



CREDIT GROWTH AND ASSET DELINQUENCY IN INDIAN BANKS

J Sopan*

*Senior Research Fellow,
Department of Commerce,
Sikkim University Gangtok, INDIA
Email id: jsopan@sikkimuniversity.ac.in

ABSTRACT

The present article examines the factors that affect the credit risk in Indian banks by analyzing the bank specific and macroeconomic determinants that influence a bank's asset delinquency rate. The bank specific factors analyzed in the study include Size of the bank, excessive past credit growth, priority sector lending, asset restructuring, bank profitability and the effect of previous year's delinquent assets of a bank. Whereas the rate of growth of Gross Domestic Product (GDP) constitutes the macroeconomic determinant. In order to analyze the effect of these factors on a bank's asset delinquency rate, the study deploys a panel data analysis on 43 Indian banks comprising of 20 Nationalized banks, 17 Private bank and 6 State Bank of India (SBI) group banks observed over a period of 10 years from Financial Year (FY) 2006 to 2015. The results of the empirical analysis show that within the bank-specific determinants, bank size, and priority sector lending and rate of assets restructuring negatively influence the asset delinquency rate of Indian banks. Whereas past credit growth, profitability and preceding level of delinquent assets had a positive effect. Further, the macroeconomic determinant i.e. the growth rate of GDP is observed to have a positive relationship with a bank's asset delinquency rate.

KEYWORDS: *Credit Risk, Indian Banks, Non-Performing Assets, Npl, Panel Data Analysis.*

INTRODUCTION

In the modern economies, the banks predominantly engage themselves in risk management practices, since the economic ramifications of a bank failure can be devastating for the entire financial system. However, imprudent risk management practices overseeing credit policy had a critical role to play in the financial crisis of 2008 (Atikogullari, 2009; Thiagarajan *et al.*, 2011). Thus, paving the way for the regulators in framing more prudent credit risk and lending policies



Credit risk as defined by the Basel Committee on Banking Supervision is the potential risk of default by borrowers while meeting their obligations in accordance with the agreed terms (Bank for International Settlements, 2005). These delinquent assets otherwise known as Non-Performing Assets (NPA), are directly associated with the financial health of a bank and are a major influencing factor towards the credit riskiness of the banking sector. As these advances lent by the banks become delinquent or ceases to generate revenue, they become non-productive or non-performing assets. Historical evidences indicate that majority of the failures in the banking industry can be directly linked with inadequate credit risk management (Jimenez & Saurian, 2006). Further, this issue of asset delinquency not only affects the banking system but also the entire economy as the bad loan pile up the it reduces the lending capacity of banks and thereby bringing down credit flow in the economy (Levine *et al.*, 2000).

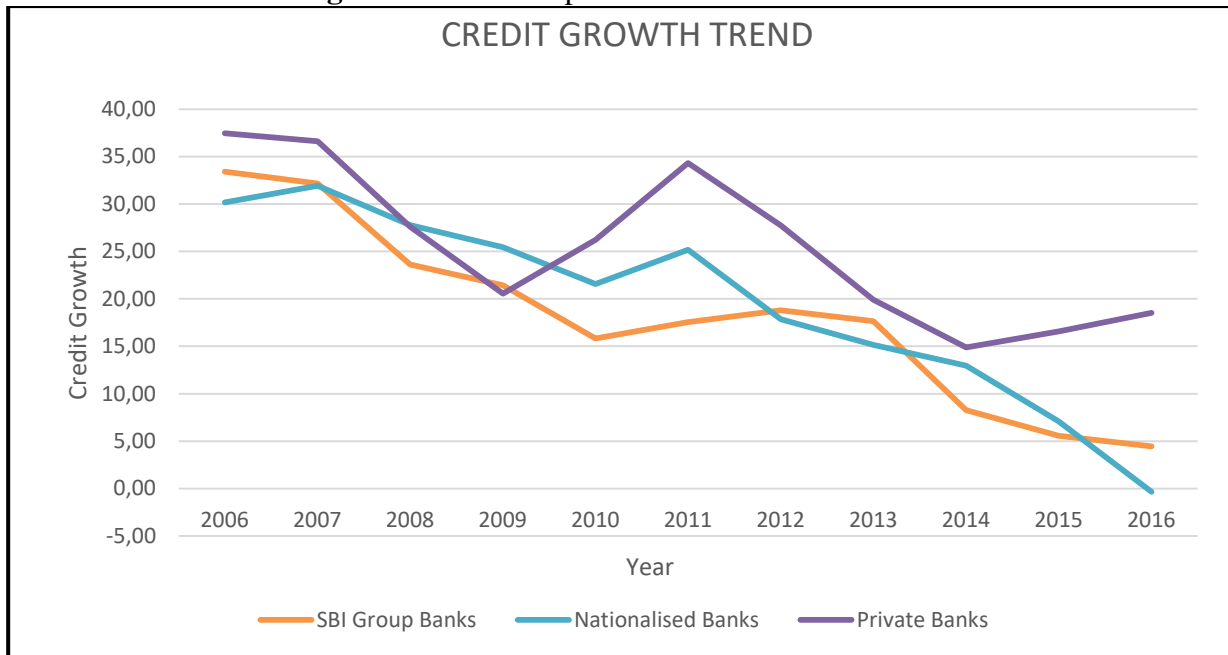
Following the liberalization and deregulation of the Indian banking sector during 1994-1997 within the contours of the Narasimhan Committee recommendations, the Indian banks have achieved significant strides with regards to the management of delinquent assets. The most noticeable improvement can be witnessed in the case of Public Sector Banks (PSBs), where the delinquency rate dropped from 14 percent during 1990-04 to less than 3 percent in 2003. Similarly, the Private Banks also attained comparable success in this regard, following the policy changes brought in by the Reserve bank of India (RBI) (Thiagarajan *et al.*, 2011). However, as the Indian economy witnessed a secular upward trend in GDP growth during 2003 till 2011 throttled by an expansionary monetary policy and coupled by an aggressive credit push channelized through Public Sector Bank (PSB) lending (Samantaraya, 2016), the quality of assets held by these banks deteriorated. As most of this credit went into funding of infrastructure projects, which were severely affected by the sub-prime crisis resulting them to become delinquent over time.

Thus, it becomes pertinent to study and explain the gradual surge in asset delinquency through determining the factors at large that affect credit risk of Indian banks. The study intends to empirically analyze macroeconomic and bank-specific factors with a special focus on exploring the effect of excessive credit growth in the past, through studying the impact lagged credit growth on overall credit risk of Indian banking sector.

2. Credit Growth and Asset Delinquency Trends

From the figure1 which depicts the bank group-wise growth in credit for the period FY 2005-06 to FY 2006-17, it can be observed that nationalized banks and the SBI group banks follow a very similar trend in the growth of their credit. Whereas, the private sector banks' credit growth trend follows a divergent path but is reflective of the prevailing economic cycles. During the financial crisis of 2008, it can be clearly seen that the growth in credit took a deep plunge in the case of private sector banks due to drying up of liquidity in those banks as people started moving their deposits to the SBI group banks and the nationalized banks (Acharya & Kulkarni, 2012). After the effects of the crisis subsided and the economy started gaining growth momentum from FY 2009-10 onwards, the private sector banks also started posting upward growth in their credit flows.

Figure1: Bank Group-Wise Credit Growth Trend



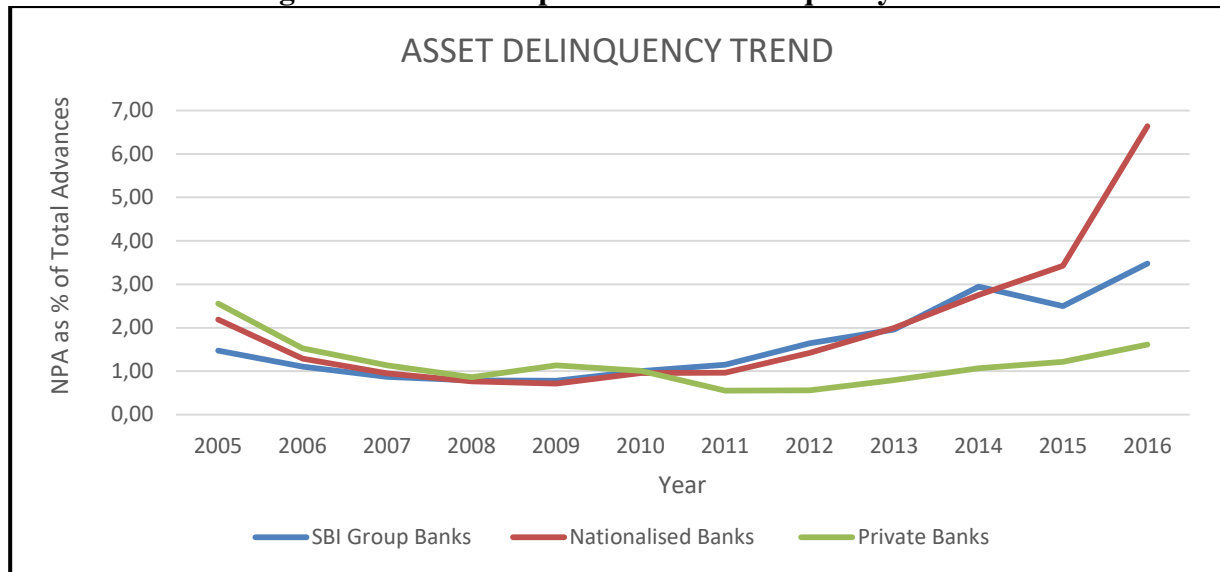
SOURCE: Computed Figure

But on the other hand, The SBI group banks and the nationalized banks posted a higher level of credit growth than the Private Sector Banks from FY 2006-07 to FY 2009-10, and even during the crisis years of 2008 and 2009. This higher growth in credit was mainly fuelled by the expansionary credit policy adopted by the Government of India which channeled the funds from public sector banks to fund various infrastructure projects (Samantaraya, 2016). From FY 2012-13 onwards we can see a secular fall in the rate of credit growth of public sector banks as their credit lending ability is severely impaired by the accumulation of loans that turned out to be delinquent.

By examining the trend of asset delinquency among the private sector banks and the public sector illustrated in the figure 2 it can be observed that from FY 2005-06 to FY 2010-11, both followed a similar trend with SBI group banks posting lower level of bad loans among the public sector banks. But from FY 2011-12 onwards the bad loans started to pile up in the public sector banks which were a result of excessive growth in credit during the economic boom periods and started turning out to be delinquent with the passage of time (Samantaraya, 2016).

The situation of asset delinquency started getting worse for the public sector banks from FY 2014-15 onwards as the NPAs of both SBI group banks and nationalized banks crossed 3 percent. The net NPA level of nationalized banks even reached a 7 percent level in FY 2016-17. This sharp rise in the level of bad loans in public sector banks especially the nationalized banks can be attributed to the exercise of asset quality review brought in by the RBI which unearthed a large amount of substandard and bad loans which were earlier kept on restructuring process for years by the public sector banks and these loans from escaped classification as delinquent loans.

Figure 2: Bank Group-Wise Asset Delinquency Trend



SOURCE: Computed Figure

3. Literature Review

Several studies have been carried out globally on the credit risk of banks, of which the prominent ones include Makri *et al.* (2014), Nikolaidou and Vogiazas (2014), who studied the credit risk of European banks, whereas Ahmad and Ariff (2008) did a comparative study of credit risk determinants of banks from emerging and developed economies. The other prominent literature on the credit risk of banks includes studies from South East European countries such as Italy, Greece, and Spain (Louzis *et al.* 2012), (Messiah and Jouini 2013), and from Tunisia (Abed *et al.* 2014). Misra and Dhal (2010), Thiagarajan *et al.* (2011), and Samantaraya (2016) studied the factors affecting asset delinquency of the banks in India. From examining these studies and a survey of other relevant literature pertaining to bank credit risk it can be summed up that asset delinquency of banks is a function of both internal and external factors. The internal factors are bank-specific whereas the external factors are macroeconomic determinants that are bank irrelevant. The bank-specific factors include bank size, credit growth, profitability, priority sector lending rate, asset reconstruction, and capitalization rate. While the inflation rate, GDP growth, and unemployment rate constitute the macroeconomic determinants.

Bank-Specific Determinants

Bank size, the rate of priority sector lending, and the profitability level of banks have been found to have a negative association with bank credit risk. Makri *et al.* (2014), Nikolaidou and Vogiazas (2014), and Morina (2020) found that the size of a bank in terms of total assets has a significant bearing on the amount of bad loans the bank holds. They observed that size of the bank was negatively related to the credit risk of banks. Further, the profitability level of a bank influences its credit risk parameter and it has been found to have a negative relationship with the latter, which was reinforced by the findings of Lou zest *al.* (2012) and Messiah and Jouini (2013). Moreover, the proportion of priority sector of the total advances of the bank also reduces the probability of its loans from turning delinquent. Misra and Dhal (2010) and Bradman and Mukherjee (2016) found evidence to support the negative association of priority sector lending on the bank's asset quality. However Samantaraya (2016) found a positive



relationship between priority sector lending and the stock of restructured assets held by Indian banks.

The bank-specific factors that were found to have a positive association with a bank's asset delinquency rate include credit growth, asset restructuring, and accumulated past bad loans. Thiagarajan et al. (2011), Messiah and Jouini (2013), and Samantaraya (2016) found that credit growth or the rate of growth of the loans issued by a bank has a positive effect on the rate of its asset delinquency. Further, the practice of loan ever greening or asset restructuring also increases the stockpile of bad loans of a bank. Messai and Jouini (2013), Bardhan and Mukherjee (2016) and Samantaraya (2016) found in their studies the assets that were once restructured had a higher possibility of turning delinquent, which added to the overall credit risk of the bank. However, in most of the studies, the lagged effect of asset restructuring was studied. While some studies found the practice of asset restructuring can also have a negative effect on the delinquency rates of loans in a bank as they tend to reduce the actual amount of doubtful assets by converting them into standard assets (Misra and Dhal, 2010). A very similar effect was also observed by Makri *et al.* (2014), Nikolaidou and Vogiazas (2014) in their study of Eurozone banks, where they found that the accumulated bad loans from the previous periods had a positive effect on the credit risk of banks.

Macroeconomic Determinants

The macroeconomic factors that were found to influence the asset delinquency rate of banks, comprised of the rate of inflation, the growth rate of GDP, and even to some extent the rate of unemployment. The rate of inflation and the rate of unemployment in an economy was found to have a positive relationship with the credit risk of banks. Messai and Jouini (2013), Abid et al. (2014), and Makri et al. (2014) found that the prevailing unemployment rate of a country increases the chances of loans issued by banks to turn delinquent and thus increasing its credit risk. Messai and Jouini (2013) and Nikolaidou and Vogiazas (2014) found that the rate of inflation had a positive but statistically insignificant effect on a bank's asset quality.

The growth rate of GDP was found to have a differing effect on the credit risk of banks in different regions of banks studied in the extant literature. The studies that found to have a positive and statistically significant association of GDP growth or economic cycles on bank credit risk include those of Louzis et al. (2012) and Makri et al. (2014). A majority of studies including those of Messai and Jouini (2013), Abid et al. (2014), Samantaraya (2016), and Morina (2020) found that the asset delinquency rate of a bank was negatively associated with the growth rate of GDP as during economic booms the borrowers were at a better position to pay back their loans.

4. Objectives, Scope and Sources of Data

The primary focus of the present article is to study the effect of excessive credit growth in the past, particularly during the periods of accelerated economic expansion on the level of NPAs or delinquent assets. In addition, the article also tries to assess the impact of other major bank-specific and macroeconomic factors such as bank size, priority sector lending, profitability, and asset restructuring and economic cycles on the bank asset delinquency rate.

The study is confined to only Indian banks of which 43 banks are considered, comprising of 20 nationalized banks, 17 Private banks and 6 State Bank of India (SBI) group banks, and are observed over a period of 10 years from FY 2006 to 2015. The data pertaining to the variables considered in the study have been extracted from various RBI databases.

5. Methodology

The present study analyses the determinants of asset delinquency of Indian banks using a panel data model. The choice of using panel-data regression model over a pooled OLS model is done to account for the bank specific effect or the cross-section heterogeneity and to enhance the robustness of the estimates by increasing the number of observations (Wooldridge, 1999). Algebraically, the panel data regression model is represented in the equation (1):

$$LNPA_{it} = \alpha + \beta_1 LNTA_{it} + \beta_2 LDGC_{it} + \beta_3 PRSLTA_{it} + \beta_4 SDATA_{it} + \beta_5 ROA_{it} + \beta_6 LNPA_{it-1} + \beta_7 GDP_t + u_i + \epsilon_{it} \dots(1)$$

Where *LNPA* is the dependent variable which measures the asset delinquency rate of banks, it is measured as natural log of non-performing assets. *LNTA* or natural log of total assets absorbs the bank size effect and is expected to have a negative effect as larger banks indulge in businesses other than traditional lending operations thus reducing their exposure to delinquent lending. *LDCG* represents the effect of excessive past credit growth by taking a progressively weighted average of five year’s credit growth of a bank comprising of the current year and preceding four years with higher weights been assigned to the farthest year and lowest to the most recent year. The years are weighted progressively at 0.25, 0.20, 0.15, 0.10, and 0.05 respectively. The rationale behind such technique is that the effect of past credit growth is deferred over subsequent years and over time contributes to non-performing assets. *PRSLTA* and *SDATA* indicates the effect of priority sector lending and asset restructuring respectively Both are expected to have a negative effect as priority sector loans are mostly backed by the government or are comprised of retail loans which have lower delinquency rate, similarly, restructuring of assets transforms the doubtful loans into standard assets thereby reducing NPAs. Profitability (*ROA*) and economic cycles (*GDP*) can have both negative and positive relationship depending on the bank’s practices. Lastly, previous year’s NPA level (*LNPA_{it-1}*) or *LGILNPA* also contributes to the current year’s NPA levels and thus has a positive effect. The relationship between the repressors and the dependent variable has been summarized in Table.1

TABLE 1.SUMMARY OF VARIABLES, MEASUREMENT AND EXPECTED RELATIONSHIP

Dependent Variable	Proxy	Measurement	
Asset Delinquency	LNPA	Natural Logarithm of Non-Performing Assets	
Independent Variable	Proxy	Measurement	Expected Sign
Bank Size	LNTA _{it}	Log of total Assets	-
Lagged Credit Growth	LDCG _{it}	Five Years Weighted Lag of Credit Growth (Growth Rate of Total Advances)	+
Priority-Sector Lending	PRSLTA _{it}	Ratio of (Priority Sector Loans)/ (Total Advances)	-
Restructured Assets	SDATA _{it}	Ratio of (Standard Restructured Assets) / (Total Advances)	+
Return on Assets	ROA _{it}	100*(Net Profit)/ (Total Assets)	+/-



Lagged NPA	LNPA _{it-1}	One period lagged LNPA	+
Economic Cycle	GDP _t	GDP Growth Rate	+/-

SOURCE: Based on Priori Information

6. RESULTS AND DISCUSSION

The findings of the estimation model are illustrated in Table 2. The estimates have been run for both Fixed Effects Model (FEM) and Random Effects Model (REM). In both the models F-Statistic is found to have significant probability values, which proves the efficiency of each model. Further, to choose between the models, Hausman Test is performed. The results of the Hausman Test show a χ^2 value of 152.38 with a probability of less than 5 percent, thus proving the alternative hypothesis of the test that FEM is the more appropriate model. Moreover, the R^2 value of the Fixed Effects Model is 0.76, which signifies a high degree of explanatory power of the model. The model is also free from the problem of autocorrelation as the Durbin-Watson statistic sits in the relatively normal range i.e. within the prescribed range of 1.5 to 2.5 (Field, 2009).

Having chosen the FEM model, the study now delves into the analysis of coefficients of the explanatory variables. It can be observed that all the repressors, except GDP show a statistically significant relationship with the dependent variable LNPA. The variables LNTA, LDCG, SDATA, ROA and LG1NPA are statistically significant at 1 percent level while PRSLTA is found to be significant at 5 percent. Further, the sign coefficients associated with the explanatory variables are all in line with the priori expectations.

The empirical findings reveal that among the bank specific factors Lagged Credit Growth (LDCG), Profitability (ROA) and one period lagged NPA (LG1LNPA) have a positive association with the rate of asset delinquency. LDCG is found have the highest effect among all the repressors and 1 percent increase in LDCG would soar up the NPAs of a bank by 1.89 percent. The effect of one period lagged NPA is observed to be moderate and that of profitability to be significantly low. Moreover, priority sector lending (PRSLTA) and asset restructuring (SDATA) reveal a negative relationship with NPAs with a moderately higher degree of influence. Further, size of a bank has a negative but at a very lower degree of impact. Finally, an economic cycle (GDP) is observed to have a positive but statistically insignificant effect on a bank's NPA.

TABLE 2 RESULTS OF PANEL DATA MODELS – LNPA

Variable	Fixed Effects model		Random Effects Model	
	Coefficient	t-Statistic	Coefficient	t-Statistic
LNTA	-0.07***	-4.77	-0.02***	-5.01
LDCG	1.89***	5.00	0.66**	1.96
PRSLTA	-0.60**	-2.52	-0.46**	-2.37
SDATA				
	-0.55***	-4.78	-0.22**	-2.23
ROA	0.04***	3.06	0.06***	5.28
LG1				
LNPA	0.38***	8.47	0.69***	20.82
GDP	0.01	0.23	0.03**	2.03
C	2.76	10.04	1.19	7.85



Observations	387	387
F-Statistic	21.78	98.06
Prob (F-Statistic)	0.00	0.00
R ²	0.76	0.64
Durbin-Watson Stat	1.91	1.84
Hausman Test Stat	$\chi^2(7) = 152.38$ Prob > $\chi^2(0.00)$	
Chosen Model	Fixed Effects Model	

SOURCE: Authors' Calculation

Note: ***, ** and * denote statistical significance of 1%, 5% and 10% respectively

7. CONCLUSION AND POLICY IMPLICATIONS

After having analyzed the empirical results, it can be concluded that the asset quality of Indian banks was largely affected by their credit policy. The results of the empirical analysis reveal that all the factors considered in the model equation to determine the credit risk of Indian banks are statistically significant and have a bearing on their level of asset delinquency. Among the determinants effect of excessive credit growth had the highest impact on bank credit risk. As it is evident from the findings that expansionary lending practices during the periods of economic boom led to excessive credit growth among the banks which in the later periods resulted in higher incidences of asset delinquency.

From the results, we can observe that the variable asset restructuring has a negative and statistically significant association with the level of delinquent assets held by a bank. This can be attributed to the unsound practice of asset restructuring and ever greening of loans followed by the Indian banks in order to escape from the brunt of additional provisioning. This led to stockpiling of substandard and loss assets over a period of time, which is in fact a matter of concern as these substandard loans are kept on being restructured into standard assets, it will be catastrophic for the banks if these assets are not written off in time.

Further, the priority sector lending had a significant negative effect on the credit risk of the Indian banks. Contrary to the general belief, these loans do not contribute much to the asset delinquency or the level of NPAs of Indian banks, rather it has a negative association primarily because most of these advances are retail loans or farm loans which are in receipt of government waivers. The profitability and the size of the banks had a very low impact on the asset quality of Indian banks; thus, the credit policy of the banks should be framed independently from the influence of its profit earning capability or the size of the bank's total assets.

Moreover, the effect of accumulated bad loans and the macroeconomic factor are found to be positively associated with the credit risk of banks. The lagged NPAs or the accumulated bad loans impaired the credit lending ability of Indian banks from issuing fresh loans and in turn led to higher incidences of delinquent assets to accumulate over time. Lastly, the growth rate of GDP representing the effect of economic cycles did not have any impact on the credit lending policy of banks in India.

REFERENCES

Abed, L., Overtone, M. N., & Zouari-Ghorbel, S. (2014). Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: A dynamic panel data. *Procedia Economics and Finance*, 13, 58-68.



- Acharya, V. V., & Kulkarni, N. (2012) what saved the Indian banking system: state ownership or state guarantees? *The World Economy*, 35(1), 19-31.
- Ahmad, N. H., & Ariff, M. (2008) Multi-country study of bank credit risk determinants *International Journal of banking and Finance*, 5(1), 135-152.
- Atikogullari, M. (2009).An analysis of the Northern Cyprus banking sector in the post-2001 period through the CAMELS approach *International Research Journal of Finance and Economics*, 32(10), 212-229.
- Baltagi, B.H. (1995). *Econometric analysis of panel data* New York: John Wiley and Sons.
- Bank for International Settlements (2005) Sound Credit Risk Assessment and Valuation for Loans Retrieved from <https://www.bis.org/publ/bcbs126.pdf>
- Bardhan, S., & Mukherjee, V. (2016).Bank-specific determinants of nonperforming assets of Indian banks *International Economics and Economic Policy*, 13(3), 483-498
- Field, A.P. (2009). *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll* 3rd edition). London: Sage.
- Jiminez.G. and J., Saurina, 2006. Credit cycles, credit risk and prudential regulate *International Journal of Central Banking* 2(2): 65-98.
- Levine, R., Loayza, N., & Beck, T. (2000) financial intermediation and growth: Causality and causes. *Journal of monetary Economics*, 46(1), 31-77.
- Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, 36(4), 1012-1027
- Makri, V., Tsagkanos, A., & Bellas, A. (2014) Determinants of non-performing loans: The case of Euro zone. *Pano economicus*, 61(2), 193-206.
- Messai, A. S., & Jouini, F. (2013) Micro and macro determinants of non-performing loans *International journal of economics and financial issues*, 3(4), 852-860
- Misra, B. M., & Dhal, S. (2010). Pro-cyclical management of banks' non-performing loans by the Indian public sector banks. *BIS Asian Research Papers*, 16, 1-23.
- Morina, D. (2020). Determinants of Credit Risk in Commercial Banks of Kosovo *International Journal of Economics & Business Administration (IJEBA)*, 8(2), 179-190.
- Nikolaidou, E., & Vogiazas, S. D. (2014) Credit risk determinants for the Bulgarian banking system *International Advances in Economic Research*, 20(1), 87-102
- Samantaraya, A. (2016). Procyclical credit growth and bank NPAs. *Economic and Political Weekly*, 51(12), 112-119.
- Thiagarajan, S., Ayyappan, S., & Rama chandran, A. (2011) Credit risk determinants of public and private sector banks in India *European Journal of Economics, Finance and Administrative Sciences*, 34(34), 147-153.
- Wooldridge, M. (1999) *Econometric analysis of cross section and panel data* Cambridge: MIT Press.