EXAMINING EFFECT OF FORWARD INTEGRATION CREDIT RISK MITIGATION MECHANISMS ON RETURN ON EQUITY (ROE) OF AGRIBUSINESS FIRMS IN KENYA

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Abstract:-

Commercial Banks apply Forward Integration Credit Risk Mitigation Mechanisms (FICRMMs) to promote credit access, security and productivity for various sectors, since credits make a significant portion in business' capital structure and performance. Credits to the agribusiness sector; which contributes 53% to employment in developing countries, and 80% in Kenya, has registered decreasing trends between 2002 and 2016; ranging from 6.5% to 2.9%. However, there is little information on the effect of Forward Integration Credit Risk Mitigation Mechanisms on agribusiness firms' performance with respect to Equity as owner investments in Agribusiness Enterprises in Nyanza region; where agribusiness operations play core absorption over 80% of its labour-force. The purpose of this study was to analyse the effect of Forward Integration Credit Risk Mitigation Mechanisms on Return on Equity (ROE) of agribusinesses enterprises. With objectives of determining the effect of the mechanisms on ROE, the single period Regression results reveal R^2 of 0. 647 to return on equity (ROE), implying that FICRMMs account for 57% of ROE at significant level $p<0.05$.

Key words:-*Forward integration, Credit Risk mitigation, Return on equity*

INTRODUCTION

According to Pandey (2002), profitability means ability of a firm to make profit from all its business activities; showing how efficiently the management can make profit by using all the resources available in the market. However, Harward & Upton (1961) states that "profitability is the ability of a given investment to earn a return from its use." Dumbrava (2010) subsequently defines profitability as the contribution of various resources to the increase of efficiency. Delen, Kuzey and Uyar (2013), analyze firm profitability through financial ratios (i.e. Return on Assets, Return on Equity, Net Interest margin among others), as predictive measures of performance. Robert (2010) explains that Return on Equity (ROE) as a function of the profit margin, asset turnover, and financial leverage. He states that careful management of these levers can positively affect ROE. He also asserts that although ROE as a measure of financial performance suffers from three critical deficiencies, which are, the timing problem, the risk problem, and the value problem; which if seen in proper perspective, will make Return on Equity remains a useful and important performance indicator, but it must be interpreted in light of its limitations. This implies that it must not be automatically assumed that a higher Return on Equity (ROE) is always better than a lower one. Mathew, Mark and Jon (1995), states that in contrast with common perception that credits are a costly burden to the borrowers, commercial bank loans elicit significantly positive borrower returns on equity (ROE). He argues that the credit risk mitigation mechanisms must therefore be implemented in such a way that takes care of the entire effect on borrowers' business performance especially the contribution to profit of his owner equity in the entire investment. Felix and Claudine (2008) gives an inferential evidence that return on equity (ROE) and return on assets (ROA), both as measures of profitability, inversely relate to the nonperforming loan totals, thereby leading to a decline in profitability of both the bank and borrower firms.

1.2 Statement of the Problem

The role of borrower business profits in loan repayment, while grant of loans is to an extent dependent on Forward Integration Credit Risk Mitigation Mechanisms; and the fact that growth stage is financed through debt to help realise faster growth, requires examination of credit risk management effect on borrowers' profitability, Return on Equity and growth in capital employed. A majority of the literature does not relate to specific sectors' performance measures; and are commonly analysed on the basis of expected rather than actual firms' return. This scanty information leaves a gap that requires deeper sector specific designed study to analyse the effect of Forward Integration Credit Risk Mitigation Mechanisms on performance of the agribusiness sector.

1.0 Literature Review

Koulafetis (2017), on Modern Credit Risk Management- Theory and Practice, Provides a guide to assessing and managing credit risks at bank, sovereign, corporate and structured finance level, using quantitative, qualitative and legal tools. It strongly advocates the importance of sound credit risk management and how this can be achieved with prudent origination, credit risk policies, approval process, setting of meaningful limits and underwriting criteria. Dean (2009) explains that a credit model that is innovatively designed to promote borrowing, and at the same time secure default risk, helps small and medium scale business firms to grow their capital base; and consequently enable them to acquire a consistent but controlled development. Kargi (2011) established that credit risk management has significant impact of profitability of banks as lenders, and subsequently asserts that this condition arises from increased loans and advances to the borrower firms resulting into borrowers' capital growth, Return on equity and Profit after tax. Thierry (2000), in his study of Imperfect Information, Social Capital and the poor access to credit, found that well documented interrelations between the lender and borrower and quality between lender and borrower organisations as important in credit risk management, borrower business returns, productivity and sustainability.

Samuel, Dasah and Kwaku (2012) state that Credit risk management is very vital, not only to measure and optimize the profitability of banks, but also for borrowers' profitability. They recognize that the capacity of the borrowers to repay the loans arise from their profits partly generated through credit finance, while Basel (1999) explains that the long term success of any banking institution depended on effective system that ensures repayments of loans by borrowers which is critical in dealing with asymmetric information problems, thus, reduces the level of loan losses. Borrowers therefore rely upon credits to build their capital base (Malik and Lyn, 2010), which Kimathi (2008) attributes to enhancing business financing, to trigger real business incomes. The critical role of the borrower business profits in the repayment of the loans, whose grant is a function of the Forward Integration Credit Risk Mitigation Mechanisms, and the fact that growth stage is financed through debt to help realise faster growth, given that credit risk management affects both the borrowers' and lenders' profitability, makes it necessary to determine the effect of credit risk mitigation mechanisms on the performance of agribusiness firms, with respect to profitability, Return on Equity, growth in capital employed. The role of borrower business profits in loan repayment, while grant of loans is to an extent dependent on Forward Integration Credit Risk Mitigation Mechanisms; and the fact that growth stage is financed through debt to help realise faster growth, requires examination of credit risk management effect on borrowers' profitability.

As credit risk mitigation framework caters both for protection from default and borrowers' capacity to limit default (Duffie, 2008). Wolfgang (2005) observes that the Commercial banks' handling of credit risk constantly seeks to ascertain the risk- profit profiling in a way that the interest of lenders and borrowers, including regulators, are satisfied. However, in departure from expectation, the agricultural sector has been receiving the least level of credit facilities from commercial banks with exception of a few banks (Koza, 2007). UNIDO (2012) asserts that the financing structure should be developed to help grow the sector's capital base for sustainable productivity. According to Angius *et al* (2011), all these have been

modeled in the risk mitigation schedules of the lending institutions to agribusiness borrowers. Malik (2007) asserts that businesses rely upon credit for operations, to bridge the gap between production of products and payment for them, promote investment and build capital; and to cover swings in supply and demand conditions. Pavla (2007) further explains that the Probability that the bank would lower its loss from any kind of credit risk mitigation depends on type of borrowers' default and use of method of credit risk mitigation. Agribusiness' significant contribution to the economy makes it a vehicle for enhancing agricultural profitability, sustainability and adaptability, through focused investment (Gichira, 2010). Mhalanga (2010), says that new funding mechanisms with strategic agribusiness funding and credit risk mitigation operations that not only cushion the fund providers from the uncertainty of returns due to default, but also enhance credit consumers' capacity to refund and improved investment returns is critical. Kolapo, *et al* (2012) concludes that loans and advances ratio coefficients exert the most significant positive effect on profitability as an aggregate outcome of Return on Equity and Return on Assets, not only across the banking firms but also as a function of the borrower performance.

Robert (2010) explains that ROE is a function of the profit margin, asset turnover, and financial leverage. It is a filtered index of profitability and continued investment in a firm by both owners and creditors. He further states that careful management of these levers can positively affect ROE. He also asserts that although ROE suffers from three critical deficiencies as a measure of financial performance, that is the timing problem, the risk problem, and the value problem, Seen in proper perspective, ROE remains a useful and important performance indicator, but it must be interpreted in light of its limitations, and no one should automatically assume a higher ROE is always better than a lower one. Mathew *et al* (1995), states that in contrast with common perception that credits are a costly burden to the borrowers, commercial bank loans elicit significantly positive borrower returns on equity (ROE), Return and Assets (ROA). He argues that the credit risk mitigation mechanisms must therefore be implemented in such a way that takes care of the entire effect on borrowers' business performance. Ian (2006) states that credit risk transfer by the lenders impact on profit growth trends of a business, which consequently influence the business Return on Equity (ROE). This occurs where the banks' Credit Risk

Mitigation Mechanisms considers the borrowers return environment. Felix and Claudine (2008), while investigating the relationship between banks' performance and credit risk management, give an inferential evidence that "return on equity (ROE) and return on assets (ROA), both as measures of profitability, inversely relate to the non- performing loan totals, of the financial institutions thereby leading to a decline in profitability of both the bank and borrower firms. Return on Equity being a filtered index of a firm's profitability and continued investment in a firm by both owners and creditors such as commercial banks and the fact that commercial bank credits elicit significantly positive borrower returns on equity (ROE), while the effect of the credit risk mitigations on agribusiness sector's ROE is unknown due to the fact that its relationship with probability of default (PD) is based on less investigated assumptions. A majority of the literature also does not relate to specific sectors' performance measures; and are commonly analysed on the basis of expected rather than actual firms' return of large scale, highly formal industry. Subsequently is becomes necessary to examine the effect of credit risk mitigation mechanisms on Return on Equity in specific sectors of the economy, such as the agribusiness sector.

Findings of Ian (2006), on an empirical analysis of the effect of lenders' Credit Risk Transfer Activities on Borrowing firms' Return on Equity (ROE), posits that ROE places greater value on information contained in the announcement of the new loans extended by the banks that have a track record of securitizing credit risks; which implies that ROE is sensitive to continued credit provision to the borrower firm. The evidence so adduced suggests that the risk effect significantly reduces if the lender sells off portfolio credit risk through collateralization of loan obligations, which subsequently reduces risk inherent in the increased credit spread. These findings imply that there is need by the commercial banks to systematically participate increase the loan demand although they are a credit supply side. This provides two prong the need to analyse the variables on a sector specific orientation to establish the effects of the variables on ROA, Profits and Loan Advances to Total Deposit and measure the credit volume to the sector.

Felix and Felix and Claudine (2008) while investigating the relationship between banks' performance and credit risk management, gives an inferential evidence that "return on equity (ROE) and return on assets (ROA), both as measures of profitability, inversely relate to the non- performing loan totals of the financial institutions, thereby leading to a decline in profitability of both the bank and the borrower firms. The evidence that ROE is positively sensitive to continued flow of credit, while at the same time Return on Equity has inverse relations to non-performing loans, despite the fact that Return on Equity is consequent to profitability of a firm, creates a critical need to examine the relation between credit mitigation and Return on Equity.

3.0 Methodology
This study adopted a descriptive longitudinal research design which is positivist in philosophical orientation. The method allows for analysing panel and time series data, deductive theorizing, empirical verification and quantification of qualitative observations; as are requisite for this study. It therefore enables the researcher to explain how credit risk mitigants impact on agribusiness performance indicators over time (Graeme and Anne, 2008). This is for the period 2002 to 2016; analysing both primary and secondary producer firms. With a sample size of 45 firms, stratified and randomly selected for objectivity in selecting a sufficient number of subjects from each stratum and fair representativeness of population's characteristics, a five point Likert scale questionnaire to determine the levels of implementation of Forward Integration Credit Risk Mitigation Mechanisms (FICRMMs) and secondary data schedule for collating performance

information, the data was tested for reliability using Cronbach's alpha test giving a standardised coefficient of 0.839; allowing for analysis for social science.

The VAR general model form for the analysis is constructed as

$$y_t = f(y_{t-i}, x_{t-i}, y_{t-i}, w_{t-i}, u_{t-1} \varepsilon_t) \quad t = 1, 2, ..., T; \quad i = 1, 2, ..., k \quad (3\text{-}1)$$

Where:

$z_t = Portfolio\ Diversification$

$y_t = Information\ Managemnt$

$w_t = Credit\ Insurance$

$u_t = Technical\ Assistan ce$

$y_t = Performance$

Where ROE function is represented by:

$$y_t = a_{51}x_{t-1} + a_{52}z_{t-1} + a_{53}w_{t-1} + a_{54}u_{t-1} + a_{55}z_{t-1} + b_{51}x_{t-2} + b_{52}z_{t-2} + b_{53}w_{t-2} + b_{54}u_{t-2} + a_{55}y_{t-2} + \varepsilon_{5t} \quad (3\text{-}2)$$

4.0 Results and Discussions

Table 4.1: Correlation results of all the variables

Correlation	CAPEMGR	CREDINS	INFMGT	PORTDIV	PROFIT	ROE	TECHASS
CAPEMGR	1.0000						

CREDINS	0.701927**	1.0000					
	(0.0000)	-----					
INFMGT	0.792685**	0.826471**	1.0000				
	(0.0000)	(0.0000)	-----				
PORTDIV	0.728044**	0.477341**	0.694530**	1.0000			
	(0.0000)	(0.0000)	(0.0000)	-----			
PROFIT	0.703711**	0.582143**	0.789072**	0.804132**	1.0000		
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	-----		
ROE	0.693471**	0.565294**	0.627022**	0.784481**	0.789256**	1.0000	
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	-----	
TECHASS	0.714812**	-0.354275**	0.582746**	0.800001**	0.602104**	0.694142**	1.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	-----

Note: The p values are in parenthesis. ** Significant at 1% i.e. α= 0.01
Sample 2002-2016; n=2520;
Source: Research Data 2016

From the correlation results, there are significant positive association between all the variables except for Credit Insurance (CREDINS) and Technical assistance (TECHAS), having a weak negative association coefficient of r = -0.354275, p = 0.0000. This suggests that increased investment of funds on provision of Credit Insurance, limits the general market maintenance resource base to be applied in Technical Assistance; hence the negative association. Other forward Integration Credit Risk Mitigation Mechanisms' association with Agribusiness firm Performance indicators yields significant positive association. In this case Credit Insurance (CREDINS) association with; Capital Employed growth (CAPEMGR) gives r = 0.701927, p = 0.0000; Profit (PROFIT) gives r = 0.703711, p = 0.0000 and Return on Equity (ROE) gives a coefficient of r = 0.693471, p = 0.0000. Association between Information Management (INFMGT) and Capital Employed growth (CAPEMGR) gives r = 0. 792685, p = 0.0000; Profit (PROFIT) gives r = 0. 789072, p = 0.0000 and Return on Equity (ROE) gives a coefficient of r = 0. 627022, p = 0.0000. Subsequently the association between Portfolio Diversification (PORTDIV) and Capital Employed growth (CAPEMGR) gives r = 0. 728044, p = 0.0000; Profit (PROFIT) gives r = 0. 804132, p = 0.0000 and Return on Equity (ROE) gives a coefficient of r = 0. 784481, p = 0.0000. Finally the association between Technical assistance (TECHAS) and Capital Employed growth (CAPEMGR) gives r = 0. 714812, p = 0.0000; Profit (PROFIT) gives r = 0. 602104, p = 0.0000 and Return on Equity (ROE) gives a coefficient of r = 0. 694142, p = 0.0000.

Table 4.2: Forward Integration Credit Risk Mitigation Mechanisms on ROE
Dependent Variable: ROE; Method: Least Squares: N=2520
Sample (adjusted): 6 2520;
Included observations: 2514 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-10.842437	0.897751	-12.077332	0.0000
C(2)	0.558253	0.095104	5.869921	0.0002
C(3)	0.984659	0.104531	9.419780	0.0000
C(4)	0.323629	0.099521	3.251866	0.0052
C(5)	1.857925	0.210634	8.820632	0.0000
R-squared	0.647239	Mean dependent var		11.65250
Adjusted R-squared	0.622421	S.D. dependent var		7.690491
S.E. of regression	5. 607209	Akaike info criterion		6.607209
Sum squared resid	78264.43	Schwarz criterion		6.623052
Log likelihood	-5677.200	Hannan-Quinn criter.		6.613071
F-statistic	163.43272	Durbin-Watson stat		2.723115
Prob(F-statistic)	0.000000			

Note: C(1)= Constant, C(2), C(3), C(4) and C(5) are coefficients of the tested variables

ROE=C (1) +C (2)*CREDINS+C (3)*INFMGT+C (4)*PORTDIV+C (5)*TECHASS
The results in Table 4.2 indicate that a unit change in credit insurance (CREDINS) leads to change in Return on equity (ROE) by a value of 0. A unit change in information management (INFMGT) leads to a change in Return on equity (ROE) by 0.984659. A unit change in credit portfolio diversification (PORTDIV) leads to a change in Return on equity (ROE) by 0.323629. Lastly, a change in Technical assistance (TECHASS) with one unit results in a change in Return on equity (ROE) by 1.857925. From the finding, model (3-2) it is established that; $ROE \square \square 10.8424 \square 0.5582 credins \square 0.9847 inf mgt \square 0.3236 portdiv \square 1.8579 techass$**(4.1)** The regression results reveal that a unit increase in Credit Insurance C(2) increases Return on Equity level by 0.5582 percentage points (i.e. 49.9%) at $p < 0.05$ significance level. This implies that Credit Insurance significantly contribute to Return on Equity, as shown by the magnitude of the coefficient and the p-value. This implies that although a cost, Credit Insurance provides a stable operational environment which in turn affects Return on Equity. Hull (2007) asserts that at the onset of the loan contract there are more loan- fund management costs which impact of investment profits. Consequently, bank supervisors must understand the distinct nature of assetbased lending to avoid classifying loans as non-performing, thereby increasing costs to borrowers by high premiums. A one percentage increase in information management C (3) increases predicted profit levels by 0.9847 percentage points (i.e. 98.5%) at $p < 0.05$ significance level. This implies that Credit Information Management's contribution to agribusiness Return on Equity is significant. It is also observable here that Credit Information Management highly contributes to agribusiness ROE as it does for its Profits, as shown by the coefficient magnitude, i.e. 177% and 104% respectively. Mutua (2010) states that training as information management process also borrowers determine their credit needs persuade lenders of their creditworthiness and manage debt. The parameters of this variable should be consistently employed to improve agribusiness' borrowers' credit access and profitability; which subsequently improves borrowers' capacity and help reduce Probability of Default (PD).

A unit increase in Credit portfolio Diversification C (4) results into increase of predicted profit levels by 0. 323629 percentage points (i.e. 32.36%) at $p < 0.05$. this implies that Credit Portfolio Diversification significantly contributes to agribusiness Return on Equity, consistent with priory expectation, considering that Return on Equity is an indirect function of profit, it takes measurement cue for profits of a firm. Arriola (2004) states that portfolio diversification defines the credit risk management elements in a focused manner in line with each sector's features, while Oliver (2006) argues that if the diversification parameters are sensitively analysed on specific sectors' features then it should lead to increased profits which would in turn influence Return on Equity. It is therefore necessary to establish the profit margins that feed into Return on Equity as generated through portfolio diversification.

A unit increase in Technical Assistance C (5) increases the predicted Return on Equity levels by 1.8579 percentage points (i.e. 186%) at $p < 0.05$. This implies that Technical Assistance significantly contributes to agribusiness Return on Equity. Again like for profits the banks provision of technical assistance based programmes is reflected here as key to realizing higher Return on Equity. Jaffee, Siegel and Andrews (2010) state that credit risk probabilities when conjured by expert opinion, information systems analysis and technical assistance would improve credit portfolio productivity and profits which in turn influences Return on Equity.

Therefore the null hypothesis H_{04}: r = 0; Forward Integration Credit Risk Mitigation Mechanisms do not significantly contribute to Return on Equity changes is therefore rejected and the alternative hypothesis H_{14}: r≠0; is accepted, that is,

Forward Integration Credit Risk Mitigation Mechanisms significantly contribute to Return on Equity changes of agribusiness enterprises in Nyanza region.

Subsequently, the single period regression results on Table 4.2 show an R^2 value of 0.6472 adjusted to 0.6224 for this study. This means that the independent variables explain the changes in Return on Equity (ROE) by up to 64.72 %. Durbin-Watson statistics used to show autocorrelation among the error tools reveal that there is no auto- correlation among the error tools; as shown by the value 2.723115 which is above 2; acceptable by a general rule of thumb for nonexistence of auto-correlation. These results closely concur with the findings of a study by Saeed, Fatemeh and Sharif (2012), who established that there is a significant relationship between credit portfolio diversification parameters, technical assistance and credit insurance to Return on Equity (ROE) performance on both the demand and supply sides; with an R^2 value of 0. 647239 adjusted to 0. 622421. Since β is positive CREDINS, INFMGT, PORTDIV and TECHASS have a positive correlation with ROE, i.e. ROE increases if the variables increase, and decreases when the variables decrease. However this study sought to establish the effect of FICMMs on the credit demand side and not both demand and supply sides.

The statistics show that FICRMMs play an important role in determining ROE in the agribusiness sector in the Nyanza region. They explain up to 64.72% of the changes or variations in ROE, when they are exclusively regressed on agribusiness ROE. However, when the other explained (dependent variables) are incorporated into the model, for a longer period and the selected lengths, the factors increase their aggregate influence on the variability of ROE. This further explains that ROE of the agribusiness operations is also a function of all the variables including itself. These results have implied congruence with Markus *et al* (2011), who in their study of the Effect of New financial regulation and its impact on capital-markets businesses, using OLS estimation to forecast future growth in Return on Equity as a net profit determinant, from 2006-2010 established that banks that deploy a full menu of immediate credit risk mitigation actions can rebuild Return on equities (ROE). He asserts that if properly employed, the mitigation process would feed into the business profit, which in turn increases Return on Equity (ROE). In this study the results reveal that **Technical Assistance** and **Credit Information Management** are still significant contributors at coefficients of 1.857925 and 0.984659 at p< 0.05 respectively. **Portfolio diversification** is insignificant while **Credit Insurance** is significant but with fairly low coefficient magnitude. It is again evident that the commercial banks need to invest more resources on enhancing these mitigants as plausible determinants of agribusiness Return on Equity.

4.1 Further diagnostic Tests for the variables

The diagnostic tests in Table 4.3 indicate the absence of serial correlation, that is, the disturbance terms are uncorrelated with each other. The results also indicate lack of heteroskedasticity thus the variance of the disturbance terms is constant with time. It therefore assumes that the error (residual) of a regression model is homoskedastic across all values of the predicted value of the dependent variables.

Table 4.3: Serial correlation and Heteroskedasticity test for ROE Model

| F-statistic	2333.534	Prob. F(2,1713)	0.0000
Obs*R-squared	1258.193	Prob. Chi-Square(2)	0.0000
Heteroskedasticity Test: White			
F-statistic	1.376060	Prob. F(14,1705)	0.0000
Obs*R-squared	19.21719	Prob. Chi-Square(14)	0.0000
Scaled explained SS	107.5153	Prob. Chi-Square(14)	0.0000

Source: Research Data 2016

The results in Tables 4.25 and 4.4 indicate lack of multicollinearity among the dependent variables in the model. That is, the explanatory variables are linearly independent. Figure 4.7 indicates that the residuals are normally distributed with mean of zero. The majority of the recursive residuals of quarterly return on equity index for the agribusiness firms for the period 2003 to 2012, for the 1720 observations on the 43 sampled firms range within 7.5% point (-7.5 ≤ t ≥ 7.5). Therefore, the variables are normally distributed since they devolve around the mean or zero line over the period.

Table 4.4: Multicollinearity test for ROE Profit Model

Variance Inflation Factors

Variable	Coefficient Variance	Un-centered VIF	Centered VIF
C(1)	0.988269	39.32458	NA
C(2)	0.020798	11.39719	1.461270
C(3)	0.007489	19.59746	1.544719
C(4)	0.020530	18.88001	1.461929
C(5)	0.035078	40.89384	1.460264

Source: Research Data 2016
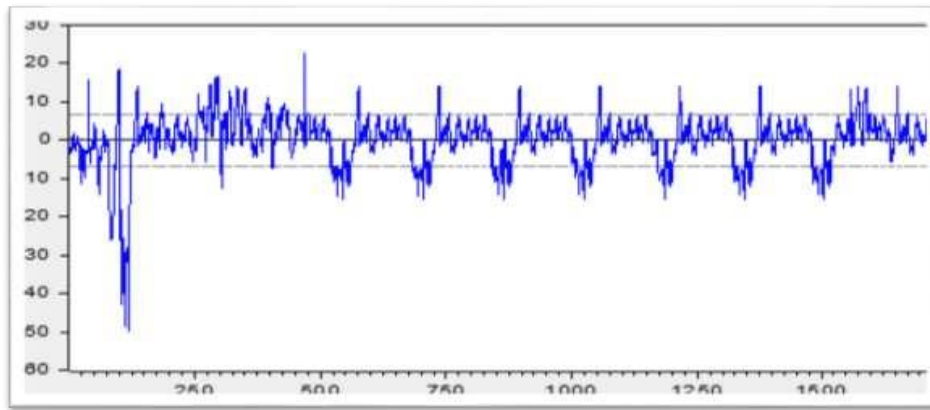
Figure 4.7 Residual for ROE. Source: Research Data 2016

The centered VIF is numerically identical to $1/(1-R^2)$ where R^2 is the R-squared from the regression of that regressor, on all of the other regressors in the equation. Centering of the variables is done to reduce the VIF to acceptable levels.

Conclusion

It is evident that the commercial banks need to invest more resources on enhancing these mitigants as plausible determinants of agribusiness Return on Equity. However this study sought to establish the effect of FICMMs on the credit demand side and not both demand and supply sides.

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