Effect of Liquidity Risk, Premium Growth on the Performance of Quoted Insurance Firms in Nigeria: A Panel Data Analysis

Lasisi Isiaka Olalekan[1]

[1]Department of Accounting and Management, Faculty of Arts and Social Sciences, Nigerian Defence Academy,Kaduna, Nigeria.
Correspondence: Department of Accounting and Management, Faculty of Arts and Social Sciences, Nigerian Defence Academy, Kaduna, Nigeria. E-mail:lasmanyk30@gmail.com,Tel:+2348037322585

Abstract

This study assesses the effect of liquidity risk on firm performance of listed insurance companies in Nigeria for the period of 2011-2015. The listed insurance firms are twenty Five (25) in numbers out of which a sample of twelve (12) were used for the study. Liquidity risk as the independent variable was proxy with leverage, claim loss ratio and premium growth, while the return on asset was used to proxy firm performance. The study adopts a panel multiple regression techniques and data were collected from secondary source through the annual reports of the firms after controlling for fixed/random effects.The findings of random effect reveal that leverage has significant negative effect on return on assets. The claim loss ratio has insignificant negative influence on return on assets while premium growth has positive and insignificant effect on firm performance of listed insurance companies in Nigeria. It is recommended among others that the managers, shareholders and other stake holders to checkmate and control liquidity risk as it have been found empirically to enhance the quality of the firm's financial performance.

1. Introduction

Insurance industry plays a major role in the society as the operation of the industry can set energy for other industries and development of an economy (Abate, 2012). The insurance market plays an important role in the financial services industry in almost all developed and developing countries, contributing to economic growth, allocating efficient resources, reducing transaction costs, creating liquidity, promoting investments and distribution of financial losses (Das, Davies, & Podpiera, 2003). Insurance companies shares the function of banks and other financial institutions beside to the role of risk minimizing by pooling similar risk exposures (Daare, 2016). The function of insurance companies and other financial institution is to establish effective and efficient pecuniary structure by risk transfer, intermediation and savings mobilization in economy.

Consequently financial bodies canal resources and transport risks from one monetary element to another to assist resources pact and trade (Saeed & Khurram, 2015). One of the most severe liquidity stress scenarios faced by an insurer is a mass surrender of policies owing to a loss of confidence in its financial strength. This happened to Equitable Life following the House of Lords ruling on its guaranteed annuity liabilities in 2000. Risk is a natural element of business and community life (kamau, F & Njeru, 2016). It is a condition that raises the chance of losses/gains and the uncertain potential events which could manipulate the success of financial institutions (Crowe, 2009).

Financial risk is the unexpected variability or volatility of returns (Holton, 2004). It includes credit risk, liquidity risk and market risks which contribute to the volatility of financial performance (Tafri et al., 2009 & Dimitropoulos et al., 2010). The global financial crisis that began in July 2007 has highlighted gaps in the field

of liquidity risk management(Otieno & Nyagol, 2016). Financial institution have demonstrated the lack of good forecasting models to manage liquidity risk, which has led to a liquidity spiral and given rise to a sudden deterioration of financial institution balance sheets with consequent difficulties in finding new sources of liquidity on financial markets(Cucinelli, 2013). The inability of insurance firms to raise liquidity can be attributed to a funding liquidity risk that is caused either by the maturity mismatch between inflows and outflows and/or the sudden and unexpected liquidity needs arising from contingency conditions (Duttweiler, 2009).

Liquidity Risk is a risk of insufficient liquid assets to meet payouts from policies (surrender, expenses, maturities, etc.), forcing the sale of assets at lower prices, leading to losses, despite company being solvent(kamau, F & Njeru, 2016). Loss from meeting liquidity comes either from fire sale or by paying interest on borrowing to meet payouts. Liquidity risk arises due to two reasons, one on the liability side and other on the asset side (Sonjai, 2008). Financial performance on the other hand refers to the act of performing financial activity; it is used to measure firm's overall financial health over a given period of time. Financial performance is a desirable objective for all profit-oriented firms. The absence of it can indeed spells failure. Typical measures of financial performance are profitability,(Yahaya & Lamidi, 2015).

In Nigeria, previous studies such as (Ahmed *et al* (2011), Daniel and Tilahun (2012), Sumaira and Amjad (2013) among others concentrated on the effect of liquidity on profitability of commercial banks and non financial institution. From the review, very few study focus on insurance sectors. This study therefore differs by concentrating on the effect liquidity risk, premium growth on the performance of insurance firms in Nigeria. In order to achieve this, we hypothesized that; Ho$_1$: liquidity risk, premium growth has no significant effect on the Performance of insurance firms in Nigeria.

2. Literature Review

2.1 Liquidity Risk and Firms Performance

Performance measures serve as a basis for evaluating the financial performance of a corporate entity. Performance of an organization can be measured through return on assets (ROA), return on equity (ROE), earnings per share (EPS) among others. Furthermore, many researchers; Pathirawasam and Adriana, (2013); Ali, Mohammed & Amer, (2015); Yahaya & Lamidi, 2015; have used ROA to measure the financial performance of companies. For this, ROA has been will be used this study as the dependent variable for analysis. This variable is most sustainable because it is measure of efficiency, by revealing how effectively and efficiently a firm utilizes the resources (assets) at its disposal, in revenue generation. The liquidity risk factor that affect the firm performance of insurance companies include, liquidity ratio, premium growth rate, leverage, underwriting risk, claim ratio loss among others. This study therefore focuses on leverage risk, claim ratio loss, and premium growth rate because they are liquidity risk attributes that relates to the performance of insurance companies

Leverage Risk

Insurance companies could prosper by taking reasonable leverage risk or could become insolvent if the risk is out of control. Nevertheless more empirical evidence supports the view that leverage risk reduces the performance of the companies. It is a financial ratio that indicates the percentage of firm's asset that is financed with debt. Leverage is measured as total liabilities to total assets (Nikhik, Kingshuk, and Mihir., 2015; Mehari and Aemiro, 2013). In this study the ratio of total liabilities to total asset is taken as an independent variable.

Claims Ratio

The claim ratio is something very specific for the insurance business. It is claims payable as a percentage of premium income. This is also known as claims loss ratio. (Pietersz,   2016.). The claims ratio measures the number of claims in a period and divides that by the earned premium for the same period. Insurance is the business of managing liquidity risks and it is essential to have a thorough understanding of the incurred claims

ratio. If the value is higher than expected or established norms, then further investigation is required to figure out why that is. It is important to investigate if there is a threat of an insurance fraud. If the ratio is lower than expected, it could indicate irrelevant products or difficulties in claiming, possibly affecting customer satisfaction, and obviously requires more investigation. (Klipfolio 2016.).

Premium Growth Rate

Premium growth is another important financial variable that influences the financial performance of insurance companies. Therefore the growth in premium of the firm has been argued to have influenced on the financial performance of insurance companies and this has been studied frequently. Premium growth as measured by percentage change in total assets or sometimes as percentage change in premium of insurance companies (Abate, 2012). Premium growth rate measures the rate of market penetration (Ahmed *et al,* 2011).

2. 2 Liquidity Risk and Financial performance: An Empirical Review

This section focuses on related studies of which emphasis is placed on the attributes used in this study as they relate to performance of insurance companies. For instance kamau, & Njeru, (2016) examine the effect of liquidity risk on financial performance of six Insurance Companies Listed at the Nairobi Securities Exchange for the period 2012-2015. The risks studied included operational risk, market risk and credit risk. The study was descriptive in nature. It was found out that operational, market and credit risks has negative effect on the financial performance. The study recommended that measures should be put into place to hedge these risks and hence maintain a healthy financial performance.

Muriithi & Waweru, (2017) conduct a study on liquidity risk and financial performance of 43 registered commercial banks in Kenya over a period of (2005 – 2014). Liquidity risk was measured by liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) while financial performance by return on equity (ROE). Panel data techniques of random effects estimation was used for the study. Findings indicate that NSFR is negatively associated with bank profitability both in long run and short run while LCR does not significantly influence the financial performance both in long run and short run. It is recommended that bank's management to pay the required attention to the liquidity management. Similarly, Iqbal ,Chaudry, qbal & Zia ud Din   (2015) examine the impact of liquidity risk on firm specific factors; A case of four (4) Islamic bank of Pakistan   for the period of   2000-2013. Their findings reveal that profitability is negatively co integrated with liquidity risk, exist strong positive significance of return on assets on liquidity risk, leverage is found to be positively correlated with liquidity risk and bank size has positive impact on liquidity risk. The findings of this study might not be widely accepted since the study is centered on Islamic banks.

Otieno & Nyagol, (2016) examine the relationship between Liquidity risk management and financial performance of microfinance banks in Kenya. Longitudinal research design utilizing panel data covering the period from 2011 to 2015 was used. The findings were that Liquidity risk management with FGR and CAR parameters had a strong Positive correlation (r=0.45), giving a significant negative relationship with both ROAA and ROAE performance measures as depicted by regression coefficient of 0.3 estimated by GMM. Also, Mehari & Aemiro, (2013) conduct a study on firm specific factors that determine insurance companies' performance in Ethiopia. Return on total assets (ROA) - a key indicator of insurance company's performance- is used as dependent variable while age of company, size of the company, growth in writing premium, liquidity, leverage and loss ratio are independent variables. The sample includes 9 insurance companies over the period 2005- 2010. The results of regression analysis reveal loss ratio (risk) is statistically significant and negatively related with ROA of insurance companies in Ethiopia. But, growth in writing premium, insurers' age and liquidity have statistically insignificant relationship with ROA.

Saeed & Khurram, (2015) examine the factors influencing the financial performance of 24 non-life insurance

companies of Pakistan over the period 2005 - 2013. Fixed effect model of Hausman test was employed for the study. The findings indicate that loss ratio proves significant in determining performance. Also, Nikhik, Kingshuk, Mihir (2015) conducted a study on firm specific factors affecting the overall financial performance of life insurance companies in India over the period of ten (10) years from 2003-04 to 2012-13. The analysis shows that there is significant negative relationship between leverage and financial performance (ROE). Also, Kambi & Ali, (2016) study the effects of financial risk management practices on the financial performance of 44 listed banks at the Nairobi Securities Exchange. Secondary data was used and census approach was used since the target population is small. The study recommends that there is need for the management to maintain the liquidity level at safe level and training could be organized for staff so that they learn more about the concept of financial risk management on financial performance.

Cucinelli, (2013) conduct a study on the relationship between liquidity risk and probability of default: Evidence from the Euro Area. The sample is composed of 575 listed and non-listed Eurozone banks and the methodology applied in the analysis is OLS regression based on panel data. The results show a relationship only between the liquidity coverage ratio and credit rating, while there is no relationship between the long- term liquidity measure and probability of default. Similarly, Hossein, Dezfouli, Hasanzadeh, & Shahchera, (2014) inspect the effectiveness of liquidity risk on banks profitability in Iran. Using a four-step econometric model and GMM linear forecasting model, it was concluded that there is a significant relation between mentioned factors (NPL (dependent variables- Non-Performing loans ratios, liquidity ratios, liquidity gap ratio, capital ratio, and bank size) and the profitability ones (independent variables- ROE and ROA). Furthermore, Ail, Tabari, Ahmadi, & Emami, (2013) examine the effect of liquidity risk on the performance of commercial banks using of panel data related to commercial banks of Iran during the years 2003 to 2010. In the estimated research model, two groups of bank-specific variables and macroeconomic variables are used. The results of research show that the variables of bank's size, bank's asset, gross domestic product and inflation will cause to improve the performance of banks while credit risk and liquidity risk will cause to weaken the performance of bank.

2.3 Theoretical Framework of the Study

There are two theory that accord these study; risk return theory and extreme value theory.

Markowitz (1952) is the pioneer scholar that propounded the risk return theory .The theory that underpins this study is Risk-Return Theory; this is because insurance companies is both a risk-taking and profit making business, and insurance firms activities should return profits commensurate with their risk. The higher the risk, the higher will be the financial performance and vice versa. This postulation is true when the insurance firm risk appetite is lower than the risk tolerance.

Extreme value theory which was pioneered by Leonard Tippet in the 1950's. is a practical and useful tool for modeling and quantifying risk. It is the theory of modeling and measuring events which occur with very small probability. This implies its usefulness in risk modeling as risky events per definition happen with low probability. This theory shows that the probability on very large losses is eventually governed by a simple function, regardless the specific distribution that underlies the return process. .

3. Research Methodology

This study adopts the Correlation research design. The data were obtained from secondary sources through the firm's audited annual reports. The population of the study consists of the twenty five (25) listed insurance companies in Nigeria as at 31st December 2016 (NSE, 2016). The sample size is twelve (12) over the period 2011 to 2015. This study relied on the use of judgemental sampling techniques which is based on the availability and accessibility of data. Multiple regression techniques were used for the analysis through the use of STATA 13.0. The model encapsulates the contribution of Leverage, claim loss ratio and premium growth on the firm

performance given as; $ROA_{it} = \beta_{0it} + \beta_1 LV_{it} + \beta_2 CL_{it} + \beta_3 PG_{it} + \varepsilon_{it}$

Where, Return on Asset (ROA) are measure as firm performance, β_0 = constant, $\beta_1 \ldots \beta_3$ = the slope which represents the degree in which financial performance changes as the independent variable change by one unit variable., LV = Leverage, CL = claim loss ratio, PG= premium growth, ε = error term, t = measure of time, i = number of insurance firm observation. Where:

Return on Asset (ROA)	=	Profit before tax/Total Asset
Leverage (LV)	=	Total Liabilities/Total Asset
Loss Ratio (CLR)	=	Net claims incurred/ Net earned premiums
Premium Growth (PG)	=	Current Premium–Previous Premium/Previous Premium

4. Result and Discussions

This section presents the result of data analysis and tests of hypotheses formulated earlier in the paper. First, descriptive statistics, followed by the correlation matrix table and then the summary of Regression Result are presented and analyzed.

Table 1: Descriptive Statistics

Variables	No of OBS	Minimum	Maximum	Mean	Standard Dev.
ROA	60	- 0.2142	0.2228	0.03353	0.0643
Leverage	60	0.1351	1.2628	0.56816	0.2254
Claim Loss Ratio	60	0.1918	1.5808	0.3942	0.1882
Premium Growth	60	-0.5025	1.4187	0.1467	0.3012

Sources: Output of Stata$_{13}$ Result

Table 1 above presents the descriptive statistics for all the variables of the study. From the description, it is observed that for the sampled firms and for the period covered by the study, the average value for financial performance (ROA) is 0.3353 with standard deviation of 0.6143 which is very far to the mean. The mean value leverage (LV) of 0.568 or 57% is an indication that debt financing in the insurance sector is to the tune of 57% of the total finance sources. The remaining 43% are sourced from asset financing. The claim loss ratio has minimum and maximum value of 0.19 and 1.58 respectively with the mean value of 0.3935 and standard deviation of 0.1882. Therefore, there exists a moderate variation among the value of loss ratio across the sample insurance companies included in this study. Premium growth has an average mean value of 0.1467 and standard deviation of 0.3012 with a minimum and maximum are -0.5025 and 1, 4186.

Table 2: Correlation Matrix Table

Variables	ROA	LV	CLR	PG
ROA	1.0000			
LV	-0.4197*	1.000		
	0.0008			
CLR	-0.1191	0.1706	1.0000	
	0.3649	0.1925		
PG	0.2142	-0.1171	-0.3138*	1.0000
	0.1004	0.3730	0.0146	

Sources: Output of Stata$_{13}$ Result

Table 2 above captures the correlation values between the independent variables and dependent variable as well as among independent variables themselves. From the table it is revealed that leverage is significant negative related with ROA, also there exist insignicant and negative association between Claim loss and return on asset. This implies that the higher the Claim loss the lower the return on asset and vice versa. Furthermore, ROA is however positively correlated with premium growth and insignificant, this implies that the higher the premium growth the higher the return on asset. The correlation matrix also revealed that no two explanatory variables were perfectly correlated. This means that there is the absence of multicolinearity problem in the model.

4.1 Regression Diagnostics Tests

The value of F- statistics of 9.73 (p-0.0210) is significant at 5% level of significance. This indicates that the model is fit and the explanatory variable are properly selected, combined and used. The results of the VIF further prove the absence of perfect multicollinearity among the independent variables, because the mean Variance Inflation Factor (VIF) is 1.09. The rule of thumb is that a value of VIF of 10 and above is a suggestion of multicolinearity among the explanatory variables (Gujarati, 2004). Breusch-Pagan / Cook-Weisberg test for heteroskedasticity revealed homoskedastic results (Prob > chi2 = 0.0602). Besides Ramsey RESET (regression specification error test) test was performed for model specification and the results show the model has no omitted variable (Prob > chi2 = 0.1434).

4.2 The Regression Result

Table 3 below is the regression result of the random effect model. The model was selected for interpretation because the hausman specification test favors the random effect model with, probability of 0.3062 which is not significant at 5%. The cumulative R^2 of 0.1970 is the multiple coefficient of determination which shows the percentage of the total variation in the dependent variable explained by the independent variable together. Therefore, it indicates that 20% of total change in operating performance of quoted insurance companies in Nigerian is explained by their level of leverage, claim loss ratio and premium growth.

Table 3: Summary of Regression Result – Random Effects Model

Variables	**Coefficient**	**t-value**	**P-value**	**VIF**	**1/VIF**
Constant	0.967694	3.34	0.001		
Leverage	-0.0997178	-2.43	0.015	1.03	0.966417
Claim Loss ratio	-0.0253039	-0.59	0.553	1.13	0.883331
Premium growth	0.0231079	0.95	0.344	1.11	0.897344
Mean VIF					1.09
Hausman	Ch2=3.61		pro>chi2=0.3062		
R2 (overall)			0.1970		
F-Statistics	FStat=9.73		P>F=0.0210		
Ramsey test	F=1.88		P>F=0.021		

*Source: STATA Output Result*** Significant at 5%

Test of Hypothesis and Policy Implication

There is no significant effect for leverage on return on asset. It was found that the beta coefficient (β) of -0.0997178 and ρ=0.015 at 5% level of significant. This implies that an increase in the liabilities by 1% will lead to decrease in the performance of the study insurance firm by 9%. The result suggested that the insurance firms should properly manage their liabilities in order to avoid future insolvency or liquidation. Thus, it can be

concluded that insurers with high leverage (using leverage beyond a level) will have adverse impact on the profitability. This finding is against the study results of (Charumati, 2012). The study therefore provides evidence to reject the null hypothesis. Hence, there is a significant negative relationship between insurance leverage and return on assets.

Claim loss ratio has no significant effect on the return on assets. The claim loss ratio has a beta coefficient of -0.0253039 with a p-value of 0.553 which is insignificant at 5% level. This implies that for every 1% increase of claim loss ratio, return on assets of insurance companies in Nigeria will decrease by 3%. The study is supported by (Saeed & Khurram, 2015). This provides evidence for us to accept the null hypothesis and conclude that claim loss ratio has negative and insignificant effect on return on assets of listed insurance firms in Nigeria.

Finally, premium growth has no significant effect on the return on assets. The computed value of beta coefficient is 0.0231079 with p-value of 0.344; therefore, premium growth has a positive relationship with return on assets and is found to be statistically insignificant. This implies that an increase in premium growth by 1% will result to 2% increase in return on asset. This indicate that the higher premium growth over the study period, the better the returns on asset and this increase in the insurance firms profitability is at a marginal level. This result is in line with the findings of ((Mehari & Aemiro, 2013). This provides evidence for us to accept the null hypothesis and concluded that the premium growth has no significant effect on return on assets.

5. Conclusion and Recommendation

In this study, the empirical analysis of examining the effect of liquidity risk on the performance of insurance firms in Nigeria was conducted using a panel data set consisting of financial data of twelve insurance companies over the period of 2011 to 2015. The results of panel multiple regression analysis revealed that leverage are negative and statistically significant to explain performance of insurance companies in Nigeria. Claim loss and premium growth have no a statistical significant relationship with performance of insurance firms in Nigeria. The result of the study also shows that insurance firms claim loss was negatively related to performance (ROA) while premium growth were positively related to insurance performance.

The researcher therefore recommends that there is need to invest on measures to curb liquidity risk in these companies in order to have a sound financial performance and manage properly the leverage of the insurance companies. These risks can be avoided by ensuring correct and effective measures are in place. Potential investors, shareholders and managers should monitor the leverage, claim loss levels and the growth of firm's premium they intend to invest in, so as to check whether they are questionable or favorable. This will help these investors in making wise investment decisions. This will benefit investors to take advantage on the investment opportunities available when these variables vary. While this study provides some insights of the study variables, the implications of the new liquidity frameworks proposed by the study warrants further research.

References

Ahmed, N., Ahmed, A., & Usman, A. (2011). Determinants of performance: A case of life insurance sector of Pakistan. *International Research Journal of Finance and Economics (61), 123-128.*

Ali, F. A., Mohammed, S.B., & Amer, M.A.,(2015), Corporate Governance, Firm Attributes and Financial Performance of Saudi Listed Banks. *World Review of Business Research, 5 (3).*

Agnes, W K., (2013) Relationship between Firm Characteristics and Financial Performance of Life Insurance Companies in Kenya. *Unpublished   Master Of Science In Finance, University Of Nairobi.*

Ail, N., Tabari, Y., Ahmadi, M., & Emami, M. (2013). The Effect of Liquidity Risk on the Performance of Commercial Banks. *International Research Journal of Applied and Basic Sciences*, *4*(6), 1624–1631.

Cucinelli, D. (2013). The relationship between liquidity risk and probability of default: Evidence from the euro area. *Risk Governance and Control: Financial Markets and Institutions*, *3*(1), 42–50.

Charumati, B (2012). On the determinants of profitability of Indian life insurance. An empirical study, proceedings of the world congress on engineering. vol.1. London UK. (www.iaeg.org/publications/wae2012).

Daare, W. J. (2016). Determinants Of Non-Life Insurance Companies Profitability: An Empirical Study In India. *International Journal of Innovative Research and Advanced Studies*, *3*(13).

Ferrouhi, E. M. (2014). Bank Liquidity and Financial Performance: Evidence from Moroccan Banking Industry. *Business: Theory and Practice*, *15*(4), 351–361.

Hossein, M., Dezfouli, K., Hasanzadeh, A., & Shahchera, M. (2014). Inspecting the effectiveness of liquidity risk on banks profitability. *Kuwait Chapter of Arabian Journal of Business and Management Review*, *3*(9), 191–207.

kamau, F & Njeru, A. (2016). Effect of Mergers on Financial Performance of Firms Listed at the Nairobi Securities Exchange. *International Journal of Science and Research (IJSR) ISSN*, *5*(10), 867–872. https://doi.org/10.21275/ART20162288

Kambi, R., & Ali, A. I. (2016). Effects of Financial Risk Management Practices on Financial Performance of Listed Banks at the Nairobi Securities Exchange in Kenya. *THE International Journal Of Business & Management, 4(4), 19–36.*

Mehari, D., & Aemiro, T. (2013). Firm Specific Factors That Determine Insurance Companies'Performance in Ethiopia. *European Scientific Journal*, *9*(10), 245–255. Retrieved from http://eujournal.org/index.php/esj/article/view/961

Muriithi, J. G., & Waweru, K. M. (2017). Liquidity Risk and Financial Performance of Commercial Banks in Kenya. *International Journal of Economics and Finance*, *9*(3), 256. https://doi.org/10.5539/ijef.v9n3p256

Nikhik B, Kingshuk i, R. M. (2015). Factor Determining Financing Performance of Life insurance Companies of India-an Empirical Study. *EPRA International Journal of Economic and Business Review*, *2*(8), 42–48.

O A, Yahaya & Lamidi, Y. (2015). Empirical Examination of the Financial Performance Of Islamic Banking In Nigeria : A Case Study Approach. *International Journal of Accounting Research*, *2*(7), 1–13.

Otieno, S., & Nyagol, M. (2016). Empirical Analysis on Relationship between Liquidity risk management and financial performance of microfinance banks in Kenya. *Research Journal of Finance and Accounting*, *7*(6), 115–142.

Saeed, U., & Khurram, N. (2015). Factors Influencing the Financial Performance of Non-Life Insurance Companies of Pakistan. *International Journal of Empirical Finance*, *4*(6), 354–361.

Appendix

Sample Nigeria Insurance Firms

1. Consolidated Hallmark Insurance Plc
2. AIICO
3. Continental Reinsurance Plc
4. Cornerstone insurance plc
5. Great Nigeria insurance plc
6. Guinea insurance plc
7. International energy insurance plc
8. Niger insurance plc
9. Sovereign trust insurance plc

10. Equity assurance plc

11. Mutual benefits assurance plc

12. Lasaco assurance plc

```
        ___   ____  ____   ____  ____   (R)
       /__    /   ____/   /   ____/
      ___/   /   /___/   /   /___/    13.0    Copyright 1985-2013 StataCorp LP
        Statistics/Data Analysis          StataCorp
                                          4905 Lakeway Drive
          MP - Parallel Edition           College Station, Texas 77845 USA
                                          800-STATA-PC        http://www.stata.com
                                          979-696-4600        stata@stata.com
                                          979-696-4601 (fax)

3-user 8-core Stata network perpetual license:
        Serial number:  501306208483
          Licensed to:  lasisi
                        kaduna

Notes:
        1.   (/v# option or -set maxvar-) 5000 maximum variables
        2.   New update available; type -update all-

Checking for updates...
(contacting http://www.stata.com)
host not found
http://www.stata.com did not respond or is not a valid update site
unable to check for update; verify Internet settings are correct.

. *(6 variables, 60 observations pasted into data editor)

. summarize roa lv clr pg

    Variable |        Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------------
         roa |         60      .03353    .0614306      -.2142       .2228
          lv |         60      .56816    .2254438       .1351      1.2628
         clr |         60       .3942    .1881533       .1918      1.5808
          pg |         60    .1467467    .3012165      -.5025      1.4187

. pwcorr roa lv clr pg, sig star(5)

             |      roa       lv      clr       pg
-------------+------------------------------------
         roa |   1.0000



          lv |  -0.4197*  1.0000
             |   0.0008


         clr |  -0.1191   0.1706   1.0000
             |   0.3649   0.1925


          pg |   0.2142  -0.1171  -0.3138*  1.0000
             |   0.1004   0.3730   0.0146


. regress roa lv clr pg

      Source |       SS       df       MS              Number of obs =      60
-------------+------------------------------           F(  3,    56) =    4.78
       Model |  .045373509      3   .015124503         Prob > F      =  0.0049
    Residual |    .1772759     56   .003165641         R-squared     =  0.2038
-------------+------------------------------           Adj R-squared =  0.1611
       Total |  .222649409     59   .003773719         Root MSE      =  .05626

-------------+----------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lv |  -.1091059    .033051    -3.30   0.002    -.1753149   -.0428968
         clr |   .0006341    .041422     0.02   0.988    -.0823442    .0836124
          pg |   .0342411   .0256712     1.33   0.188    -.0171845    .0856668
       _cons |   .0902449   .0254104     3.55   0.001     .0393417     .141148
-------------+----------------------------------------------------------------

. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
         clr |      1.13    0.883331
          pg |      1.11    0.897344
          lv |      1.03    0.966417
-------------+----------------------
    Mean VIF |      1.09

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of roa

        chi2(1)      =      3.53
        Prob > chi2  =    0.0602

. ovtest

Ramsey RESET test using powers of the fitted values of roa
        Ho:  model has no omitted variables
                F(3, 53) =      1.88
                Prob > F =    0.1434
```

```
. xtset firm year
       panel variable:  firm (strongly balanced)
        time variable:  year, 2011 to 2015
                delta:  1 unit

. xtreg roa lv clr pg, fe

Fixed-effects (within) regression              Number of obs      =          60
Group variable: firm                           Number of groups   =          12

R-sq:  within  = 0.1012                         Obs per group: min =           5
       between = 0.1880                                        avg =         5.0
       overall = 0.1372                                        max =           5

                                                F(3,45)            =        1.69
corr(u_i, Xb)  = 0.0610                          Prob > F           =      0.1828

------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lv | -.0549078   .0729111    -0.75   0.455    -.2017583    .0919427
         clr | -.0650551   .0500785    -1.30   0.201    -.1659185    .0358083
          pg |   .014728   .0257962     0.57   0.571    -.0372282    .0666841
       _cons |  .0882098   .0413802     2.13   0.039     .0048658    .1715539
-------------+----------------------------------------------------------------
     sigma_u |  .03777526
     sigma_e |  .05031314
         rho |  .36049328   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:       F(11, 45) =      2.28             Prob > F = 0.0262

. estimates store fixed

. xtset firm year
       panel variable:  firm (strongly balanced)
        time variable:  year, 2011 to 2015
                delta:  1 unit

. xtreg roa lv clr pg, re

Random-effects GLS regression                  Number of obs      =          60
Group variable: firm                           Number of groups   =          12

R-sq:  within  = 0.0859                         Obs per group: min =           5
       between = 0.3500                                        avg =         5.0
       overall = 0.1970                                        max =           5

                                                Wald chi2(3)       =        9.73
corr(u_i, X)   = 0 (assumed)                     Prob > chi2        =      0.0210

------------------------------------------------------------------------------
         roa |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lv | -.0997178   .0410809    -2.43   0.015    -.1802349   -.0192006
         clr | -.0253039   .0426725    -0.59   0.553    -.1089404    .0583327
          pg |  .0231079   .0244115     0.95   0.344    -.0247378    .0709537
       _cons |  .0967694    .029001     3.34   0.001     .0399286    .1536103
-------------+----------------------------------------------------------------
     sigma_u |  .02607035
     sigma_e |  .05031314
         rho |  .21166216   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store random

. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random         Difference          S.E.
-------------+----------------------------------------------------------------
          lv | -.0549078    -.0997178          .04481           .0602361
         clr | -.0650551    -.0253039         -.0397512          .0262091
          pg |   .014728     .0231079          -.00838           .0083378
------------------------------------------------------------------------------
                       b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        3.61
                Prob>chi2 =      0.3062

.
```

Copyrights