International Journal of Economics, Commerce and Management
United Kingdom Vol. VI, Issue 9, September 2018
http://ijecm.co.uk/ ISSN 2348 0386

THE MODERATING EFFECT OF ECONOMIC GROWTH ON THE RELATIONSHIP BETWEEN BANK-SPECIFIC DETERMINANTS OF COMMERCIAL BANKS FINANCIAL STABILITY IN KENYA

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Abstract

The study sought to examine the moderating effect of economic growth on the relationship between selected bank-specific variables (namely; regulatory capital, credit exposure, bank funding, bank size, corporate governance) and banks financial stability in Kenya. To achieve this objective, the study observed the direction, magnitude and statistical significance of the product terms between the above individual study explanatory variables and moderating variable. Altman's Z-Score plus Model for non-US and non-manufacturing firms was adopted as financial stability measure. Secondary panel data contained in the annual reports and financial statements of study population which consisted of all commercial in Kenya licensed by Central Bank of Kenya for period year 2000 to year 2015 was collected and used for analysis. A census of all 39 commercial banks and quantitative research design was adopted. The study adopted

panel regression to capture both cross sectional and longitudinal dimensions. Specified panel regression model for fixed effects supported by the Hausman test results was estimated. Panel Generalized Method of Moments (GMM) regression results found during the period of study economic growth had a statistically significant moderating effect on the relationship between all selected bank-specific variables except credit exposure and banks financial stability in Kenya. Specifically, the study found economic growth had statistically significant buffering moderation effect on regulatory capital, antagonizing moderation effect on long-term bank funding, corporate governance and bank size variables. The results further revealed economic growth had significant enhancing moderation effect on short-term bank funding. The study concludes that economic growth plays a significant influence on the relationship between regulatory capital, credit exposure, bank funding, bank size, corporate governance and banks financial stability in Kenya. On the basis of these empirical findings, the study recommends that policy makers should adopt policies that promote economic growth.

Keywords: Financial Stability, Commercial Banks, Economic Growth, Regulatory Capital, Credit Exposure, Bank Funding, Bank Size, Corporate Governance

INTRODUCTION

David & Quintyn (2003) defines commercial banks financial stability as a 'steady state in which the commercial banks efficiently performs its key economic functions, such as allocating resources and spreading risk as well as settling payments', if contrary, the banks are in financial instability state. Segoviano, Miguel, & Goodhart (2009) states that commercial banks in financial instability can arise either through 'idiosyncratic components related to poor banking practices adversely affecting an individual bank's solvency' or from systematic components initiated by macro shocks leading to financial strains for the commercial banks or a combination of both. Lee, Ryu and Tsmoscos (2012) argue that 'financial stability' refers to the ability of the key institutions and markets that make up the financial system to perform their key functions. Lee et.al further argues commercial banks financial instability must meet two conditions. First, there must be less fragility of the key institutions in the financial system hence creating high degree of confidence, meeting their contractual obligations without interruption or external assistance. The condition requires the key markets are stable, meaning the market participants can confidently transact in them at prices that reflect fundamentals forces and they vary substantially over short periods when there have been no changes in fundamentals.

Financial instability occurs when the shocks to the financial system hinders efficiency information flows so that the financial system can no longer perform its key function of channelings funds to those with productive investments opportunities. Banks in financial instability has proven to be economically catastrophic, leading to severe economic losses which take years to recover. The year 2008/2009 global financial crisis occasioned by unsafe banking practices was channeled to real economy via commercial banks which financed the America subprime mortgages. The Mexican crisis of the early f 1994–95 and, and the 1997–98 East Asian crisis was characterized similarly by the banking crisis and economic recessions and extensive default which took many years to recover. Additionally, the 1998 Russian debt default crisis, the Texas banking crisis, and the U.S. Stock Market crash of 1987 illustrate the potential losses occasioned by financially unstable regime generated by extensive default (Segoviano et.al 2009, Lee et.al, 2012).

Reviewed literature on financial stability has nonetheless indicated macroeconomic conditions as one of the key determinants of banks financial stability. Specifically macroeconomic conditions measured by economic growth (Hardy & Pazarbasioglu 1999, Bordo, Dueker and Wheelock 2001, Kithinji & Waweru 2007, Brownbridge 1998) has been found to positively associated with financial stability. These studies adopted economic growth rate as measures of the economic conditions. Authors have attributed this positive relationship to the fact that, higher economic growth rate creates increased demand for banks loans product and at same time increases the consumers disposable income. This ultimately boasts banks profitability and reduces default rate, leading to higher bank financial stability levels. This is contrast with lower economic growth rate, which is characterized by depressed aggregate demand and lower consumer disposable income, leading to lower profitability and higher default rate, ultimately leading to high level of financial instability.

To extend this analysis, this study aimed at examining the moderating effect of economic growth on the relationship between bank specific variables and financial stability of commercial banks in Kenya. Specifically, the study aimed at establishing whether or not commercial banks in Kenya exhibit similar financial stability patterns depending economic growth outcome.

LITERATURE REVIEW

The study is underpinned by financial stability theoretical frameworks such as information asymmetry as proposed by Akerlof (1970) and financial fragility proposed by Lagunoff & Schreft, (2001) and, Diamond & Rajan (2001). Financial instability results from information asymmetry, where consumers don't have sufficient information to differentiate between high quality product and low quality product, hence both products must still sell at the same price. This creates

market price distortion due to inability to price the risks accurately leading to risk buildup which may lead to financial instability. On the other hand, Proponents of financial fragility theory, argue that in a Pareto-efficient symmetric equilibriums where economic agents holds diversified portfolios, shocks to fundamentals initially led to loses necessitating resource reallocations response to mitigate further loses. However, this responses may led to financial crisis in two ways: one, gradual as loss as spread hence more economic agents affected and two, losses occurs instantaneously when forward-looking agents preemptively shift to safer portfolios to avoid future losses from contagion leading to crisis.

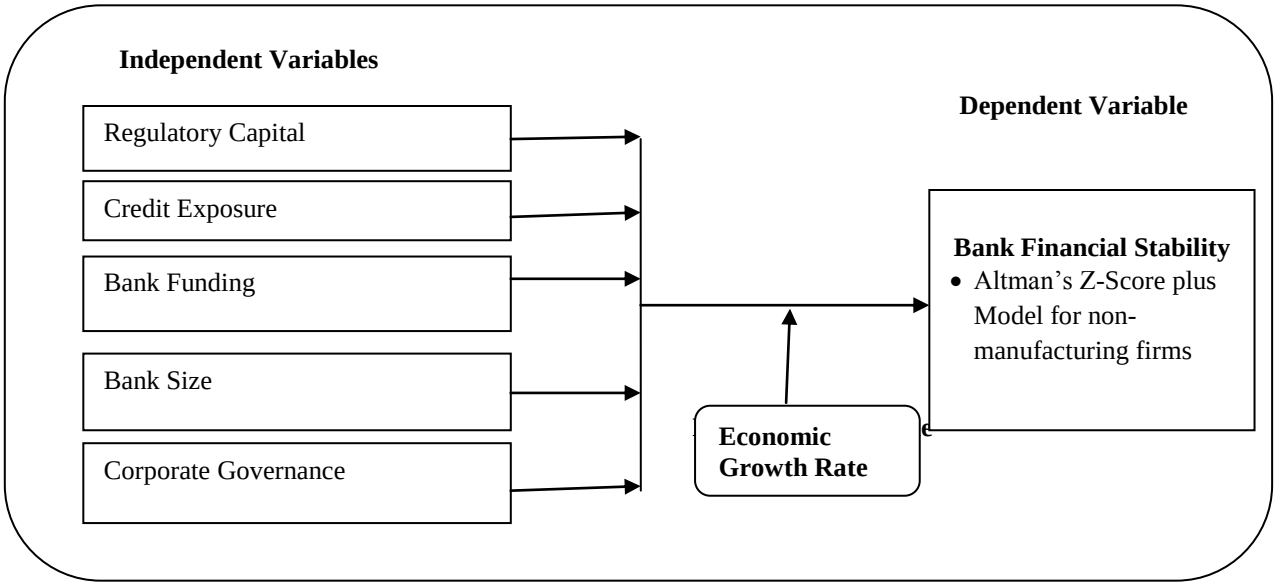
Hardy and Pazarbasioglu (1999) study examine a sample that covers 50 predominantly emerging market economies between 1977 and 1997. They found no evidence of macroeconomic variables such as inflation, economic growth and interest rate preceding banking crises. However, findings support both country and crisis specific determinants that can only be identified ex post. The authors concluded that national factors are relevant for predicting banking financial instability, whereas international factors play a role in determining banking crises. This findings conflict Bordo et al. (2001) study findings, where they constructed two annual indexes of financial conditions for the United States covering 1790-1997 using a dynamic ordered probit model. They employed banking macroeconomic conditions proxied by the real interest rate and inflation rate as determinants of financial stability for the US banks. They found leading macroeconomic indicators such as high interest rates, credit-to-GDP gap and business cycle as reliable early warning indicators of financial stability risks. Bordo et al. findings were later supported by, Hanschel and Monnin (2005) study, where they examined a continuous financial stress index for the Swiss banking sector. They employed equal-weighting methodology for market price, balance sheet, nonpublic and other structural data. They found that macroeconomic variables such as investment ratios to national GDP is able to explain a large part of the Swiss banking sector's financial stability. This indicates that a significant link exists between the macroeconomic variables and the banking sector's financial stability. Hanschel and Monnin findings however have been criticized for their model relying on a small number of observations for the stress index. Critics, argues including more observations would probably decrease the uncertainty about the coefficients' significance and improve the robustness of the forecasts.

Demirgüc-Kunt and Detragiache (2005) study 'cross-country empirical studies of systemic bank distress: a survey' for banks affiliated to IMF and applied a multivariate logit approach. They link a set of explanatory variables to the probability of occurrence of a binary crisis variable. Their results for both industrial and emerging market economies indicate that low economic growth, high inflation and high real interest rates impact significantly on the probability

of a banking financial crisis. These findings were reinforced by Puddu (2008) who constructed a real continuous indicator for the US Commercial banks using macroeconomic variables (such as economic growth rate, net interest margin and net loan losses to total loans ratio to predict banks financial instability events. Puddu found that economic growth rate; net interest margin and net loan losses to total loans, interest rate have significant impact on banks financial stability. However, findings differed with Lorenzoni (2008), claims that economic growth and investment booms associated with high asset prices can be inefficient as indicators of financial stability since they do not clearly indicate general market equilibrium.

Koetter and Poghosyan (2008) investigated the relationship between real estate markets and bank financial stability among German universal and specialized mortgage banks between 1995 and 2004. They found that higher house prices increases the value of collateral, which reduces the probability of bank distress. However, higher prices at given rents may also indicate excessive expectations regarding the present value of real estate assets, which increase probability of bank distress. Increasing price-to-rent ratios was positively related to probability of bank distress and larger real estate exposures amplify this effect. The findings indicate that macroeconomic variables such as price-to-rent ratios may be important determinants for financial stability in the commercial banks. They also found that, during periods of declining GDP growth rate the demand for credit falls which in turn lead to banks experiencing financial stability risks. On the contrary, in a growing economy as expressed by positive GDP growth, the demand for credit is high due to the nature of business cycle. During boom the demand for credit is high compared to recession.

Figure 1. Conceptual Framework



Hypothesis

H_0; Economic growth has no significant moderating effect on the relationship between selected bank specific variables and banks financial stability in Kenya.

METHODOLOGY

Research Design

This study used descriptive quantitative research design. This research design is preferred since the study used quantitative data as proxies for independent, moderating and dependent variables. Additionally, the study employed panel research strategy to capture both cross sectional and longitudinal dimensions (Kothari 2014, Mugenda & Mugenda, 2003)

Target Population

Study population refers to all units of analysis (Mugenda & Mugenda, 2003). This may constitute events, individuals or objects with common specific characteristics. This study population constituted all commercial banks licensed by Central Bank of Kenya from 2000 to December 2015. Following Mugenda & Mugenda (2003), census is preferred where the population is small and manageable. Census method further, enhances validity of the collected data by eliminating errors associated with sampling. Therefore, study adopted a census since only thirty nine (39) CBK licensed commercial banks in Kenya from 2000 to December 2015

Data Collection Procedure

The study collected secondary panel data containing both time series and cross sectional dimensions. The time series dimension covered year 2000 to 2015 while cross sectional dimension covered all commercial banks under study. The data were extracted from the Central Bank of Kenya reports and from individual published reports from the commercial banks.

Data Analysis Method

The collected data was converted into excel format for easier arrangements into panels. Panels analysis achieve better regression results since the researcher is able to control against unobserved heterogeneity while also giving a cross sectional and time-series dimension reducing the bias of the estimators (Kothari 2014). Descriptive statistics like measures of central tendencies, measures of dispersion and correlations statistics were calculated to summarize the dependent, moderating and independent variables. Statistical software's Eviews version 8 was used to estimate the relationship between the independent variables, moderating variable and dependent variable. Significance of individual explanatory variable on the dependent variable

was carried out using t-test at 5% significance level. Joint significance of the regression model was performed by means of F-test.

Measurement of Study Variables

The study dependent variable was financial stability. Independent variables constituted bank specific variables namely; regulatory capital, credit exposure, bank funding, bank size and corporate governance. The study moderating variables was economic growth as per **table 1.**

Table 1: Operationalization and Measurement of Study Variables

Variable	Operationalization	Measurement	Notation
Independent Variables			
Regulatory Capital	Banks capitalization levels maintained by the bank for its operation and maintained as financial shock absorbers in case of systemic and non-systemic financial crisis	Total Capital / TRWA	CAR
Credit Exposure	Quality of commercial bank loan book assets	Gross NPL's/ Gloss loans	NPL
Bank Funding (Liquidity & Solvency)	Liquidity refers to how the banks finance their loan book value in short-term (period less than one year).	Net liquid assets / Total assets	LIQ
	Solvency refers to how the banks finance their loan book value in long-term (period more than one year).	Gross loans/Total deposits	LD
Bank size	Refers how bigger or smaller the bank is in terms of the levels of banks total assets	Natural logarithm of total assets	BZ
Corporate governance	Refers to bank senior management power structures and process employed for operational efficiency and mitigation against financial instability	Natural Logarithm of management costs	OC
Moderating variables			
Economic (GDP) growth	Increase in amount of goods and services produced by country's population in one year.	Annual percentage growth rate of GDP at market prices based on local currency.	GDP
Dependent Variable			
Bank financial stability	Refers to a situation where the bank is able to meet or meet with without difficulties its financial obligation as and when the fall due, of otherwise the bank is experiencing financial instability	Altman's Z-Score plus Model for non-US and non-manufacturing firms	FD

Altman's Z-Score plus Model for non-manufacturing firms: Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4 Where: X1 = (Current Assets − Current Liabilities) / Total Assets; X2 = Retained Earnings / Total Assets; X3 = Earnings before Interest and Taxes / Total Assets; X4 = Book Value of Equity / Total Liabilities Zones of Discrimination: Z > 2.6 -"Safe" Zone, indicating the bank is financially sound and there is least probability that the bank will face financial instability; 1.1< Z < 2.6 -"Grey" Zone, if a bank falls in the grey area that means there is less probability that the bank will face financial instability in the near future. Z < 1.1 -"financial instability" Zone, there is a high probability that the bank will face financial instability in near future.

Empirical Model

We estimated the two panel regression models to determine the primary and moderating effects of economic growth. Equation 1 was used to estimate the primary effects of selected bank specific variables on banks stability while Equation 2 estimated the moderating (interaction) effects of economic growth on the relationship between bank specific factors and bank stability.

$$Y_{\text{it}} = \alpha_t + \ell_i Y_{it-1} + \sum_{i=1}^{n} \beta_i \chi_{it} + \varepsilon_{it}. \quad (1)$$

$$Y_{\text{it}} = \alpha_t + \ell_i Y_{it-1} + \sum_{i=1}^{n} \beta_i \chi_{it} + \sum_{i=1}^{n} \lambda \{ \chi_{it} * GDP_{it} \} + \varepsilon_{it}. \quad (2)$$

Where,

Y - banks financial stability,ℓ -is the coefficient of the lagged dependent variable, β– coefficient matrix of explanatory variables, Xit – vector of explanatory variables, λ, – coefficient's matrix of moderating effect of economic growth (GDP) on the relationship between dependent and independent variables, ε - error term (the time-varying disturbance term serially uncorrelated with mean zero and constant variance), Subscript i - denote the cross-section ranging from bank 1 to bank 39 and, Subscript t -denote the time-series dimension ranging from year 2000 to year 2015.

RESULTS AND DISCUSSIONS

Descriptive Statistics

Table 2: Panel Variables Summary Statistics

Variables		Mean	Maximum	Minimum	Std. Dev.	Skewedness	Kurtosis
Financial Stability		1.24	6.33	-6.69	0.84	0.55	23.26
Capital Adequacy		0.24	1.38	-0.50	0.14	1.89	13.09
Credit Exposure		0.16	0.94	0.00	0.18	1.78	5.65
Bank Funding	Liquidity	0.43	2.55	-0.38	0.23	2.46	23.38
	Solvency	0.86	11.19	0.24	0.61	9.26	140.56
Corporate Governance		1073	13335	1.60	2041	3.25	14.28
Bank Size		35,816	475,335	575.44	60907	3.02	14.07
Economic growth rate		0.045	0.084	0.002	0.023	-0.607	2.412

Unbalanced panel of 39 commercial banks for 16 years period, corporate governance and bank size variables expressed in Ksh. Millions. Financial stability variable is computed as an Altman's Z-score for emerging markets. All other variables are expressed as ratios.

Table 2 provide summary statistics of the collected study variables data covering 39 commercial banks for the period covering year 2000 to year 2015. The mean economic growth rate was 4.5 percent, with highest economic growth rate recorded at 8.4 percent (year 2010) and lowest economic growth rate recorded at 2 percent (year 2008). The corresponding low standard deviation value of 0.023 indicates fairly less variations of the observation across the years. However, the corresponding -0.607 coefficient of skewedness indicates economic growth rate was negatively skewed along the mean. The table further indicates during the study period, commercial banks in Kenya had a mean Z-score index of 1.24. Based on the Altman's zones of discrimination ($Z > 2.6$ -"Safe" Zone, $1.1 < Z < 2.6$ -"Grey" Zone, $Z < 1.1$ -"financial instability" Zone), overall commercial banks are in 'grey zone', indicating there is less probability that the bank will face financial instability in the near future. The corresponding standard deviation of 0.84 indicates less variability of financial stability levels of the commercial banks under study. The corresponding 0.55 coefficient of skewedness value shows that majority of the banks observations lay around the mean indicating the studied banks are in the 'grey zone'. Additionally the maximum financial stability Z-score observed was 6.33 indicating some banks are strong financially sound and minimum financial z-score of -6.33 indicating some banks are in severe financial stability. The table further shows the mean economic growth rate was 4.5 percent, with highest economic growth rate recorded at 8.4 percent (year 2010) and lowest

economic growth rate recorded at 2 percent (year 2008). The corresponding low standard deviation value of 0.023 indicates fairly less variations of the observation across the years. However, the corresponding -0.607 coefficient of skewedness indicates economic growth rate was negatively skewed along the mean. The mean capital adequacy ratio was 24 percent. This indicates majority of the commercial banks' capital ratios were above the minimum CBK prudential requirement of 14.5 which means the banks under study are well capitalized to withstand any negative economic shocks due to these large capital buffers. The corresponding standard deviation of 1.89 indicates slightly large variability across the banks, with maximum capital adequacy ratio of 138 percent and minimum of -0.5 percent.

Additionally the table indicates the mean value of banks credit exposure was 16 percent. This means the asset quality of the banks measured by the ratio of non-performing loans to total loans average at 16 percent. This indicates commercial banks operated on tough economic conditions where 16 percent of loans advanced were having problems in recovery or completely unrecoverable. The corresponding standard deviation value of 0.18 indicates minimal variations across the banks during this period. The maximum credit exposure value of 94 percent indicates some extreme banks observations of highly exposed banks. The table further reveals the overall mean bank size during this period was Ksh, 35 billion, with the largest bank observed having total assets worth Ksh. 475 billion and smallest bank observed having assets worth Ksh. 575 millions. The extremely large standard deviation value of 609070 depicts extremely large variations across the 39 commercial banks under the study. However, the 3.02 coefficient of skewedness depicts majority of the observed commercial banks size fall on the right hand side of the mean. Additionally the table indicates the corporate governance variable measured by total management cost, averaged at Ksh. 1 billion, with maximum cost observed at Ksh. 13 billion and minimum cost at Ksh 1 million. The corresponding large standard deviation value of 2041 depicts large variations across the 39 observed commercial banks.

Panel data Diagnostic Tests

Prior to undertaking any statistical analysis, prior panel data specification tests were conducted to determining suitability of the data. The tests were to verify if the panel data meet the basic classical linear regression requirements. The tests undertaken were; panel unit root test, normality test, multicollinearity test, panel-level heteroscedasticity test and serial correlation test. If the any violation of these basic requirements was detected, necessary correction measures were applied. To test long-run association of the study variables panel cointegration test was conducted.

Panel Data Normality Test

Normality is one of the OLS cardinal requirements which assumes the error terms have an asymmetric distribution centered at zero. Violation of this requirement may lead to inaccurate hypothesis testing due exaggerated test statistics. Jarque-Bera residual normality test examines the third and fourth moments of the residuals in comparison to the residuals from normal distribution under the null hypothesis of normal distribution. If the residual are found to be normally distributed, its histogram should be bell-shaped while Jargue-Bera test statistics should not be statistically significant (Jarque & Bera 1987).

Table 3: Panel Variables Normality Test Results

Variable		Observations	Jarque-Bera Statistics	P-Value
Financial Stability		624	10708.14	0.0000
Regulatory Capital		624	3473.29	0.0000
Credit Exposure		624	509.96	0.0000
Bank Funding	Liquidity	624	11426.15	0.0000
	Solvency	624	500899.00	0.0000
Corporate Governance		624	13.62	0.0011
Bank Size		624	28.65	0.0000
Economic growth		16	1.21	0.5455

Null Hypothesis: Normal Distribution at 5 percent significance level

Table 3 presents the Jarque-Bera test statistics and their corresponding P-values for the study variables with normal distribution null hypothesis. The results indicate all the study variables except economic growth; Jarque-Bera test statistics had corresponding p-values equal to 0.0000. These variables null hypotheses were rejected since the p-values associated with respected test statistics were less than 5 percent. Rejection of null hypotheses meant financial stability, capital adequacy, credit exposure, bank funding, corporate governance and bank size variables were not normally distributed. The extremely large Jarque-Bera test statistics for bank funding, capital adequacy and financial stability variables indicates the data sets used contained outlier's. Economic growth variable was found to be normally distributed. To eliminate non-normality problems on the above observed study variables, outliers variable elimination technique was employed to obtain relatively normal distribution data sets. This involved elimination of the firm-year observed value outside the following ranges; 0<financial stability > 2; 0< capital adequacy>0.5; 0<credit exposure> 0.25; 0< bank funding (liquidity)>0.8; 0<bank

funding (Solvency)>1.5; and; 0<corporate governance>4. The Table 4 shows the summary statistics after elimination of the outliers.

Table 4: Summary Statistics for the Study Variables Post Outliers Elimination

Variables		Mean	Maximum	Minimum	Std. Dev.	Skewedness	Kurtosis
Financial Stability		1.10	2.00	0.00	0.39	0.02	2.85
Regulatory Capital		0.23	0.50	0.01	0.09	0.81	3.08
Bank Funding	Solvency	0.77	1.50	0.24	0.25	0.45	3.27
	Liquidity	0.41	0.80	0.00	0.17	0.11	3.29
Credit Exposure		0.08	0.25	0.00	0.06	0.88	3.10
Corporate Governance		928.61	9977.00	1.00	1671.01	3.09	13.22
Bank Size		35816.81	475335.20	575.44	60907.55	3.02	14.07
Economic Growth		0.05	0.08	0.00	0.02	-0.61	2.41

Unbalanced panel of 39 commercial banks for 16 years period, corporate governance and bank size variables expressed in Ksh. Millions. Financial stability variable is computed as an Altman's Z-score for emerging markets. All other variables are expressed as ratios.

Table 4 indicates the coefficients of skewedness and kurtosis values are near to normal distribution levels of between zero and three for all the study variables apart from bank size and corporate governance coefficient of kurtosis. This is after elimination of outliers in the panel data. Taking inconsideration's corporate governance and bank size variables were now closer to normal distribution, the data was considered good for further analysis

Panel Unit Root Test

To determine the stationarity of the panel data, panel unit root test was applied on the study variables. Testing of panel unit root involves solving 'ρi' in an autoregressive AR (1) process for estimated as equation 3.

$$y_{it} = \rho_i \gamma_{it-1} + X_{it}\delta_i + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Where, i= 1, 2…39 commercial banks, that are observed over periods t= 2000, 2001… 2015. The Xit represent all the explanatory variables used in the model, ρi is the autoregressive coefficients and εit are error term. If /ρi/ =1, it means the dependent variable Yi was dependent on its own lag hence Yi contains a unit root (non-stationary) hence may lead to spurious results in hypothesis testing of explanatory variables statistical significance (Gujarati 2003). Table 5 provides a summary of the panel unit root test.

Table 5: Panel Unit Root Test Results

Variables		Test	Intercept	*p*-Value
Financial Stability		Levin-Lin-Chu	-7.53198	0.0000*
		Im, Pesaran and Shin W-stat	-9.48319	0.0000
		Fisher-Chi Square-ADF	234.271	0.0000
		Fisher-Chi Square-PP	489.512	0.0000
Capital Adequacy		Levin-Lin-Chu	-4.56156	0.0000
		Im, Pesaran and Shin W-stat	-3.91637	0.0000
		Fisher-Chi Square-ADF	130.563	0.0002
		Fisher-Chi Square-PP	159.678	0.0000
Credit exposure		Levin-Lin-Chu	-19.3823	0.0000
		Im, Pesaran and Shin W-stat	-7.66643	0.0000
		Fisher-Chi Square-ADF	141.845	0.0000
		Fisher-Chi Square-PP	135.549	0.0000
Bank Funding	**Liquidity**	Levin-Lin-Chu	-4.04787	0.0000
		Im, Pesaran and Shin W-stat	-3.85623	0.0001
		Fisher-Chi Square-ADF	147.164	0.0000
		Fisher-Chi Square-PP	199.318	0.0000
	Solvency	Levin-Lin-Chu	-8.81113	0.0000*
		Im, Pesaran and Shin W-stat	-10.0504	0.0000
		Fisher-Chi Square-ADF	245.443	0.0000
		Fisher-Chi Square-PP	513.786	0.0000
Corporate Governance		Levin-Lin-Chu	-6.27682	0.0000
		Im, Pesaran and Shin W-stat	-5.95046	0.0000
		Fisher-Chi Square-ADF	169.755	0.0000
		Fisher-Chi Square-PP	321.535	0.0000
Bank Size		Levin-Lin-Chu	-5.99377	0.0000*
		Im, Pesaran and Shin W-stat	-6.03357	0.0000
		Fisher-Chi Square-ADF	165.382	0.0000
		Fisher-Chi Square-PP	285.532	0.0000
Economic growth rate		Levin-Lin-Chu	-10.5754	0.0000*
		Im, Pesaran and Shin W-stat	-6.30589	0.0000
		Fisher-Chi Square-ADF	160.485	0.0000
		Fisher-Chi Square-PP	327.697	0.0000

**stationary at first difference, ** stationary at second difference, Null hypothesis: Series contains unit root. The p-value for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.*

Table 5 results are based on Levin-Lin-Chu (LLC), Im-Pesaran & Shin W-stat (IPS), Fisher-Chi Square-ADF (Fisher ADF), and the Phillips-Perron Fisher-Chi Square-PP (Fisher PP). All these tests are based on null hypothesis the panel data is non-stationary, with alternative hypothesis that the data is stationary, meaning /ρi/ =1 and /ρi/ ≠1 respectively. LLC assume across cross-sections persistence parameters are common i.e. ρi= ρ for all i. This assumption caters for non-homogeneous cross-sectional effects in the generalized specified model, on other hand IPS, Fisher-ADF and Fisher-PP all ρi to vary across cross-sections. This informs the applications of all these tests for comparison. Additionally, since Fisher-ADF test is parametric necessities application of non-parametric Fisher-PP to improve model robustness in case of serial correlation of the error term without addition of lagged difference term. IPS test complemented and confirmed LLC, ADF and PP tests findings.

Table further indicates, based on IPS, Fisher-ADF, Fisher-PP and LLC panel unit root test for all study variables used in the study. The null hypothesis of 'series have unit root' for all the four tests was evaluated against their associated p-values at the conventional 5 percent statistical level of significance. For credit exposure, capital adequacy, liquidity and corporate governance variables, the null hypotheses was rejected since the p-values associated with respected test statistics were less than 5 percent.

Rejection of the null hypotheses means these variables we used in levels instead of their first difference. The variables financial stability, Solvency, bank size and GDP were found to be non-stationary at levels. To correct for this violation of OLS cardinal requirement, first difference of the data was undertaken. Under the first difference the data was found to be stationary.

Panel Multicollinearity Test

Panel multicollinearity test was conducted to eliminate possibility of having collinear explanatory variables used in the study. Pair-wise correlation coefficient matrix for the entire study variables was estimated. The estimated correlation coefficient value of 1 indicate perfect correlation among the variables while, correlation coefficient value of -1 indicates perfect negative correlation between the variables. Consequently correlation coefficient value closer to 1 or -1 indicates strong positive or negative correlation among the variables respectively. Correlation coefficient closer to zero indicates weaker positive/negative correlation. The panel multicollinerity test results are presented in the Table 6.

Table 6: Pairwise Correlation Matrix of the Dependent and Explanatory Variables

	FD	BZ	CAR	GDP	LD	LIQ	NPL	OC	CAR*GDP	BZ*GDP	LD*GDP	LIQ*GDP	NPL*GDP	OC*GDP
FD	1.00													
BZ	-0.01	1.00												
CAR	0.55	-0.29	1.00											
GDP	0.08	0.16	-0.04	1.00										
LD	0.07	0.09	-0.08	0.08	1.00									
LIQ	0.09	0.12	0.22	0.01	-0.49	1.00								
NPL	-0.31	-0.30	0.02	-0.20	0.00	0.14	1.00							
OC	-0.09	0.74	-0.31	0.14	0.12	0.01	-0.22	1.00						
AR*GDP	0.37	-0.03	0.54	0.76	0.02	0.17	-0.16	-0.07	1.00					
BZ*GDP	0.08	0.42	-0.11	0.79	0.10	0.04	-0.26	0.38	0.68	1.00				
LD*GDP	0.09	0.17	-0.07	0.75	0.54	-0.22	-0.14	0.17	0.63	0.83	1.00			
LIQ*GDP	0.13	0.19	0.15	0.72	-0.25	0.62	-0.08	0.09	0.68	0.71	0.44	1.00		
PL*GDP	-0.21	-0.16	-0.03	0.45	0.09	0.09	0.68	-0.10	0.31	0.35	0.42	0.37	1.00	
OC*GDP	0.04	0.51	-0.15	0.80	0.12	0.00	-0.26	0.51	0.60	0.78	0.79	0.65	0.33	1.00

Table 6 provide summary of the pairwise coefficient of correlation for all the explanatory variables, the moderating variable and dependent variable. The results found strong positive correlation between financial stability and capital adequacy indicated by correlation coefficient of 0.55. This implies commercial banks with higher capital adequacy are less likely to be financially distressed in comparison with commercial banks with lower capital ratios. The negative correlation between financial stability and corporate governance may implies commercial banks that have significantly high management costs are highly likely to experience financial instability in near future. Additionally, as commercial banks increases it liquidity ratio, the less likely that bank will experience financial instability as indicated by positive correlation coefficient between financial stability and liquidity. The negative correlation between credit risk and financial stability as indicated by correlation coefficient of -0.31 indicate, as credit risks increase meaning the quality of banks asset deteriorate the highly like bank will experience financial instability in future.

Table further reveals high positive correlation between corporate governance and bank size with correlation coefficient at 0.74. As expected large commercial banks due to nature of its operation will always incur huge management cost. As expected, high multicollinearity was found among the explanatory variables and the corresponding moderated variable. The highest positive correlation was found to be between corporate governance (OC) variable and corporate

governance moderated by economic growth (OC*GDP) variable at a value of 0.80, this was followed by correlation between economic growth (GDP) variable and bank size moderated by econo mic growth(BZ*GDP) variable at a value of 0.79. Others were; economic growth rate (GDP) variable and solvency variable moderated by economic growth (LD*GDP) variable at a value of 0.75 and, liquidity variable and liquidity moderated by economic growth (LIQ*GDP) variable at a value of 0.72. High correlation between the explanatory variable and their corresponding moderating variables create problem of isolating unique contributions of the individual predictor on the dependent variable variance. This may also lead to enlarging standard errors of the estimated coefficients creating statistical estimation errors.

The problem of severe multicollinearity was solved by the study employing variable elimination technique. This technique involves dropping of study variables after applying Variance Inflation Factor's (VIF) which show the inflation magnitude of a regressor coefficient estimate due collinearity with other regressors. VIF's are simply calculated by dividing variance of a coefficient estimate by the variance of that coefficient considering if the other regressors had not been included in the equation. Gujarati (2003) recommended applying variable centering approach to eliminate this problem of severe multicollinearity between explanatory and their corresponding moderating variables. Variable centering approach transforms the series variable by subtracting the sample mean before calculating the product terms. Gujarati (2003) recommendation, if correlation coefficient is below 0.8 the study variables fit for further statistical analysis since they do not signify severe multicollinearity problem, for this case all other variables had correlation coefficient of less than 0.8 hence adopted for the study.

Serial Correlation Test

For an estimated model to be robust, its error terms should not be correlated with each other. This means the error term of an individual observation should not be influenced by the error term relating to another observation. If the opposite of this situation occurs, it's referred to as serial correlation problem. Presence of serial correlation in the study data leads to generation of smaller standard errors hence inaccurate hypothesis testing. Testing for autocorrelation involved applications of Lagrange multiplier (LM) tests. The LM tests are used to test for higher order Autoregressive Moving Average (ARMA) errors especially if lagged dependent variables are used or not unlike the Durbin-Watson statistics which is used for low order such AR(1) processes (Torres-Reyna 2007, Breusch, & Pagan 1979, Breusch 1978). LM tests apply null hypothesis of no serial correlation up to pre-specified lag order p, where p is an integer (Wooldridge 1997).

The study employed Arellano-Bond Serial Correlation Test as proposed by Arellano & Bond (1991), Doornik, Bond & Arellano (2006) for models estimated using GMM. This test involves computation of the first and second i.e. (AR(1) and AR(2) order correlation statistics and present the two statistics separately. If the variables are i.i.d. the AR(1) statistic should be significant with a negative auto-correlation coefficient while the AR(2) statistic should be insignificant.

Table 7: Arellano-Bond Serial Correlation Test results

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-7.386475	-4.661082	0.631029	0.0000
AR(2)	0.384086	0.288375	0.750809	0.7009

Table 7 present Bond Serial Correlation Test estimated for the GMM models. The results indicates a negative and significant correlation coefficient of -7.386475 at 1 percent significant level for AR (1) statistics. Additionally the table indicate the AR(2) statistic was insignificant. This indicates the estimated model errors terms for the study variables were uncorrelated in levels. To address the suspected heteroskedasticity and autocorrelation anomalies found in the study panel data, the study followed Newey and West (1987) recommendation of applying special GMM models which allows estimation of dynamic panel data specifications where data is suspected of having both heteroskedasticity and autocorrelation.

The Hausman Test for Fixed / Random Effects Model Estimation

To decide which the most appropriate model between the fixed effect model (FEM) and random effect model (REM) for this study, Hausman test was used. This involved estimating both models in particular order, starting with FEM against the alternative hypothesis REM is appropriate at 5% confidence level. Based on Huasman test chi-square and corresponding p-value, null hypothesis is accepted or rejected. The Hausman test was proposed by Hausman (1978) as a test statistics for endogeneity by directly comparing fixed and random effects estimates of coefficients values. Results of the Correlated Random Effects test (Hausman Test) indicated by Table 8 shows the Chi-Square test statistics and, their corresponding degree of freedom and p-value for the panel model equation (1) and equation (2).

Table 8: Hausman Test for Model Effects Estimation

Model Specification	Chi-Square Statistic	Degree Freedom.	P-Value
Panel Model 1	84.620507	8	0.0000
Panel Model 2	94.812593	14	0.0000

Null Hypothesis: Random Effects Model is Appropriate: Significance level 5 Percent

The table 8 indicates the Chi-Square for panel model equation (1) and equation (2) was 84.62 and 94.81 respectively. Their corresponding 0.0000 and 0.000 P-values respectively were statistically significant at 5 percent significance level. The means the study rejected the null hypothesis that REM was most appropriate statistical analysis model for panel model equations (1) and (2) at 5 percent significant level. This means the FEM was found to be most appropriated model for both equation 1 and equation 2.

Panel Model Regression Results

After conducting the panel data specification tests outlined here, and taking necessarily remedial actions to correct any violation of the cardinal OLS requirement identified, the study undertook panel regression analysis as discussed in this section. The study overall objective was to establish the moderating effect of economic growth on the relationship between selected bank-specific factors and financial stability of commercial banks in Kenya. This was achieved in two folds. First involved estimating two panel equations namely equation (1) and equation (2) for fixed effects as guided by Hausman's test results. Secondly involves comparing the panel results of this equation to determine if moderating effect occurred. Following Muigai (2016) the study deemed moderating effect to be significant if the coefficient of determination (R^2) of the moderated regression is higher than that of the initial regression equation and the coefficients of the moderated variables are statistically significant. Saunders, Lewis and Thornhill (2009) argued a moderating variable change or potentially influence the nature of dependent and independent variable relationship. They classified the moderating effect broadly into three; antagonistic (reversing) moderating effect- where increasing moderator variable reverses the primary effect of explanatory variables on the dependent variable; Enhancing (increasing) moderating effect- where increasing the moderator variable increases the primary effect of explanatory variables on the dependent variable and; Buffering (decreasing) moderation effect- where increasing the moderator variable decrease the primary effect of explanatory variables on the dependent variable.

In order to eliminate panel-level heteroscedasticity and serial correlation detected in the panel data, a dynamic panel data estimation technique was employed instead of Ordinary Least Squares (OLS) due to its provision of consistent estimators. To eliminate problem of collinearity among the explanatory variables step-wise model re-estimation of equation (1) was undertaken where highly collinear variables were dropped following Gujarati (2003) recommendations. Table 9 summarizes the panel regression results of the panel equation (1) estimated while Table 10 present summary of dynamic panel fixed –effects regression results for equation (2) with economic growth as moderating variable respectively.

Table 9: Step-Wise Dynamic Panel Fixed –Effects Regression Results

Dependent Variable: Financial Stability Method: Panel Generalized Method of Moments 2SLS instrument weighting matrix			
Variable	Equation 1a Coefficient (P-value)	Equation 1b Coefficient (P-value)	Equation 1 c Coefficient (P-value)
Constant			0.172130*** -0.0009
Lagged Financial Stability	0.613031*** (0.0000)	0.603176*** (0.0000)	0.742036*** (0.0000)
Bank Funding (Solvency)	0.207280*** (0.0000)	0.117507*** (0.0039)	
Bank Funding (Liquidity)			0.150290** (0.0214)
Credit Exposure	-0.565458*** (0.0004)	-0.647504*** (0.0006)	-0.487680** (0.0206)
Lagged Corporate Governance		0.035653* (0.0618)	
Bank Size	0.622023*** (0.0000)	0.535184*** (0.0000)	0.249788*** (0.0096)
Regulatory Capital	1.346836*** (0.0000)	1.517959*** (0.0000)	
	Statistics		
Adjusted R-squared	0.71027	0.70607	0.65013
Durbin-Watson stat	1.774063	1.766802	1.908711
J-statistic	421	357	372
Prob(J-statistic)	0.0000	0.0000	0.0000
Total Panel (unbalanced)	428	367	378

*The asterisk ***, **, * represent significance at 1%, 5% and 10% levels respectively*

Table 10: Dynamic Panel Fixed –Effects Regression Results Moderated by Economic Growth

Dependent Variable: Financial Stability			
	Equation 2a	Equation 2b	Equation 2 c
Variable	Coefficient (P-value)	Coefficient (P-value)	Coefficient(P-value)
Constant	-1.267594**(0.0397)	0.168334 (0.7896)	0.592060*(0.0972)
Lagged Financial Stability	0.617679***(0.0000)	0.620077***(0.0000)	0.739670***(0.0000)
Bank Funding (Solvency)	0.927913**(0.0103)	0.556574**(0.0172)	
Bank Funding (Liquidity)			0.549671**(0.0038)
Credit Exposure	-0.69066***(0.0000)	-0.74543***(0.0003)	-2.156314**(0.0215)
Lagged Corporate Governance		0.196910***(0.0002)	
Bank Size	1.208846***(0.0000)	1.191648**(0.0122)	0.133768**(0.0187)
Regulatory Capital	1.243977***(0.0000)	0.139593***(0.0019)	
Bank Funding (solvency)*GDP	-0.168064**(0.0467)	-0.088237(0.3499)	
Bank Funding (Liquidity)*GDP			0.173507**(0.0243)
Credit Exposure*GDP	-0.266201(0.3970)		-0.431854(0.2985)
Corporate Governance*GDP		-0.03907***(0.0018)	
Bank Size*GDP	-0.13699(0.3694)	-0.16369**(0.0345)	-0.027626(0.8817)
Regulatory Capital*GDP	0.035271(0.8743)	0.258397**(0.0294)	
Economic Growth	0.295014**(0.0416)	0.085784(0.5697)	
Statistics			
Adjusted R-squared	0.726739	0.718875	0.660142
Durbin-Watson stat	1.744750	1.715331	1.839512
J-statistic	393.0000	325.0000	346.0000
Prob(J-statistic)	0.000000	0.000000	0.000000
Panel (unbalanced) observations	406	339	357

The asterisk ***, **, * represent significance at 1%, 5% and 10% levels respectively

Comparative analysis between Table 9 and Table 10 regression results indicates introduction of the moderation variable results into model improvement prediction power as indicated by increased in the coefficient of determination (adjusted R^2) values. These is evident by improvement of adjusted R^2 from 71.02 percent (equation 1a) to 72.67 percent (equation 2a), from 70.60 percent (equation 1b) to 71.89 percent (equation 2b) and, from 65.01 percent (equation 1c) to 66.01 percent (equation 2c). Additionally the J-statistics for the re-estimated equation is statistically significant as shown by the corresponding p-values of 0.0000, meaning the study variables in the regression equation are jointly statistically significant. The results further indicate economic growth has a positive but statistically insignificant effect on the Altman's Z-score for financial stability. This signifies during the period of study, economic growth

had no statistically significant effect on the commercial banks financial stability in Kenya. However, the effect would have been positive if it happens. This result contradicts Hanschel and Monnin (2005) who found positive and statistically significant link between economic growth and financial stability. They attributed this positive link to the ability of economic growth in spurring bank balance sheet expansion hence rapid accumulation of capital buffers. The accumulated capital buffers acts shock absorbers incase the bank experience crisis, ultimately reducing the likelihood of the banks experiencing financial instability. Similar positive link were found in Bordo et.al (2001). Additionally, the results indicate the coefficients of moderating variables expressed as the product terms between primary variable and bank size, presented in the moderated equation are all statistically significant at 5 percent significance level, except for credit exposure moderated by economic growth (credit exposure*GDP). The statistical significant findings reveals economic growth has statistically significant moderation effect on the relationship between study selected bank specific variables and, commercial banks financial stability in Kenya, except on credit exposure variable.

Specifically, further comparatively analysis of the reveals negative and statistically significant relationship between the interactions of bank funding –solvency (bank funding solvency*GDP) and commercial banks financial stability at 5 percent significance level. This means economic growth have antagonizing (reversing) moderation effect on the interaction between bank funding (solvency) and financial stability, considering the primary effect was positive and statistically significant. The findings signify, increasing the solvency levels for commercial banks when during higher economic growth period, reduces the Altman's Z-score of financial stability, indicating high levels of financial instability. On other hand high solvency levels for commercial banks during lower economic growth increases Altman's Z-scores, reducing financial stability risks. This results support Kotter and Poghosyan (2008) study findings on German banks. They study found negative and statistically significant link between economic growth and banks financial stability. They found increasing economic growth rate led to increased real estate prices increasing value of collateral. However the increased real estate was driven to some extent by speculation. These increased real estate collateral driven by speculation increases the banks exposures hence low Z-score signifying high probability of experiencing financial instability. The table also indicates a positive and statistically significant moderating effect of economic growth on the relationship between the bank funding –liquidity (bank funding-liquidity*GDP) and commercial banks financial stability. This is a statistically significant enhancing moderation effect taking into consideration the primary effect of bank funding (liquidity) on commercial banks financial stability is positive and statistically significant. This signifies higher economic growth in Kenya as bank liquidity levels increases, boast

Altman's Z-score of financial stability, signifying lower levels of commercial banks financial instability. On other side, lower economic growth, as banks liquidity levels increases the reduces their Z-scores index for financial stability signifying higher financial stability risks. However, these study results contradict Lorenzoni (2008) study who found economic growth has no significant link to banks financial stability. They attributed the no link results to fact, economic growth merely create banks operating environment. The banks specific characteristics reactions to this economic environment ultimately determine the banks financial stability.

The results indicate a negative and statistically significant antagonizing moderation effect of the economic growth on the interaction between corporate governance (corporate governance*GDP) and financial stability 1 percent significance level. This is based on the fact primary effect of corporate governance is positive and statistically significant at 5 percent significance level. This implies that during higher economic growth Kenya increasing corporate governance variable lowers the Altman's Z-score, signifying higher financial instability. On other hand increasing corporate governance variables among small commercial banks boast their Altman's Z-scores hence low financial instability. These study findings mirrors Boyd and Runkle (1993) study, where they found negative and statistically significant relationship between bank size and US banks financial levels. They attributed this negative link to diseconomies of scale, where large banks committed large resources as salaries perk for senior management, which never led to higher productivity. This ultimately led to reduced profitability hence increasing distress levels. On the contrary, small banks made maximum use of limited resources for highest productivity as they struggled for survival, ultimately leading to higher Altman's Z-scores reducing the financial instability. These findings however contradicted, Surajit and Saxena (2009) on Indian steel manufacturing firms where they found positive and significant link between firm size and financial stability. They attributed to positive link to management structures put in place where large firms were able to attract and retain skilled management personnel who were able to put in place efficient systems and internal controls processes. This ultimately boasted the Altman's Z-scores hence lowering distress levels of these firms. On the other hand small firms, due to budget limitation committed limited resources to corporate management hence the inability to put attract and retain skilled personnel's leading to weaker internal control processes, ultimately lowering the Altman's z-scores hence higher financial instability.

The results further indicate a positive and statistically significant relationship between bank size (bank size*GDP) and financial stability for commercial banks in Kenya as indicated by positive coefficient at 99 percent confident level. However after introducing moderating variable, the direction of the relationship changes as shown by negative and statistically significant

coefficient at 95 percent confidence level. These results indicate economic growth has statistically significant antagonizing moderating effect on the relationship between bank size and financial stability for commercial banks in Kenya. This signifies during period of high economic growth, increasing profitability lowers the Altman's Z-scores hence leading to higher financial stability. On other hand, during period of low economic growth increasing profitability boast the Altman's Z-scores hence lowering the financial instability. This finding supports Goddard (2004) who found positive and statistically significant link between bank size and financial stability. They attributed this positive link to economies of scale enjoyed by large banks where its massive balance sheet is able to finance large profitable ventures boasting its returns ultimately increasing Altman's Z-score for financial stability, however for small banks in competitive environment face massive competition from larger banks, ultimately reducing Altman's Z-scores hence experiencing higher financial instability. The table further indicate a buffering moderating effect of economic growth on the interactions between regulatory capital (regulatory capital*GDP) and financial stability. This is evidenced by positive and statistically significant coefficient from the moderated equations at 5 percent for both regulatory capital*GDP. However, upon comparison with the corresponding positive and statistically significant coefficients from the moderated equations, revealed respective primary coefficients declined after moderation process. This signifies despite increase in regulatory capital boasting Altman's Z-scores for commercial banks, the rate of increasing in Altman's Z-scores is lower during high economic growth.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The study objective was to examine how economic growth moderates the relationship between selected bank-specific variables (namely regulatory capital, credit exposure, bank funding, bank size, corporate governance) and banks financial stability in Kenya. To achieve this objective, the study observed the direction, magnitude and statistical significance of the product terms between the above individual study explanatory variables and moderating variable. The study results revealed during the period of study economic growth had a statistically significant moderating effect on the relationship between the selected bank-specific variable except credit exposure variable and banks financial stability in Kenya. Specifically, the study found economic growth had statistically significant buffering moderation effect on the relationship between regulatory capital variables and banks financial stability. The results also revealed economic growth had statistically significant antagonizing moderation effect on the relationship between long-term bank funding, corporate governance and bank size explanatory variables and banks financial stability. The results further revealed economic growth had statistically significant

enhancing moderation effect on the relationship between short-term bank funding and banks financial stability in Kenya

The study concludes that economic growth plays a significant influence on the relationship between regulatory capital, credit exposure, bank funding, bank size, corporate governance and banks financial stability in Kenya. Specifically, the study concludes although rising liquidity (short-term bank funding) reduces bank financial instability; this is more favorable during period of higher economic growth rate. Additionally, study concludes although maintaining high regulatory capital boast banks financial stability, it's more favorable during period of higher economic growth rate. The study also conclude although rising bank solvency (long-term bank funding), corporate governance and bank size lowers the bank distress levels, the gains reduces as economic growth increases.

For policy makers, the study recommends the banks financial regulator in Kenya namely The National Treasury and Central Bank of Kenya to enact adequate legislative framework and guidelines that promote increase of banks regulatory capital and bank size which has been found to lower financial instability for commercial banks in Kenya. Additionally, these policy makers should promote economic policies that stimulate economic growth by adopting pro economic growth policies. These recommendations are based on study findings that, higher economic growth promotes banks financial stability in Kenya.

SCOPE FOR FURTHER RESEARCH

The study overall objective was to empirically investigate the moderating effect of economic growth. This was achieved by examining only commercial banks licensed by Central Banks of Kenya as at between 2000 and December 2015. This ultimately may lead to non-conclusive study findings due to exclusion of banks which ceased / started operations before / after the above study period respectively. Additionally other banking categories such as development and investment banks operating in Kenya are excluded in this study. Further research can be extended to cover non-commercial banks in Kenya, and also extended the study period to verify these study findings. Additionally, similar research may be extended to undertake cross country analysis. This is based on the fact this study focused on limited geographical location Kenya. This was based on budgetary constraint of the research. Cross country analysis will adequately bring out effect of unique characteristics such political, economic and regulatory environment. The cross country findings will verify these study findings and greatly inform policies especially with the anticipated economic federations such as East African Community (EAC), Common Market for Eastern and Southern Africa (COMESA).

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