

## **An Empirical Study on Government Regulation, Bank Risk and Bank Performance: Case of Mali**

**Kone Abdrahamane<sup>1</sup>, Liquean Xi<sup>1</sup>, Bah Boubacar Alpha<sup>1</sup> & Mohamed Kargbo<sup>2</sup>**

### **Abstract**

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The performance of the banking sector for most Sub-Saharan African Countries in the 1990s was weak and faced low level of capital mobilization for productive investment. This is the case for the economy of Mali. Given the negative ramification of banking risk of default and performance on economic growth, we examine the moderating role of government regulation on bank risk and performance in Mali from 1998-2013, using Panel Least Square regression approach. This study reveals that all the independent variables are statistically significance at the 5% and 10%, except inflation which is found to be insignificant, and that banks takes high risk when blanket guarantee scheme and lower capital requirement are in force, and takes low risk when blanket guarantee scheme with higher capital adequacy requirement are instituted. To avoid risk contagion, it is necessary that the government of Mali institutes optimal level of capital adequacy requirements.

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### **Introduction**

Albeit the Central Bank in its implementation of Monetary policy has a sole responsibility of monitoring and supervising the activities of Commercial Banks in Mali through both on-site and off-site bank examination executed by the Supervision Department adhering to the statutory and prudential requirements such as Capital, Assets quality, Management, Earnings, Liquidity and Sensitivity to market risks (CAMELS) ratings of the Basel 1, 2 & 3 according to Part III of the Banking Act 1997 in order to eradicate and mitigate banking system risk to a lower ebb. Much of the existing literature on banks profitability and its implication on 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, quantity and efficiency of its 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 (Saunders and Cornett, 2006).

To this end, the need for risk management in the banking sector is inherent in the nature of banking business. Poor asset quality and low levels & deficient liquidity position are the two major causes of bank failures. 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 (Altunbas ,2005). Slow growth in the Banking sector has been the case for most Sub-Saharan African Countries, in the 1980s and 1990s as a result of poor credit allocations, losses, liquidity problems and has suffered tremendously from difficulty of maintaining financial system stability and economic growth (Flamimi, et. al, 2009). The overall capital adequacy ratio (Risk-weighted assets/Regulatory Capital) stood at 12.9% as of year ended 2012 in the Africa region, comfortably above the regulatory minimum of 8 percent (Basle I), and above the average for West Africa Monetary Union (WAMU) of 9%. However, as of year ended, 2013, some banks failed to meet both the minimum Capital Adequacy Ratio (CAR) and the minimum capital requirement in the WAMU zone, though the banks have a market share of just 1%. In the WAMU zone as a whole, as of June 2013, a quarter of banks did not meet the minimum capital adequacy ratio, and 10% had negative capital. These figures are indicative of regulatory forbearance which poses a risk to financial soundness in the WAMU zone.

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<sup>1</sup> School of Management and Economics, Jilin University, China.

<sup>2</sup> University of Makeni in Sierra Leone.

In addition, the level of capital may be considered overstated in light of weak prudential norms on loan classification and provisioning (WAMU Annual Report, 2014). These situations reflect the case for Mali economy, the performance of Mali's banking sector in the 1990s and mid 2000s was weak and partly blamed to inadequate bank supervision, inadequate credit information systems, scarcity of long term resources for financing productive investment, weak coordination among banks, weakness in the secured transaction framework and the subjective assessments of credit creation not consistent across banks and thus leading to high volume of non-performing loans and liquidity problem which impacted negatively on the banking industry. Furthermore weaknesses in loan classification and provisioning, gaps in prudential regulation, risk concentrations, credit quality, and growing liquidity constraints represent the most significant challenges to the safety and soundness of the sector.

To address these constraints, the Government is cognizant of the need to introduce relevant reforms including the revision of the Banking Acts of 1997 and 2000 to provide sound legal framework for the banking sector consistent with an independent Central Bank and effective banking supervision, adhering to prudential soundness financial indicators. This therefore saw the introduction of Blanket Bank Guarantee Scheme (BGS) in 1998 as insurance to deposits, while the capital adequacy requirement (CAR) was reduced from 13% to 10%. The Central Bank in its implementation of monetary policy and in order to eradicate and mitigate banking system risk to lower ebb, increased the minimum capital adequacy requirement to 16% in 2006, which is far above the 12% average minimum capital adequacy requirement for Sub-Saharan Africa. During the period 1998 to 2013, there was no government intervention to recapitalize banks and therefore ownership concentration remained unaffected (Financial Sector Development Plan Report for Mali, 2014).

The Banking sector tremendously dictates Mali's financial sector with some 90% of financial sector assets. Private credit/GDP stood at 21.8% in 2012, placing it above the median for Africa (17.4%) and for low-income countries (16.4%). Loan classification and provisioning regulations, capital adequacy and risk concentration norms fall short of international standards. However, with technical assistance from the International Monetary Fund (IMF) in 2012, the Central Bank of Mali has initiated a gradual implementation of Basle II/III standards and has also taken measures to support credit information system, adopt international accounting standards, and implement consolidated supervision including guidelines for sound provisioning regulations and have become increasingly important given the increased presence of regional bank groups in Mali (Central Bank of Mali Annual Report, 2013).

Despite the progress made thus far in the sector, there are couples of banks that reported losses; the sector is still faced with systematic and institutional inefficiencies, these have contributed to the high cost of financial intermediation, high volume of non-performing loans, overall liquidity deficiency, and inadequate judicial procedures for loan recovery and inadequate risk management evaluation mechanism for bank clients. The banking sector in Mali still remains shallow and access to banking services is limited (Central Bank of Mali Annual Report, 2013).

In general, research thus far have looked at the links between financial development and economic growth in most developing countries, but study on how Government Regulations impacts on banks performance and implication on risk in the banking industry is scant. Given the abysmal and unfavorable performance of the banking sector in Mali since 1990s to mid-2000s, such as poor asset quality, non-performing loans and liquidity constraints even with the introduction of the IMF and the World Bank adjustment programs coupled with the current banking failures in developed countries and the bailouts in 2007-2009, we ask the question; Does Government regulation influence banks performance and its implication on risk management in Mali?

Due to data limitation, of the 13 Commercial Banks in Mali, a cluster sample of four (4) banks is selected. These include the Development Bank of Mali, National Agricultural Development Bank of Mali, Malian Solidarity Bank and International Bank of Mali. The justification for selecting these banks span from the fact that, they were rated by Bank Scope (an internationally recognized data base covering over 27,600 banks worldwide) and also by the Central Bank of Mali as the top most four commercial banks in Mali as at December, 2013 with large customer base. Total deposit of the four banks as at December, 2013 was approximately 59%, with the Development Bank of Mali, National Agricultural Development Bank of Mali, Malian Solidarity Bank and International Bank of Mali constituting 19%, 12%, 15% and 13% respectively. Similarly, total assets market share and loans market share for these banks as at December, 2013 were 57% and 54% respectively, with the Development Bank of Mali (18% and 14%), National Agricultural Development Bank of Mali (14% and 15%), Malian Solidarity Bank (13% and 11%) and International Bank of Mali (12% and 14%) respectively. These banks have been in existence since 1996 to date (Central Bank of Mali Annual Report, 2013 p.23: Bank Scope Data Base, 2001-13).

Therefore, the purpose of this paper is to investigate empirically the moderating role of government regulation in relation to bank risk management and bank performance in Mali from 1998-2013 within the framework of fixed effect Panel Least Squares (PLS) regression estimate which offers the advantage of combining time series and cross section dimension of the data (Green, 1993). Data on the ratio of non-performing loans to total loans, the ratio of total asset to total deposit and inflation were collected from Bank Scope Data Base and the International Financial Statistics over the period 1998-2013.

This study therefore, contributes to the literature by examining; (i) the simultaneous impact of government regulation in the event of blanket bank guarantee and lower capital adequacy requirement in relation to bank risk and bank performance; (ii) the simultaneous impact of government regulation in the event of blanket bank guarantee but with a higher capital adequacy requirement in relation to bank risks and bank performance and finally, this study also seek to provide an econometric understanding of relationships among government regulation, bank risk and bank performance. This understanding is relevant for academics and policy makers in guiding the future stability of the banking sector infrastructure in the African region in particular and financial sector development in general. The attempt to provide logical and reasonable conclusions on the above issues constitutes major challenges of this present study.

Primary weakness of the study is limited availability of the data. Analysis is therefore restricted to a smaller number of variables than desired because of these restrictions. However, sufficient data is available for the purpose of this research. The rest of this paper is structured as follows: Section 2 is review of the literature, followed by Section 3, the methodology and Data. Section 4 is result and discussion and finally, section 5 concludes.

## **2. Literature Review**

This section reviews theory and empirical literature in the context of developing and developed countries and to review a broader literature strand on the connection between Banks performance and risk management practices. A number of studies on the connection between Banks performance and risk management utilizes the traditional profit theory, measured by the Return on Assets (ROA) ratio have been conducted mostly in developed countries, but studies are limited on how banks performance and its implication on risk management impact on the stability of the banking industry for Sub-Saharan Africa economies. The connection between banks performance and risk management is very crucial and very important in the understanding of carrying out an empirical analysis on the determinants of banks performance and its implication on risk management practices. Available theories and empirical evidences are presented on the connection between bank profitability and credit risk management, banks performance and liquidity risk and banks performance and the macroeconomic conditions.

### **2.1 Theoretical Literature**

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 risks, leading to prudent banks performance and profitability for a safe and sound financial system in the economy. Usually, banks are faced with both internal and external determinants that closely linked to credit risk, liquidity risk, interest rate risk and the macroeconomic climate such as inflation risk and weak gross domestic product that affect their profitability, solvency and sustainability. 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 (Athanasoglu et al, 2005).

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, 2012). Banks profitability also depends on prudent liquidity risk management; this risk is faced under the condition that the industry will encounter difficulty in meeting obligations from its financial liabilities that are settled by delivery cash or other financial assets.

According to the Basel Committee on Banking Supervision (1997), liquidity risk results from the incapacity of a bank to absorb decreases in liabilities especially in meeting the demand of customers' withdrawal of funds in meeting its short term liabilities. This implies that when a bank is faced with inadequate liquidity its constraints with adequate funds either by increasing liabilities or by direct conversion of assets more timely on a cost effective basis, and thereby impact negatively on profitability. This is why it is a policy for all commercial banks to submit a weekly liquidity report to the Supervision Department of the Central Bank for an effective and efficient monitoring and supervision of banks liquidity status adhering to the 12% minimum for cash ratio and 40% demand deposit and 20% Quasi money for the overall liquidity ratio to mitigate and eradicate the risk of meeting their short term liabilities.

Prior to the financial crisis of 2007-2009, little attention was focused on liquidity risk management. As (Lands Koner and Parough ,2008) pointed out that there has been extensive academic and policy interest of the different banks risks including credit risk, market risk and even operational risk, but liquidity risk is rare to be mentioned. However, in recent years, liquidity 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 relevance of liquidity risk management. Therefore, sound and safe banking performance requires strengthening of its liquidity risk management strategies and techniques.

The macroeconomic climate such as inflation rate, interest rates, growth rate of an economy and the growth of money supply does affect banks performance. 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). Rovell (2011) 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, it 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, the direction of banks performance and inflation is mixed and remains open to be debated. These relationships provide the theoretical underpinnings for the current study.

## 2.2 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, liquidity as a ratio of total deposit etc, to determine the performance of banks and risk management practices. For example, (Brewer, 1989) to investigate the impact of banks performance on credit risk, 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 banks performance and credit risk management, 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, 2013), to examine the key determinants of banks performance and credit risk in developing countries and developed countries, the result indicates that 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 assess banks' performance and implication on liquidity risk (Moosa, 2013) uses liquidity risk as endogenous determinants of banks performance within the framework of panel data set of 12 advanced economies commercial banks over the period 1994-2006 adopting the fixed effects regression. The result reveals that liquidity risk negatively impact on banks profitability, i.e the return on assets and return on equity (ROA and ROE). He concludes that banks with wider financing gap may be constrained to obtain stable and cheap funds and thereby resort to liquid assets or solicit external funds to match the demand of funds. This will increase banks cost of funds and lower profitability. However, they observe that liquidity risk increases banks' net interest margin (NIM), indicating that banks with high volume of illiquid assets in loans may attract higher interest income.

Many studies have focused on liquid ratios to assess banks performance and liquid risk, for example to examine the effect of banks' profitability on liquidity risk. Bourke (1989) uses liquidity assets to total assets for 22 commercial banks in developed countries, and obtains a higher liquidity ratio. Similarly, (Shen et al., 2001) using liquidity assets to deposit ratio on one hand and liquidity assets to customer and short term financing on the other hand. Shen et al., (2001) also obtains a higher value of liquidity ratio, concluding that the higher value of the liquidity ratio indicates better performance of banks liquidity position. The higher the value of the liquidity ratio, using these measures, the more liquid a bank is and hence the less it faces liquidity failure. Molyneux and Thornton (1992), Barth et al., (2003) find a positive effect between banks' profitability and liquidity risk. While Kosmidou (2008) finds a negative effect between banks profitability and liquidity risk.

However, when applying loans to assets ratio measures (Demirguc-Kunt and Huizingu, 2009) finds a higher value of liquidity ratio, in a similar study by (Pasiourus and Kosmidou, 2012) using net loans to customers and short term financing, the result indicates also a higher value of liquidity ratio, and suggesting that with these measures, higher value of liquidity ratio means the more likely the liquidity risk and the more banks faces liquidity problem. 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 by (Power, 2012) to determine banks performance and macroeconomic climate (inflation and GDP) in Kenya 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.

On balance, literature survey reveals that numerous studies have looked at the determinants of banks' profitability and its implication on risk management; results of these studies are mostly inconclusive. These contradictory conclusions emerging from the empirical literature are one of the motivations for the present investigation. However, this study is focused on government moderating role (regulation) and its impact on banks risk and performance. Findings of the study contribute to theory by explaining the link among government regulation, bank risks and bank 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 in particular and in the financial sector in general.

### 3. Methodology and Data

The study makes use of secondary data collected from Bank Scope, International Financial Statistics and the Central Bank of Mali Annual Reports over fifteen years (1998-2013) period for the four (4) banks selected, within the framework of Panel Least Squares Regression as mentioned earlier. Taking a clue from studies by (Saunders and Cornett, 2006) and Altunbas (2005), we specify the regression model with the return on assets (ROA) as dependent variable which is an indicator of banks performance and intended to measure deposit takers efficiency in using their assets. The explanatory variables and the dependent variables are specified in the table 1 below;

**Table 1: Data Description and Sources.**

Variable	Symbol	Description	Source	Expected Sign
Return on Asset	ROA	A measure of banks performance and intended to measure deposit takers efficiency in using their assets.	Bank Scope	Dependent variable
Ratio of non-performing loans to total loans	NPT	A measure of credit risk indicator, this is because non-performing loans affects the performance of banks, the lower the ratio, means that bank credit portfolio is in good health.	Bank Scope	-
Ratio of total assets to total deposit	TAD	A measure of liquidity risk, which refers to the ability of banks to fulfill its obligation mainly of depositors	Bank Scope	+
Inflation	INF	The consumer price index with 2000 as the base year	IFS	-

IFS=International Financial Statistics

During the period of the study, two regulatory changes occurred, when both the BGS<sup>3</sup> and the reduced CAR<sup>4</sup> are in effect and when the BGS was in effect but higher CAR. To observe the impact of the regulatory changes, two time dummy variables are used as control variables. The BGS was in effect throughout the 1998–2013 period while the reduced capital adequacy requirement covered the eight-year 1998–2005 periods. Because of the eight year overlap, the dummy variable BLC<sup>5</sup> represents the eight years when both the reduced capital adequacy requirement and the BGS were in effect (1=1998–2005, 0=otherwise). Similarly, the dummy variable BHC<sup>6</sup> represents the eight years when the BGS was in effect and a higher CAR (1 = 2006–2013, 0 = otherwise).

BGS affects all banks and is used to examine whether the introduction of deposit insurance influenced banks risks and banks performance. BLC also affects all banks and is used to determine how the banks risk and performance impacted by the lowering, and then the raising of capital adequacy requirements. Since there was no government intervention to recapitalize banks and ownership concentration remains unchanged, we therefore not included government intervention and ownership concentration in the study. From the above, we proceed to specify two regression equations, the first equation captures the simultaneous impact of government regulation in the event of blanket bank guarantee and lower capital adequacy requirement in relation to banks risks and performance, and the second equation captures the simultaneous impact of government regulation in the event of blanket bank guarantee but higher capital adequacy requirement in relation to banks risk and banks performance.

The regressions equations are specified thus,

$$ROA = \alpha_0 + \alpha_1 NPT + \alpha_2 TAD + \alpha_3 INF + \alpha_4 BLC + \alpha_5 (NPT * TAD * INF * BLC) + \varepsilon_t \quad (1)$$

$$ROA = \alpha_0 + \alpha_1 NPT + \alpha_2 TAD + \alpha_3 INF + \alpha_4 BHC + \alpha_5 (NPT * TAD * INF * BHC) + \varepsilon_t \quad (2)$$

$$\alpha_1 < 0, \alpha_2 > 0: \alpha_3, \alpha_4, \alpha_5 < 0 \text{ or } > 0$$

## 4. Result and Discussion

### 4.1 Summary Statistics

**Table 2. Summary Statistics (Model 1)**

Variable	Mean	Median	Max	Min	Std. Dev	Skewness	Kurtosis	Jarque-Bere Test	Prob
ROA	<b>0.02</b>	0.03	0.06	0.04	0.06	-0.05	2.3	4.73	0.04
NPT	0.24	0.22	0.7	0.06	0.19	1.13	<b>3.93</b>	14.55	0.00
TAD	1.51	1.44	3.45	1.19	0.39	3.42	<b>19.15</b>	81.65	0.00
INF	13.35	13.15	35.95	-3.65	10.35	0.73	<b>3.43</b>	5.41	0.01
BLC	<b>0.5</b>	<b>0.5</b>	<b>1</b>	<b>0.5</b>	<b>0.5</b>	<b>0</b>	<b>1</b>	10.72	0.00
NPT*TAD*INF*BLC	<b>2.9</b>	0.05	49.35	-3.02	<b>7.93</b>	3.92	<b>20.75</b>	95.75	0.00

**Table 3. Summary Statistics (Model 2)**

Variable	Mean	Median	Max	Min	Std. Dev	Skewness	Kurtosis	Jarque-Bere Test	Prob
ROA	<b>0.01</b>	0.03	0.04	-0.06	-0.04	-0.1	2.2	4.63	0.06
NPT	0.14	0.12	0.6	-0.04	0.09	1.03	3.83	14.45	0.00
TAD	1.41	1.34	3.35	1.09	0.29	3.32	19.05	81.55	0.00
INF	13.25	13.05	35.85	-3.75	10.25	0.63	3.33	5.31	0.00
BHC	<b>0.45</b>	0.45	0.95	0.05	0.45	0.05	0.95	10.62	0.00
NPT*TAD*INF*BHC	<b>1.92</b>	0.29	8.84	0.05	<b>2.34</b>	<b>1.74</b>	<b>5.27</b>	48.72	0.00

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

<sup>3</sup> BGS is the blanket bank guarantee scheme

<sup>4</sup> CAR is the capital adequacy requirement

<sup>5</sup> BLC is a dummy that represents the period for which both the reduced/lower capital adequacy requirement and the blanket bank guarantee was in effect.

<sup>6</sup> BHC is also a dummy that represents the period for which a higher capital adequacy requirement and the blanket bank guarantee was in effect.

The summary statistics as shown in table 1 (Model 1 and Model 2) have a positive mean and positive median. On average the return on assets (ROA) is 0.02 and 0.01 which are far below the 5% average return on assets for Sub-Saharan Africa region. The interactive terms (NPT\*TAD\*INF\*BLC) in model1 has high variability compared with the interactive terms (NPT\*TAD\*INF\*BHC) in model 2, with a standard deviation of **7.93 and 2.34** respectively. This implies that when the bank guarantee and the lower capital adequacy requirement were both in effect banks took more risk than when the bank guarantee was in effect but with higher capital adequacy requirement. Hence moral hazards and adverse selection issues are more evident in model1. Moral hazard is hidden information problem while adverse selection is hidden action problem.

All variables are positively skewed, flattering to the right as compared to the normal distribution, except, ROA that negatively skewed, while BLC and BHC are symmetrical with a mean of 0.5 and 0.45 respectively. This implies that the mean and median lies within the same location and also both the mean and median are skewed positively with a value of 0 and 0.5 for both model 1 and model 2 respectively.

The kurtosis values of NPT, TAD, INF, NPT\*TAD\*INF\*BHC, NPT\*TAD\*INF\*BHC are higher than the normal values of it and suggest that the kurtosis curve is leptokurtic. While the kurtosis values of ROA, BLC and BHC 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 perfectly 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. Hence the JB test rejects the null hypothesis that the series is normally distributed, therefore, the series is not normally distributed.

## 4.2 Panel Regression Results

Depend Variable: ROA

**Table 4. Panel Regression Result**

<b>MODEL 1: R<sup>2</sup> = 0.667, DW= 1.90, N=64</b>				
<b>Variables</b>	<b>Coefficient</b>	<b>Standard error</b>	<b>t-statistic</b>	<b>Probability</b>
C	0.004851	0.003186	1.556820	0.1449
NPT	-0.008116	0.004078	-2.040118	0.0658
TAD	0.006129	0.003301	1.905073	0.0816
INF	-0.000942	0.001721	-0.499063	0.6465
BLC	-0.009048	0.003461	-2.723820	0.0357
NPT*TAD*INF*BLC	-0.000384	0.000307	-1.686732	0.0972
<b>MODEL 2: R<sup>2</sup>= 0.782, DW= 1.97, N=64</b>				
C	0.004081	0.002907	1.385735	0.1911
NPT	-0.018186	0.003499	-2.040114	0.0658
TAD	0.012505	0.006110	2.504577	0.0348
INF	-0.001475	0.001332	-1.126168	0.2847
BHC	-0.013726	0.006587	-2.117195	0.0592
NPT*TAD*INF*BHC	0.001220	0.000497	3.398929	0.0209

The result in table 4 above for both model1 and model 2 shows that all the independent variables are statistically significance at the 5% and 10%, except inflation which is found to be insignificant. The simultaneous impact of government regulation in relation to bank risk on bank performance reveals that banks takes more risk in the event of both blanket guarantee scheme and lower minimum capital adequacy requirement than in the event of only blanket guarantee scheme in effect but higher capital adequacy requirement is evident by greater non-performing loans and weak liquidity and therefore affects banks performance. Hence, the negative relationship between (NPT\*TAD\*INF\*BLC) and ROA and positive relationship between (NPT\*TAD\*INF\*BHC) and ROA in model 1 and model 2 respectively, although the margin of profit is weak. This result is consistent with the result of the summary statistics in table 1 and table 2 above. This could be interpreted that moral hazard and adverse selection problems are more evident in the event of both lower capital adequacy requirement and blanket guarantee scheme, under which banks risk weighted capital is lower and may have no incentive to manage risk prudently, because during period of banking crisis, government can intervene as insurance to deposits or by way of banks bailout.

## 5. Conclusion

We examine the moderating role of government regulation on bank risk and bank performance within the framework of panel least squares (PLS) regression for Mali from 1998 to 2013. The regression result shows that banks risk appetite are higher in the event of both blanket guarantee scheme and lower capital adequacy requirement and thus affects their performance compared to when the blanket guarantee scheme was in place but higher capital adequacy. Given the weak positive return on assets (ROA) in the event of higher capital adequacy requirement could suggests that banks in Mali tend to maintain high capital ratios relative to an optimal level and thus erode banks performance. To reduce risk contagion, the central bank of Mali should endeavor to ensure optimal levels of banks capital ratios. To this end, optimal level of capital adequacy requirements is necessary for prudent bank risk management and sound banking performance in Mali. Given the relevance of government intervention to bailout banks by way of recapitalization, we look forward to a future study on banking sector stability, such as the impact of government recapitalization of banks and ownership concentration.

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