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Research paper

Usage of time series models in assessing the value of demand in the insurance market

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Abstract

Insurance can affect savings and investment as insurance and reinsurance companies are among the most important financial institutions in the country's economy. The researcher will analyze, based on the partial auto correlation function and experimenting with several models of auto regression and moving averages, and testing the most appropriate model to describe the quarterly data on the number of polices.

Keywords: *Time Series; Auto Regressive Model; Moving Averages Model; Auto Regressive and Moving Averages Model; Auto Regressive Integrated Moving Averages Model.*

1. Introduction

The insurance sector has become one of the main motives of the economic activity in any country due to the accumulation of huge financial resources that can contribute to the activation of financial markets and the movement of economic development, and the institutions of this sector contribute to the preservation of national wealth and local property, therefore the improvement in the insurance industry has clear implications for the country's economic growth rate in the short and long term.

It is clear that the insurance industry in the industrial countries has participated in the economic growth sectorially and geographically, where it intertwined with the sectors of manufacturing, petroleum, mining, agriculture, transport of all kinds, internal and external trade and humanitarian activities for all age groups and all risks. As an integrated risk management and distribution system, insurance can affect savings and investment as insurance and reinsurance companies are among the most important financial institutions in the country's economy.

2. Importance of the problem

The important economic role played by the insurance sector in Egypt faces many obstacles and challenges in the short and long term. The most important of these is the decrease in demand for insurance compared with other developed and developing countries. The size of the insurance companies' economic role can be illustrated by looking at the amount of funds accumulated by the insurance companies, especially in terms of premiums collected, shareholders' equity, rights of policyholders and the volume of investments in the years from 2008 to 2018 as an indicator of the extent of the industry's ability to provide economic development plans in Egypt.

Table 1: Premiums (Annual Statistical Book - Egyptian Insurance Supervisory Authority, 2018)

Years	Direct premiums		
	Total	People	Properties
2008/2009	1383112	55846	1941958
Growth rate %	2.1	22.5	7.3
2009/2010	1394612	624143	2018754
Growth rate %	0.8	11.7	4.0
2010/2011	1450662	664795	2115456
Growth rate %	4.0	6.5	4.8
2011/2012	1563223	720489	2283712
Growth rate %	7.8	8.4	8.0
2012/2013	1945011	939377	2884388
Growth rate %	24.4	30.4	26.3
2013/2014	2464211	1338469	3802680
Growth rate %	26.7	42.5	31.8
2014/2015	2767061	1521731	4288792
Growth rate %	12.3	13.7	12.8
2015/2016	2803500	1787553	4591033

Growth rate %	1.3	17.5	7.0
2016/2017	3273802	2413142	5686944
Growth rate %	16.8	35.0	23.9
2017/2018	4169950	3277826	7447776
Growth rate %	27.4	35.8	31.0

Table 2: Total Investments, Rights of Policyholders and Shareholders' Equity

Years	Total equity	Total rights of policyholders	Total Net Investment
2008/2009	2323269	7451360	10709850
Growth rate %	14.9	5.9	7.2
2009/2010	2533024	8134883	11330051
Growth rate %	9.0	9.2	5.8
2010/2011	2764204	8641171	12008149
Growth rate %	9.1	6.2	6.0
2011/2012	2938462	9324134	12844789
Growth rate %	6.3	7.9	7.0
2012/2013	3219612	10433685	14079724
Growth rate %	9.6	11.9	9.6
2013/2014	3466531	11627864	15553908
Growth rate %	7.7	11.4	10.5
2014/2015	3750338	12651403	16812748
Growth rate %	8.2	8.8	8.1
2015/2016	4052363	14295406	18694766
Growth rate %	8.1	13.0	11.2
2016/2017	4575223	16490946	21257610
Growth rate %	12.9	15.4	13.7
2017/2018	8535306	20700897	28994035
Growth rate %	86.6	25.5	36.4

The importance of research in providing the results of this study as aid tools for insurance companies and supervisory and control organizations in putting insurance and financial policies that take into account the statistical methods suitable for forecasting demand and thus predict profitability of insurance companies in the short and long term to enable them to achieve a better financial and competitive position in the market.
Also the identification of the specific characteristics of the market for the profitability of the insurance companies helps supervisors and control authority to predict and control the characteristics of the structure of the insurance market in order to achieve the objectives of supervision and control laws such as protecting the rights of the policyholders and ensuring the continuity of providing insurance coverage by insurance companies and preventing monopoly in providing insurance coverage and providing an economic climate that allows insurance companies to achieve fair profits as shown in table (1).
Although insurance culture, insurance awareness, future risk analysis and control tools have played a strategic role in insurance coverage through effective insurance marketing, the development of the skills of insurance agents, the art of negotiation, persuasion, contracting and mutual trust between insurance companies and members of the community. also electronic computers and communications technology make insurance marketing easier and less expensive from: the law of large numbers large production large marketing marginal cost and rationalization of tunnels and Insurance companies and international insurance groups. But, it is noted that the market and insurance industry in most Arab countries grow at a rate lower than the rate of growth of national income as seen in table 2, despite the small size of this industry when compared to the national income, which means low demand for insurance or the existence of an inactive demand for insurance was not met or not provide adequate and necessary coverage to face the risks faced by individuals and sectors of the economy. And the previous phenomena show the importance of analysis, study and continuous follow-up of the Egyptian insurance market and estimate the volume of actual demand and in it so that we can achieve the objectives of this important sector.

3. Research aim

This research aims to: Prepare several economic standard models that take into account all the economic, social and financial changes that are emerging under the framework of the new world order and the new general situation. And to determine the size of the demand and supply on the insurance documents of each branch of insurance alone, and how to maximize the financial and economic and social return to them. Also predict and control the volume of demand and thus the insurance market to allow the achievement of the objectives of supervision and control laws and provide an economic environment that allows insurance companies to achieve fair profits.

4. Research methodology

The main thrust of this research is to forecast the demand for various types of insurance for the next 5 years. This forecast is based on a long-term analysis of insurance companies' experience and actual demand over the past 20 years. In addition to covering all insurance companies operating in the insurance market in Egypt.
First: the proposed models
Auto Regressive Integrated Moving Average (ARIMA) models
The primary goal of time series analysis using ARIMA models is to create a model for an accurate description of the process from which the time series is generated and an explanation of the behavior of the phenomenon under study with a view to predicting its future behavior is based on an analysis of its behavior in previous periods. In order to be able to rely on the time series in the prediction must be characterized by silence or stability, which is determined by the following characteristics:

a) Stability of average values over time $[E(y_t) = \mu]$
b) Stability of variance over time $[\mathrm{var}(y_t) = E(y_t - \mu)^2 = \sigma^2]$
c) The variance between any two values for the same variable depends on the time gap between the two values and not on the actual value of the time at which the covariance is calculated $[Y_k = E(y_t - \mu)(y_{t+k} - \mu)]$

To test the stationarity of the series, the Autocorrelation function can be used, which is represented in (p_k). Where

$$\left[p_k = \frac{\lambda_k}{\lambda_0} \right] \tag{1}$$

The stationarity of the series requires that (p_k) in equation (1) is not different from zero for any time gap in it (K > 0). The features of the nonstationary of time series are as follows:

a) There is a general trend in the series data and can be removed by taking first or second order differences by type of general trend, whether linear or non-linear
b) The instability of the series variance over time can be confirmed by taking the square root of the series data.
c) Seasonal fluctuations in the series data over time and their removal Seasonal variations of the first or second order are taken if necessary.

Kinds of Time Series Models

a) Auto Regressive Model (AR):

Auto Regressive Model of rank (P) is {AR(p)} and takes the following form

$$y_t = \alpha + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \cdots + \phi_P y_{t-P} + \alpha_t \tag{2}$$

b) Moving Averages Model:

The moving averages model of the rank (q) is {MA (q)} and takes the following form:

$$y_t = \mu + \theta_0 a_1 + \theta_1 a_{t-1} + \theta_2 a_{t-2} + \ldots\ldots\ldots\ldots + \theta_q a_{t-q} \tag{3}$$

c) Auto Regressive and Moving Averages Model (ARMA):

It is a model that includes the auto regressive model (p) and the positive averages at the p-rank. Suppose that P = 1, q = 1, we have an ARMA (1.1) model and take the following form:

$$y_t = \alpha + \phi_1 y_{t-1} + \theta_0 a_t + \theta_1 a_{t-1} \tag{4}$$

d) Auto Regressive Integrated Moving Averages (ARIMA):

It is a model that includes the regression model and the moving averages It is called integral as an indication of a number of differences (α) To achieve the stationarity of the series. So it includes three levels

Rank of Auto Regression (p)
Rank of Moving averages (q)
Rank of Integrity rank (d)
and it is written as (p, d, q) ARIMA

Second: predicting the use of models (ARIMA)

The Jenkins model in statistical analysis of time series provides specific stages to predict using ARIMA models as follows:

Stage 1: Identification

This stage is the basis of the model bank and relies on two basic tools

a) Auto Correlation Function (ACF)

Auto regression coefficients are used to identify the appropriate ARIMA model. If the coefficients of auto correlation coefficients are found to be zero, the greater the time gap indicates that the series is stationary, but if the difference in the coefficients is substantially different from zero, this indicates the need for additional differences to achieve the stationary series.

b) Partial Auto Correlation Function (PACF)

The partial correlation coefficients measure the correlation between successive values of a variable within two periods with the stability of the other time periods, and the partial auto correlation function is used to determine the number of parameters to be contained in the model used.

Stage 2: Estimation

This stage includes estimating the parameters of the model based on several methods, the most important is the maximum likelihood estimation function and the least squares method.

a) Estimation of Auto Regression (AR) Parameters:

The auto regression parameters to be estimated are $\alpha, \phi'S$ using the estimates of the mean, variance and auto correlation coefficients

b) Estimating the Parameters of Moving Averages (MA)

The parameters to be estimated are $\theta's$ basing on estimates of variance and auto correlation coefficients.

c) Estimating the parameters of (ARMA)

The parameters to be estimated are $\phi's, \theta's$ based on auto covariance and auto correlation coefficients.

Stage 3: The Test:

At this stage, it is determined whether the estimated model is appropriate, reliable and we can depend on it in prediction or it is not suitable and should be stopped, re-defined and reassessed based on the calculation of a special factor (Q) as follows:

$$Q(K) = n(n+2)\sum_{k=1}^{k} \frac{1}{n-k} r_k^2(\hat{\alpha}) \tag{5}$$

(Q) follows χ^2 distribution with degrees of freedom (k-p-d-q), the model will be suitable and reliable for prediction if the value of Q in equation (5) is smaller than χ^2 with degrees of freedom mentioned earlier.

5. Applied study

In this section, we will use the time series analysis method to estimate the demand for life insurance only through the statistical estimate of the number and amount of individual life insurance policies in the Egyptian market. The demand for life insurance is linked to interrelated economic and insurance factors that make it difficult to estimate well using regression models, it is also necessary to estimate the values of most of the explanatory variables in the regression equation during the prediction period, which makes the prediction of the dependent variable less accurate. It is therefore preferable to use time series models in the case of life insurance as they avoid this problem and provide accurate analysis of the change in demand over time, especially with seasonal availability (monthly, quarterly or semi-annually).
The time series approach was used to estimate the number of documents and values of life insurance using ARIMA models based on the following steps:

1) Determine the graph of the phenomenon.
2) Build the model of the time series analysis process by:
- Select the form.
- Estimate the model.
- Test the model.
3) Predicting the phenomenon in the future.

First: Function Number of Policies:

1) Determine the graph of the phenomenon: Based on the data of the time series of the number of documents in the Egyptian market. Figure 1 shows that the data of this series are not stationary and shows the graph of the annual data of the original series of the number of Policies

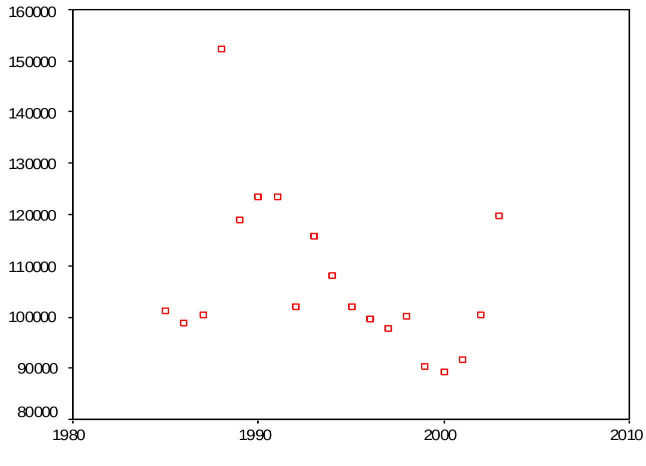

Fig. 1: The Annual Data of the Original Series of the Number of Policies.

In order to stabilize the variance, the logarithmic transformation is performed. The first differences were taken to remove the effect of the general trend and the first seasonal differences as shown in Figure (2), which shows the stationarity of the series.

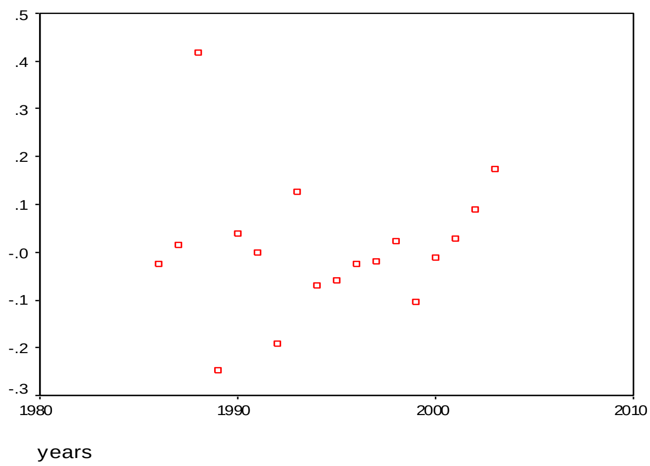

Fig. 2: The Data Function Number of Policies after the Logarithmic Process.

The first differences were taken to remove the effect of general trend and seasonal differences to remove the seasonal effect

2) Build a Process Model Time Series Analysis:

a) Defining the Analysis Process Model:

After converting the time series to a stationary series, (ACF) and (PACF) must be calculated.
Auto Correlation Function (ACF):
The main purpose of this function is to make sure that the time series is stationary. The following are the researcher results for the auto correlation coefficient at different time gaps. Table (3) shows the results of the auto correlation test for the number of annual data Policies

Table 3: The Results of the Auto Correlation Test for the Number of Annual Data Policies

Standard error	Auto correlation	Delay period	Standard error	Auto correlation	Delay period
0.158	- 0.067	9	0.217	-0.337	1
0.149	0.110	10	0.211	0.015	2
0.139	-0.209	11	0.204	0.181	3
0.129	-0.040	12	0.197	-0.349	4
0.118	-0.013	13	0.190	0.236	5
0.105	-0.024	14	0.183	-0.088	6
0.091	0.193	15	0.175	-0.048	7
0.075	-0.005	16	0.167	-0.038	8

Whereas Table (4) shows the results of the Auto correlation test for the number of quarterly data Policies

Table 4: The Auto Correlation Test for the Number of Quarterly Data Policies

Standard error	Auto correlation	Delay period	Standard error	Auto correlation	Delay period
0.152	-0.154	9	0.182	-0.461	1
0.147	-0.155	10	0.179	0.079	2
0.143	0.216	11	0.175	0.180	3
0.138	0.061	12	0.171	-0.209	4
0.134	-0.118	13	0.168	0.160	5
0.129	0.078	14	0.164	-0.089	6
0.124	-0.052	15	0.160	-0.108	7
0.119	0.022	16	0.156	0.280	8

The following figure is a format showing the auto correlation function of annual data polices

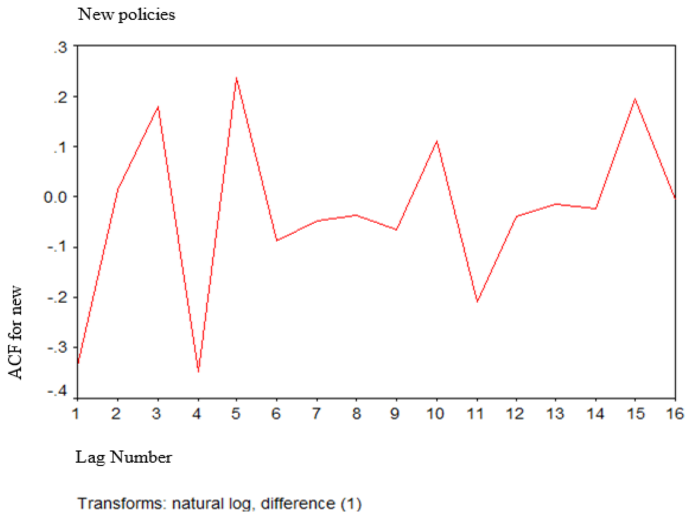

Fig. 3: Auto Correlation Function – New Policies (Annual Data).

Whereas Figure (4) shows Auto Correlation Function for Quarterly Data.

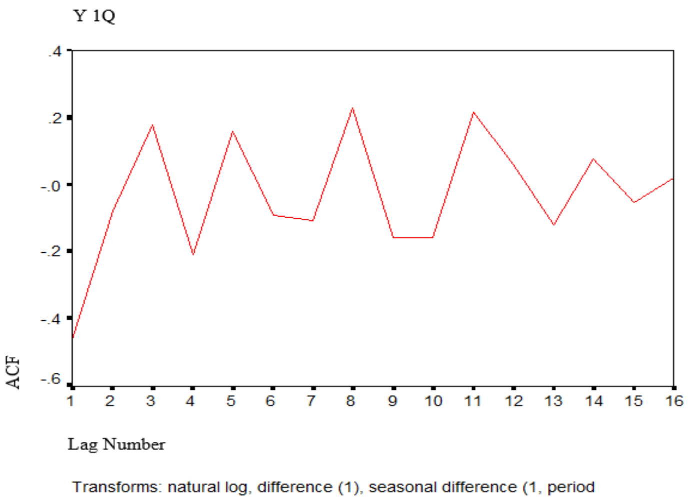

Fig. 4: Auto Correlation Function –New Policies (Quarterly Data).

It is noted from the previous figures that most auto correlation coefficients are not significantly different from zero, ie, they are statistically insignificant, which means that the time series after taking the differences has become stationary.

Partial Auto Correlation Function (PACF):

The main purpose of this function is to determine the number of parameters to be used in the form. The following are the findings of the researcher for the partial auto correlation coefficients which table (5) shows the results of the partial auto correlation test for the number of annual data Policies, which shows that all the standard error are equal for all the delay period.

Table 5: Results of the Partial Auto Correlation Test for the Number of Annual Data Policies

Delay period	Auto correlation	Standard error	Delay period	Auto correlation	Standard error
1	-0.337	0.236	9	-0.056	0.236
2	-0.111	0.236	10	0.043	0.236
3	0.171	0.236	11	-0.195	0.236
4	-0.267	0.236	12	-0.282	0.236
5	0.059	0.236	13	-0.173	0.236
6	-0.040	0.236	14	-0.018	0.236
7	0.005	0.236	15	0.065	0.236
8	-0.220	0.236	16	0.030	0.236

Whereas table (6) shows the results of the partial auto correlation test for the number of quarterly data Policies, which shows that all the standard error are equal for all the delay period

Table 6: The Results of the Partial Auto Correlation Test for the Number of Quarterly Data Policies

Delay period	Auto correlation	Standard error	Delay period	Auto correlation	Standard error
1	-0.461	0.192	9	-0.067	0.192
2	-0.371	0.192	10	-0.350	0.192
3	-0.061	0.192	11	-0.233	0.192
4	-0.224	0.192	12	0.071	0.192
5	-0.014	0.192	13	-0.042	0.192
6	-0.113	0.192	14	-0.010	0.192
7	-0.221	0.192	15	0.007	0.192
8	-0.004	0.192	16	-0.038	0.192

The following is a format showing the partial auto correlation function of the differences PACF.

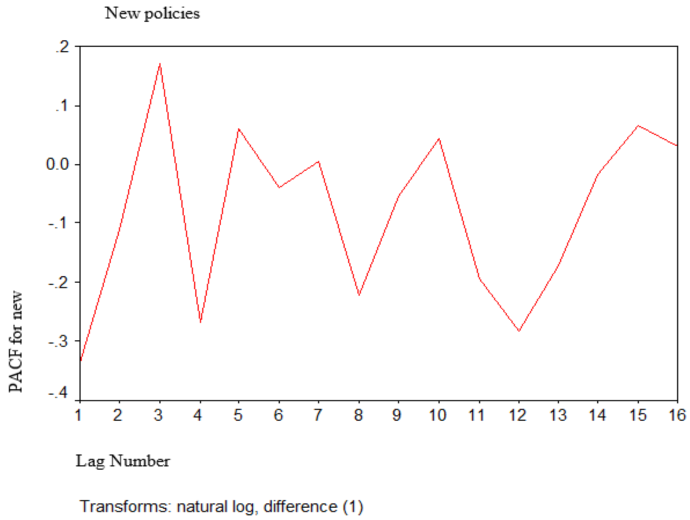

Fig. 5: Partial Auto Correlation Function – New Policies (Annual Data).

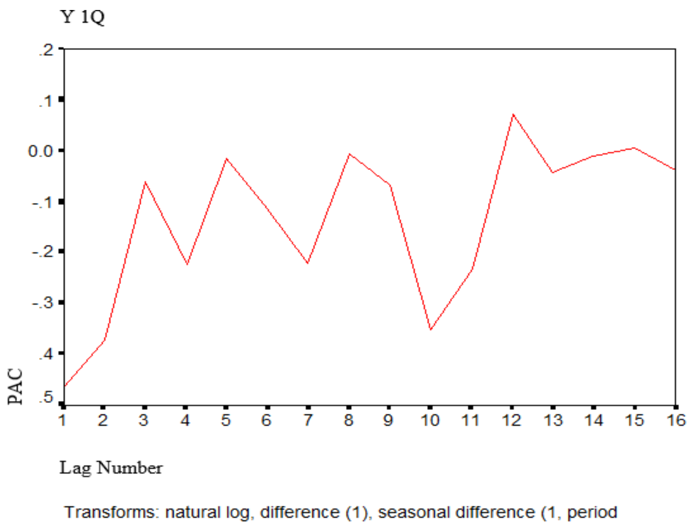

Fig. 6: Partial Auto Correlation Function –New Policies (Quarterly Data).

Based on the partial auto correlation function, several models of auto regression and moving averages were tested and the most appropriate model for describing the quarterly data on the number of policies was selected. The best model was ARIMA $(0,1,1)(0,1,0)^4$

b) Estimating a model ARIMA (0,1,1)(0,1,0)4

This model takes the following form:

$$Lny_t = a - \theta_1 Lny_{t-1}$$

Therefore, the coefficients to be estimated are (a, θ_1). The following are the findings of the researcher:

$$Lny_{1t} = 0.8888 - 0.0083\, Lny_{1t-1}$$

Note that the value of t is calculated for the parameter θ_1 is (5.7523) is greater than the tabulated value τ at significance level of 5% (1.65) indicating the significance of the parameter θ_1.

It is also noted that $|\theta_1| < 1$ indicates the stability of the time series.

c) Testing the model:

The P-value calculated at time gaps 4, 8, 12 and 16 was obtained and is noted to be greater than 0.05 at all-time gaps indicating the quality of the model. Also χ^2 was tested for this model at different time gaps and the calculated values of χ^2 are less than the theoretical values of χ^2, which means that this model has high goodness of fit and is therefore an appropriate model for describing time series data for the number of policies. This model can therefore be used to predict the number of individual life insurance documents in the Egyptian market.

3) Forecasting the number of policies

Using the ARIMA model $(0,1,1)\ (0,1,0)^4$, the predicted number of policies (Y_1) was reached for 8 quarterly periods.

Table 7: Number of Policies Predicted Using Model ARIMA $(0,1,1)\ (0,1,0)^4$

Year	Quarter	Number of policies	Minimum confidence interval	The upper limit of the trust period
2019	1	34601	29987	39215
	2	34807	29982	39633
	3	35014	29973	40055
	4	35221	29961	40481
2020	1	40108	31983	48233
	2	40521	31858	49184
	3	40935	31736	50133
	4	41348	31616	51079

Second: the function of insurance premiums:

1) Determine the graph of the phenomenon:

Based on the time series data of the insurance amounts function in the Egyptian market, Figure (3) shows that the graph of the data of this series is not stationary - and some large variances appear.

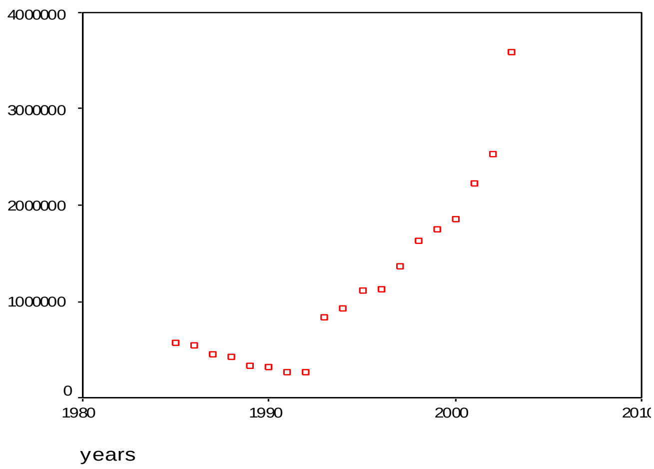

Fig. 7: The Original Series Data of the Insurance Amounts Function.

In order to stabilize the variance, the logarithmic transformation is performed. The first differences were taken to remove the effect of the general trend and the first seasonal differences, as shown in Figure (8), which shows the stationarity of the series.

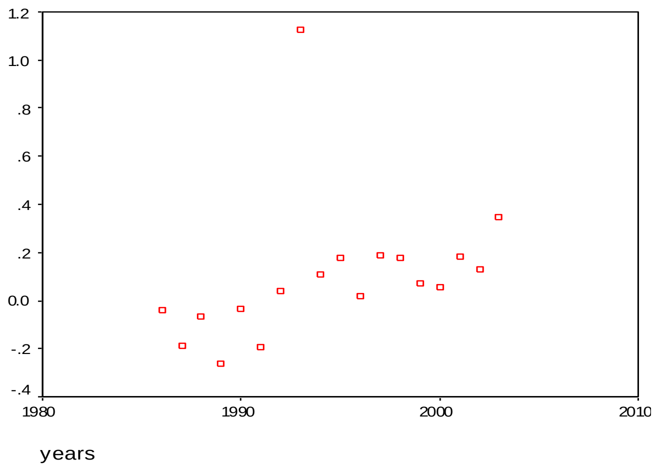

Fig. 8: The Insurance Amounts Function After the Logarithmic Procedure.

The first differences were taken to remove the effect of general trend and seasonal differences to remove the seasonal effect.

2) Build a process model Time series analysis:

a) Determine the analysis process model:

After converting the time series to a stationary series, the auto correlation and partial auto correlation functions must be calculated.

Auto Correlation Function:

The main purpose of this function is to make sure that the time series is stationary. The following are the results of the auto correlation coefficient at different time gaps.

Table 8: The Results of the Auto Correlation Test for Annual Insurance Amounts

Delay period	Auto correlation	Standard error	Delay period	Auto correlation	Standard error
1	0.135	0.217	9	0.011	0.158
2	0.034	0.211	10	0.143	0.149
3	-0.046	0.204	11	-0.031	0.139
4	-0.121	0.197	12	-0.066	0.129
5	-0.010	0.190	13	-0.026	0.118
6	-0.228	0.183	14	-0.074	0.105
7	-0.148	0.175	15	-0.040	0.091
8	0.041	0.167	16	-0.050	0.075

Table 9: The Results of the Auto Correlation Test of Insurance Amounts for the Quarterly Data

Delay period	Auto correlation	Standard error	Delay period	Auto correlation	Standard error
1	-0.334	0.182	9	-0.207	0.152
2	-0.166	0.179	10	-0.131	0.147
3	0.157	0.175	11	0.272	0.143
4	-0.094	0.171	12	0.004	0.138
5	-0.035	0.168	13	-0.046	0.134
6	-0.037	0.164	14	0.014	0.129
7	-0.004	0.160	15	0.030	0.124
8	0.146	0.156	16	-0.050	0.119

The following is a graph showing the auto correlation of ACF

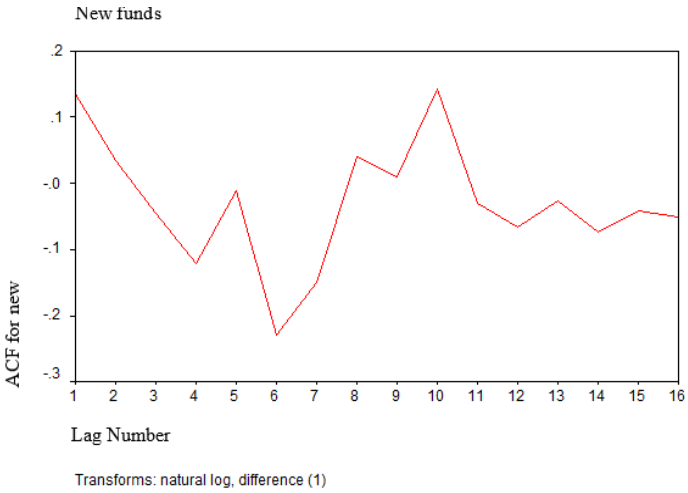

Fig. 9: Auto Correlation Function – New Funds (Annual Data).

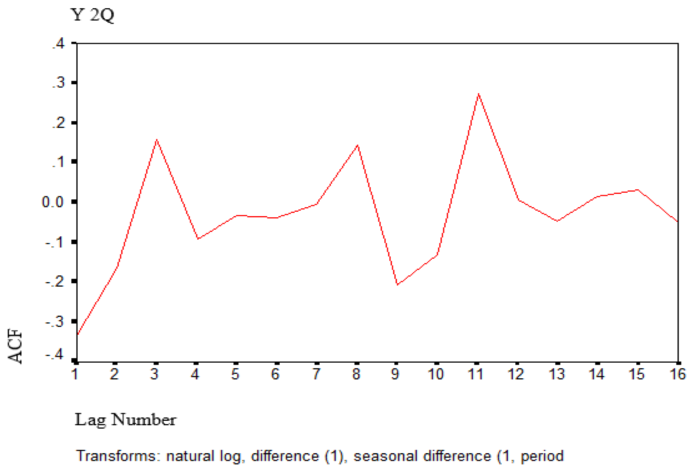

Fig. 10: Auto Correlation Function – New Funds (Quarterly Data).

It is noted from Figures (9) and (10) that most auto correlation coefficients are not significantly different from zero, meaning that they are statistically insignificant, which means that the time series after taking the differences has become stationary.

Partial Auto Correlation Function (PACF):

The main purpose of this function is to determine the number of parameters to be used in the form. Table (10) shows the results of the researcher for the partial auto correlation coefficients.

Table 10: The Results of the Partial Auto Correlation Test of the Annual Insurance Amounts

Delay period	Auto correlation	Standard error	Delay period	Auto correlation	Standard error
1	0.135	0.236	9	-0.017	0.236
2	0.016	0.236	10	0.084	0.236
3	-0.053	0.236	11	-0.078	0.236
4	-0.111	0.236	12	-0.099	0.236
5	0.024	0.236	13	-0.060	0.236
6	-0.233	0.236	14	-0.039	0.236
7	-0.108	0.236	15	-0.043	0.236
8	0.077	0.236	16	-0.014	0.236

It is clear from table (10) that all the standard error are equal for all the delay period

Table 11: The Results of the Partial Auto Correlation Test of the Insurance Amounts for the Quarterly Data

Delay period	Auto correlation	Standard error	Delay period	Auto correlation	Standard error
1	-0.334	0.192	9	-0.169	0.192
2	-0.312	0.192	10	-0.328	0.192
3	-0.024	0.192	11	-0.051	0.192
4	-0.107	0.192	12	0.064	0.192
5	-0.086	0.192	13	0.073	0.192
6	-0.158	0.192	14	-0.043	0.192
7	-0.121	0.192	15	-0.024	0.192
8	0.080	0.192	16	-0.051	0.192

Also from table (11) shows that all the standard error are equal for all the delay period in the case of the partial auto correlation test of the insurance amounts for the quarterly data.

Figure (11) is a graph shows the partial auto correlation function of the difference (PACF).

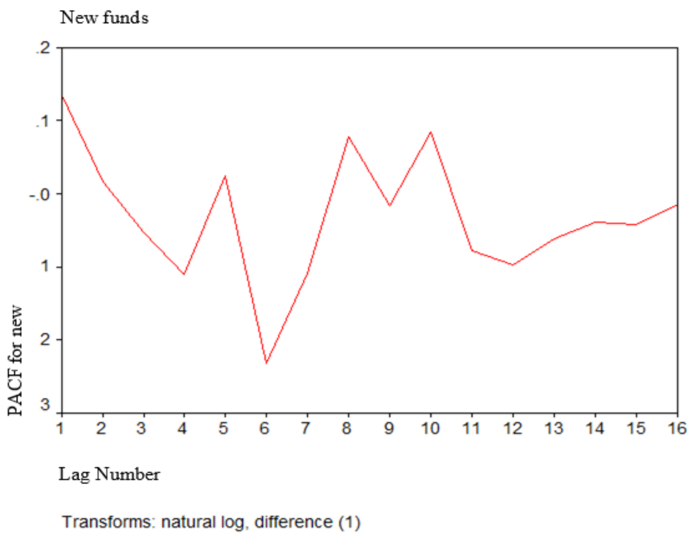

Fig. 11: Partial Auto Correlation Function – New Funds (Annual Data).

Figure (12) is a graph shows the partial auto correlation function of the difference (PACF) for the insurance amounts in the case of quarterly data.

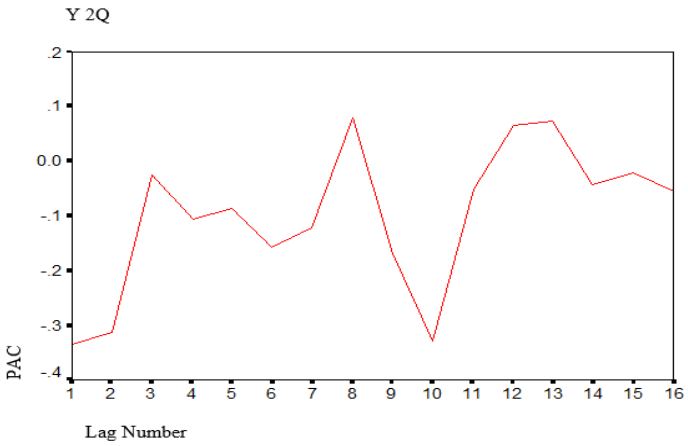

Fig. 12: Partial Auto Correlation Function – New Funds (Quarterly Data).

Based on the partial auto correlation function, several models of auto regression and moving averages were tested and the most suitable model was selected to describe the number of polices. The researcher reached the best model using the ARIMA model (1,1,1) (1,0,1) ^{4}

b) Estimation of the ARIMA model (1,1,1) (1,0,1) 4

This model takes the following form:

$$Lny_t = -\phi Lny_{t-1} - \theta a_t$$

Consequently, the coefficients to be estimated are (ϕ, θ) and the following are the results of the researcher:

$$Lny_t = -0.7264\, Lny_{t-1} - 0.6116\, a_t$$

It is noted that the calculated value of t for the two parameters (ϕ, θ) was 1.991 and 3.825 respectively, both of them are greater than the tau value, τ tabulated with a significant level of 5% (1.699) which indicates the significance of both parameters.

It is also noted that $|\theta|$ < 1 and which indicates the stability (stationarity) of the time series. 1 $|\phi|$ <

c) Testing the model

The calculated P-value at time gaps 4, 8, 12 and 16 was obtained and is noted to be greater than 0.05 at all-time gaps indicating the quality of the model. A χ^2 goodness of fit test was also performed where it was calculated χ^2 for this model at a different time caps and the calculated values χ^2 were less than the tabulated values χ^2, which means that this model has high goodness of fit, and thus is an appropriate model for describing the time series data of the insurance amounts. This model can therefore be used to predict the amounts of insurance policies in the Egyptian market.

3) Forecast of insurance amounts:

Using the ARIMA (1,1,1) (1,0,1)^4 model, the forecasted insurance amounts (y_1) were reached for 8 quarterly periods. Table (12) shows Insurance amounts forecast using a model ARIMA (1,1,1) (1,0,1)^4

Table 12: Insurance amounts forecast using a model ARIMA (1,1,1) (1,0,1)^4

Year	Quarter	Insurance amounts	Minimum confidence interval	The upper limit of the trust period
2019	1	1127068	849864.2	1494689
	2	1121917	810102.1	1553753
	3	1120959	786439.0	1597771
	4	1120780	766817.0	1638133
2020	1	1322322	794800.3	2199968
	2	1317939	746717.4	2326132
	3	1317123	711930.7	2436772
	4	1316971	682124.9	2542660

6. Conclusion

From the previous analysis, based on the partial auto correlation function and experimenting with several models of auto regression and moving averages, and testing the most appropriate model to describe the quarterly data on the number of polices, the best computer model was obtained ARIMA (0,1,1) (0,1,0)^4 and by executing the X^2 test we obtained from this test that this model has highly goodness of fit and therefore the number of polices was predicted for 8 quarterly periods as in Table (7).

The time series of the insurance amounts function was used in the Egyptian market and eight quarterly periods of insurance were forecasted using ARIMA (1,1,1) (1,0,1)^4 model.

The results of the study showed that this model is an appropriate model for describing the series data for insurance amounts.

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