Explanatory Power of Bank Specific Variables as Determinants of Non-Performing Loans: Evidence form Pakistan Banking Sector

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Abstract: It is widely accepted that the growth in Non-performing loans is associated with the inefficiency, failures of the banks and financial crisis in the developed and developing countries. In fact, existing studies have provided evidence that the rapid growth in NPLs leads to the financial crisis. Therefore whenever financial vulnerability is examined, main emphasis is placed on the levels of NPLs. The NPLs in Pakistan are increasing with an alarming rate each year; therefore the main aim of the current study is to investigate the bank specific determinants of NPLs. The current study used 6 years panel data (2006-2011) of 30 banks to test the validity of 10 banks specific hypotheses. The commercial banks can use the findings of current study to improve the current management performance, control the current level of lending as compared to expected NPLs and extensive lending during boom to reduce the level of NPLs.

Key words: NPLs • Bank specific variables • Efficiency • Performance • Bad management

INTRODUCTION

The Pakistan commercial banking sector has blamed recently by both foreign as well as local stakeholders for apparently avoiding its responsibility to provide credit to different private sectors to stimulate the country economic growth. Locally, regulatory authorities and government are realizing the fact that commercial banks should provide the leverage where it is needed (private sector). Whereas foreign credit rating agencies such as Moody’s are constantly highlighting that commercial banks should not increase their loan portfolio risk by putting all their eggs in single basket i.e. investing in the government securities only.

The total Non-performing loans (NPLs) stood at Rs613 billion for all banking sector exclusive of finance development institutions, as per data provided by State bank of Pakistan (SBP) on September 30, 2011. Out of total NPLs 62 percent comes from the balance sheet of private banks; nearly 31 percent reside on the public banks balance sheet, almost 6 percent comes from the specialized banks and foreign banks are holding very minor percent of the total NPLs. The NPLs are growing continuously on quarterly basis, registering 6 percent (almost Rs37 billion) growth in the first quarter of fiscal year 2011-12. On the other hand cash recovery for the first quarter against the NPLs reached to Rs14 billion, with major recovery by the private banks of Rs10.5 billion. The Net NPLs / Net Loans for the banking sector is 6.4 percent, the ratio is high because of the 15.1 percent ratio contribution of publically held banks and 14.7 percent ratio contribution of specialized banks. Whereas foreign owned banks and local privately held banks have net NPLs/net loans ratios of 1.3 percent and 3.8 percent, respectively.

The government of Pakistan from time to time criticizes the private banks for not providing credit to the private sector, but in reality government owns the larger share of private banks lending. The depreciating currency of Pakistan is reducing the foreign exchange reserves, government in order to get the budgetary support rely heavily on the local bank borrowing. During the current fiscal year from July 1 to February government borrowed Rs190 billion from the SBP, where as total borrowing of government from scheduled banks reached to a massive figure of Rs700 billion.

About 20 percent of the private borrowing is done by the textile sector; the amount of the loans outstanding towards textile sector is Rs555 billion in January 2012. Whereas manufacturing sector is the largest borrower in
the private sector owning 51 percent of the total borrowings (Rs1,464 billion). The persistent electricity shortfalls and gas shortages now become a consistent phenomenon; as a result the manufacturing and textile sector are made to borrow more than their usual working capital requirement. The biggest example of gas shortage effect on manufacturing sector is the world's largest single-train urea manufacturing plant which is not working because of the irregular supply of gas. The cost of this project is over $1 billion which is mainly financed by the banks. As the plant is not fully operating thus there is every possibility of defaults of loans and increase in NPLs of the banking sector. Therefore, because of such infrastructure-based uncertainty banks of Pakistan avoid lending to the private sector, as it can translate into growth in NPLs. Thus banks are only lending to the government because of the growth in demand but also to reduce the riskiness of the loan portfolio.

The further reduction of 100-200 basis points in the current market interest rates would not likely to stimulate the growth in private sector lending, because of the infrastructural issues and energy deficit problems. If the government resolves the energy problem then it would increase the demand for the credit and will also help in the reduction of the loan portfolio risk of private banks.

The aim of the current study was to test the determinants of NPLs by using the Pakistani banking sector data. The existing literature provides evidence relating the explanatory power of numerous variables such as macroeconomic variables and bank specific variables, banks ownership structure, corruption and information sharing as determinants of NPLs. They are not the only variables having impact on the NPLs, however, the uniqueness of banking sector, banking polices, efficiency maximization efforts and risk reduction polices also have significant impact on the quality of loans. Furthermore variables such as efficiency of the management, risk appetite and liquidity level, profitability, capital availability, size of banks, nature of operation, deposits and lending rates also have significant influence on the growth and decline of NPLs. Banks earn profit by lending funds to the borrowers that are willing to pay higher rates but it mainly increases the risk exposure of the banks, which can be consider negligence on the part of mangers because they prefer the short term profits and ignore the future loan defaults.

The main aim of this study is to investigate the explanatory power of bank specific variables as determinants of NPLs. After an extensive literature review, nine bank specific hypotheses are selected for this study, among them six hypotheses are developed by Berger and DeYoung [1]; and Louzis, Vouldis and Metaxas [2], whereas three hypotheses are developed in this study by using findings of existing studies. To empirically test the validity of 10 banks specific hypotheses 10 bank specific variables are used. This study used 6 years panel data of 30 banks over the time period of 2006-2011, among 30 banks, 3 banks were public, 21 banks were private and 6 banks were foreign owned. By following Festiæ, Kavkler and Repina [3] current study used panel regression analysis.

This paper is divided into different sections. Section 1 presents the introduction of the study, section 2 highlights the exiting literature relating bank specific determinants of NPLs and presents the hypotheses used in current study. Section 3 provides the research methodology and results and analysis are presented in section 4. Finally, section 5 discusses the findings, policy related implication and future research.

**Literature Review:** Literature on bank specific variables is not that extensive, few studies have investigated the association of NPLs with bank specific factors. For instance, Berger and DeYoung [1] used USA commercial banks data over the period of 1985-1994 and employed granger causality test to investigate the direction of causality among cost efficiency, loan quality and bank capital. They presented and empirically tested 4 hypotheses in their study. This current study used their four hypotheses and also develops other hypotheses from the existing literature.

The four bank specific hypotheses of Berger and DeYoung [1] are given as follows.

**Bad Luck Hypothesis:** Due to macroeconomic events such as bad performance of economy in the form decreased production level, high unemployment, failure of any sector, failure of manufacturing plant, energy crisis, unexpected events such as terrorist attacks; the economic activities in the country declines which results in the reduced earnings and profits of individuals and firms, leading to the growth in bad loans. In order to recover bad loans banks incurs extra operating costs in the form of additional monitoring expenses, attention divergence of top management, the costs of pricing, handling and disposing off collateral, negotiations with defaulters etc, as a result the increase in bad loans erodes banks cost efficiency in the form of increased monitoring and recovering costs.
Bad Management Hypothesis: Low cost efficiency (high cost inefficiency) signals the current bad performance of the senior managers in managing day to day activities and loan portfolio. The lower management also does not monitor and control operating expenses, which is reflected in the low cost efficiency almost immediately. Managers in such banks do not follow the standard practices of loan monitoring, controlling and underwriting. Thus as “bad managers” they have poor credit scoring, collateral evaluating and loan monitoring and controlling skills. When managers are inefficiently managing the current banking operations then it will lead to the future growth in NPLs.

Berger and DeYoung [1] concluded that current poor performance, poor credit evaluation and monitoring skills and wrong collateral valuation lead to the growth in future NPLs.

H1: According to bad management hypothesis “high cost inefficiency leads to the future growth in NPLs”.

Skimming Hypothesis: Resource allocated for monitoring loans and underwriting effects the cost efficiency and loan quality of the banks, higher cost efficiency leads to the growth in NPLs. In order to achieve short term profits, banks prefer lower costs but in long run it will affect the quality of loans. Therefore managers have to decide tradeoff between cost efficiency and resource allocation for underwriting, appraising collateral, controlling and monitoring outstanding loans. Thus banks that prefer high cost efficiency dedicate less effort in ensuring quality of loans; however such banks have higher growth in NPLs during long run.

H2: According to skimming hypothesis “low cost inefficiency leads to the future growth in NPLs”.

Moral Hazard Hypothesis: Banks having low capital tends to increase earnings through increase in loan portfolio riskiness by allocating funds to low quality borrowers, resulting in the future growth in NPLs. This practice of banks comes under moral hazard, because banks know that they are thinly capitalized but still increases the riskiness of loan portfolio. Thus low financial capital may leads to the future growth in NPLs.

H3: According to moral hazard hypothesis “low financial capital leads to the growth in future NPLs”.

H4: According to moral hazard hypothesis “high loans to assets ratio results in the growth of NPLs”.  

The NPLs are significantly positively associated with loan to asset ratio, implying that with the increase in loan to asset ratio banks chance of insolvency increases due to the mismanagement of assets by the banks in long run [3, 4, 5, 6]. The mismanagement of assets refers to the extensive lending by the banks when they have excess time deposits. Thus under moral hazard it can be hypothesized that high loans to assets ratio (low financial capital) are positively associated with NPLs.

Podpiera and Weill [7] extended the work of Berger and DeYoung [1] by applying dynamic panel estimator technique, Generalized Method of Moment (GMM) by using data from Czech banks over the period of 1994-2005 to investigate the validity of bad management and bad luck hypothesis. They found strong support for bad management and partial support for bad luck hypothesis. They concluded that banking supervisory authorities should focus on the managerial performance and cost efficiency in order to reduce NPLs and enhance the financial system and banks stability. Louzis et al. [2] investigated the impact of macroeconomics and bank specific variables as determinants of NPLs and used Greek banking sector data by employing dynamic panel estimator technique. There results supported the bad management hypothesis.

Sales and Saurina [8] used panel data of Spanish savings and commercial banks over the period of 1985-1997. They combined both macroeconomic and bank specific factors in the same model to investigate the determinants of NPLs. They found statistically insignificant relationship between NPLs and lagged efficiency, suggesting no support for the bad management and skimming hypotheses. They further concluded that insignificant association was because of the opposing effect of bad management and skimming behavior. They also found negative impact of bad loans to lagged solvency, confirming the moral hazard hypothesis. Furthermore they also investigated the impact of bank size on the NPLs and found that larger size banks tend to have lower NPLs, the finding of Sales and Saurina [8] was used to formulate “size effect” hypothesis.
Size Effect Hypothesis: Size of the bank allows the diversification opportunity in lending, consequently the loans of the banks will be dispersed among different sectors and chances of NPLs will decline as compared to the concentrated loans. Therefore diversification supports the negative association between NPLs and size of the banks. Hu, Yang and Yung [9] used panel data over the period of 1996-1999 and found that the banks with higher government ownership are having less NPLs. They further concluded that bank size negatively affect the NPLs. Thus it can be concluded that increase in bank size reduces the future NPLs.

H5: According to size effect hypothesis “increase in bank size (share in total loans) results in the decline of NPLs”.

Bad Management II Hypothesis: The existing literature has found contradictory relationship between NPLs and management performance. One possible relation is that poor performance (high cost inefficiency) increases the future NPLs which is similar to the bad management hypothesis because low cost efficiency is due to the poor manager performance. The opposite relation (positive) is also possible as given by Rajan [10], the argument for positive relation is that managers of banks convince the potential investors and market regarding the profitability of their lending and future prospects of the economy and financial sector and adopts lenient credit policy to increase the current earnings, which results in the current cost efficiency and future growth of NPLs. Hence, past good performance may have positive impact on the growth in future NPLs, therefore it can be concluded that current good performance of management can be positively linked with growth in NPLs. Here performance of management can be used as proxy for quality of management as in bad management hypothesis.

H6: According to bad management II “increase in current good performance increases the future NPLs”.

Procyclical Credit Policy Hypothesis: The existing literature has suggested that banks adopt liberal credit policy during the boom and adopt tight policy in depression [10]. Marcucci and Quagliariello [11] also confirmed that NPLs follows a cyclic trend, increase during boom and decrease during depression.

Babihuga [12] concluded that banking income cycle is significantly negatively correlated with the banking size cycle, suggesting that low income economies with low financial development have significant negative association between capital adequacy and business cycle and vice-versa. Thus the positive impact of the business cycle can be expected on the NPLs in economies with lower financial development. Furthermore Festič et al. [3] suggested that procyclicality and high economic growth increases the credit in the country but sudden slowdown or decline in the economic growth leads to the growth in NPLs due to inability of the borrowers to repay loans. Thus credit growth in boom results in growth of NPLs in depression.

H7: According to procyclical credit policy hypothesis “credit growth results in the growth of future NPLs”.

Soft Budget Constrained Hypothesis: Various studies have suggested in most of the transition economies when banks have high level of liquidity and savings, in order to utilize idle funds banks start extensive lending to households and firms (soft budget constraints) [3, 13, 14, 15], which result in the substantial loses to the economy because extensive lending by the banks leads to the growth in lending as compared to the investments and consumptions. This leads to the counter-productiveness of the funds by increasing the liabilities as compared to the income of households and firms. The inability to repay loan by the households and enterprise raises the NPLs of the banks. Thus by using soft budget constrain it can be hypothesized that soft budget constrain can result in the growth of NPLs.

H8: Thus by using soft budget constrain it can be hypothesized that “soft budget constrain results in the future growth of NPLs”.

Deposit Rate Effect Hypothesis: During intensive competition banks offers a competitive deposit rates to attract funds and charge marginal costs to the borrowers. Banks offering higher deposits rates have greater share of deposits and lower interest rate spreads, whereas banks offering lower deposits rates have small share of deposits and higher interest rate spread. Thus it can be concluded that market concentration is significantly positively associated with interest rate spread. The banks with lower capitalization and high risk increases their customers by offering higher competitive rates and have lower interest rate spread [16]. Uhde and Heimeshoff [17] argued that the short term increase in interest rates to deposit rates increase the banks costs of funds, resulting in the higher interest demand on loans. The growth in lending rates is positively correlated with loan defaults, thus results in growth of banks NPLs.
H9: According to deposit rate hypothesis “growth in deposit rates has positive impact on the NPLs”.

**Deposits to Loans Ratio Effect Hypothesis:** The deposits to loans ratio can be used as a rough estimate of profitability on the deposits or as a rough estimate of the growth in deposits to loans ratio can predict the decline in the NPLs ratio [5, 18]. The theoretical justification of the relation is that the growth in deposits to loans ratio means the greater increase in the deposits as compared to the loans. As the deposits of the banks are growing and loans are not, it shows that banks are risk averse and lend only to those customers who have good credit history and are able to repay the loan.

H10: Deposits to loans ratio effect hypothesis “growth in the deposits to loans ratio has negative impact on NPLs”.

Hypotheses given above are not mutually exclusive, any one of the above can be occurred independently or more than one can occur at any time. In extreme condition, all the above given hypotheses can affect the banks at the same time.

**MATERIALS AND METHODS**

The existing studies relating the determinants of NPLs have used NPLs/total advances as the dependent variable, for instance, Louzis et al. [2]; Festiç et al. [3] and Dash and Kabra [19], current study also uses NPLs/total advances as dependent variable.

**Bank Specific Variables:** The 10 bank specific hypotheses are measured with different bank specific variables. Two of the above given nine hypotheses are measured with two variables each and two hypotheses with one variable, which makes 10 bank specific variables to investigate the validity of above given nine bank specific hypotheses. The variable used to measure each bank specific hypothesis, their definition and supported literature is given in the Table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition</th>
<th>Hypothesis tested</th>
<th>Relation with NPLs</th>
<th>Data source</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inefficiency</td>
<td>( IE_{it} = \frac{\text{Operating Expenses}<em>{it}}{\text{Operating Income}</em>{it}} )</td>
<td>Bad Management</td>
<td>+</td>
<td>SBP</td>
<td>Berger and DeYoung, 1997; Podpiera and Weill, 2008; Louzis, 2010</td>
</tr>
<tr>
<td>Inefficiency</td>
<td>( IE_{it} = \frac{\text{Operating Expenses}<em>{it}}{\text{Operating Income}</em>{it}} )</td>
<td>Skimming</td>
<td>-</td>
<td>SBP</td>
<td>Berger and DeYoung, 1997; Louzis, 2010</td>
</tr>
<tr>
<td>Solvency Ratio</td>
<td>( SR_{it} = \frac{\text{Owned Capital}<em>{it}}{\text{Total Assets}</em>{it}} )</td>
<td>Moral hazard</td>
<td>-</td>
<td>SBP</td>
<td>Berger and DeYoung, 1997; Louzis, 2010</td>
</tr>
<tr>
<td>Loans to Deposit Ratio</td>
<td>( LDR_{it} = \frac{\text{Loan}<em>{it}}{\text{Deposits}</em>{it}} )</td>
<td>Moral hazard</td>
<td>+</td>
<td>SBP</td>
<td>Fofack, 2005; Ferreira, 2008; Männasoo and Mayes, 2009; Louzis, 2010 and Festiç et al., 2011</td>
</tr>
<tr>
<td>Market power</td>
<td>( MP_{it} = \frac{\text{Loan}<em>{it}}{\text{Total loans of all banks}</em>{it}} )</td>
<td>Size</td>
<td>-</td>
<td>SBP</td>
<td>Louzis, 2010</td>
</tr>
<tr>
<td>Return on Assets</td>
<td>( ROA_{it} = \frac{\text{Profit}<em>{it}}{\text{Total Assets}</em>{it}} )</td>
<td>Bad Management II</td>
<td>+</td>
<td>SBP</td>
<td>Rajan, 1994; Louzis et al., 2010</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>( ROE_{it} = \frac{\text{Profit}<em>{it}}{\text{Total Equity}</em>{it}} )</td>
<td>Bad Management II</td>
<td>+</td>
<td>SBP</td>
<td>Rajan, 1994; Louzis et al., 2010</td>
</tr>
<tr>
<td>Credit growth</td>
<td>( CG_{it} = \frac{\text{Loan}<em>{it} - \text{Loan}</em>{it-1}}{\text{Loan}_{it-1}} )</td>
<td>Procyclical credit policy</td>
<td>+</td>
<td>SBP</td>
<td>Rajan, 1994; Babihuaga, 2007; Marcucci and Quagliariello, 2008; Louzis et al., 2010 and Festiç et al., 2011</td>
</tr>
<tr>
<td>Total liabilities to income</td>
<td>( TLI_{it} = \frac{\text{Total liabilities}<em>{it}}{\text{Income}</em>{it}} )</td>
<td>Soft budget constrained</td>
<td>+</td>
<td>SBP</td>
<td>Berglöf and Roland, 1995; Podpiera, 2006; Kiss et al., 2006; and Festiç et al., 2011</td>
</tr>
<tr>
<td>Total liabilities to income</td>
<td>( TLI_{it} = \frac{\text{Total liabilities}<em>{it}}{\text{Income}</em>{it}} )</td>
<td>Soft budget constrained</td>
<td>+</td>
<td>SBP</td>
<td>Bergler, 2004; Uhde and Heimeshoff, 2009</td>
</tr>
<tr>
<td>Deposits rate</td>
<td>( DR_{it} = \frac{\text{Interest expenses}<em>{it}}{\text{Total deposits}</em>{it}} )</td>
<td>Deposit rate effect</td>
<td>+</td>
<td>SBP</td>
<td>De Nicolo et al., 2003; and Ferreira, 2008</td>
</tr>
<tr>
<td>Reserve ratio</td>
<td>( RR_{it} = \frac{\text{Deposits to loans ratio effect}}{\text{Total deposits}_{it}} )</td>
<td>Deposits to loans ratio effect</td>
<td>-</td>
<td>SBP</td>
<td>De Nicolo et al., 2003; and Ferreira, 2008</td>
</tr>
</tbody>
</table>
Data and Procedures: The bank specific hypotheses model used panel data of commercial banks operating in Pakistan and for each bank 6 years data was collected. Currently there are 34 commercial banks operating in Pakistan which can be divided into three broad categories i.e., public owned, private owned and foreign owned banks. In this study specialized banks are excluded because the main focus of current study was commercial banks, out of 34 banks 30 banks fulfilled the data requirement. The data relating the bank specific variables and dependent variable (NPLs) was collected from the State Bank of Pakistan (SBP) publication “Financial Statement analysis of the Financial Sector 2006-2009” and annual reports and financial statements of commercial banks for the year 2010 and 2011 given in SBP and respective banks website. The sample for bank specific hypotheses consists of 30 commercial banks operating in Pakistan over the period of 2006 to 2011.

The methods used in the existing studies for investigating the empirical relationship between NPLs and bank specific variables are panel regressions analysis [2], co-integration analysis, cross-country regressions analysis [3] and dynamic panel models [7]. It is clear from the existing literature that most of the studies have used panel regression analysis; therefore panel regression analysis was used in current study.

In most econometric analysis before applying models variable series are converted into log forms to remove heteroskedicity from the analysis and this process is known as log transformation. Where as, Lütkepohl and Xn [20] demonstrated that log transformation is accurate in some special cases. Here the main aim is to capture the dynamics of NPLs; thus log transformation can produce downward bias during estimation. Therefore to capture the dynamics in NPLs, variable series are first converted into differences and then expressed as percentage change. After that unit root test is conducted to check for the stationarity of the variable series. The stationarity of data means that most of the variable series have constant mean and variance values, which results in the false regression analysis with high R-squared value and few significant relationships between variables. Therefore this problem is solved by checking the variable series for the unit root by using panel data stationarity tests of Fisher ADF and Levin, Lin & Chu unit root test. If series are stationary at level then panel regression is conducted by using the same values of the series but when series are stationary at first difference or second difference then panel regression is also applied by using the first or second difference of the time series.

Before applying panel regression explanatory variables are checked for the multicollinearity by using correlation matrix. The multicollinearity problem arises because of the high correlation between any explanatory variables. The multicollinearity problem makes the significant variables insignificant by increasing the p-value; the increase in p-value lowers the t-statistics value. Thus the panel regression results with multicollinearity will show significant variables as insignificant variables. The multicollinearity problem is solved by dropping the high correlated variable. This can be done by applying the panel regression analysis by using the variable series having multicollinearity problem, then that variable series is dropped from two highly correlated series that have high p-value. After that panel regression is again applied by dropping the variable series with high p-value among two correlated variables, the results will now provide more significant relation then before.

First the model was analyzed by using fixed effect regression analysis and then by using redundant fixed effect test the validity of fixed effect model is checked. The redundant fixed effect test compares the common effect model against the fixed effect model with the null hypothesis that there is no individual effect. If the null hypothesis is rejected than fixed effect model is preferred over random common effect model is used. If the null is rejected than random effect model is run and Hausman specification test is applied to check whether random or fixed effect model provide the correct specification. After getting the results of common or random or fixed effect, model is checked for its prediction ability by using certain features and characteristics. First model R-squared value with number of significant relation and F-statistics value is checked; commonly high R-squared value with maximum number of significant relations and F-statistics value with p-value less than 5% are considered best. Second, residual correlation is checked by using Durbin-Watson statistics, commonly when its value is 2 results will now provide more significant relation then before.

After the redundant fixed effect test the validity of fixed effect model is checked. The redundant fixed effect test compares the common effect model against the fixed effect model with the null hypothesis that there is no individual effect. If the null hypothesis is rejected than fixed effect model is preferred over random effect model.

The bank specific variables and ownership structure model is given as:

\[ NPL_{it} = \beta_0 + \beta_1 FE_{it} + \beta_2 SR_{it} + \beta_3 LDR_{it} + \beta_4 MP_{it} + \beta_5 ROA_{it} + \beta_6 ROE_{it} + \beta_7 CG_{it} + \beta_8 TLI_{it} + \beta_9 DR_{it} + \beta_{10} RR_{it} + \mu_{it} \]  

(1)
where

\( NPLs_{it} \) is the dependent variable, banks riskiness (impaired loans to gross loans ratio) in time period “\( t \)” for cross-recessional unit “\( i \)”

\( IE_{it} \) is the inefficiency ratio in time period “\( t \)” for cross-recessional unit “\( i \)”

\( SR_{it} \) is the solvency ratio in time period “\( t \)” for cross-recessional unit “\( i \)”

\( LDR_{it} \) is the loans to deposit ratio in time period “\( t \)” for cross-recessional unit “\( i \)”

\( MP_{ih} \) is the market power ratio in time period “\( t \)” for cross-recessional unit “\( i \)” as a percent of “\( h \)”

\( ROA_{it} \) is the return on assets in time period “\( t \)” for cross-recessional unit “\( i \)”

\( ROE_{it} \) is the return on equity in time period “\( t \)” for cross-recessional unit “\( i \)”

\( CG_{ih} \) is the credit growth in time period “\( t \)” for cross-recessional unit “\( i \)” as a percent of “\( h \)”

\( TLI_{it} \) is the total liability to income ratio in time period “\( t \)” for cross-recessional unit “\( i \)”

\( DR_{it} \) is the deposits ratio in time period “\( t \)” for cross-recessional unit “\( i \)”

\( RR_{it} \) is the reserve ratio in time period “\( t \)” for cross-recessional unit “\( i \)”

\( \beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9 \) and \( \beta_{10} \) are the respective co-efficient terms

\( \beta_0 \) is the intercept

“\( i \)” is the cross section units (30 banks)

“\( t \)” is the time period (2006 to 2011)

Results and Analysis: The analysis of bank specific variables started with the selection of 10 bank specific hypotheses and then assigning each hypothesis with the bank specific variables as suggested by the existing literature. Literature suggested 10 bank specific variables for the 10 bank specific hypotheses, out of 10 hypotheses five are assigned with one bank specific variable each whereas two hypothesis is assigned with two variables each and two hypotheses with one variable. The bank specific hypotheses and their respective bank specific variables are given in Table 1.

The NPLs/total loans ratio and 10 banks specific variables are converted into differences and then expressed as percentage change. The percentage changes of the variables are taken to capture the dynamics of the variables over the period of time [20]. The panel unit root tests are conducted to check for the stationarity of the variables, current study used Fisher ADF stationarity test. The results of unit root tests are given in Table 2, suggesting that all the variables are stationary at level. Thus panel regression can be applied by using the original percentage values of the variables.

Before applying panel regression explanatory variables were checked for the multicollinearity by using correlation matrix. The multicollinearity problem arises because of the high correlation between any explanatory variables. The multicollinearity problem makes the significant variables insignificant by increasing their p-value; the increase in p-value lowers the t-statistics value. Thus the panel regression results with multicollinearity will show significant variables as insignificant variables. The multicollinearity problem is solved by dropping the high correlated variable. This can be done by applying the panel regression analysis by using the variables having multicollinearity problem, then that series is dropped from two highly correlated series that have high p-value. The correlation matrix between 10 bank specific variables is given in Table 3.

### Table 2: Unit root test results of bank specific variables

<table>
<thead>
<tr>
<th>Levels</th>
<th>Fisher-ADF</th>
<th>Levin, Lin &amp; Chu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-4.78147*</td>
<td>-36.9797*</td>
</tr>
<tr>
<td>NPLs/total gross loans</td>
<td>-2.06447*</td>
<td>-313.365*</td>
</tr>
<tr>
<td>Inefficiency</td>
<td>-9.08764*</td>
<td>-510.378*</td>
</tr>
<tr>
<td>Solvency</td>
<td>-3.05921*</td>
<td>-17.8655*</td>
</tr>
<tr>
<td>Loans to deposits ratio</td>
<td>-2.09951*</td>
<td>-410.040*</td>
</tr>
<tr>
<td>Market power</td>
<td>-11.4564*</td>
<td>-89.1631*</td>
</tr>
<tr>
<td>Return on Assets</td>
<td>-2.67509*</td>
<td>8.65813*</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>-3.20033*</td>
<td>-25.2551*</td>
</tr>
<tr>
<td>Credit growth</td>
<td>-4.01674*</td>
<td>-22.4841*</td>
</tr>
<tr>
<td>Total liability to income</td>
<td>-3.52744*</td>
<td>-89.1631*</td>
</tr>
<tr>
<td>Deposits rate</td>
<td>-11.4564*</td>
<td>-1256.46*</td>
</tr>
<tr>
<td>Reserve ratio</td>
<td>-3.72806*</td>
<td>-18.4624*</td>
</tr>
</tbody>
</table>

Where * represents significance level of 1%
The results in Table 3 suggest that there is no correlation between any of the explanatory variables. Thus all the bank specific variables can be used in the further analysis.

First the model was analyzed by using fixed effect regression analysis and then by using redundant fixed effect test the validity of random effect model is checked. The redundant fixed effect test compares the common effect model against the fixed effect model with the null hypothesis that there is no individual effect. The results of redundant fixed effect test are given in Table 4.

The results in Table 4 suggest that the p-value is greater than 5% therefore the null hypothesis that there is no individual effect is accepted. Therefore the fixed effect model is not valid and common effect model can provide the valid specification of the model. The model 1 is applied by using common effect model and results are given in Table 5.

The common effect model is applied by using 10 explanatory variables; the results of common effect model are given in Table 5. The fitness of the model is predicted with the help of R-squared, F-statistics and number of significant relationship between NPLs and explanatory variables. The R-squared value for the model is 49%, suggesting that almost 49% variance in NPLs are explained by all explanatory variables. The F-statistics of the model has a p-value of 0, suggesting that all explanatory can influence the NPLs jointly.

The results in Table 5 provide the validity of three bank specific hypotheses (i.e. moral hazard, bad management II and procyclical credit policy,) by suggesting significant association of respective bank specific variables with NPLs and rejected the five hypotheses (i.e. bad Management, skimping, size, soft budget constrained and deposit rate effect) by providing.
insignificant association of respective bank specific variable with NPLs whereas rejected deposits to loans ratio effect hypothesis by providing significant positive association with NPLs.

The results given in Table 5 reject the validity of both bad management hypothesis and skimping hypothesis in case of Pakistani banking sector. The results provide negative but insignificant association between the NPLs and inefficiency. Thus it can be concluded that inefficiency does not results in the growth in NPLs but the influence is insignificant.

The result of the current study is opposite to the findings of Berger and DeYoung [1], they suggested that current bad performance (high cost inefficiency), deviation from standard loan allocation practices, wrong evaluation of collateral and lack of loan monitoring and controlling skills leads to the growth in NPLs, whereas current study suggest that NPLs are due to increase in the short term cost efficiency (skimping hypothesis) rather than the bad management practices of the bank managers. With the growth in NPLs the banks cost efficiency further declines because of increase in spending on the recovery, monitoring, selling collaterals and tracking the current loans [2, 7].

The moral hazard hypothesis is tested by using two bank specific variables i.e. solvency ratio and loans to deposits ratio. The results reject the moral hazard hypothesis when solvency ratio is used to measure it by providing insignificant positive relation with NPLs. It can be concluded from the results that moral hazard hypothesis by using solvency ratio is not applicable in Pakistan, the NPLs of the banks does not increase due to the decrease in banks capital as compared to the lending. When moral hazard hypothesis is tested by using loans to deposits ratio then it provides significant positive association with NPLs. This suggest that the with the increase in banks lending as compared to the deposits increases the NPLs of the banks because at the time of low loans to deposits ratio banks in order to earn more start lending to the low quality borrowers and do not follow the standard loan allocation practices, which leads to the growth in NPLs [3, 4, 5, 6].

The results in Table 5 suggest that market power is positively associated with NPLs but the association is insignificant. Thus results reject the size hypothesis in case of Pakistani banking data. This can be concluded from the positive relation that when loans share of individual bank increases in total loans of banking sector than NPLs also increases.

The bad management II hypothesis is tested by using two bank specific ratios i.e. ROA and ROE. The results in Table 5 provide positive significant association between the NPLs and ROA, suggesting that ROA has significant influence on the NPLs. Thus ROA can significant change in the level of NPLs. The results reject the validity of bad management II hypothesis when ROE was used as a measure; results provide insignificant negative association between NPLs and ROE. The explanation for the positive relation between ROA and NPLs is that in order to increase the short term earnings, banks management portray wrong picture to the investors relating the future profitability and positive return prospects. Consequently, investors start borrowing from the banks and invest in the less profitable projects. This results in the current good performance and profitability of the banks but because of the wrong forecasting, returns on the investments are not according to the investors’ expectation, resulting in the inability of the investors in repayment of loans thus leading to the growth in NPLs.

The study provides the validity of procyclical credit policy hypothesis by using Pakistani banking data. The results in Table 5 provide significant positive association between NPLs and credit growth. The result of current study is in consistent with the existing studies [2, 3, 10, 11, 12]. The theoretical justification of the positive association is that extensive lending of the banks during the boom; they in order to earn more even lend to the low quality borrowers. As the boom ends and depressions starts low quality borrowers do not have sufficient earnings to repay loans thus leading to the growth in NPLs.

The current study rejects the soft budget constrained hypothesis by suggesting negative and insignificant association between NPLs and total liabilities to income ratio. It can be concluded that in case of Pakistani banks NPLs does not increase due to the soft budget constrained. The negative relation suggest that in order to utilize the deposits funds banks reduces their lending rates, which attracts the businesses and high quality borrowers to borrow more and invest funds in the profitable projects, resulting in the high economic activities, circulation of funds, high employment, high profits and stable cash flows. This results in the repayment of loans on time by the individuals and businesses, thus leading to the decline in the NPLs.
The Table 5 suggests the insignificant positive association between NPLs and deposits rate ratio. The result rejects the validity of deposits rate hypothesis. The justification for the positive relation is that with the increase in deposit rate, the interest spread rate and competitiveness of the banks decline, because of which deposit holders demand higher rates, in order to attract deposits banks has to pay higher rates. To pay deposit holders banks lend funds at higher rates to the low quality borrowers and by using corrupt practices low quality borrowers do not repay loans, thus results in the growth of NPLs.

The current study rejects the validity of the deposits to loans ratio effect by suggesting significant positive association between NPLs and reserve ratio. The findings of current study is opposite to the findings of Ferreira [5]; and De Nicolo et al. [18]. They concluded that increase in deposits as compared to the loans shows that banks are more concerned with the quality of loans rather than the quantity and lend only to the quality borrowers, whereas the finding of current study suggests that the banks has already lend funds to the low quality borrowers in order to utilize idle funds because of the management deviation from standard loan allocation practices, wrong evaluation of collateral and lack of loan monitoring and controlling skills (bad management hypothesis) and expect that in future the borrowers will not repay loans, banks stop lending with the fear of further increase in the riskiness of loans, thus deposits to loan ratio increases because of the expected increase in the future NPLs. Thus it can be concluded that the deposits to loan ratio increases because of the current lending to the low quality borrowers because of the bad management and stop current lending to prevent further growth in future NPLs.

Conclusions, Policy Related Implications and Future Research: The theoretical and empirical findings presented in the literature whether or not confirmed by the empirical findings of current study or future studies, but they have economic, operation and policy related implications. According to bad luck hypothesis performance of the bank is affected by external environment. Thus the government or regulatory authorities should design and implement regulatory and supervisory rules and laws that reduce the effect of external events on banking performance. The bad management hypothesis shows that bad performance of the banks are due to there internal inefficiency. This suggest that bank supervisors must include level of loan losses, quality of borrowers, credit risk with cost efficiency to measure the bank performance. The skimping hypothesis also suggests that bad performance of the banks is due to internal inefficiency. But it mainly focuses on the inefficiency of the loan processing department. Thus inefficiency can be reduced by implementing strong system and supervision of loan department, specifically collateral evaluation department and credit control department.

The moral hazard hypothesis shows that banks should constantly monitor there capital ratio and riskiness of there loan portfolio. They should constantly take measures to keep there capital ratio and riskiness at certain level. The size hypothesis shows that with the increase in size, banks should diversify there loan portfolio in order to reduce credit risk and increase the circle of operation to the other sectors. This will reduce the effect of downturn of any sector on the performance of bank. The hypothesis has implications for banks with larger size.

According to bad management II hypothesis banks has to supervise the current performance and quality of loans. During boom phase banks should only lend to the quality borrowers. The procyclical credit policy hypothesis implies that during the boom phase banks should only lend to the quality borrowers and finance only profitable projects. This will ensure the quality of loans and repayment of the loans by the borrowers. If banks would lend to the low quality borrowers then it would lead to the growth of NPLs in depression phase.

The soft budget constrained and reserve ratio hypothesis shows that with the increase in deposits banks should manage the risk of there loan portfolio and only lend to quality borrowers. Banks should not lend the idle funds to the low quality in order to utilize the funds; this will result in the future growth in NPLs. The deposit rate effect hypothesis implies that with the increase in deposit rates, banks should maintain its competitiveness by offering loans only to the high quality borrowers. In order to earn more banks should not lend to the low quality, this can lead to the growth of NPLs.

The current study used common effect model to investigate the validity of 10 banks specific hypotheses by using 10 bank specific variables and ownership structure. The results provided the validity of three bank specific hypotheses (i.e. moral hazard, bad management II
and procyclical credit policy) and rejected the five hypotheses (i.e. bad management, skimping, size, soft budget constrained and deposit rate effect) whereas rejected deposits to loans ratio effect hypothesis but provided its significant association with NPLs.

The results suggest the validity of moral hazard hypothesis when tested by using loans to deposits ratio. This suggest that with the growth in deposits banks start extensive lending, which leads to the increase in bank lending as compared to deposits and also increases the riskiness of loan portfolio by allocating funds to the low quality borrowers, which in future leads to the growth in NPLs. Similarly results confirm the validity of bad management II hypothesis when ROA was used as a measure. This shows that management of the bank in order to show short term profitability depict wrong picture to the investors relating the future profitability and positive return prospects of the economy and force them to investment in less profitable projects. Consequently, investors start borrowing and because of the wrong forecasting during economic downturn investors do not earn, resulting in their inability of repayment thus leading to the growth in NPLs.

The study provides the validity of procyclical credit policy hypothesis and suggest that extensive lending of the banks during the boom, they in order to earn more even lend to the low quality borrowers. As the boom ends and depressions starts low quality borrowers do not have sufficient earnings to repay loans thus leading to the growth in NPLs.

The current study rejects the validity of the deposits to loans ratio effect by suggesting significant positive association between NPLs and reserve ratio. The results suggest that banks has already lend funds to the low quality borrowers and to reduce the riskiness of the loan portfolio they have stop lending, because of which their deposits to loan ratio increases. Thus current increase in ratio is because of the anticipation of future increase in NPLs.

Based on the findings of current study, commercial banks of Pakistan should pay attention to several bank specific factors in order to reduce the level of NPLs. First by using findings of moral hazard hypothesis banks should not do extensive lending in order to utilize their deposits, because it will lead to the increased riskiness of the loan portfolio and growth in loans to deposits ratio. Thus before lending banks should consider their loans to deposits ratio and riskiness of their loan portfolio.

The commercial banks it self or SBP can set a specific level of loans to deposits ratio, below which banks are not allowed to lend.

Second, the results suggest that the increase level of NPLs is not due to the cost inefficiency of the management (bad management hypothesis) and not because of the decrease spending on the credit allocation, evaluation and monitoring process (skimping hypothesis) but due to the wrong forecasting and current bad performance of management by encouraging borrowers to borrow and invest in high risky projects by predicting exaggerated future earning and performance of the economy (bad management hypothesis II). Thus banks should consider the riskiness level of their loan portfolio before lending to high risky projects and to low quality borrowers and should provide the accurate information relating the future performance of economy and proposed projects because the probability of high risk project failure is high and leads to the growth in NPLs.

Third, according to the procyclical credit policy hypothesis, banks should not go for extensive lending in boom and should follow the standard rules and procedures of credit allocation to allocate loans only to the high quality borrowers. The banks can reduce the riskiness of their loan portfolio and can reduce the level of NPLs in the depression. Fourth, the significant negative association between deposit rate ratio and NPLs can be used by commercial banks to control the level of NPLs. The increased in deposits rate leads to the growth in NPLs, but as the results of deposits rate effect hypothesis suggest that NPLs can be controlled by lending only to those potential borrowers who have good credit history and ability to pay high interest payment. Thus banks can reduce the level of NPLs during the time of high interest rate by allocating loans only to the high quality borrowers. Finally the positive association between reserve ratio and NPLs can be use by the banks when they already have lend funds to the low quality borrowers and predict that borrowers will default than banks should stop lending in order to control the level of NPLs by restricting the NPLs only to the existing borrowers.

The current study tested the validity of 10 bank specific hypotheses, future studies can use other bank specific variables to check their impact on the NPLs. The current study used the 6 year banking data of Pakistan; future study can use the banking data of more than 6 years of Pakistan or any other single developing or developed country to test the validity of bank specific
hypotheses. This study can also be done by using the panel data of banks from the sample of developing and developed countries [3]. As current study has only used the static panel data model, therefore future study can use other advanced techniques such as Fully Modified OLS or Two Step Least Square method [3] and dynamic panel data techniques such as GMM [2].

REFERENCES