A Study of Credit Risk and Commercial Banks' Performance in Yemen: Panel Evidence

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Abstract

Slow growth in the banking sector has been the case in the Middle East and North Africa (MENA) region in the 1970s and 1990s. This situation is the case for Yemen, the banking sector is dominated by public sector banks, which are characterized by government intervention in credit allocations, losses and liquidity problems and non-performing loans. We investigate empirically the determinants of credit risk and its implication on bank performance in Yemen from 1998-2013 using panel data. The study shows that non-performing loans negatively affect profitability. In general all the six banks are profitable with minimal average Return on Assets (ROA) of 0.79% with an average of 17.2% volume of non-performing loans. The result also shows that Credit risk management and its effect on Banks performance are similar across banks (cross-section invariant) in Yemen. There is evidence of causal relationship between credit risk and banks performance in Yemen. This study contributes to current literature by providing an econometric understanding of relationship in credit risk and its implication on bank performance for the MENA countries. This understanding is important for academics, policy makers and development organizations in shaping the future banking and financial sector infrastructure and hence economic growth.

Keywords: Credit Risk, Bank Performance, Non-Performing Loans, Causality Test and Yemen.

1. Introduction

Albeit the Central Bank in its implementation of monetary policy has a sole responsibility of monitoring and supervising the activities of Commercial Banks through both on-site and off-site banking examination executed most times by the Bank's supervision department, adhering to the statutory and prudential requirements such as the Capital Adequacy, Management Efficiency, Liquidity and Sensitivity to risk (CAMELS) ratings of the Basel 1,2 & 3 according to Part III of the Banking Act 2000 in order to eradicate and mitigate banking system risk to a lower ebb. The relationship between credit risk and banking sector performance is a controversial topic because we are most concern about poor banking performance that can lead to bank failure and crisis in the financial sector and thus have a devastating effect on the economic growth.

This research does not undermine banking failure and the consequences it may cause on the financial sector and the overall growth climate. We have seen recently the world witnessed one of the most devastating financial meltdowns of 2007-2009 since the great depression of the 1930s.

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The most affected sector was the financial services industry, particularly the banking sector and it became a regular target for tougher regulation, public anger and academic critics, and one factor that received considerable attention is risk management discourse.

Credit risk management and its implications on banking sector performance have been fraught with difficulties and challenges that ultimately results to poor banking performance that incubate tendency and leading to unfavourable banking performance with unclear balance sheet, bank failure and crisis in the financial sector leading to a systemic risk and thus have a negative functional ramification on economic growth. However, among the risks faced by banks credit risk plays a crucial role on banks performance since huge amount of banks revenue are from credit as a result of interest charged on credit. It is important to note that, interest rate charged is directly correlated with credit risk; high interest rate may increase the chances of credit default (Ahmed and Ariff (2007).

However, studies on credit risk and its implications on banks performance are scant; examples of some of the studies include the financial turmoil of 2007-2009, the economic and financial crisis of Vietnam and the banking and financial crises in Asia largely on account of non-performing loans and forced several banks in Indonesia and Thailand to close operation (Ahmed and Ariff (2007). The performance of the banking sector can be affected by internal and external factors, such as bank specific factors (management, board and ownership etc) and macroeconomic factors (Inflation, Real Gross Domestic Product etc). Banks play a pivotal role as depositories and often provide the main financial instrument for household wealth and are the major financial intermediaries in developing countries (Gelb, 1989). This implies that maintaining confidence in the banking sector is relevant for avoiding disruptions in the financial sector and hence economic growth.

Much of the existing literature on banks profitability and credit risk management attribute greater importance to the rate of physical capital accumulation in the process of economic growth; the rate of capital accumulation in the banking sector depends upon the control of quality and efficiency of its credit risk management. Therefore, the very nature of banking business is so sensitive because credit creation process exposes banks to high default risk and thereby affecting its liquidity and general operation that might lead to financial distress including bankruptcy (Kargbo et al., 2015).Credit risk is the exposure faced by banks when a borrower (customer) default in honoring debt obligations on due date at maturity (Coyle, 2000). To this end, the need for credit risk management in the banking sector is inherent in the nature of banking business. However, in today's dynamic environment, banks are exposed to a large number of risk such as credit risk, liquidity risk, operational risk and macro economic instability, (inflation, weak growth) among others are the risks that creates some source of threat for banks survival and success (Al-Tamimi, Al-Mazrooei, 2007).

It is important to note that the instability of the banking sector offer important theoretical insights and policy recommendations that are particularly valuable in areas of the world suffering from banking and financial crisis and low level of domestic mobilization of capital for investment and economic growth. Consistent with the notion of building a safe, sound and stable banking system and promote financial and economic growth in the Middle East and North Africa (MENA) region requires prudent and robust approach to building the confidence and stability of the Banking sector and hence economic growth. Slow growth has been the case in the region since the 1970s and 1980s. This worsened in the 1990s partly as a result of civil unrest and political instability in the region which adversely affected planning and growth. (Central Bank of Yemen Annual Report, 2013)The financial sector performance of most MENA countries in the 1990s spanning to early 2000s has been dismally limited, with uneven reforms in the financial sector, the banking sector is dominated by public sector banks, which are characterized by government intervention in credit allocations, losses and liquidity problems and wide interest rates spread.

Given the growing concern by MENA countries to improve on the poor growth episodes and financial sector restraints of the 1970s to 1990s, development of the financial sector attracted considerable attention from policymakers across the region with prudent reforms in the sector by improving access to finance for investment and extensive liberalization of the financial sector in the region, and managing banking risk to its low ebb (Almekhlafi et al., 2015).

This scenario is the case for Yemen, the growth performance of the country in the last decades was weak, and classified as the poorest country in the MENA region, coupled with the range of successive crises and growth challenges led to increase in poverty and food insecurity. The financial sector in Yemen is dominated by the banking sector, as is the case for most developing countries and is considered as one of the weakest in the MENA region and as such any failure in the sector has an immense implication on the economic growth of the country. This is due to the fact that any unfavourable banking performance say bankruptcy that could happen in the sector has a contagion effect that incubate tendency of banking systemic risk that can lead to lack of confidence in the industry, bank runs, crises and economic turmoil (Financial Infrastructure Development Project of Yemen, 2013).

To address these problems, the Central Bank of Yemen (CBY) and the Banking Acts were revised in 2012, to provide sound legal framework, increasing the scope of financial liberalization and intermediation consistent with an independent Central Bank and effective banking supervision. These measures resulted to good overall financial performance in the country. There are currently a total of 17 Commercial Banks in Yemen and consists of 12 (twelve) conventional banks and 5(five) Islamic banks. In terms of ownership status, the conventional banks include 3 (three) state-controlled banks, 4 (four) domestic private banks, and 5 (five) foreign owned banks while, Islamic banks include one state controlled bank and 4 privately owned banks. Competition is generally weak due to dominance of a few, mainly public sector banks. Despite the progress made thus far, the sector is still faced with systematic and institutional inefficiencies, ineffective functioning of the banking system as demonstrated by the untimely and inadequate bank supervision, weak coordination among banks and the subjective assessments of credit creation not consistent across banks and leading to high volume of non-performing loans and liquidity problem and impacts negatively on the banking industry. The sector was significantly affected by the uncertainties of the 2011 crisis leading to a fall in banking balance sheet as large deposit withdrawals in both local and foreign currencies were made (Almekhlafi et al., 2015).

Given the abysmal and unfavourable performance of the banking sector in Yemen since 1990s to mid 2000s, such as poor asset quality, non-performing loans, cash and overall liquidity constraints even with the introduction of the IMF and the World Bank Structural Adjustment Programmes (SAP) coupled with banking failures in developed countries and the bailouts in 2007-2009. This study therefore aims at providing logical examination on the link between credit risk and its implications on banks performance in Yemen. Specifically, the study seeks to (i) determine whether credit risk and its effect on bank performance are similar across banks (ii) determine the direction of causation between banks profitability and credit risk in Yemen; and (iii) provide policy implications to academics, investors, development organizations and policy makers in shaping the future stability of the banking sector in terms of increased productive investments and hence economic growth. These features of Yemen's banking sector performance offer us the motivation to investigate the link between credit risk and banks performance in Yemen.

Due to data limitation, of the 17 Commercial Banks in Yemen, a sample of 6 (six) banks is selected. These include; National Bank of Yemen (NBY), Arab Bank (AB), Yemen Commercial Bank (YCB), Bank Credit to Housing (BCH), Calyon Bank (CB) and Cooperative and Agricultural Credit Bank (CACB)over the period 1998-2013. These are the largest banks and accounted for over 50% of the banking system assets and have been rated by the Bank Scope, an internationally recognized data base covering over 28,900 banks worldwide as the top most six commercial banks in Yemen with large resource base and customer base (International Financial Institutions and Yemen Country Report, 2007).

Data on the determinants of Banks performance were collected from Bank scope data base (2013), and the World Development Indicators data base (2013) from 1998-2013 and analyze within the framework of Panel Least Squares (PLS) regression estimate which offers the advantage of combining time series and cross section dimension of the data (Green, 1993).The common constant effect and fixed effect (cross sectional specific) estimates is applied to determine the first hypothesis that credit risk management and its effects on and Bank performance are similar across banks and the Granger Causality test is used to test the second hypothesis causal relationship exists between credit risk management and banks performance in Yemen. This study is the first in the context of Yemen to assess key determinants of credit risk and implications on bank's performance.

Second, the study attempt to capture whether or not credit risk and its effect on Banks performance are similar across banks (cross-section invariant) in Yemen. Third, it contributes to the literature by providing an econometric relationship of credit risk and its implications on banks' performance in Yemen, this understanding is important for academics and regulators particular monetary policy makers in shaping the future stability of the banking sector in the MENA region and globally.

Primary weakness of the study is the scarcity of data. Analysis is therefore limited to a smaller number of variables than desired because of these limitations. Despite the limitation, reasonable data is available for the study purpose. The rest of this paper is organized as follows: section 2, the literature review, section 3, provides the methodology and data, section 4, the results and discussion of results and finally, section 5 is the conclusion

2. Literature Review

This section reviews the theoretical underpinnings and empirical literatures and to also provide a broader understanding on the connection between credit risk and banks performance. The link between credit risk management and banks performance is crucial and relevant in the context of carrying out an empirical analysis on credit risk and its implication on banks performance. We first present the theoretical literature and then proceeds to provide empirical evidence of the theory.

2.1 Theoretical Literature

The link between credit risk management and bank performance has currently become an issue of focus that has captured a lot of theoretical debates among policy makers, academicians, banks practitioners and central bank regulators. For example, in academia sometimes risk and uncertainties are ambiguously and interchangeably related. It is the case that risk is hard to predict, but it is necessary to find ways to reduce it to enhance performance. However, Knight (1921) pioneered the differentiation between risk and uncertainty in a systematic way. According to Knight, a case where the distribution of outcome is known is "risk" and the case where the distribution of outcome is unknown is "uncertainty". On the contrary, Power (2007) argues that the distinction between risk and uncertainty is in essence an institutional and managerial matter between those events and issues which are expected to be treated with proper management system.

Prior to the financial crisis of 2007-2009, little attention was focused on credit risk management. As (Landscaper and Parough, 2010) pointed out that in recent times there has been extensive academic, policy interest and debates of the different banks risks including credit risk, market risk and even operational risk. However, in recent years, credit risk has become one of the major risks faced by banks and has attracted more attention by researchers, academicians and policy makers, particularly during the financial meltdown of 2007-9 and has prompted banks as a wake-up call of the need for sound credit risk management. Therefore, sound and safe banking performance requires strengthening of its credit risk policy to prevent negative ramifications on bank's liquidity position. Hence, credit risks policies in recent times are now accompanied by appropriate segregation of duties, training of staff and borrowers, professional development, carrying periodic assessment of credit risks, control and procedure to address the risk identified, compliance with regulation and other prudential and legal requirements(Kargbo et al, 2015).

The fact that banks accepts deposits and transforms them into loans makes them vulnerable to the risk of default. In short, banks are in the risk management operations and should therefore asses and manage credits, leading to prudent banks performance and profitability. Credit risks management therefore are measures employed by banks to avoid or mitigate negative effect of credit. The success of banks performance to a greater extent depends on effective and efficient management of credit risk. Credit risk is the risk of a financial loss to the banking industry if customers or counterparty to a financial instrument fails to meets its contractual obligations and arises principally from the industry's loans and advances to customers (Heffernan, 1996). Increase in credit risk may raise the marginal cost of debt and equity, which will increase the cost of fund for the bank and therefore result to liquidity and solvency constraints. Credit risk is crucial to banks performance since the default of customers can lead to fall in banks assets and undermine solvency (Bessis, 2002).

Credit risk can be mitigated by banks with repetitive interactions by both banks and borrowers, collateral securities, or be a customer and hold a deposit account with banks for a certain period before credit request are considered (Nissanke and Aryeetey, 1998). They noted however that, credit request should be based on viability and return on projects, information references with other banks about credit worthiness of borrowers and information from third parties usually superior officers in the same place of work with proper monitoring to mitigate risk of default.

A sound and profitable banking sector is necessary to withstand adverse conditions and hence contribute to the stability of the financial sector. Therefore banks profitability is normally expressed as a function of internal and external determinants, particularly so, when the banking sector in recent years is undergoing major transformation in its operating environment and thus external factors such as GDP growth influences the direction of credit made by banks and hence affect banking performance (Athanasoglu et al., 2005).In period of slow growth, the demand for credit decreases which ultimately impact negatively on banks performance. However, during boom period-strong growth of an economy may lead to high demand for credit to further stimulate investment (Atthanasglou, 2005). Revell (1979) observes that the effect of inflation on banks performance depends on whether the wages and other operational expenses increase above the inflation rates. If inflation can be precisely predicted, banks can reasonably control the operational cost they faced. Consistent with this notion, Perry (1992) opines that the condition under which inflation affect the profitability of banks largely depends on inflation expectation, concluding that if a bank correctly anticipates the inflation rates, its can adjust the interest rates to generate more revenues above their costs to realize profit. To this end, the relationship between inflation and banks profitability is subject to correct anticipation of inflation expectation. Hence, banks performance and inflation direction is mixed and remains opens to be debated. These relationships provide the theoretical underpinnings for the current study.

Empirical Literature

In terms of the empirical evidence, a number of studies employed financial ratios such as loan loss reserves to gross loans, return on assets, return on equity and non-performing loans etc, to determine credit risk management and performance of banks. For example, Brewer (1989) to investigate credit risk management and impact on banks performance, using the ratio of bank loans to assets. The result reveals a positive relationship between banks loans and credit risk. However, in a similar study by Altunbas (2005), he finds that improvement in credit risk management strategies might suggest that banks loans to assets negatively related to bank credit risk and concludes that banks loans are relatively illiquid and result to higher default risk than other bank assets.

In a study to investigate the relationship between credit risk and bank performance, using return on asset and return on equity as measures of banks profitability and the ratio of non-performing loans to total loans as indicators of credit risk, Felix and Claudine (2008) finds that the return on equity and return on assets are negatively related to the ratio of non-performing loans to total loans of banks. The study by (Ahmed and Ariff , 2007), to examine the key determinants of banks performance and credit risk management, the result indicates that credit risk of default in the emerging developing economies were higher than that of developed economies, concluding that regulation and statutory prudential requirement are significant to the banking system that provides varieties of products and services. Therefore, prudent credit risk management is critical in the case of loan dominated banks in emerging market developing economies.

To test whether economic conditions affects banks profitability, (Mayer and Yeager, 2001) employs a set of macroeconomic factors such as inflation and GDP growth, by fitting an OLS model when the return on assets is the dependent variable, the loan loss provision, inflation, GDP growth and non-performing loans as independent variables. (Mayer and Yeager, 2001) find that GDP growth is significant at the 1 % level and impact positively on banks 'profitability. However, the relationship between inflation and banks performance is mixed. Moreover, in a study another study by Moosa (2008) to determine banks performance and macroeconomic climate (inflation and GDP) in Europe using linear multiple regression models and the Generalized Least Square (GLS) on panel data. Inflation is found to impact negatively on banks profitability and statistically insignificant, while GDP is inconclusive.

The, literature survey reveals that numerous studies on the connection between credit risk management and bank performance utilizes the traditional profit theory, measured by the Return on Assets (ROA) and the Return on Equity (ROE) and have been conducted mostly in developed countries, but studies are limited on how credit risk impacts on bank performance for the MENA countries inclusive of Yemen's economy and results of these studies are mostly inconclusive. These contradictory conclusions emerging from the empirical literature are one of the motivations for the present investigation. Findings of the study contribute to theory by explaining the relationship between credit risk and banks' performance. This is of important for policy makers who seek to develop policies for sustained banking sector. This understanding is also of significance for investors and businesses who seek to invest in profitable ventures for superior risk-adjusted returns in the banking sector.

3. Methodology and Data

The study uses a quantitative approach and makes use of secondary data source obtained from bank scope and the World Development Indicators data base (2013) for sixteen years (1998-2013) period. Due to data limitation a cluster sample of 6 (six) banks is selected. As stated earlier, these banks have been rated as the top most six banks in Yemen, and accounted for over 50% of banking system assets with large customer base.

The objective of using secondary data is to link the various explanatory variables that are use as indicators of credit risk on the return of assets (ROA), which is an indicator of banks performance. Taking a clue from studies by Brewer (1989) and Altunbas (2005) to empirically determine the relationship between credit risk and banks profitability, with the return on asset and return on equity as measures of banks profitability, the ratio of non-performing loans as indicators of credit risk. However, this study improves on the model by attempting to capture whether or not credit risk and its effect on Banks performance are similar across banks (cross-section invariant), and to test whether causality exist between credit risk and banks performance in Yemen.

3.1 Model Specification

Generally, the model is specified thus,

$$Y_{it} = \alpha_0 + \alpha_{it} X_{it} + \mu_{it} \qquad (1)$$

where i=6 cross sections and t= 1998-2013, the dependent variable which reflects the bank performance measured by the Return on Asset (ROA), and is a vector of the independent variables that reflects credit risk and macroeconomic variables. These variables have been selected because of their relevance to the model. The intercept , varies across banks to empirically account for the specific effect for each bank, and the slope co-efficient measures the impact of the explanatory variables on banks profitability.

Based on the above, the model can be decomposed thus,

$$ROA = \alpha_0 + \alpha_1 LA + \alpha_2 NPL + \alpha_3 \text{GDPG} + \alpha_4 INF + \mu \ (2)$$

Transforming equation (2) into natural logarithms yields

$$\ln ROA = \alpha_0 + \alpha_1 \ln LA + \alpha_2 \ln NPL + \alpha_3 \ln\text{GDPG} + \alpha_4 \ln INF + \mu \qquad (3)$$

$$<0 \text{ or} >0, \quad <0, \quad <0 \text{ or} >0, \text{ and } <0 \text{ or} >0$$

The restrictions in the parameters and their expected signs (coefficients to be estimated) can be tested in the analysis, it implies that a unit increase in the independent variable will lead to a unit decrease (<0) or increase (>0) in the dependent variable. Therefore, we advanced the following hypotheses that can be tested.

Null Hypothesis: Credit risk management and its effect on Banks performance are similar across banks (cross-section invariant) in Yemen.

Alternative Hypothesis: Credit risk management and its effect on Banks performance are not similar across banks (cross-section variant) in Yemen.

Similarly,

Null Hypothesis: Causal relationship exists between credit risk management and banks performance in Yemen.

Alternative Hypothesis: Causal relationship does not exist between credit risk management and banks performance in Yemen.

3.2 Data Description and Source

Table 1: Data Description and Sources.

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Variable	Symbol	Description	Source
Return on Assets	ROA	This is an indicator of banks profitability and measure deposit takers efficiency in the use of assets.	Bank Scope
Ratio of total loans to total assets	LA	This is a measure of credit risk, since most of the revenues of banks are obtained by loans, but riskier.	Bank Scope
Non-performing loans	NPL	The loans that associated with customers and or credit default and may lead to fall in bank assets and constraint solvency.	Bank Scope
Gross Domestic Product Growth	GDPG	The output of the economy that is produced domestically and measures on an annual basis.	World Bank Data Base
Inflation	INF	Measured as the consumer price index on an annual basis with 2000/1998 as base year.	World Bank Data Base

3.3 Estimation Procedure

The study adopts panel data which has the advantage of combining both time-series and cross sectional dimensions, the technique therefore, suffers less from distribution issues and also adjusts for the problem of heterogeneity of the six banks selected for this research. Hence, the technique is more informative and efficient (Gujarati and Sangeetha, 2007). Descriptive statistics is carried to determine the nature of the mean, standard deviation, skewness, kurtosis and the Jarque-Bera (JB) test of normality of the distribution. The common constant effect and the fixed effect estimates are used to determine the first hypothesis. While the Granger Casualty test is used to determine the second hypothesis of the study.

3.3.1 Common Constant (CC) Versus Fixed Effect (FE) Models

The common constant method is based on the assumption that the intercept is the same for the six banks across space and time, the slope coefficients are constant across space and time and the disturbances capture differences over space and time. In effect, this method is equivalently ignoring time and space dimensions.

While the fixed effect methods assumes that the intercept varies for each bank (that is over space), but is constant across through time, this allows for a limited degree of bank specific characteristics and disturbances capture differences over space and time. However, the common constants model can be tested against fixed effects (different constants for each cross-section), we carry out an F-test. The common constant model is the restricted model and the fixed effects model is the unrestricted model (Asteriou and Hall, 2007).
We carry out the test thus:

H_(0:)(Null hypothesis):- all the constants are the same i.e Credit risk management and its effects on and Bank performance are similar across banks in Yemen. (Common constants estimates).

H_(1:)(Alternative hypothesis):- at least one of the constants are not the same i.e credit risk management and its effects Bank performance varies across banks in Yemen. (Fixed effects estimates), the test statistic is defined as;

$$F_{Stat} = \frac{\left[R_{FE}^2 - R_{CC}^2\right] \big/ N-1}{\left[1 - R_{FE}^2\right] \big/ N.T-k} = \frac{\left[RSS_{CC} - RSS_{FE}\right] \big/ N-1}{RSS_{FE} \big/ N.T-k} \qquad (4)$$

With N cross-sectional units with(N-1) dummy variables and restrictions, degree of freedom in the fixed effects model are the number of observations used for estimating (NT) minus the number of parameters estimated k. If the calculated value of the test statistic is greater than the critical value the common constant is rejected; hence the fixed effects estimate is valid. R_{FE}^2 = R-squared of the fixed effect model, and R_{CC}^2 is the R-squared of the common constant model. RSS is the residual sum of squares.

3.3.2 Granger Causality Tests:

Causality is an important concept in empirical analysis and refers to the ability of one variable to predict or cause the other. The Granger (1969) causality procedure is developed to test for causal relation. According to Granger, Y causes X if the past values of Y can be used to predict X more precisely then simply using the past values of X and vice versa. Therefore, the relevance of this test is to determine the direction of causation between two variables(X and Y) in a time series data. The idea behind this test is to run the following bi-variety regression models, if we want to determine the direction of causality between X and Y.

$$X_t = \gamma_0 + \sum_{i=1}^{n}\delta_i X_{t-i} + \sum_{j=1}^{m}\sigma_j Y_{t-j} + \mu_{1t} \qquad (5)$$

$$Y_t = \alpha_0 + \sum_{i=1}^{n}\alpha_i X_{t-i} + \sum_{j=1}^{m}\beta_j Y_{t-j} + \mu_{2t} \qquad (6)$$

Where m and n are the number of lagged, X and Y are the terms respectively.   are the random errors equation (5) predicts that   is related to past values of itself as well as that of   an equation (6) predicts similar trend for .If we want to test whether X causes Y or/and Y causes X we carry out an F-test on the joint significance of   and respectively. Therefore, we proceed with the test thus:

$$H_0 : \sum_{j=1}^{m}\sigma_j = 0 \ and \ H_0 : \sum_{i=1}^{m}\alpha_i = 0, \text{respectively}$$

We reject, if the calculated, k is the number of parameters estimated in equations (5) and (6), n is the number of observations. Otherwise we do not reject.

We may also use the Probability value of the F-statistic to make a decision based on the significance level, usually 1%, 5% and 10% respectively. An econometric view (E View-6) is applied in the analysis.

4. Results and Discussions

Table 1: Summary Statistics

Variable	Mean	Max	Min	Std. Dev	Skewness	Kurtosis	Jarque-Bere Test
LNROA	**0.79**	11.74	7.43	1.07	-0.48	2.59	4.25
LNLA	8.12	0.58	-3.01	0.68	-0.68	3.23	7.70
LNNPL	17.32	9.48	3.61	**1.44**	-0.90	3.18	12.8
LNINF	12.22	9.94	1.52	0.41	-0.11	1.91	4.82
LNGDPG	1.47	2.71	0.94	0.39	1.77	6.47	96.60

Max= Maximum, Min=Minimum and Std. Dev=Standard Deviation

The descriptive statistics in table 1 above reveals that all the six banks are profitable with a very minimal average return on asset of 0.79%, and standard deviation of 1.07. On average 17.32% of the loans are not performing, this is fairly large and has high standard deviation, which implies high variability compared to LA, INF and GDPG. Hence, non-performing loans affect the profitability of banks in Yemen. Therefore it can be observed that loans are more risky and needs to be reasonably managed to guide against credit risk of default. Inflation averaged around 12.22% signalling a double digit and thus indicates some level of macroeconomic stability which has tendency to impact negatively on growth. No wonder, the growth rate averaged around a minimal percentage (1.47%). For a developing country like Yemen, growing at a rate of 1.47% demonstrates weak and slow growth potential. The weak growth of the economy can affect credit provisioning and even if credits facilities are made available by banks, it can incubate credit default.

All variables are negatively skewed, flattering to the left as compared to the normal distribution. Except GDPG that is positively skewed, flattening to the right. The kurtosis values of LA,NPL and GDPG are higher than the normal values of it and suggest that the kurtosis curve is leptokurtic. While the kurtosis values of ROA and INF are lower than the normal values of it suggesting that the kurtosis curve is platykurtic. Generally, the normal value of skewness is 'Zero' and for Kurtosis is 'three' when the observed series is normally distributed. Given that none of the values of the series satisfies these conditions of normality, the series is therefore not normally distributed. The result is consistent with the Jarque-Bera (JB) test statistics in which all its values are not zero or close to zero. The JB test is used to determine whether the given series is normally distributed or not, the null hypothesis is that the series is normally distributed against the alternative hypothesis that the series is not normally distributed. The result of the JB test rejects the null hypothesis that the series is normally distributed. Therefore, the series is not normally distributed.

The Regression results of the OLS are provided below:

Dependent Variable: ROA
Method: Panel Least Squares
Sample: 1998 2013
Cross-sections included: 6
Total panel (balanced) observations: 96

Table 2: Common Constant Effect Estimates

Variables	Coefficient	Standard error	t-statistic	Probability
C	0.064547	0.066075	0.000017	0.7079
LNLA	0.722854	0.063474	11.38822	0.0016*
LNNPL	-0.554574	0.032880	-16.86675	0.0034*
LNINF	-0.061675	0.112706	-0.547219	0.5856
LNGDPG	-0.149144	0.109513	-1.361889	0.1767

* means significance at 1%, ** means significance at 5% and *** means significance at 10%

R-Squared= 0.85913, DW=1.97, N=96

The result in table 2 above shows that NPL has negative impact on ROA and statistically significant at 1%, Also, INF and GDP are found to impact negatively on ROA and insignificance. However, LA impacts positively on ROA and significant at the 1% level. In general, all the credit risk indicators are significance and have the expected signs. The coefficient of determination R-squared is 0.859 which means that 85.9% of variations in ROA are explained by the independent variables, and the Durbin Watson Statistic is 1.97 which is close to two, suggesting no presence of first order Auto correlation. However, this model assumes that the intercept value is the same for all the six banks, and the slope coefficients of the two credit risk variables are assumed to be identical for the banks. But with close examination of the result in table 2, the intercept value is positive and insignificance. To this end, the restricted assumption is distorting.

Table 3: The Fixed Effect (Cross sectional Specific) Estimates

Variables	Coefficient	Standard error	t-statistic	Probability
C	0.064547	0.041530	1.554236	0.1243
LNLA	0.715825	0.070756	10.11684	0.0012*
LNNPL	-0.545727	0.032171	-16.96353	0.0027*
LNINF	-0.053039	0.105737	-0.501991	0.6169
LNGDPG	-0.149025	0.102173	-1.458552	0.1482

* means significance at 1%, ** means significance at 5% and *** means significance at 10%

R-Squared= 0.884367, DW=1.99, N=96

The result of the fixed effect estimates for all the six banks in table 3, above indicates that LA and NPL are statistically significant at 1%, except for INF and GDPG which are found to be insignificant. This result does not contradict the result obtained in table 2, above. The R-squared is 0.884(88.4%), the Durbin Watson statistic is 1.99 and N=96. However, to test whether credit risk management exerts similar effects on banks profitability in Yemen (Cross-Sectional invariant), we use the restricted F-test as specified in equation (4) above.

Hence,

$$F_{stat} = \frac{[0.884367 - 0.85913]/4}{[1 - 0.884367]/[96]} = \textbf{5.238}$$

Critical value of F at (4, 96); for 4 numerator and 96 denominator degrees of freedom is 6.341. Since the calculated value of the test statistic (5.238) is less-than the critical value (6.341) the common constant is not rejected; we use the common constant effects estimates. Therefore table 2 above is valid. Hence, credit risk management and its effects on banks performance are similar across banks in Yemen (cross- section invariant). This can be attributed to regulatory mechanisms where banks are subject to operate under similar prudential and regulatory conditions.

Table 4: Result of the Correlation Matrix

Variables	LNROA	LNLA	LNNPL	LNINF	LNGDPG
LNROA	1.00				
LNLA	0.59	1.00			
LNNPL	-0.43	-0.18	1.00		
LNINF	-0.49	-0.11	0.32	1.00	
LNGDPG	-0.09	0.01	-0.03	-0.52	1.00

The result in table 4 shows that NPL, INF and GDPG negatively correlated with ROA, this indicates weak management of credit risk by banks in Yemen. This is because, non performing loans affects banks profitability. The result also indicates that high inflation and slow growth may affect the performance of banks in Yemen. However, LA has positive correlation with ROA (moving in the same direction); an increase in LA leads to an increase in ROA. This suggests that prudent credit risk management can impact positively on banks profitability. All the correlation coefficient values are moderates which suggest that multi-collinearly is not present.

Table 5: Result of the Granger Causality Tests

Hypothesis	Obs	F-Stat	Prob.	Conclusion
DLNLA does not Granger Cause DLNROA	74	24.4942	7.E-09*	Bi-directional
DLNROA does not Granger Cause DLNLA	74	54.8097	3.E-15*	Relationship
DLNNPL does not Granger Cause DLNROA	70	4.01133	0.0221**	Unidirectional
DLNROA does not Granger Cause DLNNPL	70	0.69578	0.5018	Relationship
DLNINF does not Granger Cause DLNROA	74	3.17900	0.0478**	Unidirectional
DLNROA does not Granger Cause DLNINF	74	0.60670	0.5480	Relationship
DLNGDPG does not Granger Cause DLNROA	74	9.59219	0.0002*	Uni-directional
DLNROA does not Granger Cause DNGDPG	74	0.06300	0.9390	Relationship
DLNNPL does not Granger Cause DLNLA	74	5.51266	0.0019*	Bi-directional
DLNLA does not Granger Cause DLNNPL	74	3.42699	0.0219**	Relationship
DLNINF does not Granger Cause DLNLA	78	2.75491	0.0492**	Unidirectional
DLNLA does not Granger Cause DLNINF	78	0.67309	0.5715	Relationship
DLNGDPG does not Granger Cause DLNLA	78	2.48534	0.0903***	Unidirectional
DLNLA does not Granger Cause DLNGDPG	78	0.25514	0.7755	Relationship
DLNINF does not Granger Cause DLNNPL	74	3.20192	0.0468**	Bi-directional
DLNNPL does not Granger Cause DLNINF	74	4.97685	0.0096*	Relationship
DLNGDPG does not Granger Cause DLNNPL	74	9.21767	0.0003*	Unidirectional
DLNNPL does not Granger Cause DLNGDPG	74	1.46904	0.2373	Relationship
DLNGDPG does not Granger Cause DLNINF	74	0.93720	0.3967	Uni-directional
DLNINF does not Granger Cause DLNGDPG	74	2.40550	0.0977***	Relationship

(*), (**) and (***) indicates that the null hypothesis is rejected at 1%, 5% and 10% level of significance respectively. The test is performed on the logarithm of the first difference data series.

The result of the Granger causality test in table 5, above indicates a bi-directional relationship between L A and ROA at 1% respectively. NPL and INF granger causes ROA at 5%, GDGP granger causes ROA at 1%. NPL and LA exhibit a bi-directional relationship at the level of their p-values. There exist a unidirectional relationship between INF and LA; the causation runs from INF to LA at 5% level of significance. Causation runs from GDPG to LA at the 10% level of significance and does not run in the reverse sense. INF and NPL indicate a bi-directional relationship at the level of their p-values. GDPG granger causes NPL at 1% level of significance indicating a unidirectional relationship, running from GDPG to NPL and not in the opposite direction. INF granger causes GDPG at 10% level of significance.

In general, the Granger Causality test result reveals evidence of casual relationship between the credit risk indicators (LA and NPL) and Return on Assets (ROA),the indicator of bank performance)confirming the hypotheses that causality exists between credit risk and bank performance in Yemen.

5. Conclusions

The study investigates empirically the link between credit risk and banks performance in Yemen using credit risk, bank performance measures and macroeconomic indicators collected from Bank scope and the World Bank data base from 1998 to 2013.

The regression result reveals that non-performing loans erode banks profitability, problem loans are very costly to recover and the whole efforts amount to throwing good money after bad. When some banks management and regulatory controls have led to deterioration of assets quality, high loan recovery cost associated to high risk exposure. Bad loan syndrome, poor risk management mechanisms may affect the liquidity and general operations of banks in Yemen. This is evidenced by the negative relationship between non-performing loans and profitability.

The correlation result indicates that prudent credit risk management positively correlates with profitability. This is because effective and efficient management of credit risk may result to minimal default and delinquency and hence increases banking performance. The result of the Granger Causality test supports the hypothesis that causality exists between credit risk indicators and banking performance measure in Yemen. The result also indicates that credit risk management and its effects on banks performance are similar across banks in Yemen (cross- section invariant).

Our findings have important implications for policy maker, academicians and development partners that are assisting with the growth process of the banking and financial sector in Yemen, this is because the role of the banking sector is to mobilize savings, allocate resources and diversify risks. Given that the banking system represents an important share of the financial systems in Yemen, a more efficient banking system could positively impact financial development and economic growth especially if banks can effectively play their financial intermediary role (i.e. transform collected deposits in to loans for investments). They can do this if there is a much sound credit risk environment and management, judicial and legal support among other considerations.

Hence, the Government should strive to attain sound macroeconomic policy consistent with growth of the banking sector in particular and financial sector in general and prudential regulatory requirements to make banks more robust and responsive to the needs of the Yemeni populace.

Despite data limitation, our findings are relevant and provide solid foundation of achieving broad based stability of the banking and financial sector and hence economic growth. On this basis, we look forward to future study on banking issues with a view to further provoke policy discourse, such study could be the nexus between Government Regulation and Banking sector performance in Yemen.

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