Firm Size and Growth: Testing Gibrat’s Law in the Nigerian Life Insurance Industry

Nelson Nwani Nkwor* and Isaac Monday Ikpor

Department of Accountancy/Business Administration/Banking & Finance, Alex Ekwueme Federal University, Ndufu-Alike, 482131, Nigeria

ABSTRACT
The Gibrat’s Law of Proportionate Effects (LPE) of 1931 states that a firm’s size is irrelevant to its organic growth. This study tests this law in the Nigerian life insurance industry for the period of 2007-2014, sub-divided into 2007-2010 and 2011-2014; and on composite and life specialist insurers to account for both the time-varying and structural effects for the testing period. Additionally, it examines other determinants of firm growth in the industry. Using panel unit root test and generalized methods of moment (GMM) regression techniques, the study found that Gibrat’s law does not hold in the entire industry and sub-samples over the entire period and the sub-periods. The results further indicate that smaller life insurers grow faster than bigger ones. In addition, while a firm’s profitability has a positive association with its growth, age and reinsurance do not determine life insurers’ growth in Nigeria. These findings provide further valuable insight on the determinants of life insurers’ organic growth and the applicability of LPE in the financial service sector of developing economies. A paradigm shift from ‘one-cap-fits-all’ regulatory approach to more proactive policy measures aimed at spurring older firms’ growth is recommended for accelerated growth and deeper penetration of the life insurance industry in Nigeria.

Keywords: Firm size, firm growth, Gibrat's law, life insurers, Nigeria
INTRODUCTION
There have been growing concern among scholars to establish relationship between the firm size and firm growth after the emergency of the Gibrat’s LPE of 1931 (Gibrat, 1931). This law states that firm’s organic growth rate is independent of its size, which suggests a random walk. Practitioners and academia in different industries have made attempts toward establishing link between firms’ internal growth rate and size. Those studies covered manufacturing and service sectors as well as developed and developing economies.

Insurance industry is not left out in the search but with a smaller number of studies compared to manufacturing and other financial service sectors. Studies on insurance industry include Adams et al. (2014), Choi (2006, 2010), Hardwick and Adams (2002), Javaheri (2013), Pan et al. (2012), and Tien and Yang (2014). But the ones that focused only on life insurance are: Hardwick and Adams (2002) on UK life insurers, Adams et al. (2014) on Swedish life sector, and Tien and Yang (2014) on Taiwanese life industry. The findings of these scholars differ considerably as some provide supportive evidence for presence of Gibrat’s law, others, do not. To date, there is no consensus on the debate based on the available empirical evidence on insurance industry.

So, this study adds to literature by testing the Gibrat’s LPE on both composite and life specialist insurance firms in Nigeria for the period 2007 to 2014, sub-divided into 2007 to 2010 and 2011 to 2014 periods, to check the time-varying effects within the period of testing, that is, the incubation period after the recapitalization (2007-2010), and on the long-run (2011-2014). Both Goddard et al. (2002) and Oliveira and Fortunato (2008) argued that growth persistence in larger firms might be for a short period rather than long-run.

This study is unique in two ways. To the best knowledge of the author, there is no evidence of prior attempt to test the Gibrat’s law in Nigerian insurance markets. Again, this study is the first to consider the structural effect of life insurance industry in the test of the LPE. An analysis of life insurers based on composite and life specialists is important due to the inherent cross-selling advantage in the composite life insurers.

The present study is imperative because the existence of LPE is contextual (Daunfeldt & Elert, 2011), hence, generalization of findings from other countries may not suffice for a valid forecast in another. In view of this, Tien and Yang (2014) advocated for more studies in developing countries for further insight into the dynamics of the Gibrat’s Law in the insurance industry and expansion of the extant literature on asset-growth nexus among insurers in different countries.
Evidently, there has been a consistent increase in assets (size) of life insurers in Nigeria in more recent years, unlike the non-life industry. The sector has a ten-year (2005-2014) average growth rate of 22.62% while non-life recorded 14.69% (Nigeria Insurers Association [NIA], 2014). The rapid growth in asset within the sector necessitates the investigation whether it connects internal growth of the industry. The focus on life sector is justified on its strategic significance in economic growth and human development via the provision of risk management, financial intermediation and security, job creation and poverty alleviation, as well as, long-term investment funds for government and manufacturers in Nigeria. The sector held investment assets of ₦168.7 billion as at 2012 (Nkwor, 2017) and contributed 0.5% to the GDP as at 2013 (Swiss Re, 2014).

The study investigates the relationship between the life insurance firm size and growth by testing the Gibrat’s Law as well as other firm-specific determinants. It further investigates if growth behaviour differs between the composite and life specialist insurers in Nigeria.

The remainder of the paper is structured as follows. Section two presents an overview of the Nigerian life insurance market while section three discusses the Gibrat’s Law and other determinants of growth. Section four presents the data and method of analysis while the penultimate section discusses the results and the last section concludes the study highlighting the policy implication of the findings of the study.

NIGERIAN LIFE INSURANCE INDUSTRY

The concept of modern (life)insurance in Nigeria dates back to 1900, though, before the advent of modern insurance in Nigeria there existed primitive forms of insurance (Irukwu, 1971). The industry evolved over time from informal to formal and the first insurance law in Nigeria was the Insurance Act 1961, which was a fall out of J.C. Obande Commission. Akintola-Bello (1986) noted that the historical development of the insurance industry witnessed a positive dramatic turn following the enactment of the Insurance Act 1976, which provided for insurance licensing, operation, guidelines and penalties for defaulters. At present, two laws regulate the sector in Nigeria, Company and Allied Matters Act [CAMA] (1990) and the Insurance Act No. 37 (2003).

The insurance landscape in Nigeria changed following the 2005 reform. The exercise among other things, consolidated the industry from 104 to 60 (re)insurance as well beefed up the minimum share capital of insurers. Apparently, the (life)insurance industry is made up of 17 life specialists, 31 non-life specialists, 10 composite companies and 2 reinsurers with capitalization requirement of ₦2 billion for life specialists, ₦3 billion for non-life specialists, ₦5 billion for composite companies, and ₦10 billion for reinsurers.
exercise strengthened the industry’s capital base as well engendered higher level of competition and professionalism, which in turn, significantly impacted on the image and reputation of the industry.

As at date, the Nigerian life insurance sector is made up of 17 life specialists, which engage only in life insurance products; and 10 composite insurers, which engage in both life and non-life lines totalling 27 companies licensed by the National Insurance Commission (NAICOM) to transact life insurance business.

The industry has recorded a consistent impressive growth in size in the recent time as shown in Figure 1. As at 2005, the percentage growth rate stood at 6.1% but trough and peak records were in 2006 with 1.5% and in 2008 with 85.8%.

As expected, the astronomical increase in 2008 is as a result of the recapitalization exercise, which started in 2005 and was concluded in 2007. The exercise injected more capital into the sector which, as expected, induced the assests and the premium income in the preceeding year. The peak could be a fallout of mergers and acquisitions in the industry as well as ‘switchings’ from composite or non-life to life (which requires lower capital) following the recapitalization exercise.

It is disturbing to note that the insurance development indicators in Nigeria are abysimally low as indicated in Swiss Re (2015), notwithstanding, the available opportunities for business growth. The debate has been that these indices could be improved if the operators catch into improved disposable income among Nigerians due to natural resource endowment and demographic advantag.

The implication of the recent reform and subsequent increase in the assets of life insurers is an expected growth in the

\[ \text{Source: Insurance Digest, NIA (2014)} \]

\[ \text{Figure 1. Percentage growth rate in premium income of Nigerian life insurers, 2005-2014} \]
industry, if that is dependent on size of firms as found in Swedish life insurance sector (Adams et al., 2014).

GIBRAT’S LAW AND DETERMINANTS OF INSURERS GROWTH

The Gibrat’s Law

The framework of Gibrat’s LPE stems from corporate growth assumption in industrial economics, which could be applied in any sector with concentrated firm size distribution. This law holds that irrespective of size, firms have equal chance for proportionate growth rate. It postulates that the organic growth rate of a firm is autonomous of its size. This is to say that “the rate of firm growth is independent of its past size and growth trajectory” (Carrizosa, 2007). The law suggests that the link between the firm growth and its size is a stochastic process that can be expressed in a model as shown in Eq. (1).

\[ \frac{(SIZE)_{i,t}}{(SIZE)_{i,t-1}} = \alpha \cdot (SIZE)_{i,t-1}^{\beta-1} \cdot e_{i,t} \]  

[1]

Where, \( (SIZE)_{i,t} \) is the size of the insurer \( i \) at time \( t \), while \( (SIZE)_{i,t-1} \) stands for the size of the insurer in the previous year, which determines the firm growth rate between periods, \( t-1 \) and \( t \). \( \alpha \) is common to all insurers in the market, while the term \( \beta \) represents insurer-specific growth rate.

Following the tradition of the previous studies, for example, Hardwick and Adams (2002), Choi (2006), Tien and Yang (2014), and Adams et al. (2014), firm size is assumed to generate lognormal distribution, therefore, Eq. (1) is re-written to take natural logarithm in Eq. (2).

\[ \ln SIZE_{i,t} = \alpha + \beta \ln SIZE_{i,t-1} + \varepsilon_{i,t} \]  

[2]

Where, \( (SIZE)_{i,t} \) Most of the earlier studies (e.g. Choi, 2010; Hardwick & Adams, 2002; Tien & Yang, 2014) employed Heckman two-stage regressions technique in testing for the LPE. Heckman’s (1979) technique overrides the econometric shortcomings of ordinary least square (OLS) method. However, some studies applied panel unit root tests in investigating the Gibrat’s law in different sectors (e.g; Aslan, 2008; Goddard et al., 2002; Oliveira & Fortunato, 2006) and only insurance sector (e.g., Adams et al., 2014; Pan et al., 2012). Following the objective of the study wherein firm size was hypothesized to have relationship with the firm growth, that is, firm growth is taken to be a function of firm size in Nigerian life insurance sector. To test this assumption, a modified Gibrat’s function of Eq. (2) is adopted using panel data model as captured in Eq. (3).

\[ \ln SIZE_{i,t} - \ln SIZE_{i,t-1} = \alpha_{i} + \sigma_{i} + (\beta_{i} - 1) \ln SIZE_{i,t-1} + \sum_{j=1}^{J} \mu_{ij} (\ln SIZE_{i,t-1} - \ln SIZE_{i,t-2}) + \varepsilon_{i,t} \]  

[3]

Where, \( \alpha_{i} \) and \( \sigma_{i} \) stand for individuality and time effects, \( \mu_{ij} \) stands for coefficients on lagged growth terms while \( \beta_{i} \) represents the size coefficient for firm \( i \). \( \beta \) indicates the effect of firm size on firm growth. The condition for Gibrat’s Law is: if \( \beta = 1 \), it means firm’s growth rate is independent of the initial size; if \( \beta > 1 \), bigger firms grow faster than the smaller ones; and if \( \beta < 1 \), smaller firms grow faster than the bigger ones. It means that where \( \beta \) significantly deviates from 1, Gibrat’s Law does not
hold, but otherwise, it does. Where it holds, it means that growth rate and initial size of the life insurer are independently distributed, and as such, follow a random walk stochastic process.

Because Eq. (3) lacks “economics” (Oliveira & Fortunato, 2008), it is expanded to incorporate other variables (firm-specific and control) that could influence firm growth dynamics as shown in Eq. (4). Therefore, a multivariate panel data empirical growth model (Eq. 4) was adopted to test the relationship between firm-specific factors such as firm size, firm age, profitability, reinsurance utilization and the control variables for changes in interest rate and capital market development, and life insurers’ growth in Nigeria. Life insurers’ growth \([\ln(\text{SIZE})_{i,t}]\) is the changes in life insurers’ asset-based growth (dependent variable) while \([\ln(\text{SIZE})_{i,t-1}]\) is the initial size of a life insurers (one of the independent variables). Earlier empirical works such as Adams et al. (2014), Choi (2010), Goddard et al. (2002), Hardwick and Adams (2002), and Tieng and Yang (2014) used firm-level factors in testing firm growth.

Firm Size: Yang (2015b) asserted that firm size influenced consumers’ choice of insurer in the first instance, possibly, due to ‘too big to fail’ philosophy. Hoyt and Trieschmann (1991) documented performance and insurer’s size to be independent while Gorter and Bikker (2011) argued that larger insurers had both scale of economies and diversification benefits advantages, unlike their smaller counterparts, it is therefore expected to have positive impact on the firm’s performance and growth.

This study adopts natural logarithm of annual total assets as measure for firm size. The essence of taking the log of the asset is to remove possible problems of extreme values in the dataset which could negatively affect the empirical results while total rather than net assets is considered because big firms with large liabilities in their financial structure may produce a negative net asset, therefore, misrepresenting the firm’s size. Earlier authors that used the same measure in similar studies include: Adams et al. (2014), Andersson, et al. (2013),

**Company Age:** The age of an insurer shows how old or young the firm is. It is of essence to insurers’ performance and could be an important determinant of growth due to scale of economies in diversification and costs saved over the years as the firm advances in age. More specific, firm’s age suggests its ability to weather tough prior conditions in the market (Hong & Bao, 2015) and have better knowledge of the local markets (Olaosebikan, 2013), which is expected to build capacity over the years. When this is achieved, survival reputation builds over the years of business distresses and industry reforms. Yet, the survived younger insurers have the tendency of growing faster than the more established ones (Adams et al., 2014). This suggests an inverse association between firm age and firm growth.

Focusing only on insurance industry, Hardwick and Adams (2002) and Pottier and Sommer (1997) documented positive relationship between age and insurers’ performance, because age of insurers had positive influence on their investment behaviour (Nkwor, 2017). But in the light of Gibrat’s process, Adams et al. (2014), Choi (2006), and Tien and Yang (2014) found negative relationship between age and growth rate in the USA, Taiwan and Sweden respectively, which supported that younger firms (insurers) tended to grow faster than the older ones. So, the a priori expectation is a negative link between insurers’ age and growth.

The age of an insurance firm is measured by the number of years the firm has been in operation in a given market and it is being obtained by subtracting the year of incorporation from the base year of study. The year of operation could be either year of incorporation, license or commencement of business. Adams et al. (2014) used licensed year while Choi (2010) and Tien and Yang (2014) used year of incorporation. The justification for the use of year of incorporation might be its certainty unlike the year of license or commencement of operations which may stagger. So, the study adopts year of incorporation.

**Profitability:** Profitability is an important factor in firm growth as the profit income is either retained for the purpose of internal financing thereby reducing the cost of external funding or invested for further returns as investment income. Either of these purposes enhances growth and development of firms. Empirically, Tien and Yang (2014) documented positive influence of profitability on the growth of Chinese life insurance industry. Similarly, Adams et al. (2014) found a positive link between Swedish life insurers’ growth and profitability and suggested that profitability could be an important factor that encourages companies from actualizing their investment dreams and catching into investment opportunities.

The usual measure for profitability in insurance literature is the inverse of underwriting loss ratio (e.g., Cummins & Outreville, 1987; Lamm-Tennant & Weiss, 1997; Chen et al., 1999) or an inverse of
economic loss ratio (e.g., Choi, 2010; Ma & Pope, 2003). However, recent studies by Adams et al. (2014) and Tien and Yang (2014) respectively used ratio of total annual net profit to gross premium income and net profit divided by total net written premium, but the study adopted ratio of profit before tax (PBT) to gross premium income.

**Reinsurance:** Reinsurance refers to insurance of insurance risk (Evans, 1999) and is important in insurer’s corporate financing (Yang, 2015a). Because the cost of external financing is usually higher than the internal model, reinsurance contributes in optimizing the value of insurers. It also gauges the level of underwriting risk hedging by an insurer because it aims at reducing volatility and uncertainty of the insurers’ pricing risks (International Association of Insurance Supervisors [IAIS], 2011).

Many studies, for example, Andersson, et al. (2013), Lee and Lee (2012), Liu et al. (2016) showed that reinsurance affected insurers’ performance and liquidity, which in turn, impacted on profitability and growth prospect. However, the empirical investigations of Shiu (2004, 2009) showed negative relationship between growth and reinsurance transactions in the UK insurance markets.

**Interest Rate:** Change in interest rate impacts on life insurers’ pricing, reserves, rate of guaranteed returns and profit sharing (Holsboer, 2000). Basically, change in interest rate affects the assets-liabilities match of insurers’ portfolio performance and management. The negative implications are felt on the life insurers’ stability (Beer & Gnan, 2015), solvency (Berlin & Grundl, 2015; Browne et al., 1999), investment opportunities described as “gambling for redemption” (Antolin et al., 2011) and profitability (Berlin & Grundl, 2015).

Browne et al. (1999) empirically examined the impact of market interest rate on US life insurers’ performance vis-à-vis solvency and found that high-interest rate positively affected the solvency of life insurers. Similarly, Adams et al. (2014) documented a significant positive relation between Swedish life insurers investment earning and real interest rate. On the whole, insurers’ growth is constrained by low interest rate. By this, a positive association is expected between interest rate and life insurers’ growth.

**Capital Markets Development:** Financial market development is important to life insurance industries in both developing nations (Outreville, 1996) as well as developed ones like the OECD countries (Li et al., 2007). Beck and Webb (2003), Li et al. (2007), and Outreville (1996) empirically tested the interactions between life insurance market activities and financial markets development. These studies severally found positive and significant effect of financial markets development on life insurers’ performance and growth. The impact of financial markets development does not vary on level of economic development; therefore, it is expected that capital markets development in Nigeria should have positive effect on growth of the life insurance companies.
METHOD

The study focused on the Nigerian life insurance sector for the period, 2007 to 2014 as data availability could permit. The data for the firm-specific variables were extracted from the Annual Statements and Accounts of Nigerian life insurers. Out of 27 firms transacting life insurance business in the Nigerian market as at 2014, 24 were selected, made up of 9 composite and 15 life specialist companies.

The three selection criteria used were: the firm must have started operations on or before the base year of the study which was 2007; data availability for at least 6 years (not more than two-year missing data); and the firm must have consistently followed approved reporting practice by NAICOM. These criteria were meant to ensure data streaming; data consistency as well reduce the incidence of missing data respectively. The data for country-specific variables were extracted from the Central Bank of Nigeria Statistical Bulletin 2015. The sample period is subdivided into 2007-2010 and 2011-2014. The sub-period tests are to account for time-varying effects within the testing period to check for growth persistence or otherwise. The whole sample is sub-divided into Composite and Life Specialists, to gauge structural effects due to their market characteristics and cross-selling advantage of composite over life specialists. Whether difference in structure affects the growth pattern of the groups.

Previous authors such as Choi (2006, 2010) and Hardwick and Adams (2002) used cross sectional data estimation, but a number of estimation errors had been adduced against the method. The study adopted panel data estimations using panel unit root tests (PURTs) and GMM techniques. The panel GMM mitigates the problem of heteroscedasticity and endogeneity, thus produces consistent and asymptotically efficient estimates. Following the works of Adams et al. (2014) who used PURTs developed by Im et al. (2003) and Levin et al. (2002), the tests shall be referred herein as Levin-Lin-Chu for Levin et al. (2002) and Im-Pesaran-Shin for Im et al. (2003).

The null hypothesis for both Levin-Lin-Chu and Im-Pesaran-Shin is that there is unit root. The assumption in Levin-Lin-Chu is that the coefficient for firm size, $\beta_i$ is a common unit root process while $\beta_i$ is assumed individual unit root process in Im-Pesaran-Shin. This can be written thus: $H_0: \beta = 1$, $H_1: \beta < 1$ (for Levin-Lin-Chu) and $H_0: \beta_i = 1$ for all $i$, $H_1: \beta_i < 1$ for some $i$ (for Im-Pesaran-Shin). PURTs are conducted to confirm if the growth ($\beta$) of Nigerian life insurers “follows a random walk (Gibrat’s process) or converges towards the means” (Aslan, 2008) and not solely to test the stationarity of the variables.

However, Table 1 provides the descriptions of and justifications for the variables used as well as the six hypotheses tested. The dependent variable is the firm size, which is measured as the logarithm of annual total asset while the independent variables are the firm age, profitability, reinsurance usage, and control variables are market interest rate and capital market development indicator. While the
Hypotheses Tested:

\( H_1: \) Ceteris paribus, Gibrat’s law holds in the Nigerian life insurance industry.

Table 1

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Expected sign</th>
<th>Justification for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size ((SIZE))</td>
<td>none</td>
<td>Measure used for firm’s size</td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial size ((SIZE;1))</td>
<td>+</td>
<td>To test the Gibrat’s law of LPE</td>
</tr>
<tr>
<td>Age ((AGE))</td>
<td>-</td>
<td>To test if age affects firm’s growth</td>
</tr>
<tr>
<td>Profitability ((PROF))</td>
<td>+</td>
<td>To test the impact of profitability on firm’s growth</td>
</tr>
<tr>
<td>Reinsurance ((REIN))</td>
<td>-</td>
<td>To test the impact of reinsurance utilization on firm’s growth</td>
</tr>
<tr>
<td>Interest Rate ((INT))</td>
<td>+</td>
<td>To test the impact of interest rate on firm’s growth</td>
</tr>
<tr>
<td>Capital Markets Development ((CMD))</td>
<td>+</td>
<td>To test the effect of capital markets development on growth of life</td>
</tr>
</tbody>
</table>

\( H_2: \) Ceteris paribus, younger life insurers have the tendency of growing faster than the older ones in Nigeria.

\( H_3: \) Ceteris paribus, there is a positive relationship between insurers’ profitability and growth rate in the Nigerian life insurance industry.

\( H_4: \) Ceteris paribus, life insurers that highly reinsure have lower rate of growth in the Nigerian life insurance industry.

\( H_5: \) Ceteris paribus, higher market interest rate induces higher growth rate in the Nigerian life insurance sector.

\( H_6: \) Ceteris paribus, a well-developed capital market leads to higher growth rate among life insurers in Nigeria.

RESULTS AND DISCUSSIONS

This section discusses results of PURTs and panel GMM regression. Tables 2 and 3 present the PURTs results from the analysis of variables included in the study for the eight years period, 2007-2014.

Analysis of PURTs on Gibrat’s Law

From Table 2, the PURTs results for the entire period, 2007-2014 and the sub-period, 2007-2010 on the 24 life insurers do not allow us to accept the null hypothesis. This suggests that Gibrat’s Law does not hold, rather smaller life insurers have the tendency to grow faster than the older ones in Nigeria. From the same table, we cannot reject the null hypothesis for the subperiod, 2011-
2014. However, the evidence is not strong enough to reverse the result for the absence of Gibrat’s Law.

Further tests on the composite and life specialists’ insurers as shown in Table 3 provide similar results that cannot allow us to accept the null hypothesis. The results indicate that class of life insurers in Nigeria does not support Gibrat’s Law neither. These findings are consistent with Adams et al.’s (2014) results, which suggest that LPE does not hold in both developed and developing life insurance markets.

**Panel Analysis of Determinants of Firm Growth**

The summary statistics of the variables used in the study as shown in the first part of Table

Table 2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Levin-Lin-Chu</td>
<td>-17.948 (0.0000)**</td>
<td>-8.664 (0.0000)**</td>
<td>0.404 (0.657)</td>
</tr>
<tr>
<td>Im-Pesaran-Shin</td>
<td>-5.211 (0.0000)**</td>
<td>-3.551 (0.0175)**</td>
<td>0.326 (0.185)</td>
</tr>
</tbody>
</table>

Note:
(i) This table presents PURT results for the period 2007-2014 and sub-periods, 2007-2010 & 2011-2014 for life insurers in Nigeria
(ii) Absolute figures are the statistics of each unit root method
(iii) p-values are in parenthesis
(iv) ** indicates that the null hypothesis cannot be accepted at conventional 5% level of significance (one tailed test).

Table 3

<table>
<thead>
<tr>
<th></th>
<th>Composite Insurers Statistic (Prob.)</th>
<th>Specialists’ Life Insurers Statistic (Prob.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levin-Lin-Chu</td>
<td>-13.065(0.0000)**</td>
<td>-12.317(0.0000)**</td>
</tr>
<tr>
<td>Im-Pesaran-Shin</td>
<td>-3.382(0.0004)**</td>
<td>-3.980(0.0000)**</td>
</tr>
</tbody>
</table>

Note:
(i) This table presents PURT results for composite and specialists’ life insurer in Nigeria for the 2007-2014
(ii) Absolute figures are the statistics of each unit root method
(iii) p-values are in parenthesis
(iv) ** indicates that the null hypothesis cannot be accepted at conventional 5% level of significance (one tailed test).
Table 4
Summary of descriptive statistics and correlation matrix

Part 1: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>All Firms</th>
<th>Composite</th>
<th>Life Specialists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std Dev</td>
<td>Mean</td>
</tr>
<tr>
<td>SIZE(N)</td>
<td>7811007</td>
<td>7570359</td>
<td>6585262</td>
</tr>
<tr>
<td>AGE(yrs)</td>
<td>16.5</td>
<td>15.1</td>
<td>18.7</td>
</tr>
<tr>
<td>PROF</td>
<td>-0.302</td>
<td>1.503</td>
<td>-0.247</td>
</tr>
<tr>
<td>REIN</td>
<td>0.124</td>
<td>0.126</td>
<td>0.117</td>
</tr>
<tr>
<td>CMD</td>
<td>2.730</td>
<td>1.950</td>
<td>3.924</td>
</tr>
</tbody>
</table>

Part 2: Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>SIZE&lt;sub&gt;ci&lt;/sub&gt;</th>
<th>AGE</th>
<th>PROF</th>
<th>REIN</th>
<th>INT</th>
<th>CMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE&lt;sub&gt;ci&lt;/sub&gt;</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>0.379</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROF</td>
<td>-0.021</td>
<td>-0.211</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REIN</td>
<td>-0.240</td>
<td>-0.203</td>
<td>0.145</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INT</td>
<td>0.104</td>
<td>-0.037</td>
<td>-0.015</td>
<td>0.042</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CMD</td>
<td>-0.112</td>
<td>0.069</td>
<td>-0.054</td>
<td>-0.001</td>
<td>-0.393</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: The first part of this Table presents means and the standard deviations of the variables included in the regression estimation for the periods, 2007-2014, 2007-2010 & 2011-2014. The second part of the Table shows a correlation matrix for the independent variables included in the study in the 2007-2014 regression equation (1-tail).
4 for the entire and sub-periods indicate an average assets size of ₦7,811,007.00 for 2007-2014 period and ₦6,585,262.00 for 2007-2010 and ₦9,033,103.00 for 2011-2014 respectively. The table also indicated an average assets size of ₦10,648,957.00 for composite insurers and ₦6,056,639.00 for life specialists. On the whole, life insurers operate with large assets size in the later years (2011-2014) while composite insurers have largest assets size. Another important observation is the negative profitability ratio at all the period and each class of insurers. This suggests that life insurance operators in Nigeria operate at loss. The level of dispersions of each of the variables is relative by within the range except the ratio of net profit to gross premium.

The second part of Table 4 shows the correlation matrix of the independent variables included in the regression equation for the entire period. The highest correlation found was below 40%. Only initial assets and age had a correlation of 0.379 (37.9%), which was the highest. This suggests no problem of multicollinearity as confirmed with a further check with the variance inflation factors (VIFs) calculated for each variable. The VIF results indicate the highest as 3.3, which is quite below the benchmark of 10. Therefore, none of the variables is expected to pose any problem of multicollinearity in the estimation model.

Tables 5 and 6 present the results of the multivariate regression analyses applying GMM dynamic technique on Equation (4). GMM technique is suitable for panel data analysis (Adams et al., 2014). The results of the analyses are meant to test the hypotheses stated earlier. Interestingly, the adjusted R-square results for all the regressions are above 50%, indicating a good fit in all periods and classes except for composite life insurers where the R² is 0.17. By rule of thumb, autocorrelations suspicion is erased as the Durbin-Watson statistics are within the acceptable bounds of between 1.2 and 2.5.

With reference to the estimates of coefficients and p-values of the regression results shown on Tables 5 and 6, each of the six listed hypotheses is tested on the Nigerian life insurance data for the periods of 2007-2014, 2007-2010 and 2011-2014, and classes of composite and life specialist insurers.

$H_1$ - (Growth and firm size): For the entire sample period of 2007-2014, the estimate of $\beta_1$ is 0.081, which is significantly less than one at 0.05 level of significance. Similarly, the estimates for the subperiods (2007-2010 and 2011-2014) are 0.072 and 0.085 respectively, which is less than one each. While the estimate for 2007-2010 is significantly less than one at 0.1 level of significance, the estimate for 2011-2014 period is also significantly less than one but not statistically significant at any level. Turning to composite and life specialists’ classes, their estimates of $\beta_1$ coefficients are 0.047 and 0.096 which are significantly less than one, though, not statistically significant for composite but statistically significant at 0.05 level for life specialists’ insurers.

Taking the PURTs results together with these findings, we reject the hypothesis that size is irrelevant to organic growth in the Nigerian life insurance industry for the period 2007-2014 and for the classes tested.
Rather younger firms tend to grow faster than the older ones in the industry. Reason could be traced to excessive risk aversion by larger life insurers in Nigeria together with managerial inertia inherent with large insurers. Nkwor (2017) documented that younger life insurers in Nigeria had higher investment risk taking appetite aimed at higher investment returns, which aided growth and fostered competitive relevance in the market. These findings are consistent with previous studies of Javaheri (2013) and Tien and Yang (2014) on developing insurance markets of Iran and Taiwan respectively, as well, on developed market of Sweden using PURTs and panel GMM estimation techniques by Adams et al. (2014). Our results reject H1.

Fixed effect (FE) and random effect (RE) panel model estimations were conducted as a robust check on the GMM results. The results for the estimation ($\beta_1$ coefficients) on the overall sample for the testing period of 2007-2014 at 5% level of significance were: FE 0.080(0.038) and RE 0.083(0.401), which were not significantly different from that of GMM. Thus, absence of Gibrat’s law in the Nigerian life insurance industry was upheld.

$H_2$ - (Growth and firm age): The estimates of $\beta_2$ coefficients are significantly less than one at both overall and sub-sample periods and in both classes. The coefficients are negative and statistically insignificant in all the tests conducted except for the second sub-period (2007-2010) which coincides with the period immediately after the reform exercise of 2005. This agrees with the earlier conclusion that younger life insurers have the tendency to grow faster than the older ones. In view of these results, $H_2$ is accepted.

$H_3$ - (Growth and Profitability): The estimates of $\beta_3$ are positive and statistically significant at all the periods and classes tested. For the entire period (2007-2014), composite and life specialists the coefficients are significant at 0.05 level. The level of significance varies between the earlier periods, 2007-2010 and later time, 2011-2014. By and large, these results present evidence that current profit of life insurers is a strong determinant of asset growth rate in Nigeria. However, strengthened and enforcement of regulatory restrictions on “no premium no cover” policy of NAICOM may have significantly contributed to the improved result from earlier work of Olaosebikan (2013), who document a negative relationship. Our results support $H_3$.

$H_4$ - (Growth and Reinsurance utilization): As expected, all the estimates of $\beta_4$ are negative and statistically significant at 0.05 level for all periods and all classes. This means that the effect of reinsurance on life insurers’ organic growth rate does not vary over time and structure for the period, 2007-2014 in Nigeria. Our results concur with the Olaosebikan’s finding and note that reinsurance cost (reinsurance price) has negative and discouraging impact on the profitability vis-à-vis growth of micro insurers in Nigeria. The high price could be associated with the high-risk nature of the dominant consumers in this sector, with the
Testing Gibrat’s Law in the Nigerian Life Insurance Industry

general low life expectancy which affects the price of life products at both primary and reinsurance markets. This finding upheld hypothesis H.4.

**H5 - (Growth and Market interest rate):** The coefficient estimates of B for the entire period (2007-2014) and the first subperiod (2007-2010) were positive but not significant, while the latter period of 2011-2014 has insignificant negative coefficient estimate. A mix result is also observed in the structural analysis. As negative estimate was observed in composite class, a positive coefficient was observed in life specialists, but none was significant. So, interest rate has positive influence on the life insurers growth in Nigeria for the period of investigation.

**H6 - (Growth and capital markets development):** The estimates of capital markets development coefficients are positive for the period investigated and the classes analysed. The estimates were significant at 0.05 level for the entire period (2007-2014) but are not in the subsequent sub-periods (2007-2010 and 2011-2014). Similarly, the estimate for capital markets development is significant for life specialists’ insurers at 0.05 level but is not for composite insurers.

Table 5


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>β₀</td>
<td>Intercept</td>
<td>1.276 (0.771)</td>
<td>1.911 (1.770)</td>
<td>8.236 (7.167)</td>
</tr>
<tr>
<td>β₁</td>
<td>ln(SIZE)</td>
<td>0.081 (0.039)**</td>
<td>0.072 (0.042)*</td>
<td>0.085 (0.102)</td>
</tr>
<tr>
<td>β₂</td>
<td>ln(AGE)</td>
<td>-0.028 (0.113)</td>
<td>0.135 (0.085)</td>
<td>-0.295 (0.270)</td>
</tr>
<tr>
<td>β₃</td>
<td>PROF</td>
<td>4.183 (0.787)**</td>
<td>3.517 (1.845)*</td>
<td>4.026 (1.412)**</td>
</tr>
<tr>
<td>β₄</td>
<td>REIN</td>
<td>-0.605 (0.228)**</td>
<td>-0.536 (0.265)**</td>
<td>-0.820 (0.395)**</td>
</tr>
<tr>
<td>β₅</td>
<td>INT</td>
<td>0.075 (1.820)</td>
<td>0.015 (0.017)</td>
<td>-0.467 (0.442)</td>
</tr>
<tr>
<td>β₆</td>
<td>CMD</td>
<td>6.741 (3.382)**</td>
<td>0.031 (0.036)</td>
<td>0.513 (0.614)</td>
</tr>
</tbody>
</table>

Notes: (i) This table presents panel regression for life insurers in Nigeria for the 2007-2014
(ii) Absolute figures are the coefficient estimates while standard errors are in parenthesis
(iii) ***, ** and * indicates statistically significant at 1%, 5% and 10% level (two tailed test) respectively.
CONCLUSIONS AND POLICY IMPLICATIONS
The study used data from 24 life insurers to empirically investigate the existence of the Gibrat’s Law or otherwise in the Nigerian life insurance market grouped into Composite and Life specialist insurers for the period of 2007-2014, subdivided into 2007-2010 and 2011-2014. Additionally, the study investigated other firm-specific factors as well as control variables that influenced Nigerian life insurers’ growth. Some interesting revelations were made.

Table 6
GMM results on the determinant of firm growth for composite and life specialist insurers.

<table>
<thead>
<tr>
<th>Dependent Variable is ln(SIZE)</th>
<th>Coefficients</th>
<th>Variable</th>
<th>Composite</th>
<th>Life Specialists</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$</td>
<td>Intercept</td>
<td>4.137 (1.663)**</td>
<td>0.503 (0.434)</td>
<td></td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>ln(SIZE)$_{t-1}$</td>
<td>0.047 (0.084)</td>
<td>0.096 (0.047)**</td>
<td></td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>ln(AGE)</td>
<td>-0.806 (1.052)</td>
<td>-0.023 (0.103)</td>
<td></td>
</tr>
<tr>
<td>$\beta_3$</td>
<td>PROF</td>
<td>2.787 (0.854)**</td>
<td>4.667 (0.317)**</td>
<td></td>
</tr>
<tr>
<td>$\beta_4$</td>
<td>REIN</td>
<td>-0.640 (0.292)**</td>
<td>-0.636 (0.116)**</td>
<td></td>
</tr>
<tr>
<td>$\beta_5$</td>
<td>INT</td>
<td>-2.704 (4.837)</td>
<td>1.436 (1.872)</td>
<td></td>
</tr>
<tr>
<td>$\beta_6$</td>
<td>CMD</td>
<td>7.350 (9.692)</td>
<td>6.955 (3.425)**</td>
<td></td>
</tr>
</tbody>
</table>

Notes: (i) This table presents panel regression for composite and specialists’ life insurers in Nigeria for the 2007-2014
(ii) Absolute figures are the coefficient estimates while standard errors are in parenthesis
(iii) ***, ** and * indicates statistically significant at 1%, 5% and 10 percent level (two tailed test) respectively.

One, Gibrat’s law does not generally hold in the Nigerian life insurance industry for the periods investigated: 2007-2014, 2007-2010 and 2011-2014, as well, for Composite and Life specialist insurers. The results indicate growth persistence both on the long- and short-run, which is also consistent in both classes of life insurers investigated. This suggests that both time-varying and structural effects do not make any difference in size-growth relationship of the Nigerian life insurers. Two, younger insurers (both composite and life specialists)
tend to grow faster than the older ones in Nigeria over the tested period.

For other life insurers’ growth determinants in Nigeria, within the firm factors that enhances the life insurers’ growth rate is profitability, while age and reinsurance usage discourage firm growth. The macroeconomic control variables (interest rate and level of capital markets development) influence life insurers’ growth in Nigeria.

These findings contribute to new knowledge and deeper understanding of firm growth in financial service industry. The findings of this paper are strategic to regulators and policymakers because of the contributions and the feedback effects of insurance industry on the entire economy. Again, knowledge of the link between size and growth in the Nigerian life insurance markets has significant contribution to the extant literature on LPE and the determinants of corporate growth in the financial service industry.

Given that firm size influences corporate life insurers’ growth in Nigeria irrespective of time (the period of investigation) and type of life insurer, the implication is that firm size is an important consideration in short- and long-run growth strategy. Therefore, ‘one-size-fits-all’ regulatory approach should be changed in favour of differential licensing policy anchored on firm age to enable life insurers in Nigeria exploit the improved personal income among Nigerians and demographic advantage for accelerated growth and deeper penetration of the industry. The main policy implication of the findings is that policymakers should adopt a regulatory framework that fosters growth of big insurers in the industry such as innovative products and use of technology such as FinTech (InsurTech) services to accelerated industry growth. Again, the recent campaign by NAICOM for microinsurance and Takaful insurance models in Nigeria should be sustained because of their high growth potentials to small sized firms.

For further studies, the present work can be extended to non-life sector for a holistic assessment of Nigerian insurance industry. It can also be done as a comparative investigation of life and non-life sectors for more in-depth and insightful understanding of the dynamics of Gibrat’s Law in the Nigerian insurance industry.

ACKNOWLEDGEMENTS
The earlier draft of this paper was presented at the 6th Accounting and Finance Research Association (AFRA) conference held at Bayero University Kano on November 8-11, 2016. The authors wish to appreciate the valuable comments made by the participants of the conference. Any other error is ours.

REFERENCES


### APPENDIX

Table A.1

**Summary of previous empirical studies on Gibrat’s law in insurance industry**

<table>
<thead>
<tr>
<th>Authors/Year</th>
<th>Country/Period</th>
<th>Data/Method Used</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan et al. (2012)</td>
<td>Chinese insurers 2005(12)-2011(05)</td>
<td>Time-series/Sequential panel selection method</td>
<td>Gibrat’s Law holds for only one firm against the total sample size of 35 insurers investigated.</td>
</tr>
<tr>
<td>Javaheri (2013)</td>
<td>Iranian insurers 2003-2009</td>
<td>Panel Regression/Chi-Square</td>
<td>Smaller firms grow faster than the big firms, which refutes the Gibrat’s Law of proportionate effects in Iran</td>
</tr>
<tr>
<td>Tien and Yang (2014)</td>
<td>Taiwan’s Life insurance 1996-2007</td>
<td>Cross-sectional/Heckman 2-Stage Regressions</td>
<td>Both for the entire sample period and sub-periods (1996-2001 &amp; 2002-2007) as well as subsamples (foreign &amp; domestic insurers), there was no supportive evidence for Gibrat’s Law in Taiwan</td>
</tr>
<tr>
<td>Adams et al. (2014)</td>
<td>Swedish Life insurance sector 1855-1947</td>
<td>PURTs/GMM</td>
<td>Gibrat’s law does not hold for the overall sample period and the second sample period (1903-1947), but it held in the period (1855-1902). The overall finding is that smaller firms grow faster than the larger ones in Swedish life insurance industry.</td>
</tr>
</tbody>
</table>

Source: Literature reviewed by the Authors
<table>
<thead>
<tr>
<th>Author/Date</th>
<th>Country Studied</th>
<th>Firm-Level/Control Variables Investigated</th>
<th>Results/Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwick and Adams (2002)</td>
<td>U.K Life industry</td>
<td>Input Cost, profitability, Output mix, Company type, Organizational form and Location</td>
<td>Only the cost-efficiency and diversification were found as a significant determinant while the other variables—profitability, type of company and organizational form do not have significant influence on the firm growth.</td>
</tr>
<tr>
<td>Choi (2006)</td>
<td>U.S P-L insurers</td>
<td>Input Cost, Profitability, and Output mix, Agency, Organizational form and Group affiliate</td>
<td>All the variables have significant influence on insurers’ growth while output mix has mixed result.</td>
</tr>
<tr>
<td>Choi (2010)</td>
<td>U.S P-L insurers</td>
<td>Input Cost, Profitability, Reinsurance and Output mix, Agency, Organizational form and Group Affiliate</td>
<td>Results indicate that input cost and diversification as a measure of output mix influence firm growth while the rest of the variables do not.</td>
</tr>
<tr>
<td>Tien and Yang (2014)</td>
<td>Taiwan’s Life insurance firms</td>
<td>Company age, profitability, Expense ratio, Product diversification and Cross-marketing.</td>
<td>All firm-specific variables tested: firm age, profitability (current), lagged expense ratio, diversification and cross-marketing influence insurers’ growth prospect in Taiwan.</td>
</tr>
<tr>
<td>Adams et al. (2014)</td>
<td>Swedish Life insurance sector</td>
<td>Input cost, Profitability, Company age, Organizational form, Reinsurance, Real rate of interest, Real GDP and Financial regulation</td>
<td>Profitability, organizational form, reinsurance utilization, real interest rate and the regulation affect the growth potential of life insurers Sweden while reinsurance and real GDP do not.</td>
</tr>
</tbody>
</table>

Source: Literature reviewed by the Authors