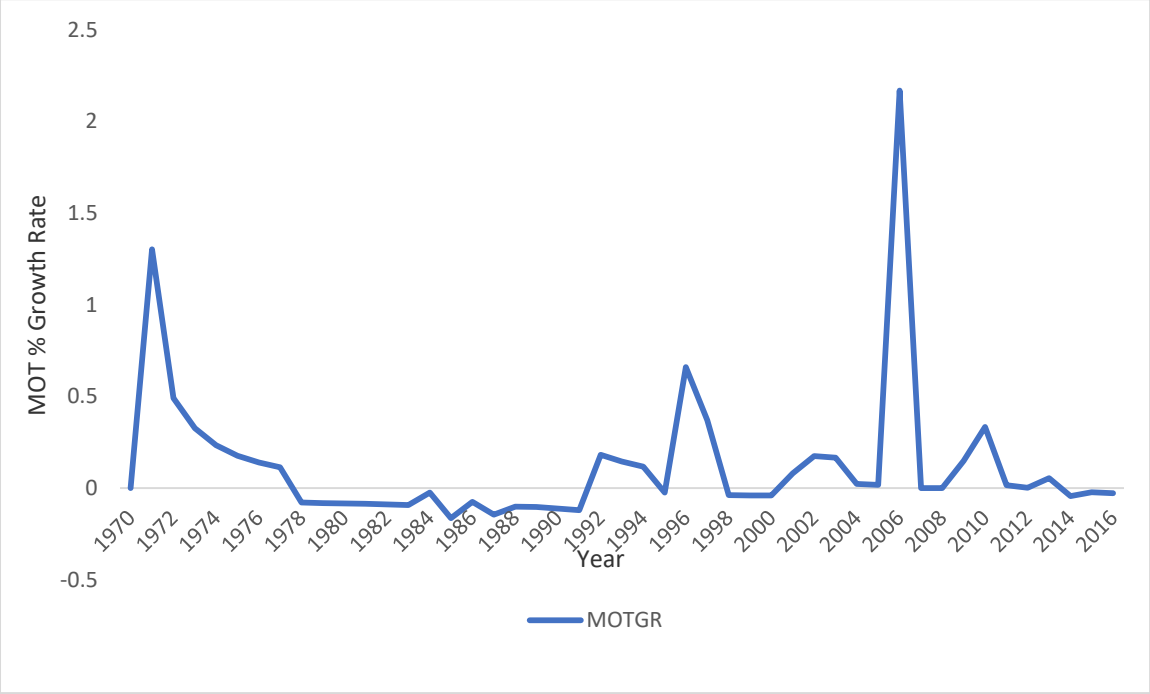

Figure 6B: % Growth Rate of Motorisation from 1970-2016
Source: Author, 2019

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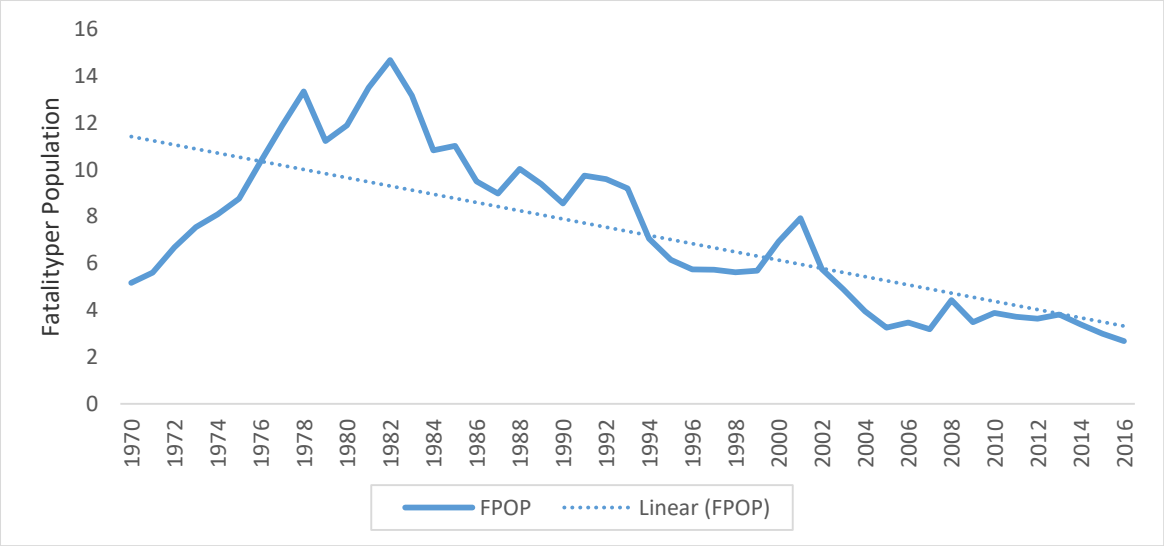

Figure 7A: Trends of FPOP from 1970-2016

Source: Author, 2019

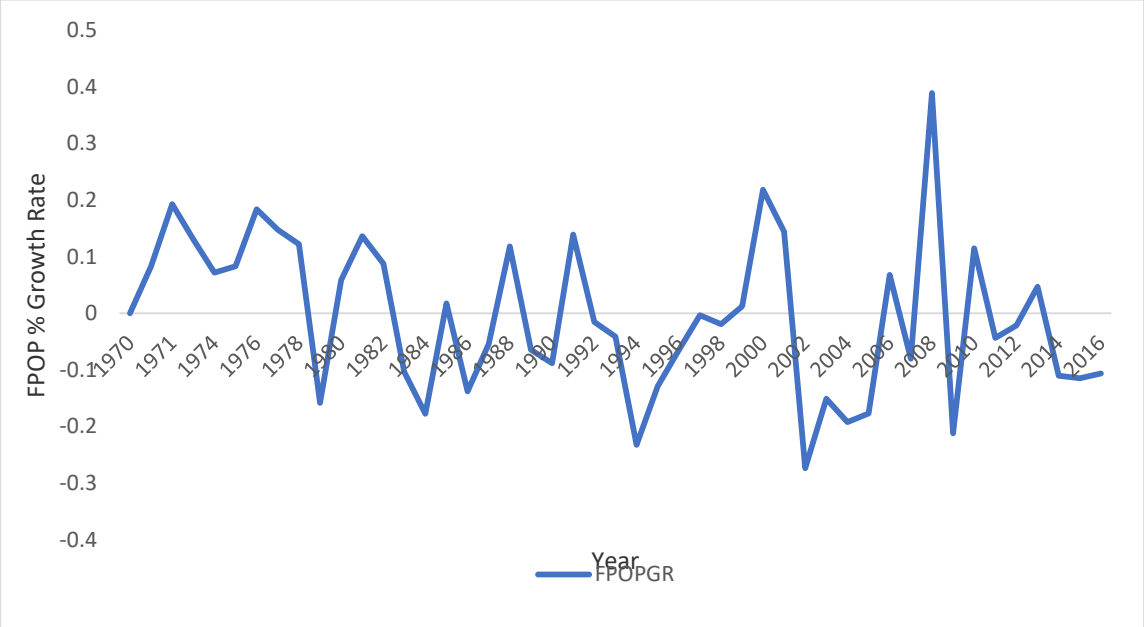

Figure 7B: % Growth Rate of FPOP from 1970-2016 Source:
Source: Author, 2019

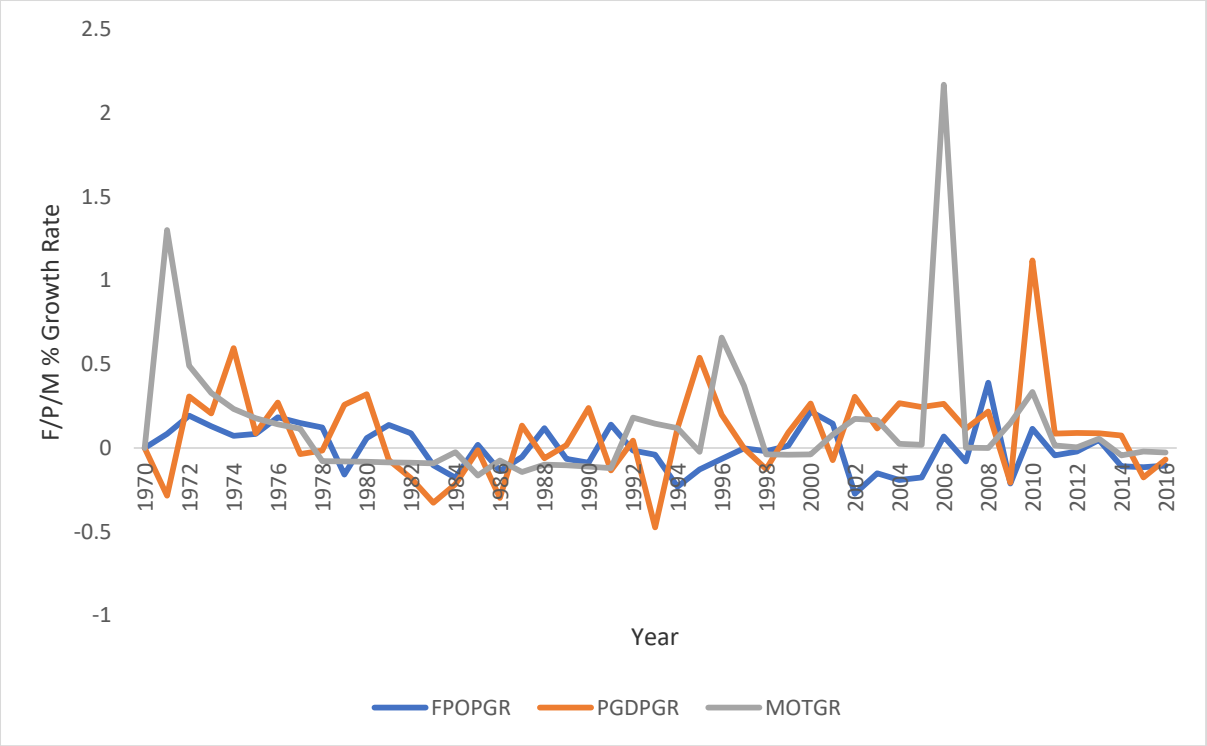

Figure 8: % Growth Rate of FPOP, MOT and PGDP

Source: Author, 2019

4.5 Trends of Fatality per Vehicle in Nigeria between 1970 and 2016

This variable was used in this study to proxy road traffic safety on Nigeria roads. It is the number fatalities per 10,000 vehicles on the road. From Figure (9A), the trends of fatalities per vehicle in the early 1970s revealed a decline despite a progressive increase in vehicle ownership resulting from the oil boom. Unlike the trend of fatalities per population that witnessed an increase especially during the oil boom, fatality per vehicle is low due to the fact there are few network of roads concentrated only in the cities. Also at this period some of the rural areas can hardly boast of one vehicle, in fact seen a vehicle everybody will be out to catch a glimpse of it. Also there were few high ways, where there is high probability of crashes, connecting cities and towns.

From the year 1976 the trend changed, and there was a progressive increase in fatalities per vehicles. This period witnessed a lot of road constructions that connected major towns and cities and these roads which also transverse villages where there are prevalent cases of hit and run. The trend peaked 1988 and the reason for this peak is because of the economic situation of the 1980s that resulted in the policy of Structural Adjustment Programme (SAP) of 1986 (Figure 9A). This period witnessed the advent of "Tokunbo" and fairly used spare parts which resulted serious fatal crashes due to tyre bust, steering lock and broken down vehicles. The period also witnessed the collapse of the Nigerian railways, and the influx of Trailers and other heavy-duty vehicles and the attendant damage and pressure on the available road network.

The effect of the establishment of the Federal Road Safety Commission as a lead agency, in traffic management could be the reason for the downward trend witnessed immediately

after 1988. Fatalities per vehicle declined because of the advent of vehicles with safety gadgets, use of seatbelt, and the provision of road side clinics along the major corridors which reduced the rate of road crash fatalities.

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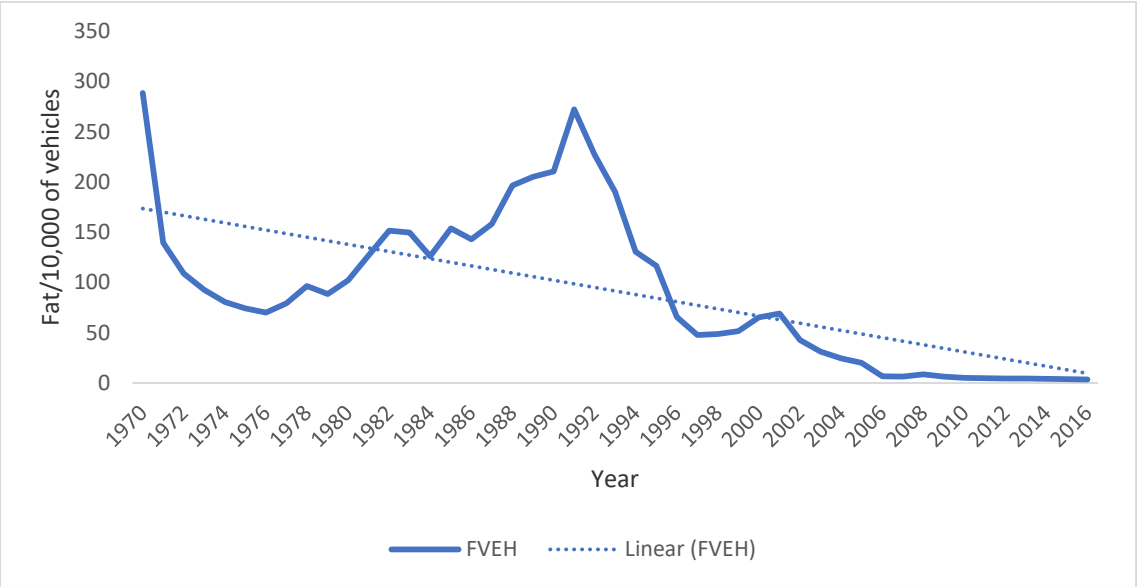

Source: Author, 2019

Figure 9A: Trend of FVEH from 1970-2016

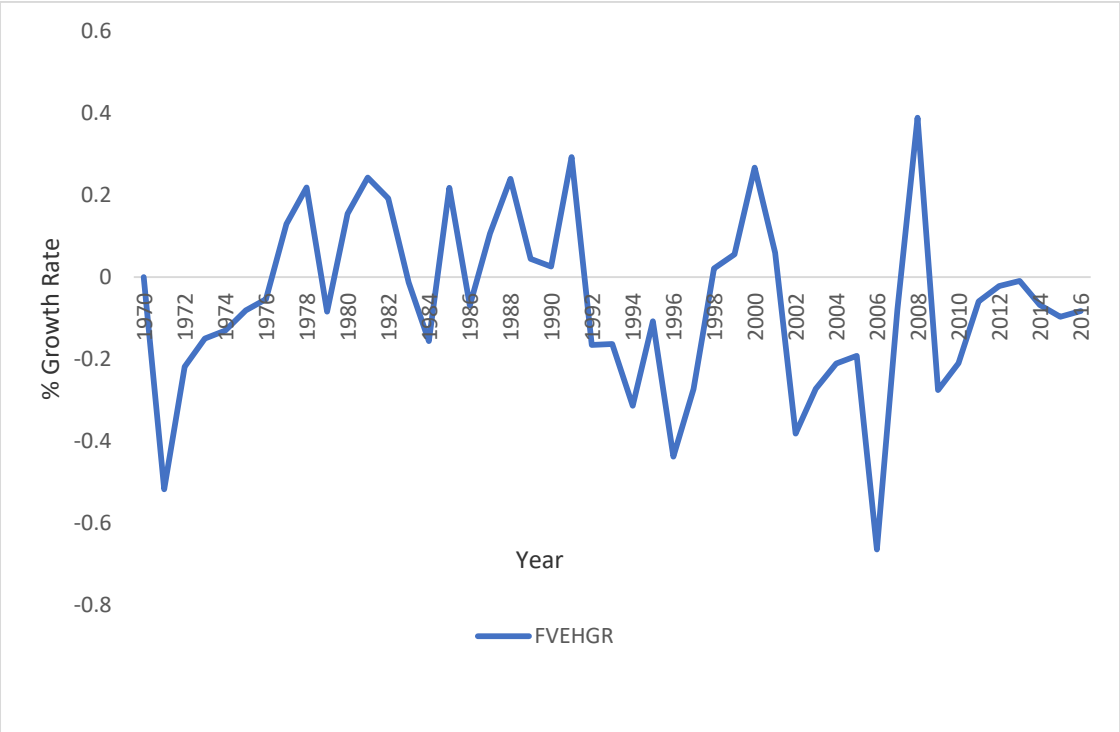

Figure 9B: % Growth Rate of FVEH from 1970-2016

Source: Author, 2019

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4.6 Trends of Real GDP in Nigeria between 1970 and 2016

Real Gross Domestic Products (RGDP) was also used as measure of economic growth in the study. The trend of the variable reflected the prevailing economic situation during the period of study. In the early 1970s, there was a progressive increase in the real gross domestic products due to increase in receipt of government from crude oil exportation (Figure 10A & 4.10B). However, the structural adjustment programmes and the global economic recession reduced the growth rate of the Real Gross Domestic Products between 1980 and 2004 (Figure10B). RGDP witnessed an increasing trend from 2005 to 2014 and declined immediately after 2014 (Figure 10A).

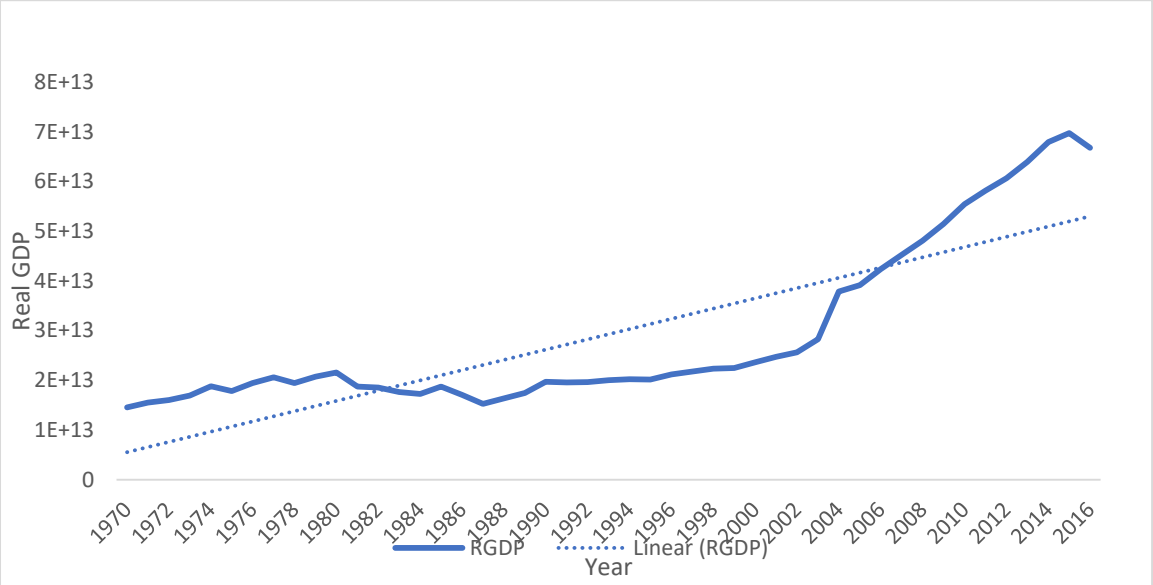

Figure 10A: Trend of RGDP from 1970-2016
Source: Author, 201

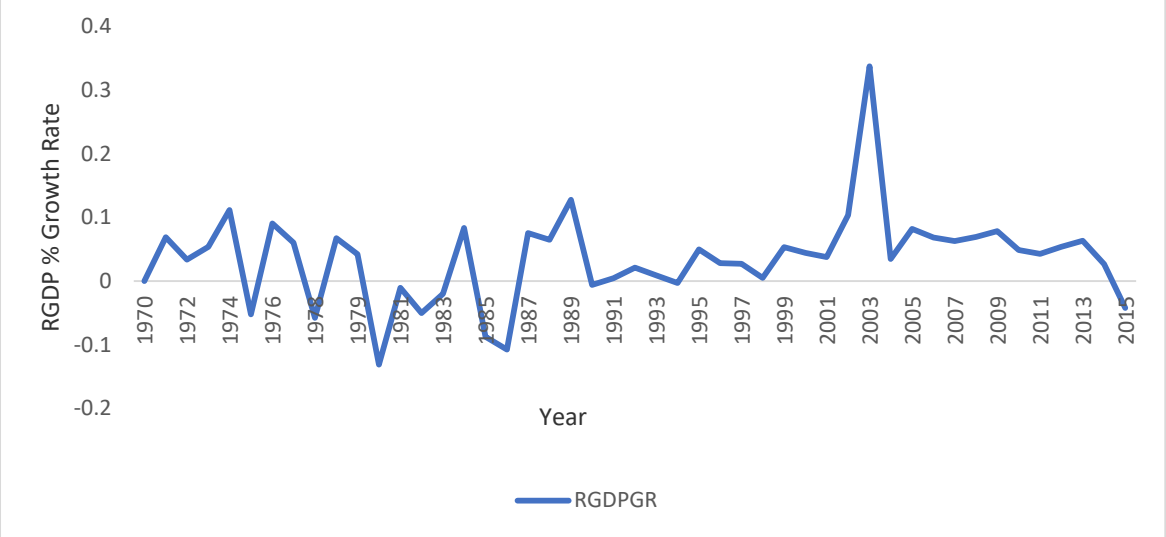

Figure 10B: % Growth Rate of RGDP from 1970-2016
Source: Author, 2019

5. Findings and Discussions

The progressive increase in economic activities immediately after independent due to discovery of oil in commercial quantity put undue pressure on the available road network. There was an increased in the disposable income of economic in Nigeria as a result of oil boom which translated to increase vehicle ownership. Vehicles per 1000 of the population (motorisation) increased without corresponding increase road network, road maintenance, drivers' education and coordinated enforcement of road traffic regulation.

This sudden increase in motorisation resulted in a sustain increase in road crashes between 1970 and 1974 from 16,666 (1.6%) to 28,893 (2.1%) as shown in figure 1 A& B. The abasement of crashes in 1975 was attributable to the unsustainable effect the establishment of National Road Safety Commission in 1974. The road carnage increased sporadically to 40,881 (2.8%) in 1976 and this was brought down not as a result of safety interventions but for the economic downturn of the early 80s that reduced the rate of motorisation (Anyanwu, 1997). The economic downturn which culminated in the Structural Adjustment Policy (SAP) worsened road traffic safety in Nigeria as there was little or no fund left for road maintenance let alone builds new ones. Also due to devaluation of Nigerian currency, automobiles and their components were so expensive leading to decrease in vehicle ownership but high road traffic safety problems. The used of Tokunbo cars and spare parts resulted many fatal crashes due to tyre burst and steering lock. The road traffic crashes rose to 37,094 (2.58) in 1982 and crash fatalities rose steadily between 1970 and 1982 from 2,893 to 11,383 representing an increase of 293% (figure 3A & 3B).

The establishment of the Federal Road Safety Commission (FRSC) through Decree No. 45 of 1988 as amended by Decree 35 of 1992 could been seen as a child of necessity as its impact could be noticed in the reduction in traffic crashes, injuries and fatalities in figures 1, 2 and 3.

6. Conclusion

The road traffic safety parameters behave cyclically with the growth in the economy. The increase in gross domestic product that culminated in the increase in personal disposable income vis-a- vis increase in vehicle ownership and the attendant increase in the pressure on the available road network. There is therefore the need for periodic evaluation of road traffic safety in the face of economic behaviour, road infrastructural development, road traffic regulations and drivers' education in Nigeria.

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APPENDIX 1

YEAR	CASUALTY	CRASHES	FAT	FAT_VEH	FAT_POP	MOT	INJ	PGDP	REG__VEH
1970	16047	16666	2893	288.53	5.17	1.79	13154	224	100268
1971	17798	17745	3206	139.27	5.6	4.12	14592	160	230200
1972	20082	23187	3921	108.92	6.68	6.14	16161	209	360000
1973	22691	24844	4537	92.59	7.55	8.15	18154	252	490000
1974	23652	28893	4992	80.52	8.09	10.05	18660	402	620000
1975	25684	23651	5552	74.04	8.76	11.83	20132	437	749900
1976	34916	40881	6761	70.1	10.37	13.49	28155	555	879800
1977	38023	35351	8000	79.22	11.9	15.02	30023	534	1009797
1978	38106	36111	9252	96.57	13.35	13.83	28854	525	958100
1979	29225	29271	8022	88.49	11.23	12.7	21203	660	906500
1980	34220	32138	8736	102.19	11.89	11.64	25484	871	854900
1981	36539	33777	10202	127	13.51	10.64	26337	807	803300

1982	39921	37094	11382	151.44	14.69	9.7	28539	661	751600
1983	37328	32109	10462	149.46	13.17	8.81	26866	445	700000
1984	32691	28892	8830	126.14	10.83	8.59	23861	349	700000
1985	33074	29978	9221	153.68	11.02	7.18	23853	344	600000
1986	30330	25188	8154	143.05	9.5	6.64	22176	241	570000
1987	30659	28215	7912	158.24	8.98	5.68	22747	273	500000
1988	33490	25792	9077	196.26	10.04	5.11	24413	256	462500
1989	32401	23987	8714	205.04	9.39	4.58	23687	260	425000
1990	30940	21934	8154	210.42	8.56	4.07	22786	322	387500
1991	34033	22546	9525	272.14	9.75	3.58	24508	279	350000
1992	35379	22864	9620	227.1	9.6	4.23	25759	291	423600
1993	33600	21459	9454	190.14	9.2	4.84	24146	153	497200
1994	25378	18204	7440	130.5	7.06	5.41	17938	171	570100
1995	21208	17030	6647	116.53	6.15	5.28	14561	263	570400

1996	21654	16442	6364	65.58	5.75	8.76	15290	315	970400
1997	17286	17488	6500	47.71	5.73	12	10786	314	1362300
1998	23879	16138	6538	48.74	5.62	11.53	17341	274	1341500
1999	24523	15865	6795	51.45	5.69	11.07	17728	299	1320800
2000	29150	16606	8473	65.18	6.93	10.63	20677	378	1300000
2001	33195	20530	9946	69.07	7.93	11.48	23249	350	1440000
2002	29519	14544	7407	42.72	5.76	13.48	22112	457	1734000
2003	24568	14364	6452	31.11	4.89	15.72	18116	510	2074000
2004	22248	14274	5351	24.57	3.95	16.09	16897	646	2178000
2005	20298	9062	4519	19.86	3.25	16.38	15779	804	2276000
2006	22334	9114	4944	6.68	3.47	51.89	17390	1015	7400000
2007	22467	8477	4673	6.15	3.19	51.91	17794	1131	7600000
2008	34641	11341	6661	8.54	4.43	51.88	27980	1377	7800000
2009	32963	10854	5693	6.19	3.49	59.58	27270	1092	9200000

2010	41743	11385	6052	4.89	3.89	79.49	35691	2315	12366366
2011	47219	13196	6054	4.6	3.72	80.72	41165	2514	13147865
2012	45440	13262	6092	4.5	3.64	80.93	39348	2740	13539090
2013	46601	13583	6544	4.46	3.81	85.38	40057	2980	14670000
2014	38059	10380	5996	4.16	3.39	81.6	32063	3203	14400000
2015	35918	9734	5440	3.76	3	79.81	30478	2640	14460000
2016	35158	9694	5058	3.45	2.68	77.55	30105	2457	14650000