Volatility of Returns on Working Capital of Insurance Firms in Egypt

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Abstract

The objective of this article is to examine the association between volatility of returns measured by (volatility of return on equity –volatility of return on assets)and natural logarithm of total assets with working capital measured by current ratio¬–liquidity ratio and quick ratio, as a sample of nineteen Egyptian insurance companies over the period 1999–2019, using two stages least square and Canonical correlation Analysis. The results elucidated that there is a significant positive effect of the predictor variables volatility of return on equity, on the dependent variable current ratio, but a significant negative effect of the predictor variable volatility of return on assets, and natural logarithm of total asset lnx3on the dependent current asset. Furthermore, there is a significant negative effect of the predictor variable natural logarithm of total asset lnx3 on the dependent variables current asset and liquidity

Key words: volatility of return on equity, volatility of return on asset, two stage least square.

1- Introduction

The insurance companies play a crucial role in the financial system in Egypt, accordingly the Financial Regularity Authority has established a new regulation to increase the paid capital to counter any crises and catastrophes. So, the insurance firm's severe risks, in such times of crises and catastrophes, face a critical situation to cover the required claims for cash flow in through liquidation of the short term assets. Hence ,this study focuses on the relationship between the volatility of returns and working capital, inconsistence with **Salah M Eladly**(2021),investigated the effect of working capital with profitability, and also **Thomas R. Berry& Stolzle** (2008) examined the effect of liquidation on insures to cover claims. Consequently, the Financial Egyptian Authority issued the Egyptian Law (10) for the year 1981,in which article (28) identifies how to allocate and invest funds to invest 50% of the paid capital mostly cash that rise up recently to one hundred million at least.

2- Hypotheses and variables

2-1 H1: Volatility of returns measured by (volatility of return on equity – volatility of return on asset) and natural logarithm of total asset have a statistically influence on current ratio

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2-2 H1: Volatility of returns measured by (volatility of return on equity – volatility of return on asset) and natural logarithm of total asset have statistically influence on liquidity ratio

2-3 H1: Volatility of returns measured by (volatility of return on equity – volatility of return on asset) and natural logarithm of total assets have statistically influence on quick ratio

Independent variables

1- Volatility of return on equity measured by standard deviation of return on equity
2- Volatility of return on asset measured by standard deviation of return on asset
3- natural of logarithm of total asset

Dependent variables

1- Current ratio measured by current asset to current liability
2- Liquidity ratio short term investment to current liability
3- Quick ratio measured by cash and treasury bills to current liability

Dependent variables have employed consistence with **André Luiz S Guimarães & Valcemiro Nossa (2010)**

3- Population, sample and Methodology

To examine the relationship between the volatility of returns and firm size with working capital in insurance firms in Egypt, this paper considered two stages least square and canonical correlation analysis as the most appropriate statistical analysis to investigate the relationship between dependent and independent multivariable in line with **Hbibu & et al 2019and Byeongyong P. Choi** (2010)who used two stage least square and firm size as independent variable; also **Philip Hardwick & Mike Adams (2002)** tests firm size with growth rate in United Kingdom life insurance. On the other hand, some of the studies investigated volatility of return, for instance **Bjorn Eraker& et al (2003)Lorne N. Switzer & et al (2017)**,and **Christian Thomann (2013)**. Despite most of the previous studies were applied on insurance industry, however there are some studies were applied on other sectors, as for **Andrew W. & Helen Higgs (2004**).

The insurance company's data this research sample is 49% from total insurance market in Egypt, where the 19 insurance companies in the research sample operated for over 21 years.

3-1 Statistic Equations

1-Y1 current ratio = β + β1X1 (volatility of return on equity) + β2X2 volatility of return on assets + β3 LNX3 natural logarithm of total assets + £

2- Y2liquidity ratio = β +β1X1 (volatility of return on equity) + β2X2 volatility of return on assets + β3 LN aX3 natural logarithm of total assets + £

3-Y3 quick ratio = β + β1X1 (volatility of return on equity) + β2X2 volatility of return on assets + β3 LNX3 natural logarithm of total assets + £

Canonical correlation Analysis:

Metric dependent variables = Metric independent variables

Y1 current ratio+ **Y**2 liquidity ratio+ **Y**3 quick ratio = β1X1 (volatility of return on equity) + β2X2 volatility of return on assets + β3 LNX3 natural logarithm of total assets

4- Review of literature

4-1 Firm size

The firm size of insurance firms measured by logarithm of total asset in most ofthe literature review, for instance **Habibu Ayuba &et al (2019)**elucidate that the relationship between capital structures is a negative significant positive relationship with Tobin Q, but firm size relationship with Tobin Q is positive and significant in Nigeria insurance firms. The previous studies have investigated many variables with firm size ,as for **Adams, M, Andersson, LF, Hardwick, P & Lindmark, M** (2014) used multivariate analysis ; the results revealed that in Swedish life insurance there is a statistical difference in growth rate between small and large firms, also there is a positive significant relationship between interest rate and growth **Byeongyong P. Choi (2010)**used two stage least square to examine relationship between growth rate and firm size ,and the results revealed that the young firms grow faster than the old one ,also the less cost one is growing faster , maybe back profitability not enough. Besides there is a negative significant relationship between cost and firm size in US property liability insurance. Some literature review examined the relationship the firm size with age and profitability, as for **Mohamed. Z. A Karim & Chanta Jhantasana 2006,**used Cobb- Douglas stochastic frontier model, and their findings elucidate that the coefficient of size is significantly negative but the coefficient of age is insignificantly negative, both of them with profitability measured by ROE in Thai insurance companies.**Philip Hardwick & Mike Adams (2002)**asserted that the relationship between growth rates and firm size is insignificant, but growth rates of input cost in United Kingdom life insurance. Other studies investigated firm size in manufacturing sectors. **S.P.G.M.Abeyrathna&, A.J.M.Priyadarshana (2019)**study indicated there is insignificant difference relationship between firm size measured by (log of total asset and log of sales) with profitability measured by (net profit and return on assets) in manufacturing sector in Sir Lanka. **Talat Afza& M. Kausar (2010)** used data envelopment analysis to investigate the efficiency in insurance firms ,he found the improvement in efficiency level of non-life insurance over the study period , also add inefficiency due to sources allocation and firm size in Pakistan insurers. Also **Yeguang Chi & et al (2020)** conducted that the firm size is positively significant with price but the relationship between volatility and market return is negative in Shanghai Stock Market.

4-2 Volatility of returns

Several literature reviews are concerned with volatility of return, for instance **Andrew W. & Helen Higgs (2004**) used multivariate GARCH analysis applied in Asian developed and emerging markets; the finding selucidate that there are large and predominantly positive volatility spiller over and mean but not homogeneous in the emerging market , but in a different methodology, **Bjorn Eraker& et al(2003)**used continuous – time stochastic volatility model as applied on S&P 500 and Nasdaq 100 index on returns only; the findings elucidate that the volatility in return Nasdaq index is much higher than S&P index , this result has effect on option prices and estimating risk. Also **Christian Thomann (2013)** used multivariate GARCH analysis to investigate the relationship between catastrophe and volatility in US insurers stock volatility, the finding selucidate that there is a statistical difference and increase in the volatility of return on portfolio in US insurers stock; also regarding change in the correlation , the post catastrophe of portfolio returns of insurance stocks and overall stock market, **Elijah Brewer & et al2007**used GARCH Model where the results indicate a negative relationship between stock return and change in interest rate ,but a positive and significant correlation with market risk of life insures companies in US. Besides, **Etti G. Baranoff (2007)** used a structural equation model to examine the relationship between capital and risk, the results refer that the regulatory asset risk is statistically effected ~~on~~ capital structure decision in small insurers, but statistically effected large insurers opportunity asset risk on both small and large insurers. Despite most of the previous studies are concerned with empirical data from insurance industry. Furthermore anther literature reviewed used different methodology and viewpoint to measure risk volatility ; **Nadine Gatzert & Andreas Kolb (2013)**indicated imperfect correlation between operational loss and insurers losses by virtue of diversifications benefits, also the operational loss is not high although using model to measure ;but literature review investigated other economic sectors ,for instance **Lorne N. Switzer & et al (2017**)examined the relationship between volatility and profitability, the study used E GARCH model, the findings showed that the relationship between volatility and profitability is positive in Canadian stock market, but a study conducted in another environment and methodology by**Richard D. Harris &Anirut Pisedtasalasai** (2006)indicated there turn and volatility are significant spillover effect from large to small stock portfolio in United Kingdom. **Xiaoquan Jiang & Bong-Soo Lee (2008**) study referred to significant relationship between stock returns and idiosyncratic volatility, however sensitive degree between idiosyncratic volatility and firm size is highly sensitive

4-3 Working capital management

Working capital management represent the relationship between current assets and current liability, so the question is what does it mean in insurance combines? The answer is operating capital ,because most of Its elements are operating capital ,based on that this paper linked between them to represent the dependent variables; however insurance firms in crises and catastrophes depend on cash flow to cover their requirements claims. So it is a prominent factor in working capital management , hence most of the pervious literature reviewed included the cash flow as variable whether dependent or independent ,-for instance **Thomas R. Berry& Stolzle (2008)**used standard actuarial risk and cash flow model to examine which is the best liquidation strategy ; he found cash first strategy is better for insurance company, and he also found there is no effect of bid risk spread magnitude and negative return spread on capital requirement and asset allocation . In consistence with using the liquidity as a dependent variable **Salah M. Eladly (2021)** examined the effect of working capital management on profitability, results identified a positive relationship between working capital management and profitability and asset quality in insurance industry in Egypt. On the other hand ,some of the literature review tests the natural logarithm of total asset ; **Tong Yu & et al (2008)** found the control variables natural of logarithm of total asset, leverage, percentage of net premium, underwriting risk, line of business, organization form and asset risk taking effected firm characteristic in insurance firms .Also **Gedion A Omwono & Everlyne A. Aloo(2020)**study revealed a negative correlation between cash conversion cycle with liquidity risk, however there is a statistically significant relationship between cash conversion cycle and liquidity risk in insurance companies in Kenya. Whereas other sectors studies, **Haitham Nobanee & Maryam AlHajjar (2014), elucidated** a negative and significant relationship between cash conversion cycle and payable deferral period with financial performance, however the relationship between receivable collection period and inventory conversion period with liquidity risk is positive and significant.**André Luiz S Guimarães& Valcemiro Nossa (2010)**used ANOVA to examine the relationship between working capital management liquidity and solvency, the found that the working capital management is associated with different level of profitability in healthcare insurance firms.

5-Study findings and empirical results

In this part the study presents and discuss the estimations results the variables of volatility of returns and working capital management of insurance firms in Egypt over the period 1999- 2019

5-1 The following table reports summery statistics

Table (1): summery descriptive statistics

Constructs	X1	X2	Lnx3	Y1	Y2	Y3
Mean	0.015071	0.055933	13.17246	1.106992	0.293178	0.078307
Median	0.012385	0.047164	13.09940	1.095451	0.132480	0.059877
Maximum	0.045481	0.159188	16.78653	1.460314	1.265079	0.259331
Minimum	4.67E-05	0.000747	9.422380	0.764558	-0.508337	0.000155
Std. Dev.	0.011002	0.039497	1.537752	0.143818	0.313739	0.065478
Skewness	0.761013	0.708424	0.260876	0.079666	0.791249	0.791561
Kurtosis	2.702422	2.702375	2.731510	2.636642	2.577521	2.729145
Jarque-Bera	39.78458	34.67197	5.724175	2.617029	44.60132	42.88650
Probability	0.001***	0.001***	0.057149	0.270221	0.001***	0.001***
Observations	397	397	399	399	399	399

*** P≥ (0.001).

In the upper Table 1 contains Jarque- Bera is normal distribution test statistics for two stage least square residual as average28.7143123, standard deviation skewness Kurtosis and mean

Univariate detection:

Based on result from Table (1), It revealed that the normality distribution of research variables natural logarithm of total asset lnx3,and current ratio Y1 by using the Jarque-Bera test at a significant level greater than (0.05). On the other hand the research variables volatility of return on equity x1, volatility of return on asset X2, liquidity ratio y2and quick ratio y3 are not normally distributed, since the significant of Jarque-Bera statistic is less than (0.001).Since the Pearson skewness coefficient for all research variables is less than (1), so the result indicates that the data are not significantly skewed.

5-2 Group unit root test

The following results in table 2 represent the stationary of time series to ensure that variance and mean are invariant through time, and the value of the covariance between two time periods depends only on the distance between the two time periods and not the actual time at which the covariance is computed for the study variables volatility of return on equity x1, volatility of return on assets x2, natural logarithm of total asset lnx3, current ratio y1, liquidity y2 and quick ratio y3 through the following statistical techniques:

Table 2: test of Group unit root

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-9.31164	0.001***	6	2379
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-14.0760	0.001***	6	2379

ADF - Fisher Chi-square	217.216	0.001***	6	2379
PP - Fisher Chi-square	275.652	0.001***	6	2384

*** P≥ (0.001).

In the upper Table (2), it reports that stationary of the time series of the current ratio Y1, of liquidity ratio Y2, quick ratio Y3, volatility of return on equity X1, volatility of return on asset X2 and natural logarithm of total assetlnx3, at level 1 ~ (0) based on the constant level, through to the following criteria; LLC, IPSW, PP, and ADF, P ≥ (0.001).

5-3 Result of Cointegrating equation Model

to measure the existence of long-run equilibrium relationship between no stationary time series used Engle–Granger Co-integration test, for variablesvolatility of return on equity X1, volatility of return on asset X2, natural logarithm of total asset lnX3, current ratio Y1, liquidity ratio Y2 and quick ratio Y3,as follows:

Table 3. Results of Cointegrating Model

Variables	tau-statistic	Prob.*	z-statistic	Prob.*
X1	-8.984018	0.001***	-134.3301	0.001***
X2	-8.135970	0.001***	-112.8973	0.001***
LNX3	-5.488013	0.0056**	-54.06248	0.0066**
Y1	-6.364273	0.001***	-73.71491	0.001***
Y2	-9.282407	0.001***	-141.7973	0.001***
Y3	-10.65256	0.001***	-174.5379	0.001***

** Significant atP≥ (0.01). *** Significant at P≥ (0.001).

Table (3), the result shows that there are long-term equilibrium relationship between current ratio Y1, liquidity ratio Y2and quick ratio Y3**with** volatility of return on equity X1, volatility of return on asset X2, natural logarithm of total asset lnx3)over the period 1999 to 2019, based on the following tests Tau-statistic, and z-statistic, at a significant P ≥ (0.01)

5-4Analysis of Pearson correlation matrix:

Table (4): Pearson correlation matrix to measure a significant linear relationship between the constructs of both independent and dependent variables

Constructs	Y1	Y2	Y3	X1	X2
Y1	**And 1**				
Y2	**0.119***	**1**			
Y3	**0.073**	**0.447*****	**1**		
X1	**0.188*****	**0.067**	**0.137****	**1**	
X2	**-0.160*****	**0.021**	**0.071**	**0.555*****	**1**
Lnx3	**-0.250*****	**-0.343*****	**-0.215*****	**-0.245*****	**0.082**

*** P≥ (0.001). ** Significant at aP≥ (0.01). * P≥ (0.05).

The in the upper Table (4), reports thatthere are significant positive linear relationships between the dependent variables current ratio Y1,and quick ratio y3the Explanatory variable volatility of return on equity x1,furthermore there are significant negative linear relationships between the dependent variables current ratio Y1, liquidity ratio y2,and quick ratio y3 the explanatory variable natural logarithm of total asset lnx3, alsoare significant negative linear relationships between the dependent variables current ratio Y1, and the independent variable volatility of return on asset x2, at a Significant level less than (0.05).

5-5 Granger Causality Analysis:

The flowing test presents Granger causality tests precedence and information content yet is not by itself indicate causality in more common use of the term.

Table 5. Pairwise Granger Causality Tests with lag 2for dependent and independent variables from 1999 to 2019

Null Hypothesis:	Obs	F-Statistic	Prob.
Y1 does not Granger Cause X1	395	3.29042	0.0383*
X1 does not Granger Cause Y1		1.48277	0.2283
Y2 does not Granger Cause X1	395	3.34746	0.0362*
X1 does not Granger Cause Y2		2.56195	0.0785
Y3 does not Granger Cause X1	395	0.28700	0.7507
X1 does not Granger Cause Y3		4.39372	0.0130*
Y1 does not Granger Cause X2	395	2.73589	0.0661
X2 does not Granger Cause Y1		0.73541	0.4800
Y2 does not Granger Cause X2	395	2.12429	0.1209
X2 does not Granger Cause Y2		0.02485	0.9755
Y3 does not Granger Cause X2	395	0.13337	0.8752
X2 does not Granger Cause Y3		0.53013	0.5890
Y1 does not Granger Cause LNX3	397	3.63008	0.0274*
LNX3 does not Granger Cause Y1		2.69801	0.0686
Y2 does not Granger Cause LNX3	397	4.37314	0.0132*
LNX3 does not Granger Cause Y2		10.7028	3.E-05***
Y3 does not Granger Cause LNX3	397	1.76371	0.1728
LNX3 does not Granger Cause Y3		3.48623	0.0316*

*** Significant at aP≥ (0.001). * Significant at a P≥ (0.05).

In the upper table (5), it reports that reject the hypothesis that volatility of return on equity X1 does not Granger cause quick ratio Y3, therefore it appears that Granger causality runs one-way from vitality of return on equityX1 to Y3 and not the other way. Furthermore, reject the hypothesis that liquidity ratio Y2 does not Granger cause natural logarithm of total asset lnx3 and LNX3 does not Granger Cause liquidity ratio Y2,therefore it appears that Granger causality runs two-way from liquidity ratio Y2 to lnx3 and the other way from natural logarithm of total asset lnx3 to Y2.Also, we do reject the hypothesis that lnx3 does not Granger cause quick ratio Y3, therefore it appears that Granger causality runs one-way from lnx3 to Y3 and not the other way. Reject the hypothesis that current ratioY1 and liquidity ratio Y2 does not Granger cause volatility of return on equity X1, therefore it appears that Granger causality runs one-way from current ratio Y1 and liquidity ratio Y2 to volatility of return on equity X1 and not the other way.

5-6 the results Canonical correlation Analysis:

Table (6): Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	.437	.236	.730	14.625	9.000	951.742	.000
2	.298	.098	.902	10.395	4.000	784.000	<.001
3	.100	.010	.990	3.990	1.000	393.000	.046

H_0 for Wilks test is that the correlations in the current and following rows are zero

In the upper table (6), the study revealed that this procedure finds the linear combinations of two sets of variables which have the highest correlation between them. The table represents the estimated correlation between each set of canonical variables. Since three of the P-values of F-test are less than 0.05, those sets have statistically significant correlations at the 95.0% confidence level.

In this case, three sets of linear combinations have been formed. The first set of linear combinations is:

Table (7): Set 1 Standardized Canonical Correlation Coefficients

Variable	1	2	3
X1	-.490-	1.017	.612
X2	.419	-1.053-	.525
X3	.760	.734	.176

Table (8): Set 2 Standardized Canonical Correlation Coefficients

Variable	1	2	3
Current ratio Y1	-.719-	.693	-.135-
Liquidity Y2	-.510-	-.811-	-.591-
Quick ratio Y3	-.179-	-.001-	1.106

$$U_1=-0.490*x1 + 0.419*x2 + 0.76*x3$$

$$V_1=-0.71*y1 - 0.510*y2 - 0.179*y3$$

Where the variables have first been standardized by subtracting their means and dividing by their standard deviations.

Table (9): Set 1 Canonical Loadings

Variable	1	2	3
X1	-.443-	.252	.860
X2	.210	-.428-	.879
LNX3	.914	.399	.069

Table (10): Set 2 Canonical Loadings

Variable	1	2	3
Y1	-.795-	.593	-.128-
Y2	-.679-	-.726-	-.111-
Y3	-.461-	-.316-	.830

Canonical loadings to measure the simple linear correlation between an original observed variable in the u- or v-variable set and that set's canonical variate.

The Standardized canonical coefficients and canonical loadings were used to evaluate the relative importance of variables in the model. For the first variable set, natural logarithm of total asset lnx3 is most important, followed by volatility of return on equity X1 and volatility of return on asset X2. The standardized canonical coefficients are interpreted in a manner analogous to interpreting standardized regression coefficients. For example, a one standard deviation increase in lnx3 leads to a (0.76) standard deviation increase in the score on the first canonical variate in the first variable set when the other variables in the model are held constant.

Canonical loadings are displayed in tables (9-10). For the u1-variables, natural logarithm of total asset lnx3 is most closely related to the first canonical function, and current ratio Y1and liquidity y2are most closely related to the second canonical function.

Table (11): Proportion of Variance Explained

Canonical Variable	Set 1 by Self	Set 1 by Set 2	Set 2 by Self	Set 2 by Set 1
1	.359	.069	.435	.083
2	.135	.012	.326	.029
3	.506	.005	.239	.002

The average variance extracted (AVE) for set 1 by self is (0.36), Compared to the set 2 by self with a value (0.44)

5-7 Two-Stage Least Squares:

The following results report the Two-stage least-squares regression which uses instrumental variables that are uncorrelated with the error terms to compute estimated values of the problematic predictor(s) (the first stage), and then uses those computed values to estimate a linear regression model of the dependent variable (the second stage). Since the computed values are based on variables that are uncorrelated with the errors, the results of the two-stage model are optimal.

Table (12): Two-Stage Least Squares to measure the effect of the covariate Variables on the dependent variables

1- Two-Stage Least Squares to measure the effect of the covariate Variables in terms of x1,x2,lnx3 on the dependent variables in terms of y1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	4.438078	0.788614	5.627691	0.001***
X2	-1.226465	0.212891	-5.760997	0.001***
LNX3	-0.013585	0.005032	-2.699943	0.007**
C	1.287791	0.068367	18.83637	0.001***

R^2=73.4% F-test= 269.7 sig=0.001*** RMSE=0.132U= 0.06 DW=2.01JB=366.4 SIG=0.001 BG=0.75 SIG=0.79Heteroskedasticity Test: BPG F-test=2.13 Sig=0.08Ramsey RESET Test F test=0.50 Sig=0.62 J-stats=0.76 sig=0.038 Cragg-Donald F-stat=2443.8 with Stock-Yogo critical values =16.38(10%)

Y1 = 4.43807844431*X1 - 1.22646535105*X2 - 0.0135849213689*LNX3 + 1.28779081126

2- Two-Stage Least Squares to measure the effect of the covariate Variables in terms of x1, x2, lnx3 on the dependent variables in terms of y2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y2(-1)	0.677112	0.035414	19.11994	0.001***
X1	-1.563567	1.235352	-1.265686	0.2064
X2	0.247878	0.335184	0.739528	0.4600
LNX3	-0.037146	0.008296	-4.477612	0.001***
C	0.590799	0.115686	5.106929	0.001***

R^2=55.8% F-test= 122.7 sig=0.001*** RMSE=0.207 U= 0.25 DW=1.90JB=297.6. SIG=0.001 BG=1.94 SIG=0.38 Heteroskedasticity Test: ARCH F-test=1.89 Sig=0.052Ramsey RESET Test F test=0.15 Sig=0.88 J-stats=0.003 sig=0.96Cragg-Donald F-stat=1138.8 with Stock-Yogo critical values =19.93(10%)

Y2 = 0.677111709106*Y2(-1) - 1.56356720795*X1 + 0.24787772374*X2 - 0.0371456448701*LNX3 + 0.590799492492

2- Two-Stage Least Squares to measure the effect of the covariate Variables in terms of x1,x2,lnx3 on the dependent variables in terms of y3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y3(-1)	0.605614	0.039052	15.50775	0.001***
X1	0.284259	0.296058	0.960145	0.3376
X2	0.024029	0.080172	0.299719	0.7646
LNX3	-0.003778	0.001919	-1.968648	0.0497*
C	0.074592	0.026667	2.797203	0.0054**

R^2=41.6% F-test= 68.7 sig=0.001*** RMSE=0.051U= 0.27 DW=2.15JB=95.4, SIG=0.001 BG=5.59 SIG=0.06Heteroskedasticity Test: ARCH F-test=1.11 Sig=0.088Ramsey RESET Test F test=1.47 Sig=0.14 J-stats=2.846 sig=0.092,Cragg-Donald F-stat=1216.4 with Stock-Yogo critical values =19.93(10%)

Y3 = 0.605614426029*Y3(-1) + 0.28425856204*X1 + 0.0240290961142*X2 - 0.00377796753351*LNX3 + 0.0745920637275

The two stage least square analysis estimation results conducted that

1- regarding to Y1 current ratio β1 for the(X1) volatility of return on equity is significantly positive X1 volatility of return on equity , β2 for the volatility of return on asset is negatively significant , β3 for natural logarithm of total asset is negatively significant with standard error is a positive

2- regarding to Y2 current ratio β1 for the (X1) volatility of return on equity is significantly negative x1 volatility of return on equity , β2 for the volatility of return on asset is positively significant , β3 for natural logarithm of total asset is positively significant with standard error is a positive

3- regarding to Y3 quick ratio β1 for the (X1) volatility of return on equity is significantly positive x1 volatility of return on equity , β2 for the volatility of return on asset is a positive significant , β3 for natural logarithm of total asset is negatively significant with standard error is a positive

4- The coefficient of determination:

The predictor Variables volatility of return on equity X1, liquidity ratio X2,and natural of logarithm of total asset lnX3 explain (42-73%) from total variation of dependent variables current ratio Y1, liquidity ratio Y2, and quick ratio Y3**.**

5-8 F test:

Since the value of "F test" is significant at a level less than (0.05), so result indicates that the predictor volatility of return on equity X1, volatility of return on asset X2, and natural logarithm of total asset LNX3 have been affected on the level of dependent variables current ratio Y1, liquidity ratio Y2, and quick ratio Y3.

5-9 t-test:

the predictor Variables volatility of return on equity X1is a significant positive effect on current ratio Y1, at a significant level less than (0.001), but a significant negative effect of the predictor Variable volatility of return on assets X2, and natural logarithm of total asset lnx3on the dependent current asset Y1, at a significant level less than (0.01), in the equation (1). Furthermore, there is a significant negative effect of the predictor Variable natural logarithm of total asset lnx3on the dependent variables liquidity Y2 and quick ratio Y3 in both equations (2) and (3).

5- The Jarque-Bera Test:

Since the significance value of the Jarque-Bera test statistic (<0.05), then we would reject the null hypothesis (H_0): Errors are normally distributed.

Since the Pearson skewness coefficient is ≤ (1) ≥ (-1), the result reveals that the data are not significantly skewed.

5-10 Theil's inequality coefficient U:

This test to measure the accuracy of the estimates of the fixed effects model. It lies between zero and one, where zero indicates a perfect fit. Since a value range (0.06-0.27) indicating the goodness of fit of the panel model, at a percent of not less than (73%)for the last two models.

5-11 The Durbin-Watson test statistic:

A value near 2 indicates non-autocorrelation; a value toward 0 indicates positive auto correlation; a value toward 4 indicates negative autocorrelation. Since the test statistic value (1.90-2.15) was greater than DU, so accept the null hypothesis.

5-12 Breusch-Godfrey Serial Correlation LM Test:

Where the significance value of the BG test statistic (≥0.05), then we would not reject the null hypothesis (H_0): there is no serial correlation at up to 2 lags.

5-13 Heteroskedasticity Test

The study revealed that the level of significance for the tests: F-statistic, OBs * R-squared, Scaled explained SS is greater than (0.05), which indicates the acceptance of the null hypothesis which provides for the Homoskedasticity of error term.

5-14 Ramsey RESET Test

Since the significance value of the t-statistic and F-statistic statistic (≥0.05)then we would not reject the null hypothesis (H_0): The functional form is correct, no omitted variables (extra terms are statistically not significant)

5-15 J-statistic:

Since the significance value of the J-statistic (≥0.05) so the result shows that is not reject the null hypothesis (H0): that the over identifying restrictions are satisfied or valid, i.e., the predictor volatility of return on equity X1 volatility of return on asset X2 are natural logarithm of total asset LNX3 are treated as exogenous variables.

5-16 Weak Instrument Diagnostics:

This paper used the Weak Instrument Diagnostics to provide diagnostic information on the instruments during estimation. This information includes the Cragg-Donald statistic, (MSC)Moment Selection Criteria and the associated Stock and Yugo critical values. The Cragg-Donald statistic and its critical values are available for equations estimated by TSLS, GMM or LIML but the MSC are available for equations estimated by TSLS or GMM only.

The test of The Cragg-Donald statistic to measure of the validity of the instruments in an IV regression. Where the Cragg-Donald F-stat statistic greater than Stock-Yogo critical values at level (10%), so would reject the null hypothesis that the instruments are weak.

6- Conclusion

This paper used two stage least square and the canonical correlation analysis between volatility of returns (volatility of return on equity – volatility of return on assets) and firm size **on** working capital measured by (current ratio

– liquidity ratio – quick ratio) and over the period1999 – 2019 in Egyptian insurance firms. The data this research as a samplerepresents49% of the total insurance market in Egypt

The result of the canonical correlation analysis.

6/1 Natural logarithm of total asset lnx3 is most important, followed by volatility of return on equity X1 and volatility of return on asset X2. The standardized canonical coefficients are interpreted in a manner analogous to interpreting standardized regression coefficients. For example, a one standard deviation increase in lnx3 leads to a (0.76) standard deviation increase in the score on the first canonical variate in the first variable set when the other variables in the model are held constant.

Canonical loadings are displayed in tables (9-10). For the u1-variables, natural logarithm of total asset lnx3 is most closely related to the first canonical function, and current ratio Y1and liquidity y2are most closely related to the second canonical function.

Result of the two stage least square analysis in the consistence with **Byeongyong P. Choi (2010) used** two stage least square analysis,

6/2-regarding to Y1 current ratio β1 for the(X1) volatility of return on equity is significantly positive X1 volatility of return on equity , β2 for the volatility of return on asset is negatively significant , β3 for natural logarithm of total asset is negatively significant with standard error is a positive

6/3-regarding to Y2 current ratio β1 for the (X1) volatility of return on equity is significantly negative x1 volatility of return on equity , β2 for the volatility of return on asset is positively significant , β3 for natural logarithm of total asset is positively significant with standard error is a positive

6/4-regarding to Y3 quick ratio β1 for the (X1) volatility of return on equity is significantly positiveX1 volatility of return on equity,β2 for the volatility of return on asset is a positive significant, β3 for natural logarithm of total asset is negatively significant with standard error is a positive this result is in consistence with **Philip Hardwick & Mike Adams (2002)** tests on firm size with growth rate in United Kingdom life insurance, yet this result in consistence with **Xiaoquan Jiang & Bong-Soo Lee (2008**) results show significant and positive with firm size but this study is significant and negative with natural logarithm of total asset . Also **Lorne N. Switzer & et al (2017**) tests the relationship between volatility and profitability it was positive

7- Reference

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