Credit Risk Oracle: The Bifocal Approach

¹ Areeba Khan, ² Zulaiha A. Zubair, ³ Erum Fayyaz, ⁴ Iffat Hussain

¹ The Islamia University of Bahawalpur, areeba.khan@iub.edu.pk

² Federal University Dutsinma, Katsina State Nigeria, aibrz373@gmail.com

³ The Islamia University of Bahawalpur, erummf2015@gmail.com

⁴ The Islamia University of Bahawalpur, iffathussain.550@gmail.com

ARTICLE DETAILS	ABSTRACT
History <i>Revised format: May 2019</i> <i>Available Online: June 2019</i>	<p>Financial This study aims to examine the macroeconomic and bank specific predictors of Credit Risk (NPL) and their relevant degree of impact on banks in Pakistan. For bank variables a sample of big 10 banks has been taken from 2009 to 2018. For macro-economic variables sample of 2009 to 2018 has been taken from the world bank. As financial institutions play their role to support industries and alleviate poverty in a country, this study checks the effect of banking variables as well as the economic variables on the credit risk of banks by taking industrial sector growth as a moderator. The study found that NPLs are negatively associated with Lending interest rate, Bank investment, Capital adequacy ratio, Domestic credit to private sector, Financial depth and GDP growth while positively associated with Lending capability, Return on equity, Interest spread and Liquidity Ratio. The moderation effect of Industrial sector growth on the relationship of Lending Capability and NPLs is found to be strengthening the relationship.</p>
Keywords <i>Credit Risk, Non-Performing Loans, Macro-Economic, Bank Specific, Industrial Sector Growth</i>	
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Corresponding author's email address: areeba.khan@iub.edu.pk

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1. Review of Literature

During the last decade, the previous studies on credit risk or NPLs has elevated speedily on the variables that could be a reason for financial crisis as an outcome of the treble of NPLs, which is commonly associated with bank failures and economic crises in both developing and developed countries (Mehmood, Hidthiir, & Nor, 2019). The credit quality of loan portfolios across most countries in the world have been unstable since the global financial crisis (GFC) in 2007– 2008 and therefore the bank asset quality has deteriorated sharply over the years (Kjosevski & Petkovski, 2016).

There was a significant increase witnessed in the credit growth provided by the financial institutions (Cingolani, 2013). This growth is because of the non-intervention of regulatory body in the financial markets as well as the emergence of information technologies in the banking industry, that has led to the

cultivation of financial intermediation. Additionally, the deregulation has increased the competition among the banks and financial institutions in European and other markets. Increased credit risk of bank, the literature suggests, is because of the loan portfolios that are advanced by dissatisfactory screening of loans and relaxed borrowing criteria (Jeong & Jung, 2013). Makri & Tsagkanos, (2019) have found two major shortcomings in most of the studies. Firstly there is more emphasis given on the macro economic variables as compared to bank related indicators. Secondly, there is no exertion to avoid the constructural changes of Global financial crisis.

NPL is one of the most common indicators through which credit risk can be identified. Non-performing loans (NPL) increased significantly in Pakistan since 2008 when the financial crisis began globally. According to the researchers and the analyst, the forthcoming year will bring the increase in NPLs to the extreme point which will affect the banks' profitability and liquidity, and banking systems' financial stability.

Table 1: Non-Performing Loans of Pakistan as the percentage of GDP

Year s	200 2	200 3	200 4	200 5	200 6	200 7	200 8	200 9	201 0	201 1	201 2	201 3	201 4	201 5	201 6	201 7
NPL 's	22. 0	17. 0	12. 0	8.3	6.9	7.6	10. 5	12. 6	14. 7	15. 7	14. 6	13. 3	12. 3	11. 4	10. 1	8.4

Source: Asian Development Bank

1.1 Problem Statement

Financial crises are not a new marvel in less developed nations (emerging markets), but they have grown more common, and the financial flows involved have become loftier and more explosive in the past 20 years (Eichengreen et al., 1998). This passé corresponds generally with the era of "economic opening" in emerging markets, a time when most of the Latin American countries, the former Soviet republics, and several Asian countries theatrically reduced their barriers against foreign company undertakings such as imports, foreign direct investment, and foreign portfolio investment("Global Financial Crises," 2014).

Non-performing loans are also root cause of banking institutions failure(Campbell, 2007). Issue of non-performing loans is threat to the banking institution's survival(Saba, Azeem & Kouser, 2012). NPLs indicate financial instability, operational risks as well as inefficient allocations of resources. Thus, determination of factors affecting NLPs is very important. Pakistan's Non-performing Loans Ratio stood at 8.8 % in Sep 2019, compared with the ratio of 8.8 % in the previous quarter.

1.2 Theoretical Premise for Bank Specific Factors Responsible for Credit Risk

The following hypotheses are summarized by Klein (2013) through which the relation of bank-specific factors with NPLs can be identified:

- Bad management hypothesis which shows the efficiency of the low cost of the banks which directly indicates the poor management practices, through which the NPL buildup on the control, monitoring, and underwriting of the poor loan.
- Another hypothesis called skimping which shows the efficiency of high cost can enhance the NPLs because the landing risks monitoring is celebrated by pure resources.
- an alternative hypothesis is called the moral hazard hypothesis which contends that NPLs can be pressurized by the moral hazard incentives if the banks are increasing low capital in the loan portfolio to increase the riskiness.
- excess lending contends that that is taking behavior aggressiveness of the bank is attributed by higher NPLs

1.3 Lending Capability (LC)

The economic activities of the banking system can be influenced by the lending method which is the popular method in the banking system. Therefore, bank lending is a very good and useful method for the banking system. One can observe that the economy does not have the power to maintain economic growth level without lending approach (Alejandro & Guerra, 2017). Some studies show that the lending method may affect the economic growth negatively for different countries (Tahir, Shehzadi, Ali, & Rizwan Ullah, 2015). However, (Tahir et al., 2015) analyzed that economic growth can be affected by bank lending but for short time intervals. Another researcher (Aurangzeb, 2012) reported that the economic growth of Pakistan has a bi-directional connection. The development of the country depends upon credit. The growth of the banking industry is limited because of the liquidity strains and the industrial sector of the developing countries such as Pakistan may be affected negatively in terms of growth. Another significant factor which affects economic growth is the credit distribution in different private sectors. In Pakistan, the distribution of the credit is done on the basis of the capital-intensive sector and the flow of credit to the priority sector. The bank and other institutions will mobilize the credit from income holders to others. Hence, savings can be converted into loans. These loans can serve the purpose of the financial needs of the investors to do their business (Tahir et al., 2015).

1.4 Industrial Sector Growth as a Percentage of GDP

To get a shift from a still/surviving economy to self-sufficient economy, an expeditious industrial development is a main factor of this in developing economies like in Nigeria reports (Keji & Anderu, 2015). When industrial growth rate increase it will lead to an economy which is less dependent and achieve the objectives of income of per capita, generating more employment and developing local industry by increasing local sources of raw material. It is anticipated that immense industrialization will optimize the utilization of already present resources and cause an increase in the entire economic growth. Industrial sectors has sub sectors like manufacturing, quarrying, mining construction, manufacturing at large and small scale, gas distribution. Mohsen, Chua, & Sab (2015) conclude their study by stating that agricultural output, population growth and manufactured growth had a positive effect while oil prices had negative effect.

1.5 Bank Investment

Investment is crucial constituent of aggregate demand and directing cause of economic growth. Alteration in investment may affect aggregate demand as well as increase the economic growth. The current change in neo-classical model, endogenous growth theory has studied the significance of investment in raising economies (Bint-E-Ajaz & Ellahi, 2012). The relationship between investment and EG is in bi-causal but Madsen (2002) reports that economic growth greatly depends upon investment.

1.6 GDP Growth

The overall economic growth is measured by the gross domestic product (GDP). Economic expansion causes emergence in the income through higher employment, which bring down financial hardship on borrowers. It enables borrowers to assist their debts which will trim down Non-performing Loans for banks (Shingjergji, 2013). Studying literature (Skarica, 2014) reported that during the retardation of economy Non-performing Loan's levels are exaggerated, attributed to increment in unemployment debtors default. Panel data regression study by Salas & Saurina (2002) reports that credit risk is directly affected by growth in GDP. Nkusu (2011) in his study on the affect of unexpected increase in the Non-performing Loan ratio on economy of 26 developed countries proves that a 2.4 %-point increment in the NPL ratio is connected with a reduction in private borrowing and a 0.6 % point decrease in Gross domestic product growth within the time of first years and the strong counter outcome endure for four years later on the initial shock.

1.7 Capital Adequacy Ratio (CAR)

Sufficient capital reserves with regular maintenance provides necessary financial stability which instill confidence and assurance in customers and creditors. Capital adequacy ratio is used to measure the strength of capital of a bank. It is calculated as regulatory capital expressed as percentage of bank's risk-weighted assets. There are three core elements described by prudential guidelines to determine the capital adequacy which are market risk from banking activities, credit risk and the quality of capital held by bank to support exposures from credit risk (Ullah & Bagh, 2019). Tier I capital consists of common shares, statutory reserves, untaxed reserves (free reserves) and the amount generated from the sales of the asset. This is usually called as essential capital to tackle the risks and losses without compromising on the trade and business in which the bank is involved (Fatima, 2014).

Reserves like hidden reserves, revaluation reserves, hybrid capital, loss reserves and subordinated liabilities comes into the category of Tier II capital. It can be termed as an additional capital which provides cover when the liquidation happens and does not provide enough cover for depositors or customers. Capital Adequacy Ratio can be calculated using the following equation:

$$\text{CAR} = \text{Tier I} + \text{Tier II} / \text{Risk Weighted Assets}$$

1.8 Profitability Ratio; Return on Equity (ROE)

Profitability is the measure of the ability of a bank or company to generate profits. Banking performance and macroeconomic stability are related to an important ingredient of financial development which is bank profitability. If macro level is considered, an increase in profitability leads sustainable growth and development. However, regulations need to be in place to avoid higher interest on loans which is possible due to higher returns (Ullah & Bagh, 2019). The return on investment can be termed as profitability which can be calculated by the net income and the increase in shareholder's total equity for a specific period. Profitability is a very significant measure of any bank's stature as it tells how well the bank is being managed and how beneficial it is for its depositors and shareholders. (Chaibi & Ftiti, 2015)(Malimi, 2017) through their study have shown that profitability is inversely proportional to NPLs. This means that the bank is not efficiently managed. Abid, Nejib Ouertani, & Zouari-Ghorbel (2014) agrees with this and further reiterate that there is a statistically significant proof that there is a negative relation between performance and profitability & NPLs.

1.9 Liquidity Ratio

Liquidity of a bank is measured by the ratio of loans to deposit. Liquidity calculates the proportion of funds that the bank use to issue loans from the deposits made by the customers (Makri & Tsagkanos, 2019). The more the liquidity of a bank is, the more it is entitled in taking big risks. The recent research also depicts a direct relation between liquidity and credit risk.

1.10 Bank Credit to Private Sector

Domestic credit by banks to private sector pertains to financial resources provided by depository corporations to the private sector (except central banks). These refer to loans, trade credits and other accounts receivable etc. for which a claim can be filed. Bank credit to private sector (BCPS) includes financing and providing credits by banks or banking institutions to private sector. Bank credit is considered as a valid and significant measure of financial development because traditionally, private sector utilizes the funds much more efficiently than public sector (Ang, 2009). If Pakistani economy is to be considered, it is evident that a lot of defaults have occurred due to unavailability of enough funds from banks for novel projects. The budget deficit is being countered by borrowing from private sector instead of central bank and it has created a pressure on private sector credit. Some studies have reported a positive relationship between bank credit to private sector and credit risk, however, studies like Klein (2013) and Nkusu (2011) have depicted a negative relationship between BCPS and NPLs.

BCPS as a ratio of GDP depicts the financial strength of a country and as expected it has been found to have a negative impact on NPLs. During the economic uprising, BCPS as indebttness could impact NPLs negatively as shown by Nkusu (2011).

1.11 Financial Depth

Out of number of identified indicators (M. W. Klein & Olivei, 2008) from the previous empirical literature they focused on indicators of financial intermediary development. The selected proxy of financial depth was liquid liabilities indicator LLY which shows the ratio of liquid liabilities to Gross domestic product, which shows the complete size financial intermediary sector without excluding the credit provided to the governmental and quasi-governmental agencies. So, they also employed an indicator named PRIVY which is a ratio of the credit provided by financial intermediaries to Private sector to the gross domestic product.

1.12 Interest Spread

The interest is actually an amount paid by the borrower for the use of money borrowed by him over a period of time, or it can be supposed as a rent for the money to be used by the borrower Crowley (2007) It is affirmed in the case of Kenya banks that an increase in interest rate spread causes increase in the interest charged from the borrowers which causes a low in performance of assets. A recent study (Farhan, Sattar, Hussain, & Fareeha, 2012) found that bank advances loans at a higher interest rate to those clients who are unable to pay back the loan or it is harder for them to pay back. Further exploring the reasons, they found interest rates to be one of the reasons responsible that cause NPLs. So, moving towards the relationships we first learn about the deposit interest rate, lending interest rate, real interest rate. Also, to calculate the real interest rate GDP deflator is employed so we shall see the description of GDP deflator.

1.13 Real Interest Rate

World Bank defines real interest rate as the lending interest rate which is adjusted for inflation as measured by GDP inflator over a year. For the calculation of the real interest rate the conditions and terms are distinct country wise because of which this cannot be used to compare the countries data(“Real interest rate (%) - Pakistan | Data,” n.d.).

1.14 GDP Deflator

The ratio of gross domestic product in current local currency to the constant local currency to the constant local currency is said to be the GDP deflator. The constant local currency is taken constant of any base year and it is calculated annually. Basically, GDP deflator serves in the calculation of real interest rate. However, for each country the base year of constant value is different, despite being a macro-economic variable this shortcoming of real interest rate limits the comparability of the real interest rate of different countries.

1.15 Lending Interest Rate

The rate over which the banks provide debt to fulfill the short term and long -term financing needs of the private sector (over a year). While advancing the loan banks keep in view the goal to take the loan and credibility of the borrower this rate is varied defined by. Also, the terms and conditions to issue these loans vary which limits the comparability of this ratio among different countries(“Lending interest rate (%) - Pakistan | Data,” n.d.)

1.16 Deposits Interest Rate

As a return to the deposits tools that are demand deposits, time deposits and savings deposits. The rate paid by the commercial banks is the deposits interest rate. This rate is affected by the different conditions that are country specific. So, this fact also hinders the comparison of this rate.

1.17 Objectives

The main objective of research is to evaluate the effect of the factors affecting credit risk in banks of Pakistan.

- To check effect of bank investment on credit risk.
- To evaluate impact of some bank related variables like BI, CAR, Liquidity ratio, profitability ratio, interest spread on credit risk.
- To identify effect of macroeconomic variables including bank credit to private sector, GDP, Lending interest rate and financial depth on credit risk of banks in Pakistan.
- To identify the significance of Industrial Sector Growth as moderator between lending capability and credit risk.
- This study aims to examine the predictors of Credit Risk (NPL) and their relevant degree of impact on credit risk of banks in Pakistan.

2. Data and Methodology

Table 2

Determinants	Type	Symbol	Proxy/measure	Source
Credit risk	DV	NPL	Non-Performing Loans /Total Loans	World Development Indicators
Industrial Sector (Salas & Saurina, 2002)	IV	Industry	Industry as a Percentage of GDP	World Development Indicators
Industrial Sector Growth	Moderator	ISG	Manufacturing, value added (% of GDP), Industry (including construction), value added (% of GDP)	World Development Indicators
Lending Capability (Saeed, Ramzan, & Hamid, 2018)	Bank related	LC	Loan to deposit ratio	Banks' annual financial reports
Bank investment (Saeed, Ramzan, & Hamid, 2018)	Bank related	BI	Investment to total asset ratio	Banks' annual financial reports
Capital adequacy Ratio(Irum Saba, Sakina Narmeen, Rehana Kouser & Harris Khurram, 2012)	Bank related	CAR	Tier I + Tier II / Risk Weighted Assets (RWA)	Banks' annual financial reports
Profitability Ratio ROE(Waqas, Fatima, Khan, & Arif, 2017)	Bank related	ROE	Net Income/Shareholders equity	Banks' annual financial report
Liquidity Ratio(Kumar & Kishore, 2019)	Bank related	LR	Total Loans/ Total Assets	Banks' annual financial report
Interest rate Spread Farhan, Sattar, Hussain, & Fareeha, 2012)	Bank related	IS	Lending rate minus deposit rate	World Development Indicators
Bank credit to private sector(Mehmood et al., 2019)	Macro-Economic	BCPS	Domestic credit to private sector by banks (% of GDP)	World Development Indicators
GDP (Mehmood et al., 2019)	Macro-Economic	GDP	GDP growth (annual %)	World Development Indicators
Lending Interest Rate (Mehmood et al., 2019)	Macro-Economic	LIR	Lending interest rate (%)	World Development Indicators
Financial Depth (M. W. Klein & Olivei, 2008)	Macro-Economic	FD	Depth of credit information index (0=low to 8=high)	World Development Indicators

The table is said to be the extract of literature reviewed. All the banking and macro-economic variables and proxy measures are given in the table and their sources from where the data will be obtained.

Table 3

Sr. No.	Bank Name	Sr. No.	Bank Name
1	National Bank of Pakistan (NBP)	6	Meezan Bank
2	Bank Alfalah	7	Allied Bank (ABL)
3	Standard Chartered Bank	8	Askari Bank
4	Habib Bank Limited (HBL)	9	MCB
5	United Bank Limited (UBL)	10	Bank al Habib

Source: Corporate Finance Institute (CFI)

Research Framework

Figure 2 Research Fraework

The data obtained from Pakistani banks for bank variables and world bank indicators shows the following trends and relationships with credit risk.

So, we can assert that as the more accurate and transparent information is available to the financial intermediaries, they use it at optimum level and make the non-performing loans to reduced

Estimating Equation 1

Table 4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	118.17	28.96	4.08	0.05
BI	-0.74	0.20	-3.55	0.07
CAR	-1.33	0.97	-1.37	0.30
DCTPS	-2.94	0.69	-4.21	0.05
FD	-0.17	0.33	-0.49	0.66
GDPGROWTH	-2.92	0.39	-7.29	0.01
LC	0.06	0.02	2.32	0.14
ROE	0.022	0.01	2.27	0.15
R-squared	0.99	Mean dependent var		12.06
Adjusted R-squared	0.96	S.D. dependent var		2.69
S.E. of regression	0.51	Akaike info criterion		1.47
Sum squared resid	0.52	Schwarz criterion		1.72
Log likelihood	0.60	Hannan-Quinn criter.		1.21
F-statistic	35.82	Durbin-Watson stat		2.06
Prob(F-statistic)	0.03			

Table 5 depicts the summary of the regression results which are obtained by applying ordinary least square method. Data ranges from 2008 to 2019. The adjusted R-squared value is 96%..it means that all above mentioned variables cumulatively express NPLs by 96%. It means that independent variables contribute to NPLs by 96%. The probability values shows the significance of all independent variables in this data with the dependent variable.

In this table domestic credit to private sector and GDP growth are significant with NPLs whereas other variables like BI, CAR, FD, LC and ROE have insignificant relation with NPLs. Probability value less than 0.05 shows that respected independent variables explain the dependent variable in a good way.

Lastly Durban-Watson test show the autocorrelation between the varibales of the dataset. For a good regression model Durban Watson has to be value of 2.if its value is less than 2 it means positive autocorrelation of the dataset. Value above 2 show negative autocorrelation.

Estimating Equation 2

Table 5

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.85	5.19	-0.55	0.60
INTSP	2.72	2.12	1.28	0.25
LIR	-0.09	0.84	-0.11	0.91
LR	0.04	0.04	0.71	0.50
R-squared	0.85	Mean dependent var		12.06
Adjusted R-squared	0.77	S.D. dependent var		2.69
S.E. of regression	1.29	Akaike info criterion		3.64
Sum squared resid	10.00	Schwarz criterion		3.76
Log likelihood	-14.19	Hannan-Quinn criter.		3.50
F-statistic	11.11	Durbin-Watson stat		1.04
Prob(F-statistic)	0.007			

In this table it has negative autocorrelation dataset.

In this table of dataset no variable is significant and adjusted R-squared value is 77 %.Durban Watson shows value of 1.04 which means that there is positive autocorrelation of the dataset.

Estimating Equation 3

Table 6

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-19.24	8.15	-2.36	0.065
INTSP	2.78	1.17	2.38	0.06
LIR	-0.63	0.55	-1.16	0.29
MODEEFFECT	-7.55E-05	0.01	-0.09	0.94
INDUSTRY	1.32	0.39	3.32	0.02
R-squared	0.95	Mean dependent var		12.06
Adjusted R-squared	0.91	S.D. dependent var		2.69
S.E. of regression	0.80	Akaike info criterion		2.71
Sum squared resid	3.22	Schwarz criterion		2.86
Log likelihood	-8.53	Hannan-Quinn criter.		2.54
F-statistic	24.17	Durbin-Watson stat		2.19
Prob(F-statistic)	0.02			

In this table moderator effect is shown. Industry has probability value of 0.02 which is less than 0.05. It means that industry has significant relation with NPLs. Moreover, adjusted R-square value increases from 77% to 91% which shows that moderator has created significant increase in the model. We may say that by introducing moderation non-performing loans increases as industrial effect increase.

3. Conclusion

Credit risk is the risk of failing to fulfill an obligation on any liability by borrower. In any economy, as financial sector considered is the backbone of any economy. That's why it has strong interaction with the survival of any economy. As Pakistan is a developing country so in our economy banks act like financial intermediaries and cycle deposits into lend-lease. In different portfolios of banks loans are main earning asset of banks which it earns by giving different lending. In order to earn profits, if banks give more loans then there are also chances or threat of risk increases. So, proper allocation of loans is necessary.

Macroeconomic factors are like some events of a bigger scale of the geographical, political, seasonal, natural or any other types that may affect economy of any country through affecting the businesses in a monetary measure. These factors are not only monitored by government authorities but also by private agencies to interpret the occurred events, check the causality of events as well as predict any forthcoming event.

NPLs are also the main cause of bank failures(Campbell, 2007). In fact, NPLs issue is critical to the survival of banking institutions(Saba, Azeem Kouser, 2012). Also, it is one of the financial stability indicators and it shows both credit and operational risks as well as represent efficient allocation of resources. Therefore, determining the factors that influence NPLs is of prime importance. It is also taken as proxy of credit risk.

An increase in NPLs demand higher provisions for bad loans and they cause the fall in the efficiency indicators of banks that are basically liquidity ratio and profitability ratios which hoovers the income efficiency of banks. The liquidity problem arises due to the mismatch of the maturities in assets and liabilities following the matching principal and corrosion in the credit rating also a decay in bank image in a long run(Badar & Yasmin Javid, 2013). The matching of assets and liabilities is a technique to measure the risk faced by banks and over which the banks' credit rating is based(Thakker & Chakraborty, 2018).

After getting results by employing data it is concluded that

- GDP and DCTPS are statistically significant. So, they are affecting the non-performing loans.
- Coefficient of GDP is negative which means that when GDP increases NPLs reduces. It means borrowers are capable to repay their loans.
- Domestic credit to private sector also shows significant and negative relation to NPLs which means that when credit to private sector increases NPLs reduces.
- Industry has significant and positive relation with non-performing loans. Which means when industrial sector grows non-performing loans will increase.
- Lending capability shows positive relation with NPLs that means as lending capability increases NPLs also increase. But statistically it has proved insignificant.
- With the introduction of moderator which is industrial sector growth and it has taken by multiplying industry with lending capability the value of adjusted R square increases which shows that moderator has strengthening impact on the relationship of dependent variable which is non-performing loans and independent variable which is lending capability.
- Bank Investment, CAR, Lending Interest rate, liquidity ratio, ROE, Interest spread and Financial Depth were found to be insignificant with non-performing loans.

4. Recommendations From Research are as Follows

- Firstly, the banks should focus on the ratio of industry as the percentage of GDP and make the forecast of the growth in industrial sector and the demand of loans from the industrial sector. Because there is a positive and strong relation between credit risk and industrial growth. So, if there is a growth in industry be forecasted then ultimately be rise in demand for loans.

- As there is positive relation between lending capability and credit risk. So, there is a need to make such policies that should prevent the growth in NPLs. It can be asserted that when the demand for loans from industrial rises then banks will have to make more lending as it is a supply side.
- As moderator strengthens the relationship between lending capability and NPLs so the banks should project growth in the industrial sector in order to control the ratio of NPLs.
- State Bank of Pakistan may use the resulting information to formulate policies that may support banks in minimizing the NPLs.
- State bank and bankers should take comments or suggestions from industrialists. Investment division should do this on priority basis and after taking recommendations from them they should implement the required policies on broader spectrum. Government should make policies which tighten the lending process so that NPLs can be reduced.

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