

Oil Prices, Early Warning Indicator and Banking Crisis: A Study of an Oil Importing Country, Pakistan

Maryam Khan¹, Khadija Malik Bari², Shamrez Ali², Riaz Ahmad³

¹Senior Compliance Officer, Dubai Islamic Bank Pakistan. Email: kmaryam834@gmail.com

²Assistant Professor, Institute of Business Administration, Karachi. Email: kbari@iba.edu.pk

³Lecturer, University of Sahiwal and Ph.D. Scholar at IBA, Karachi.

Email: shamrezali@uosahiwal.edu.pk (Corresponding author)

⁴Assistant Professor, Iqra University Karachi. Email: riaz.ahmad@iqra.edu.pk

ABSTRACT

A high ratio of non-performing loans is not only a big challenge for the economic growth of a country but also an increasing threat for the smooth functioning of the banking industry. Moreover, oil is an essential commodity and large variations in its price are a major source of economic instability. Previous studies have reported that oil price has a significant impact on non-performing loans in oil-exporting countries. However, this paper studies the impact of Oil Prices and Early Warning Indicator (EWI) along with other macro-economic and bank-specific variables on non-performing loans in an oil-importing country, Pakistan. The time frame of the sample is 2006-2019 and one step and two-step system dynamic GMM model has been applied. According to the results, oil prices and early warning indicator both have a positive and significant impact on non-performing loans in an oil-importing country. Hence, it is recommended that bank management and policymakers should be vigilant when they see oil prices, credit to GDP gap of the economy rising. Furthermore, results show that economic growth, profitability, and capital adequacy ratio have a negative and significant impact on non-performing loans.

KEYWORDS: NPLs, Early Warning Indicators, Macroeconomic variables, Bank Specific Variables, Economic Growth

JEL Classification: E32, E44, G21

Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020

1. INTRODUCTION

The banking industry serves as an intermediary and is important for the advancement of an economy. It plays a significant role in the mitigation of credit risks and managing the money supply. However, NPLs are a big threat to the banking industry because previous studies have shown that NPLs are the primary cause of banking and financial crisis. For example, seventy Indonesian banks failed because of a surge in non-performing loans in the 1997 financial crisis. Likewise, non-performing loans caused the banking crisis of the Sub-Saharan African nation in the 1990s (Adeola & Ikpesu, 2017). Similarly, the Great Depression of 1930 and the financial crisis of 2007-2008 were the consequence of the banking sector because of the high ratio of non-performing loans that created global repercussions. Consequently, a huge loss was observed in terms of national income and an increase in the unemployment rate.

Furthermore, a banking crisis is detrimental for the entire economy as it can push it into a recessionary phase. According to Goldstein (1999), the period of 1980-95 was marked by sixty-five banking crises in developing countries which nearly exhausted the banking sector's capital, therefore, the public sector

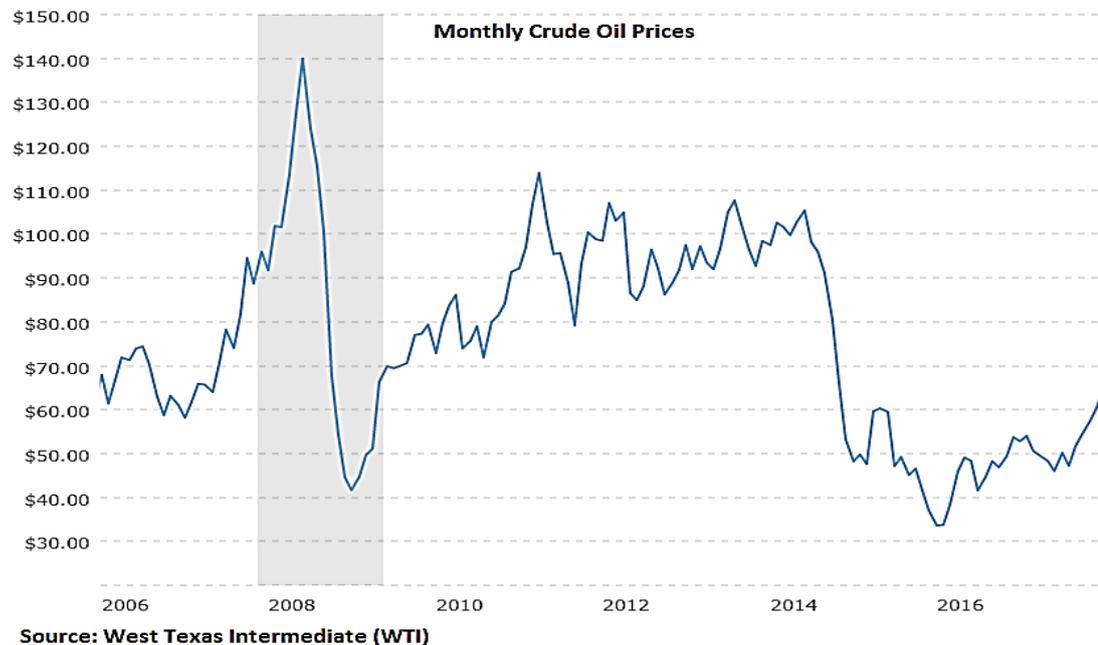
had to intervene. The bailout costs were approximately \$250 billion during this period. Furthermore, economic activity also suffered from these banking crises. Output losses tend to be on average twelve percent and it usually takes three years for the economy to recover and return to its original trend. Likewise, unemployment increases by seven percentage points and remains high for the next four years (Reinhart & Rogoff, 2009). The prolonged economic downturn results in reduced tax collections which coupled with the bailout costs lead to the large budget deficit and debt burdens as well.

Therefore, the global crisis brought the resilience of the banking sector into the spotlight and the stability of the banking sector has long been measured through NPLs. Prior literature highlights the prominence of NPLs dynamic behavior before the banking and financial crisis (Jiang et al., 2018). The increasing volume of NPLs has always been a major concern for policymakers and bank management. NPLs reduce the banks' earning capacity and profitability. Banks generally tackle NPLs by dealing with them internally which requires resources or disposing of them as bad debts and if the bank's assets are not enough to

cover the NPLs, banks become insolvent. Hence, value at risk and systemic risk increase when NPLs increase (Sbracia&Zanghini, 2001).

Likewise, oil is an essential commodity and a large variation in its price is a major source of economic instability. The sharp rise in oil price during 2003-2008 posed big challenges for countries which

import oil in a bulk quantity. The below graphs shows the movement in oil prices from 2006-2016. There is a large fluctuation in oil prices and particularly during the period of the global financial crisis of 2007-08. After a declining trend start from 2014 once again oil prices started to rise from the year of 2016.



Earlier studies have established that oil price shocks may be harmful to the economic development of a country (Cunado et al., 2015). At the macro level, positive movements in oil prices increase inflation, reduce economic growth, and indirectly affect many other costs like transportation and manufacturing. Due to increased prices, demand, and consumption of many products reduces, which ultimately affects the banking sector. As consumer purchasing power decreases, it ultimately gives rise to NPLs (Hoffmann & Jarass, 1983). Therefore, it is important to study the impact of oil prices on NPLs.

Previous studies have reported that oil price has a significant impact on non-performing loans in oil-exporting countries (Al Khazali, 2019, Alodayni, 2016, Idris and Nayan, 2016). Although it is widely recognized that cheap oil prices are of great importance to the economic development of oil-importing countries, no one (according to authors' knowledge) has studied the impact of oil prices on the case of Pakistan which is an emerging oil importing country. Therefore, our contribution in this paper is that we will study the impact of oil prices in an oil-importing country, in the presence of an early warning indicator of financial crisis which is a credit to the GDP gap of an economy. Pakistan provides an interesting case to study this relationship because the country's infection ratio (NPL to Total Gross loans) has increased to 8.8%.

NPLs has increased by PKR 88.3 billion, which is 13% in the first half of 2019 and stands at PKR 768 billion. The high ratio of NPLs is not only a big challenge for the economic growth of Pakistan but is also an increasing threat to the smooth functioning of its banking system. The primary reason for this worsening scenario is the tightening of macro-economic conditions. The highest defaulters are from the agricultural and energy sector with the latter contributing 52.8% and the former 18.6%. Furthermore, within the energy sector, 96.8% of the NPLs pertain to the public sector entities (State Bank of Pakistan, 2019)¹.

Furthermore, the petroleum group constitutes the largest share in Pakistan's import bill. As of March FY 2019, the group's amount stood at 8.002 billion US dollars. In terms of quantity, the import of petroleum products has decreased by 33.9% but it translated into only a 15% decrease in value. Additionally, the quantity of petroleum crude oil decreased by 14.5% and yet its import bill increased by 15.2% (Pakistan Economic Survey, 2019)². This is a result of increasing international oil prices. Furthermore, EIA expects that oil prices will further increase in the short term because they have forecasted that by 2021, the global oil inventories will decrease by approximately 0.2

million b/d. This is in wake of the current uncertain situation regarding OPEC production cut and events in Iraq which may lead to potential disruptions of oil supply (EIA, 2020)³.

Moreover, the outsized financial boom may generate conditions for future banking distress. The reason being that when financial bubbles inflate, generally risk appetite, asset prices, and credit increase to an unsustainable level. However, the problem is that it is difficult to identify with reasonable confidence whether the boom is unsustainable or not. Hence, there have been many previous attempts to identify variables, termed early warning indicator that may signal the financial crisis ahead of time.

Therefore, our first contribution is that the results of this study will call for policy measures that cater to the needs of an oil-importing country. Secondly, another contribution is that we will incorporate variables that may signal the banking crisis in due time and allow for the implementation of time-varying macroprudential policies. To do this, we will use early warning indicator (EWI), Credit-to-GDP gap (CGDP), suggested by Drehmann and Juselius (2014). CGDP measures the leverage build-up and provides a signal five years ahead of time because it has forecasting abilities that exceed those of the other EWIs these variables. If information is integrated from the measures, countercyclical capital buffers can be kept in time that will help to mitigate the high losses associated with banking crises. The rest of the paper is organized as follows: This study will further explain pertinent past research in section 2, section 3 will explain the methodology, while section 4 will analyze the data analysis with the estimated results and lastly section 5 will provide the recommendations and conclusion of the research.

2. Literature Review

2.1 Oil price and bank performance

Former several studies analysed the impact of oil price on the stock market and economic development of a country. In comparison, literature to study the impact of oil prices on NPLs is limited. Poghsyan and Hesse (2016) study the relationship in eleven oil-exporting Middle East and North Africa (MENA) countries. They use a sample of 145 banks for 1994 to 2008 and reported that banks' profitability is indirectly impacted by oil find that oil price changes have a statistically significant and negative impact on NPLs. Saif-Alyousfi, (2017) studies the impact of not the only oil price but also gas prices on NPLs of both Islamic and conventional banks. They choose Qatar because it is rich and economically dependent on both natural resources. The authors use a one-step generalized method of moments for the sample

period of 2000-2016 and conclude that oil prices have a positive impact on the banks' cash flows with the impact being more pronounced in Islamic banks. As a result, higher oil prices result in much lower NPLs in Islamic Banks compared to commercial banks. Similarly, Alodayni (2016) assessed the financial stability of the Gulf Cooperation Council region during the 2014-15 oil price slump. Major determinants of NPL identified from the study are housing prices, interest rate, stock price, oil price, and non-oil gross domestic product (GDP).

Previous literature has studied the impact of oil price on non-performing loans and has found a significant relationship. However, they have focused on oil-exporting countries only. Given the significance of oil prices in these countries, the focus was legitimate. During the financial crisis of 2008-2009, gas and oil prices slumped to the detriment of oil-exporting countries and this period was marked by declining export, GDP, revenue, fiscal balances, stock price, and real estate prices. Moreover, according to IMF (2015), declining oil prices decreased the asset quality and increased the NPL of banks in oil-exporting countries. Overall, past studies show that the banking sector of oil-exporting countries has been negatively affected by the decline of oil prices. However, oil is not only important for oil-exporting countries but is important for oil-importing countries as well. Therefore, we study in this paper the impact of oil price on NPLs in an oil-importing country, Pakistan, and to the best of our knowledge, we are the first one to do so.

2.2 Determinants of Non-performing loans

Previous literature identifies that there are two types of determinants; bank-specific and acroeconomic variables. Studying the former type of determinants, Berger and DeYoung (1997) did a seminal paper using US commercial banks data from 1985 to 1984. The paper explored four hypotheses which included moral hazard, bad management, bad luck, and skimping that may impact loan quality. The employed Granger-causality and concluded that cost efficiency is a very important indicator and its reduction may signal future loan problems. Similarly, Podpiera and Weill (2008) report that lower-cost efficiency depicts poor management practices which is the leading cost of increased NPLs. To reduce NPLs, managers should adequately manage and monitor loan portfolios.

Previous literature identifies that macroeconomic variables are also important determinants of NPLs. For example, Beck et al., (2015) studied the impact of macroeconomic variables on NPL by using a sample of 75 countries for 10 years from 2000-2010. They found that lending interest rate, share price, exchange rate, GDP growth rate are

significant factors in determining NPL. Similarly, Nkusu (2013) examined the determinants of NPL but focused only on developed countries. He used 26 developed countries in the sample and found that a period marked by rising NPL is associated with falling asset prices, higher unemployment rates, and slower economic growth. De Bock and Demyanets (2012) studied the relationship in 25 emerging countries. They confirmed that terms of trade, exchange rate, economic growth, and capital inflows are important determinants of NPL. Hence, different papers have used different macroeconomic factors but there is consensus regarding one important indicator which is the GDP growth rate. When the economy goes into recession, unemployment tends to rise and so do NPLs and when the economy grows, repayment capacity improves.

Many previous scholars have also used a combination of both determinants in their model. For example, Amin et al., (2019) studied NPL ratio improvement in the banks of Bangladesh. They concluded that the development was due to improvement in micro factors of management quality and internal governance. However, this was possible in the backdrop of improved financial development and economic growth. Moreover, Louzis et al., (2012) used GMM methodology in the Greek banking sector and found that NPLs are mostly impacted by macroeconomic factors rather than bank-specific factors. Amongst the bank-specific factor, they found that only bank efficiency has a significant impact. Saif-Alyousfi et al., (2017) studies the impact of oil and gas price shocks in Qatar. For bank-specific variables, they used loan loss provision, inefficiency, capitalization, liquidity, and bank size and for macro factors, they used economic growth rate, fiscal stance, unemployment rate, exchange rate, HH Index, and Global financial crisis. They concluded that amongst macro variables, fiscal stance, unemployment, and GDP growth rate determine NPLs and amongst bank-specific, loan loss provisions, liquidity, and capitalization are important factors.

Overall, past studies have used both sets of variables to understand NPLs but most studies have found macroeconomic factors to be more important in terms of explanatory power. For example, similar to the studies of Amin et al., (2019) and Louzis et al., (2012), Klein (2013) in an IMF working paper investigated NPL formation in Europe from 1998-2011 and reported that macroeconomic factors have more explanatory power compared to bank-specific factors. Therefore, the following suit, we have used both bank-specific and macroeconomic variables in our model. However, we are specifically interested in the finding of two macroeconomic variables, oil

price and early warning indicator, and its relationship with non-performing loans.

2.3 Early warning indicators

Early warning indicators (EWIs) capture unsustainable booms in the financial cycle. The insight is that when financial bubbles inflate, generally risk appetite, asset prices, and credit increase and the outsized financial boom will generate the conditions for future banking distress. Minsky (1982) was amongst the first to explore this overheating of the financial sector. He put forward the financial instability hypothesis, which suggests that over periods of prolonged economic prosperity, capitalist economies tend to move from a stable financial structure to a speculative or unstable structure. However, the problem is that it is difficult to identify with reasonable confidence whether the boom is unsustainable or not. Hence, there have been many previous attempts to identify variables, termed early warning indicators that may signal the financial crisis ahead of time.

Past empirical studies have identified some domestic and external macroeconomic fundamental indicators. Studies have found that unsustainable booms can be identified reasonably well if deviations of asset and credit from long-run trends can be called to attention (Drehmann and Juselius, 2014). However, the conundrum is that each paper and each crisis have pointed out different indicators. That is, the same variable that has are good indicators in one round of crisis have failed to perform well in the subsequent round (Saravolos, 2010). Therefore, there is a need to find variables that provide consistent results.

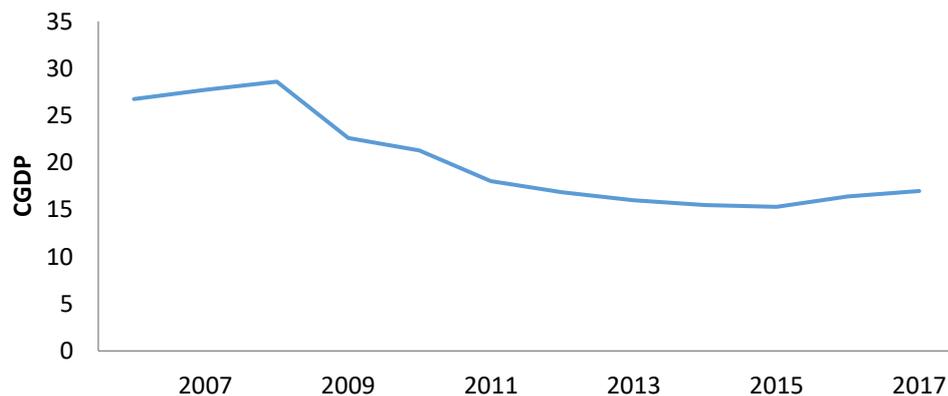
Drehmann and Juselius, (2014) made such an attempt by studying the effectiveness of 10 different early warning indicators. To do this, they used quarterly data from 1980 to 2012 of a sample of 26 countries. The early warning indicator used was GDP to growth, credit growth, proper growth, equity pr. growth, credit to GDP gap, property pr. gap, equity pr. gap and non-core liability ratio. The primary metric adopted was the receiver operating characteristic (ROC) curve so that the variables can be assessed on three important criteria of policy implementation, that is, timing, stability, and interpretability. Out of these variables, they concluded that the credit-to-GDP gap and the Debt to Service ratio were found to be the best performing EWIs. According to the authors, these two variables have an advantage over indicators in terms of all three assessment criteria.

Therefore, these variables will provide timely signals that are neither too early nor too late so that policies can be implemented in due time. Furthermore, both variables are easy to interpret and give stable and persistent signals which allow policymakers to be certain and take decisive policy action efficiently. Moreover, it was concluded as

EWIs play a crucial role in the implementation of macroprudential policies to reduce the heavy losses which can occur in the banking sector, Debt to Service ratio and Credit to GDP Gap is the most dominating early warning indicators (EWIs) as they possess far better forecasting ability than that of others. However, Credit to GDP (Domestic Credit to GDP) performs even better than the Debt

to Service ratio as, CGDP works ahead of five years or over in terms of crisis prediction, while DSR works for a precise duration for two years, so it is significant that ideal EWI signal crises early enough, as it is significant for the policymakers at the time of implementation of effective policies, for this reason, we have taken Credit to GDP gap, as an Early warning indicator in our study.

Credit to GDP Gap of Pakistan



Analyzing the above trend of Credit to GDP over the past years, and comparing the trend with Oil Prices it can be predicted that, over the same years, the movement is comparably similar, with an increasing and decreasing trend.

3. Methodology

To evaluate the impact of oil price prices and NPLs, we follow the approach of Saif-Alyousfi et al., (2017). The authors argued that the determinants of NPLs should be studied in a dynamic model because NPLs are affected by their lagged values. That is, the previous periods NPL will influence the current periods NPL. The equation (3.1) is estimated using the Arrelano-Bond estimator which is a generalized method of moment estimator introduced by Arrelano and Bond (1991). This is also known with the name of difference GMM because it takes the first difference of data before estimation. The augmented version of this estimator is called system GMM. This method has two variants first difference and second difference to tackle strong heterogeneity in the data but under the second difference, the estimated standard error could be downward biased (Blundell and Bond 1988). To fix this problem Windmeijer(2005) derived a two-step covariance matrix and the `xtabond2` command is a manual program in STAT that incorporates this information (Bari et al. 2020,). There are also some other advantages of this command such as this command provides the value of the Sargan test for the validity of instrumental variables and the value of the Arrelano-Bond test for second-order autocorrelation. Therefore, this method is an

appropriate one for the dynamic panel because it tackles all problems of a dynamic panel model. The research model, in the literature, of the study, is below:

$$NPL_{it} = \beta_0 + \beta_1 NPL_{i(t-1)} + \beta_2 LIQ_{it} + \beta_3 Prof_{it} + \beta_4 CAD_{it} + \beta_5 \log(OP)_{it} + \beta_6 GGDP_{it} + \beta_7 GFC_{it} + \beta_8 IB_{it} + \epsilon_{it}$$

Where i and t denote bank and time

respectively. NPL stands for non-performing loans and is the dependent variable. For the independent variables, this study uses four bank-specific variables and four macroeconomic variables. The Bank Specific variables are LIQ (liquidity), $Prof$ (Profitability), CAD (capital adequacy ratio), and IB (dummy variable which is 1 for Islamic Banks and 0 otherwise). The macroeconomics variables are OP (oil prices), EWI (Early Warning Indicator), $GGDP$ (Growth rate of Gross Domestic Product), and GFC (Global financial crisis). Lastly, ϵ_{it} is the error term.

3.1 Variables and Hypothesis

Table 1 shows all the variables and their expected signs according to previous studies. The two main independent variables of our study are oil price and the early warning indicator, while the remaining variables are control variables. We postulate that oil prices will have a positive impact on NPLs in an oil-importing country because the oil price has been found to hurt NPL in oil-exporting countries. Furthermore, the variable of early warning indicator used is a credit to GDP gap, a proxy for Domestic Credit to Private Sector (% of GDP). The variable was suggested by Drehmann & Juselius (2014) as the best indicators, since this variable is supposed to signal the arrival of the banking crisis,

we postulate that it will have a positive impact on non-performing loans.

Table 1

Variables	Measurement	Expected Sign
Dependent Variable		
Non-Performing Loan (<i>NPL</i>)	Impaired loans/gross loans	N.A
Independent variables		
Macroeconomic Variables		
Oil prices (<i>OP</i>)	Annual average closing Price of crude oil in dollars	+
Early warning indicator (<i>EWI</i>)	Credit to GDP gap	+
Economic Growth	The annual growth rate of GDP	-
Global Financial Crisis (<i>GFC</i>)	The dummy variable takes a value of 1 for the years 2007-2009	+
Bank Specific Factors		
Liquidity (<i>LIQ</i>)	Liquid assets/total assets	-
Profitability (<i>Prof</i>)	ROA = Net Income/total assets	-
Capital Adequacy Ratio (<i>CAD</i>)	(Tier1 Capital +Tier 2 Capital)/Risk-weighted assets	-
Islamic Banks (<i>IB</i>)	The dummy variable takes a value of 1 for Islamic Banks	-

4. Data and Results

4.1 Data

Data has been collected from seventeen Conventional and Islamic banks of Pakistan from 2006 to 2019. The banks are specifically HBL, MCB, ABL, NBP, UBL, BAF, Meezan, Askari, BOP, HMB, SCB, FBL, Soneri, JS, Summit, BOK,

DIB, BI, Sindh, Albaraka, Samba, and FWB. The sample does not contain Specialized Banks, Public Sector Banks, and other DFIs. The data for macroeconomic variables has been gathered from the World Bank and State Bank of Pakistan websites.

Table 2

Descriptive Statistics

	NPLs	LIQ	ROA	CAD	OP	CGDP
Mean	0.078	0.101	0.101	0.102	75.23	20.269
Min	0.005	0.021	-0.071	0.0029	43.58	15.38
Max	0.292	0.509	0.037	0.543	99.67	28.73
Std. Dev.	0.061	0.064	0.064	0.015	20.80	4.867
OBS	204	204	204	204	12	12

Table 2 shows descriptive statistics. The total number of observations is 204. The mean of non-performing loans is 0.078 with a maximum value of 0.292 and the minimum value of 0.005. Furthermore, the minimum value of the key independent variable, the oil price is 43.58 dollars per barrel and the maximum value is 99.67 dollars per barrel with an average of 75.23. Moreover, the standard deviation shows that oil prices have the largest variability with a standard deviation of 20.80.

Table 3 shows the correlation between the variables. Liquidity and return on assets have a negative correlation with Non-performing loans which implies that these variable and non-performing loans move in the opposite direction. However, the correlation of oil prices with CAD and CGDP is positive which shows non-performing loans and these variables move together in the same direction.

Variables	NPLs	LIQ	ROA	CAD	OP	CGDP
NPLs	1.0000					
sLIQ	-0.1709	1.0000				
ROA	-0.3736	0.0802	1.0000			
CAD	0.548	0.0678	-0.2703	1.0000		
OP	0.0732	0.1723	0.0026	0.1030	1.0000	
CGDP	0.2146	0.0983	-0.1939	0.3091	0.2676	1.0000

4

2.1 Results of Dynamic Panel

In this section, we provide and explain the regression results. To study the impact of oil price and early warning indicator on non-performing loans in Pakistan, we have used the one and two-step system GMM dynamic model estimator.

According to GMM estimations of one-step and two-step, three bank-specific factors namely; liquidity, profitability, and equity, have a negative impact on non-performing loans. Out of the three, liquidity has an insignificant impact and the latter two have a significant impact. Furthermore, the dummy variable of an Islamic bank is insignificant.

Moreover, the results show that the three macroeconomic variables oil price, economic growth, and early warning indicator, have a significant impact on non-performing loans. Economic growth has a negative impact on non-performing loans whereas oil prices and early warning indicators have a positive impact on non-performing loans. The variable of the global financial crisis remains negative in both GMM estimations but it has a significant impact on one-step one and an insignificant impact in the two-step version of GMM.

Table 3: Regression Results

	LIQ	ROA	CAD	OP	CGDP	IB	GFC	NPL (-1)
One-step GMM	-0.025 (0.043)	-1.181*** (0.215)	-0.061*** (0.39)	0.013* (0.007)	-0.009*** (0.001)	-0.005 (0.012)	-0.036** (0.017)	0.576*** (0.524)
Two-step GMM	-0.102 (0.062)	-2.861*** (1.110)	-0.072*** (0.092)	0.0233** (0.010)	-0.010*** (0.0026)	0.028 (0.0208)	-0.011 (0.0196)	0.670*** (0.2573)

Note: Standard errors are in Parenthesis.

The above results show that a one percent increase in oil prices leads to an increase of 0.0233 percent in NPLs of Pakistani banking. Previous literature found a negative relationship between oil price and NPL in oil-exporting countries, that is, higher oil Prices dampen the amount of NPL (Idris and Nayan, 2016, Saif-Alyousfi, 2017). Since Pakistan is an oil-importing country, the positive impact of oil prices on non-performing loans is as expected. Higher oil prices will lead to an increase in the production cost, transportation cost, and ultimately the prices of goods and services. As a result, household income decreases, and NPLs increase (Hoffmann & Jarass, 1983). Hence, an increase in the price of crude oil will deteriorate the strength of borrowing clients and increase the probability of default in an oil-importing country.

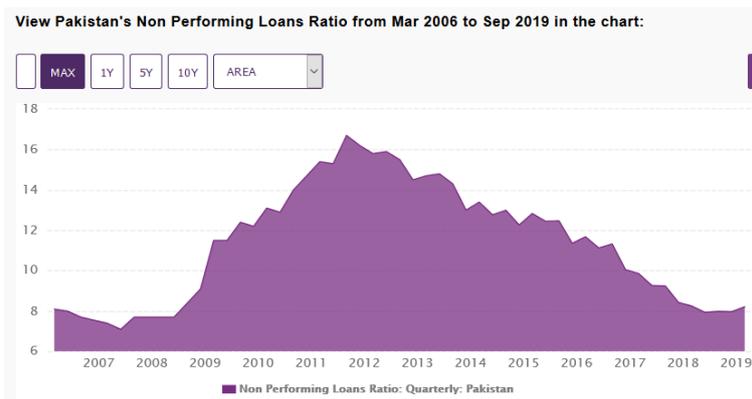
Similarly, the significant and positive impact of early warning indicator, credit to GDP, is in line with our postulation. The results show that an increase in EWI will lead to a higher level of NPLs, which is a sign of the banking crisis. Hence, it can be said with reasonable confidence that the variable is a powerful signal for the occurrence of the financial crisis. Credit to GDP compares the credit amount to the productivity of the economy. Therefore, both variables provide an accurate picture of the debt burden, as they reflect the economy's repayment capacity. If the debt burden on the economy increases; then it significantly gives rise to NPLS and deteriorates the profitability of the banks (Drehmann & Juselius, 2014).

The third macro-economic variable, economic growth, measured by GDP growth rate is a control variable. Our results show that there is a significant

and negative relationship between GDP growth and NPLs, indicating that an increase in GDP will reduce NPLs. This is in line with the findings of previous studies (Beck et al., 2015, Klein, 2015). When an economy is growing, businesses and consumers tend to have more revenue and disposable incomes, thereby making loan repayment easier. Whereas, when the business cycle goes downwards, the financial health of the borrowers deteriorates and servicing of the loan and repayment becomes difficult.

The last macro variable, the global financial crisis is a dummy variable and though, the impact of the global financial crisis on the NPLs of Pakistan is significant in one step GMM, it is insignificant in the two-step GMM estimation. However, the sign is negative in both cases, this implies that NPLs have declined during the global financial crisis 2008. This result is not consistent with our expectation as we expect non-performing loans to increase during times of financial crisis and even according to the State Bank of Pakistan, the NPLs of the banking system did rise during the period, primarily due to the global financial crisis, rupee depreciation and decrease of real GDP. However, if we look at the graph of NPLs over our sample period, we can see that NPLs were lowest during 2007 to the 2009-time frame of our sample. Furthermore, another possible explanation of this decline in NPLs of Pakistan is the precautionary measure taken by the State Bank of Pakistan after learning the lesson from the experience of developed nations. Therefore, according to the governor of State Bank of Pakistan in 2007-08,

Pakistan did not effect from the first round of this global financial crisis.⁴



Moreover, given the dynamic nature of the NPLs, the financial crisis may have translated into NPLs after some time after its occurrence. The Financial stability review of 2010-2011 reported that the indirect impact of the GFC and recession in developed countries started to become evident in Pakistan after 2009. Pakistan's exports and capital flows declined as its trading partners went into deep recessions. However, the report also pointed out that in Pakistan the sharp rise in NPLs may be attributable to many other factors such as the energy crisis, under-utilization of industrial capacity, increase in the cost of production, inter-corporate circular debt, weak economic fundamentals, and mounting fiscal deficit. Hence, this might explain the insignificant impact of the global financial crisis.

Moving on to the bank-specific factors, the first factor of ROA has a negative and significant impact on NPL. The result is in line with the studies of Berger and DeYoung (1997) and Amin et al., (2019) who put forward good management is essential for banks. Banks that have higher operational profitability can manage larger provisions which could be later utilized to write off bad debts. Hence, a good performing bank that is better in controlling its costs, we are able to recover from a non-performing loan (Amin et al., 2019). In other words, this shows that high-cost

inefficiency will result in higher NPLs. Similarly, the relationship between Capital Adequacy ratio and NPLs is also significant and negative. The result is consistent with the moral hazard hypothesis put forward by Berger and DeYoung (1997), banks with low capital tend to take more risk with their loan portfolio. Furthermore, it may also be possible that undercapitalized banks may have high NPL because as they lack capital that is necessary to write it off so they avoid reducing their gross NPL ratio.

The two remaining bank-specific variables have an insignificant impact on non-performing loans. Firstly, results show that when banks' liquidity increases, NPL decrease, but the reduction is insignificant. In banking literature, an asset that has short maturity and low risk are considered to be liquid. Thus, this includes, include cash, short-term securities (government debt and commercial paper), and one-three days' interbank loans (Alger, & Alger, 1999). Therefore, if banks increase their investment in such liquid assets, fewer resources will be available for loans that may default. Lastly, the dummy variable of Islamic banks shows an insignificant impact on non-performing loans. Therefore, there is no significant difference between commercial and Islamic banks while determining NPLs in Pakistan.

4.2.2 Results of Diagnostic Tests

Table 4. Results of Diagnostic Tests

TESTS	SARGAN TEST	AR(2) TEST	F-STATS
OUTPUT	0.3154	0.2229	212.25

The results of the Sargan test and AR (2) are confirming that the instruments used by this study are valid and the absence of serial correlation respectively. Furthermore, the value of F-Stats is confirming the joint significance of all variables that are included in the model. The value of these

diagnostic tests is confirming the validity of the results of this current model.

4.2.3 Robustness Check

To check the robustness of the data, fixed effect and random effect techniques are also applied to know the static panel results. Table 5, Model 1,

shows the regression estimates of fixed effect, and model 2 shows the estimates of random effect. A

comparison of static and dynamic models shows that the results are consistent and robust.

Table 5.

Robustness check

	Model 1	Model 2
	Fixed Effect	Random Effect
Regressors		
LIQ	0.0083 (0.0851)	-0.016 (0.0503)
ROA	-1.0031* (0.5505)	-1.1845*** (0.2226)
CAD	-0.1267*** (0.0486)	-0.0916** (0.0396)
OP	0.0158 (0.0135)	0.01782* (0.1022)
GGDP	-0.0069*** (0.0021)	-0.0065*** (0.0022)
IB(Dummy Variable)	NA	-0.0563*** (0.1718)
GBS(Dummy Variable)	-0.0223** (0.0098)	-0.0200** (0.0104)

5. CONCLUSION

A high ratio of non-performing loans is not only a big challenge for the economic growth of a country but also an increasing threat for the smooth functioning of the banking industry. Given its significance, previous scholars have studied various macro and micro determinants of NPLs in different countries. Our contribution to this literature is two-fold. Previous literature has established that oil price has a significant and negative impact on non-performing loans of oil-exporting country. However, given the importance of oil in oil-importing countries, no study has looked into the impact of oil prices on the non-performing loans of the latter. Hence, our first contribution is that we study the impact of oil prices in an oil-importing country, specifically, Pakistan. Moreover, earlier scholars have explored many indicators that may warn policymakers in time about an impending financial crisis. The conundrum is that each paper and crisis have pointed out different indicators so there is a need to find variables that provide consistent results. Hence, our second contribution is that along with other NPL determinants, we incorporated early warning indicators, as the Credit-to-GDP gap, that out-perform other variables in their forecasting abilities suggested by Drehmann and Juselius, (2014).

Thus, the purpose of this current research is to analyze the impact of oil prices and early warning indicator (EWI) on non-performing loans in an oil-

importing country. To do this, sample data was collected from seventeen banks of Pakistan from 2006 to 2019 and one step and two-step system GMM model is applied. We also included other banks' specific and macro-economic variables as control variables. These included liquidity, profitability, capital adequacy ratio, economic growth, and the dummy variables of the financial crisis and Islamic banks.

According to the results of the GMM Model, oil price and early warning indicators both have a positive and significant impact on non-performing loans in an oil-importing country. Therefore, our results have significant policy implications, policymakers should be vigilant when they see oil prices and credit to GDP of the economy rising. The early warning indicator used in our model is crucial for effective macro-prudential policy. The correct timing of these signals and ease of interpretability will allow policymakers to take measures at the accurate time. Moreover, these variables provide stable and persistent signals which reduce uncertainty regarding trends and allow for more decisive policy action.

Amongst the control variables, economic growth, profitability, and capital adequacy ratio have a negative and significant impact on non-performing loans. At the micro-level, banks can improve their resilience by improving their profitability, efficiency, and capital cushion. Furthermore, at the macro-level, banks and policymakers should keep an eye on the business cycle. The expansionary

phase of the cycle will be marked by reduced NPLs whereas the contractionary phase will be marked by increased NPLs. What's more, is that it is important to recall that previous literature also hypothesizes that expansion of lending activities in the boom period is the cause of rising NPLs during the recession. That is, the outsized financial boom will generate the conditions for future banking distress. Therefore, bank management and policymakers should be content during economic booms but avoid being blindsided and should always keep the early warning indicator in hindsight

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