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Evaluating the Credit Risk Measurement Practices of Commercial Banks in Nepal

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Abstract : *Banking sector of the Nepal is moving towards the goal of integral credit risk management system because to maintain the quality of the credit. The key purpose of this research is to explore the risk measurement practices of commercial banks in Nepal. This paper attempts to ascertain the perceptions of Nepalese bankers about the importance of credit risk measurement and the practice of various tools to measure the risk level of specific borrowers. The result of the study indicates that the Nepalese bankers are aware of the importance of various techniques to effectively identify the risk level. Furthermore, the Nepalese commercial banks have used various techniques like matrix method, internal rating approach, standard approach, judgment, causal model linear probability, and linear discriminate analysis during the credit appraisal process. In addition, there was the significant difference between all two categories of the bank, namely Private Bank with Joint Venture Bank in terms of tools and techniques practices for credit risk measurement. Moreover, there was a positive relationship between credit risk assessment and risk measuring tools using in banks.*

Keyword*: credit, risk, measurements, techniques, nonperforming loan*

I. Introduction

Credit risk management is one of the most essential functions of the bank in the modern banking concept. The risk is inherent in all aspect of banking operations. Credit business is a one of the major parts of the bank. However, credit risk is a crucial factor that needs to be managed in every phase of the credit process. Since the credit assessment is a primary stage to identify of the risk level in the specific borrower, sector or portfolio. High bank failures and the significant credit problems faced by banks during the Global Financial Crisis (GFC) is a stark reminder of the importance of accurately measuring and providing for a credit risk (Allen & Powell, 2011). So that, every commercial bank strongly focuses to developing the effective and robust credit assessment system entire the organization.

For this purpose, bank exercises the different types of statistical models and subjective judgment on the basis of realistic assumptions. The primary goal is the quantification of the risk level to take the precautionary actions for maintaining credit quality. While analysis the credit proposal more emphasis shall be given to the repayments loan out of funds generated from borrower's business instead of realization of collaterals. A formal evaluation of borrowers' financial position and ability to repay debt obligation is known as credit rating, which helps to bank grade the concerned borrower (Hassain & Chowdhury, 2011). For this rationale, bank implements the various tools and techniques on the basis of their requirements. In general, designing credit risk measuring framework, bank management must evaluate numerous consideration including cost, efficiency of the employee, nature of the business, and utility of the tools in the specific portfolio.

A credit risk measurement is a preventive approach to reducing the default rate in the overall credit exposure of the banks. Most commercial banks use different tools and technique in one or more key area of the risk management that involve credit such as loan assessment process, monitoring and reporting, analysis, loan pricing and profitability of the banks. The credit risk measurements are the primary summary indicators of the bank's individual credit exposure. The level of the risk may reflect the credit decision in the daily business. The risk measuring system based on the credit philosophy adopted by the banks. It is fundamental for banks to have a comprehensive risk management framework as there is a growing realization that sustainable growth seriously depends on the development of a comprehensive risk management framework.

Credit risk measuring practices are an issue of concern in financial institutions today and there is need to develop improved processes and systems to deliver better credit quality. There have been controversies among researchers on the effect of credit risk measuring techniques adopted by various banks. According to Saunders and Cornett (2002), good selection strategy for risk monitoring is adopted by the credit unions implies good pricing of the products in line with the estimated risk which greatly affect their profitability. On the other hand it is stated that loan portfolio management and operational efficiency management are the most important to consider in CRM as they are the most important in enhancing the quality lending. Measuring credit risk for banks is particularly challenging because of the importance of financial linkages in the banking system (Elsinger, Lehar, & Summer, 2006, p. 1302). Hence, the principal concern of this study is to ascertain the

various credit risk identification techniques and tools that are adapted by commercial banks on their credit management practices.

1.1 Purpose Of The Study

The study will evaluate the various credit risk measuring techniques utilized by the commercial banks during the credit appraisal process. This study focuses on various techniques of credit risk measurement practiced by the commercial banks. So, that it will be useful for top management of the banks. The study will present different practices which can be shared by many commercial banks in the banking industry.

Finally, the study will contribute to the broader empire of banking business and academic research. In the banking business, through its recommendations, the study will add value to better credit management practices in the Nepalese banking sector. In the academic world, the study will add significance to academic research in the broader area of credit risk management practice.

1.2 Objective Of The Study

The major objective of the study is to analyze the credit risk measuring tools and techniques practiced of some selected commercial banks operating in Nepal. The key objective of this research is to ascertain differences between Private sector banks and Joint venture bank's practices of credit risk measuring tools and techniques in the credit appraisal process.

1.3 Hypothesis Of The Study

To fulfill the predefined objectives of this study, the following hypotheses were developed and tested by using statistical tools.

H_1: There are significant differences between private sector and joint venture banks in the practice of credit risk measuring tools.

H_2: There is positive relationship between credit risk assessment and risk measuring tools using in banks.

II. Literature Review

Many studies have been emphasizing on the risk assessment practices to identify the credit risk level entire the credit portfolio. For this purpose, bank uses the different credit risk measuring tools and techniques such as qualitative techniques, quantitative techniques and many others credit rating model in banking applications. This paper will survey the latest studies of credit risk assessment tools and techniques used in the banking sector that support credit decision in Nepalese commercial banks.

Saunders and Cornett (2006) found that to address the credit risks, banks and financial intermediaries should focus center on the probability of default of the borrowers. There are a number of models accessible to analyze credit risks, some of which are qualitative models and some are quantitative models. The qualitative models indicate borrower specific factors and market specific factors. Mosharrafa, R.A. (2013) found that credit risk rating technique is an important tool for credit management as it supports a bank to realize various dimensions of credit risk involved in different borrowers and portfolio. The credit risk assessment is the source for credit risk management in commercial banks and provides the information for decision making.

Wood & Kellman (2013) examined the risk management practices of Barbadian Banks with the primary objective to evaluate the various types of risk faced by banks operating in Barbados. Information was obtained via an interview survey of Senior Bank personnel in 2011. The survey covered key aspects of risk management, including the importance of risk management practices, risk identification, risk monitoring and nature of risk management practices. The main findings of the study are: risk managers perceive risk management as critical factors to banks‟ performance; the types of risks causing the extreme exposures are credit risk, operational risk, country or sovereign risk, interest rate risk and market risk; there was a high level of success with current risk management practices and these practices have evolved over time in line with the changing economic environment and regulatory updates. Overall, the findings suggest strongly that in light of the depressed economic climate, banks operating in Barbados were certainly risk-focused for mitigation purpose.

Nazir, Daniel, & Nawaz (2012) examined and compared the risk management practices of Conventional and Islamic banks in Pakistan. The result found that those Pakistani banks are efficient in credit risk analysis, risk monitoring and understanding the risk in the most significant factors of risk management. Moreover, there is significant difference in risk management practices of the Islamic and conventional banks of Pakistan.

Imbierowicz & Rauch (2014) investigated the relationship between the two major sources of bank default risk: liquidity risk and credit risk. The results provided new approaching into the understanding of bank risk, as developed by the body of literatures on bank risk in general and credit and liquidity risk in particular.

They also served as the foundation for recent regulatory efforts aimed at strengthening banks risk management of liquidity and credit risks, such as the Basel III and Dodd-Frank frameworks.

Baral (2005) conducted the research on health check up of Nepalese joint venture commercial bank in the frame work of CAMEL taking the sample of three joint venture bank for the period of FY 2001/01 to FY 2003/04. The research found that financial health of the sampled banks was not so strong to manage the strong balance sheet shocks but average asset quality of the banks was satisfactory. Poudel (2012) appraised the impact of the credit risk management in bank's financial performance in Nepal using time series data from 2001 to 2011. The result of the study indicates that credit risk management is an important predictor of bank's financial performance.

Kattel (2015) investigated the credit risk identification techniques followed by commercial banks of Nepal. The result of the study indicates that the Nepalese bankers are aware of the importance of various techniques to effectively identify the risk level. Furthermore, the Nepalese commercial banks have used various techniques like interview, root cause effect, check list analysis, Strength, Weakness, Opportunity and Threat (SWOT) analysis, scenario analysis, expert judgment, simulation, stress testing etc. In addition, there was significant difference between all three categories of bank, namely State-Owned bank with Private Bank, State-Owned bank with Joint Venture Bank, and Joint Venture Bank with Private Bank in terms of tools and techniques used for credit risk identification.

Nepal has started preparations to implement the Basel-III framework for bank sector from 2014 in line with the global standard. The global financial crisis and the credit crunch that followed put credit risk management into the regulatory attention. As a result, regulators began to demand more transparency. They wanted to know that a bank has thorough knowledge of customers and their associated credit risk. And new Basel III regulations will create an even regulatory burden for banks.

III. Research Method And Materials

In order to find answers to the research questions useful different methods and instruments were used to collect data. The researcher has chosen the survey as the appropriate research design for the study, and as such, questionnaires were used as research instruments. A sample of 6 commercial banks randomly chosen was used in this analysis. Ten questionnaires were used to gather data with about two categories of banks like Private sector and Joint venture banks chosen. Descriptive statistics, ANOVA and regression used to analyze the data.

To ensure accuracy, internal consistency and completeness, reliability of the instrument was established using Cronbach's alpha coefficient test (Cronbach, 1946). The choice of this indicator was influenced by the simplicity and its prominence in banking risk literature. The higher generated score is more reliable. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient to measure the reliability but lower thresholds are sometimes used in the literature. In this case, the alpha (α) coefficients were 0.8, which is acceptable level.

IV. Result And Discuss

This section presents the findings obtained from the questionnaire survey. These results will be exposed in two sub sections: descriptive statistical analysis and regression analysis.

4.1 Descriptive Statistical Analysis

As shown in the given table, there was found difference of mean value of the credit risk measuring tools and techniques such as matrix method, internal judgment method, standard approach, causal model, VaR, linear probability and linear discriminate analysis (Altman Z score) in private sector banks and joint venture banks in Nepal. The result indicates that credit measuring tools and techniques are practicing differently during the credit assessment and analysis in the Nepalese commercial banks.

Table 1 Descriptive statistics of credit risk measuring techniques

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Matrix method	PSB	57	2	0	0	2	2
	JVB	72	1.22	0.419	0.049	1.12	1.32
	Total	129	1.57	0.498	0.044	1.48	1.65
Internal rating approach	PSB	57	1.49	0.504	0.067	1.36	1.63
	JVB	72	1.22	0.419	0.049	1.12	1.32
	Total	129	1.34	0.476	0.042	1.26	1.42
Standard approach	PSB	57	1.28	0.453	0.06	1.16	1.4
	JVB	72	1.06	0.231	0.027	1	1.11
	Total	129	1.16	0.363	0.032	1.09	1.22
Judgment model	PSB	57	2	0	0	2	2
	JVB	72	1.22	0.419	0.049	1.12	1.32
	Total	129	1.57	0.498	0.044	1.48	1.65
Causal model	PSB	57	2	0	0	2	2
	JVB	72	1.46	0.502	0.059	1.34	1.58
	Total	129	1.7	0.461	0.041	1.62	1.78
VaR	PSB	57	2.3	0.462	0.061	2.18	2.42
	JVB	72	1.51	0.605	0.071	1.37	1.66
	Total	129	1.86	0.67	0.059	1.74	1.98
Linear probability model	PSB	57	2.53	1.02	0.135	2.26	2.8
	JVB	72	1.24	0.428	0.05	1.14	1.34
	Total	129	1.81	0.985	0.087	1.63	1.98
Linear discriminate analysis	PSB	57	2.58	0.925	0.122	2.33	2.82
	JVB	72	1.68	0.582	0.069	1.55	1.81
	Total	129	2.08	0.863	0.076	1.93	2.23

Source: Survey data 2015, PSB = Public Sector Banks, JVB= Joint Venture Banks

The one way ANOVA has been used to see the any differences between private sector banks and joint venture banks in the usage of matrix method. It demonstrated the model was significant ($p<0.05$) with F value 196.4 at one degree of freedom. The ω^2 =0.602, indicates that approximately 60 percent of variance in the uses of matrix method is attributed to difference between the independents variables for matrix method. Similarly, there was significant differences ($p<0.05$) in the practice of internal rating approach between private and joint venture banks with F value 10.96 at one degree of freedom. The ω^2 =0.072, indicates that approximately 7 percent of variance in the employ of internal rating approach is ascribed.

The analysis of variance (ANOVA) of standard approach shows that F value is 13.4 at significant level ($p<0.05$) suggesting that there was a significant differences between two group of banks. The ω^2 =0.088, indicates that approximately 9 percent of variance in the utilized of standard approach is qualified to difference between the independent variables. Similarly, ANOVA of judgment method demonstrated that there was significant ($p<0.05$) differences with F value 196.4 at one degree of freedom. The ω^2 =0.602, indicates that approximately 60 percent of variance in the usage of judgment method is attributed.

Table 2 Analysis of variance

		Sum of Squares	df	Mean Square	F	Sig.
Matrix method	Between Groups	19.245	1	19.245	196.4	0
	Within Groups	12.444	127	0.098		
	Total	31.69	128			
Internal rating approach	Between Groups	2.302	1	2.302	10.96	0.001
	Within Groups	26.69	127	0.21		
	Total	28.992	128			
Standard approach	Between Groups	1.613	1	1.613	13.4	0
	Within Groups	15.287	127	0.12		
	Total	16.899	128			
Best judgment model	Between Groups	19.245	1	19.245	196.4	0
	Within Groups	12.444	127	0.098		
	Total	31.69	128			
Causal model	Between Groups	9.334	1	9.334	66.32	0
	Within Groups	17.875	127	0.141		
	Total	27.209	128			
VaR	Between Groups	19.572	1	19.572	65.56	0
	Within Groups	37.916	127	0.299		
	Total	57.488	128			
probability	Between Groups	52.958	1	52.958	94.47	0
	Within Groups	71.197	127	0.561		
	Total	124.16	128			
discriminate analysis	Between Groups	25.677	1	25.677	46.89	0
	Within Groups	69.548	127	0.548		
	Total	95.225	128			

The analysis of variance (ANOVA) of casual method shows that F value is 66.32 at significant level ($p<0.05$) symptomatic of significant differences between two group of banks. The ω^2 =0.336, indicates that approximately 34 percent of variance in the usage of causal method is practiced to difference between the banks. Similarly, ANOVA of VaR demonstrated that there was significant ($p<0.05$) differences with F value 65.56 at one degree of freedom. The ω^2 =0.334, indicates that approximately 33 percent of variance in the usage of judgment method is attributed.

The analysis of variance (ANOVA) of linear probability method demonstrated that the model was significant ($p<0.05$) with F value 94.47 at one degree of freedom. The ω^2 =0.420, indicates that approximately 42 percent of variance in the usage of linear probability method is attributed to difference between the two group of banks. ANOVA of linear discriminate method demonstrated that there was significant ($p<0.05$) differences with F value 46.49 at one degree of freedom. The ω^2 =0.262, indicates that approximately 26 percent of variance in the usage of linear discriminate method is qualified.

From the above statistical explanation, we conclude that there are significant differences between private and joint venture banks in the practices of risk measuring tools during the credit appraisal. Hence H_1 is accepted.

4.2 Regression Analysis

Table 3 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.603[a]	.364	.327	.366

A. Predictors: (Constant), Linear discriminate analysis (Altman's Z-score), Standard approach Linear probability model ,Causal model, Internal rating approach ,VaR , Best judgment model

In the model shows that when the independent and dependent variables interact, the model has been Pearson's correlation coefficients (R) is 0.603 and coefficient of determinates (R square) of 0.364, signifies positive and strong connection between two.

Table 4 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.276	7	1.325	9.881	.000[b]
	Residual	16.228	121	.134		
	Total	25.504	128			

a. Dependent Variable: Credit assessment and analysis

b. Predictors: (Constant), Linear discriminate analysis (Altman's Z-score), Standard approach , Linear probability model, Causal model, Internal rating approach, VaR (value at risk), Best judgment model

The analysis of variance (ANOVA) shows that F value is 9.981 at .00 significant level ($p<0.05$) suggesting that the relationship credit assessment and its explanatory variables is positive. Hence, H_2 is accepted.

While going through the every variable given in the above table, it was found out that standard approach and value at risk were not significant in the model. Similarly, matrix method is excluded from the model due to the absence of homogeneity.

Internal rating approach, best judgment model, the causal model, linear probability and linear discriminate analysis (Altman Z- score) were found significant variables during the analysis.

Table 5 Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.99	0.154		6.431	0
Internal rating approach	1.001	0.181	1.067	5.52	0
Standard approach	0.003	0.12	0.002	0.022	0.983
Best judgment model	-0.717	0.207	-0.799	-3.463	0.001
Causal model	-0.548	0.146	-0.566	-3.747	0
VaR (value at risk)	0.099	0.099	0.149	1.004	0.317
Linear probability model	0.208	0.071	0.458	2.931	0.004
Linear discriminate analysis	0.207	0.053	0.4	3.879	0

a. Dependent Variable: *credit assessment and analysis*

Internal rating approach is variable that makes the significant contribution to explaining the risk level when other remaining variables are controlled for with Beta coefficient of 1.067. Internal rating approach plays an important role to measure the credit risk. Similarly, significant contribution also found to make by linear probability model with the beta coefficient of 0.456, and linear discriminate analysis with the beta value of 0.400, while keeping all other variables constant.

More important, the best judgment model was the variable with beta coefficient (-0.799) and causal model with beta coefficient (-0.566) were found significant predictor for credit risk measurement.

V. Conclusion

It is important to evaluate the credit risk level of the every borrower as well as portfolio level of the banks. The variety of the credit risk measurement tools and techniques exist in the literature. The most common techniques are matrix method, internal rating approach, standard approach, best judgment model, the causal model, value at risk, linear probability model and linear discriminate model are grouped and discuss in this paper. These tools are differently used by the banks on the basis of credit culture and the credit philosophy. Hence, the practice of risk management was significantly different in private sector banks and joint venture banks in Nepal.

In the credit assessment processes, the banks will determine any deceitful activities on the part of the borrower to know the risk level. The bank is always trying to improve their credit risk measuring tools and techniques in their credit policy for the quality of lending and various measures are undertaken to follow the effective credit management system. This requires adequate training to the employees to enhance the skills. More risk analyst may be recruited improve the quality of the credit exposure.

In this research, the statistical result obtained through primary data analysis is not corroborated using the secondary data. This may be the potential area for future researcher in banking literature.

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