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Risk-Based Capital, Human Capital and Risk of Indian Banks: Combining Insight from Panel Data Regression and Quantile Regression

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Abstract

Management of risk has emerged as one of the core banking activities all over the world because of the banking crisis observed in different countries. This paper has tried to address the influence of risk-based capital (CAR) and human capital on the risk of Indian listed commercial banks. The relevant secondary data on 39 listed commercial banks for a period of 15 years from 1999 – 2013 are collected from 'Capitaline Plus' corporate data database, Central Statistical Organization, RBI database and Economic Survey. Employing appropriate panel data regression and quantile regression the results indicate that both CAR and human capital efficiency (HCE) are negatively associated with bank risk. Further, the influence of other explanatory variables (relational capital, bank size and growth of GDP) on bank risk is also negative. However, the study finds that panel data regression model is inadequate to explore the true picture of the influence of CAR and HCE on the bank risk. The outcome of quantile regression model indicates that the negative influence of HCE is insignificant at upper tails of the distribution of bank risk. In contrary, the negative influence of CAR is more pronounced at upper tails of the distribution of bank risk.

Keywords: *Risk-Based Capital, Human Capital, Panel Data Regression, Quantile Regression, Indian Banks*

1. Introduction

Management of risk has emerged as one of the core banking activities all over the world because of the banking crisis observed in different countries. As a response to the devastating consequences of the several financial crises, considerable effort has been devoted to set down remedies with the aim of preventing possible reiteration. An important step recommended by the Basel Committee on Banking Supervision in 1988, known as Basel I, to build a resilient banking system is the introduction of risk-based capital standard (Rime, 2001; Pennacchi, 2005).The recommendation of the Basel Committee of maintaining minimum risk-based capital as per the Basel norms has been adopted by a large number of countries including India and subsequently risk-based capital or capital adequacy ratio (CAR) has emerged as important benchmark for judging the financial soundness of banks (Maji and De, 2015).But the preservation of adequate capital to protect banks from vulnerability is a debatable issue in the extant literature since empirically the researchers have observed contradictory results. While some researchers have found the negative association between bank capital and risk (Berger and De Young, 1997; Jacques and Nigro, 1997; Agorakiet al., 2011; Maji and De, 2015), others have argued that

risk-based capital standard fails to promote bank stability (Bichseland Blum, 2004; Altunbaset al., 2007; Biekpeand Floquet, 2008). Given the scenario, some research questions emerge: Does increase in capital requirements encourage banks to reduce risk or to undertake more risk? Further, does a uniform risk-based capital standard competent enough to protect all banks from failure or need to specify different capital standard based on the risk profile of banks?

Although the preservation of risk-based capital as per the guidelines of Basel Committee on Banking Supervision is considered as an important yardstick for measuring the financial stability of banks, the success of bank, like any service sector, mainly depends upon the efficient utilization of intangible resources rather than physical and financial resources. Plethora of empirical evidences has shed light on the dominant role of intangibles or intellectual capital for enhancing the financial soundness of banks (Mavridis and Kyrmizoglou, 2005; Mohiuddinet al., 2006; Liu, 2009; Malik et al., 2012; Ghosh and Maji, 2015). However, the role of intangibles in the management of bank risk has seldom been put under empirical testing. Human capital, the heart of creating intellectual capital (Chan et al., 2005), that represents the skill, experience, talent and effectiveness of employees for boosting firm performance (Edvinsson and Malone, 1997; Bontis, 1998) plays crucial role in the process of credit risk management. Credit risk analysis consists of estimating the probability of default of the borrower and the expected loss of banks in case of default. Thus, the success of lending activities of bank mainly depends upon the correct assessment and interpretation of many internal and external factors from the loan origination phase to the servicing of accounts phase. Since all these activities are performed by the bank employees, theirprofessional experience, imaginative mind, knowledge about the credit market and professional ethics are essential for proper identification of any possible threats and responding to them in a suitable way throughout the duration of the loan agreement.

The role of human capital is also indispensible in case of project finance. Financing for large-scale infrastructure projects involve longer period of maturity along with social and environmental issues, which are very complex and challenging specifically with respect to projects in the emerging markets. In project finance, therefore, matching the time profile of debt service and project revenue cash flows considering the social and environmental factors requires high degree of skill and imaginative mind of the employees.The growing importance of human capital in managing risk in a complex environment along with lack of empirical evidence in the extant literature offers an appropriate platform to raise several questions: what is the role of human capital in managing bank risk? Further, working in a similar environment some banks perform significantly better than others (out-performing banks) or performance of some banks is comparatively very poor (non-performing banks) in the matter of managing bank risk. Thus, if the distribution of bank risk is far away from symmetry, what is the role of human capital in such a skewed distribution of bank risk?

To address the above research questions, present effort intends to empirically investigate the role of regulatory capital and human capital on the credit risk of Indian commercial banks. Selection of Indian banks for the present context is of interest for several reasons. First, the association between bank capital and risk has received less attention in emerging economics as compared to United States and Europe (Godlewski, 2005; Maji and De, 2015). In Indian context the empirical evidence relating to the association between bank capital and risk is limited particularly during Basel II and Basel III periods. Second, in the post-reform period, the RBI, also the Central Government has taken several steps to reduce the non-recovery of loans and advances and to improve financial soundness of Indian banks. Further, the regulatory pressure

in terms of maintaining minimum CAR is higher for Indian banks as compared to the international standard. Third, a study conducted by National Skill Development Corporation of India clearly points out the role of human resources in developing well defined credit evaluation policies, managing the credit quality through adequate knowledge and focusing strongly on recovery and collection efforts as the key success factors for banking and financial institutions. The empirical evidence is, however, scanty. Finally, the structure of Indian commercial banks encompassing public sector and private sector (including new and old) provides an appropriate platform for investigating the impact of risk-based capital and human capital at different locations of the conditional distribution of bank risk.

The paper is organized as follows. Section 2 presents the review of relevant literature and the development of hypothesis. Section 3 is devoted the data and methodology adopted in this study. Section 4 describes the results and discussion follows by concluding remarks in section 5.

2. Literature Review and Hypothesis Development

Risk-based capitalaccording to the Basel accord is implemented by different countries with the broad objectives of promoting the soundness and stability of the banking system. The rationale for preserving adequate capital is that it is an indicator of sufficient financial resources at the banks' disposal to provide adequate protection against unexpected losses and declines in the value of assets. Banks' with higher capitalization can use their capital as safety margin against unforeseen losses. Thus, the higher the bank capital the higher is the solvency of a bank or lower is the bank risk. This is consistent with the 'Moral Hazard Hypothesis',which states that smaller capitalized banks assume higherrisk (Berger and De Young, 1997). The option-pricing model also states that unregulated environment stimulates banks' to undertake more risk for enhancing the return to the shareholders (Benstonet al., 1986; Keeleyand Furlong, 1990). Empirically some researchers have observed the negative association between bank capital and risk. For instance, Jacques and Nigro (1997) employing simultaneous equation model developed by Shrieves and Dahl (1992) have found that bank capital and risk are negatively associated in the context of US banking sector. Similarly, the findings of Godlewski (2005) in emerging markets indicate that the regulatory capital plays a crucial role for promoting the soundness and stability in the banking system. Considering a large sample from Europe, Altunbas et al. (2007) have empirically found that inefficient European banks hold more capital and undertake less risk. However, in recent times Jokipii and Milne (2010)have observed interesting results where capital and bank risk are positively associated for highly capitalized bank in contrast to negative relationship for low capitalized banks. In Indian context, Nachaneet al. (2003), Das and Ghosh (2004) and Maji and De (2015) have also observed negative association between regulatory capital and bank risk.

On the other hand, the mean-variance framework provides opposite view regarding the association between regulatory capital and risk of banks. Mean-variance framework states that regulatory pressure force banks to undertake more risk in order to increase return. Employing mean-variance framework Kim and Santomero (1988) and Rochet (1992) have found positive association between bank capital and risk. Empirically some researchers have also observed the positive association between bank capital and risk. In the context of US banks sector Shrieves and Dahl (1992) have found that bank capital and risk are positively associated. According to Blum (1999) higher capital levels may encourage banks to increase asset portfolio risk, which in turn increases the probability of default. Empirically Bichsel and Blum (2002) have observed

positive correlation between changes in capital and risk in Swiss commercial banks. Similarly Athanasoglou (2011) have alsofound positive association between ban regulatory capital and risk in South-Eastern European (SEE) banks after the financial crisis of 2008. In case of 44 emerging markets Biekpe and Floquet (2008)have concluded that the association between capital and risk is expected to be positive in the long run. However, some researchers have observed that there is no significant association between bank capital and risk (Rime, 2001; Van Roy, 2008).

The extant literature, thus, indicates that the association between risk-based capital (CAR) and bank risk is a debatable issue. While the positive association is more pronounced in developed economics, researchers have observed negative association in many cases of emerging economics. Based on the literature on emerging economics, the following hypothesis is formulated for empirical testing:

H1: The association between CAR and bank risk is negative.

On the other hand, there is a vast literature relating to the influence of intellectual capital (IC) encompassing human capital and structural capital on the performance of firms in knowledge based sectors. However, we cannot hope to do justice to the vast literature on this subject, we briefly mention some important findings in case of banking sector. Plethora of empirical evidences indicates that intellectual capital(IC) or more specifically the human capital plays a significant role for enhancing bank performance in different countries. For instance,Mohiuddinet al. (2006) for banks in Bangladesh, Liu (2009) in case of Chinese banking sector and Ghosh and Maji (2015) for banks in India have observed significant positive influence of IC and human capital efficiency (HCE) on financial performance.

Many researchers have suggested that financial indicators according to the traditional accounting system are not sufficient to access the credit risk of banks.Guimn (2005) suggests that IC informationis very essential for credit decisionsince the relative competitive advantages of the firm can be accessed from the possession of intangible resources. According to Alwertet al. (2009) financial data is not sufficient to assess risk because of the importance of intangibles in the knowledge economic environment.Iazzolinoet al. (2013) have also argued in a similar vein that inclusion of IC variables along with financial indicators may provide better results relating to credit risk assessment.Although researches in intellectual capital have been carried out to better understand the impact that IC has on the credit risk assessment, the empirical investigation of the inclusion of IC variables in the model is very limited. Guimn (2005) have observed significant gap between the requirement of IC information for credit risk analysis and actual information provided in the reports. Employing case studies some barriers have been identified in the IC reports. However, empirically Maji and De (2015) have found significant negative influence of human capital on the credit risk of Indian banks. On the other hand, Ghosh and Maji (2014) have found significant negative influence of IC on bank risk, but fail to disentangle significant influence of IC on bank insolvency risk. Given the importance of human resources in the matter of banks' credit activities, the following hypothesis is developed for investigation:

H2: Human capital efficiency (HCE) is negatively associated with bank risk.

The above mentioned empirical studies are, however, focused mainly on the financial variables. Apart from the importance of human capital, the relation with the customers is also very vital for banks for reducing the overdue and consequently for obtaining long-term competitive advantage. Hence relational capital may be very crucial for risk management of banks. Another hypothesis of this study is:

H3: Relational capital is negatively associated with bank risk.

From the extant literature it is also evident that some Indian banks performed well in the matter of managing risks, while the non-performing assets (NPAs) of some banks were very high during the lase decade (Maji and De, 2015). If the distribution of the bank risk is skewed, the classical linear regression model may provide biased result. Further, given the creation and application of knowledge as the engine of organizational performance and growth, practically, the capacity and efficiency of all banks in utilizing human resources for managing risk cannot be the same. Hence, it is legitimate to expect that the behavior of HCE at different locations of the distribution of bank risk firm would be different.Again, the contradictory results of the association between CAR and bank risk motivate us to anticipate that a uniform risk-based capital standard is not equally effective for all banks for managing risk over the years. Hence, the classical mean regression is inadequate to provide a complete picture of the relationship and a set of quantile regression model (Koenker and Bassett, 1978) is required to get a complete picture. Thus, the last hypothesis of this study is:

H4:The impact of HCE and CAR at different quantiles of the conditional distribution of bank risk is different and thus a set of quantile regression models is necessary to adequately explain the influence of HCE and CAR on bank risk.

3. Data and Methodology

3.1. Data and Sample

The present study is based on secondary data on Indian listed commercial banks collected from 'Capitaline Plus' corporate data database, Central Statistical Organization, RBI database and Economic Survey. Based on the mid-term review of Monetary and Credit Policy during 1998-99, the RBI has raised the risk based capital ratio from international standard of 8 per cent to 9 per cent in India. Hence, the relevant secondary data are collected for a period of 15 years from end march 1999 -2013. After excluding two listed banks due to non-availability of data for the entire period, the final sample consists of 39 banks out of which 24 are public sector banks and 15 are Indian private sector banks.

3.2. Measurement of Variables

Bank Risk (RISK): Extant literature suggests a number of alternatives to measure bank risk; however, all the measures have some limitations (Rime, 2001). A more popular measure of bank risk is the ratio of net non-performing advances to net advances (NNPA). In some cases gross NPAs as a percentage of gross advances (GNPA) is also used to measure the bank risk. These measures capture the credit risk of the banks. Credit risk is the oldest of all banks risks and the combined outcome of default risk and exposure risk (Maji and De, 2015).Both the measures of credit risk are used in this study.

Risk-based Capital (CAR): As per the Basel norms, banks are required to maintain two types of capital – Tier 1 and Tier 2 capital in order to protect depositors and shareholders against unexpected losses. CAR is defines in this study as per the regulation. Thus,

$$CAR = \left(\frac{Tier\ 1\ capital + Tier\ 2\ capital}{Risk - weighted\ assets}\right) \times 100$$

Human Capital Efficiency (HCE): Pulic's value added intellectual capital model (2000) is widely used in the existing literature to measure IC and the components of IC (human

capital efficiency and structural capital efficiency). Following the VAIC model, HCE is defined as:

HCE = VA/HC ....(i), where VA is the difference between output (total revenue generated by a firm during a year) and input (summation of all costs incurred by a firm in generating revenue except employee costs which are treated as value creating entity). Algebraically VA can be expresses as:

VA = NI + T + I + D + A + EC ....(ii), Where, NI is net income after tax; T is corporate tax; I is interest expense; D is depreciation; A is amortization and EC is the employee costs.

Human capital (HC) is defined as the overall employee cost during a period.

Relational Capital (RC):In the literature of IC, marketing cost (advertising and publicity) is used as proxy to measure relation with the customers (Nazari and Herremans, 2007). Thus, RC is defined as the ratio of advertising and publicity cost to total income.

Two control variables are also used in this study. Bank size (LnB) is measured by the natural log of total business (summation of deposit and advances). On the other hand, one macroeconomic variable i.e. growth of GDP is also used as control variable.

3.3. Empirical Models

Panel Data Regression Model

Plethora of empirical studies indicates that banks in USA and Europe simultaneously determine the capital and risk decision (Maji and De, 2015). However, using the simultaneous equation model developed by Shrieves and Dahl (1992) most of the researchers have found poor explanatory power of the model. In this study we are assuming that risk is endogenous variable while regulatory capital is exogenous. The study, thus, employs appropriate regression model in a panel data set up. Appropriate panel data regression model is identified with the help of Breusch-Pagan test and Hausman test (test results are shown in table 2). The test results indicate in favour of fixed effects regression model. The following fixed effects regression model is employed in this study:

$$NNPA_{it} = \beta_{1i} + \beta_2 CAR_{it} + \beta_3 HCE_{it} + \beta_4 RC_{it} + \beta_4 LnB_{it} + \beta_5 GGDP_{it} + \varepsilon_{it} \quad ...(Model\ 1)$$

$$GNPA_{it} = \beta_{1i} + \beta_2 CAR_{it} + \beta_3 HCE_{it} + \beta_4 RC_{it} + \beta_4 LnB_{it} + \beta_5 GGDP_{it} + \varepsilon_{it} \quad ...(Model\ 2)$$

Where, $\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$ *and* $\beta_{1i} = \beta_1 + \mu_i$ *(heterogeneity effect)*

Quantile Regression Model

Assuming that the conditional quantile function is linear and unique, a linear quantile regression specifies the conditional -quantile of Yi as a linear function of regressors . According to Buchinsky (1998) the quantile regression can be written as:

$$Y_i = X_i'\beta_\theta + \varepsilon_{\theta i} \quad ...(iii)$$

$$quant_\theta\left(Y_i/X_i\right) = X_i'\beta_\theta \quad ...(iv)$$

For a sample i = 1, 2, …, N, the model is expressed as

$$Y_i = \beta_{\theta,0} + \beta_{\theta,1}X_{1i} + \cdots + \beta_{\theta,k}X_{ki} + \epsilon_i^{\theta} \quad \ldots(v)$$

where X_{ji} is the i^{th} observation for regressor j = 1, …, k; $Q_{\theta}(\epsilon_i^{\theta}|x_i) = 0$. is the coefficient estimate for quantile regression, where $0 < \theta < 1$

For a given quantile θ , β is estimated by solving the following minimization problem:

$$min_{\beta}\frac{1}{n}\left\{\sum_{i:Y_i \geq X_i'\beta} \theta|Y_i - X_i'\beta| + \sum_{i:Y_i < X_i'\beta} (1-\theta)|Y_i - X_i'\beta|\right\} \quad \ldots.(vi)$$

Based on the general model of quantile regression, our quantile regression in this study is

$$quant_{\theta}\left(RISK_{it}/HCE_{it}, CAR_{it}\right) = \beta_{\theta,0} + \beta_{\theta,1}HCE_{it} + \beta_{\theta,2}CAR_{it} + \epsilon_{it}^{\theta} \quad \ldots.(model\ 3)$$

4. Results and Discussion

4.1. Descriptive Statistics

Univariate descriptive and robust statistics of the variables are shown in table 1. Near equality of the values of mean, 5% trimmed mean and median indicate that the distribution of the variable is symmetric, otherwise skewed. A look into the table reveals that except LnB and GGDP distribution of all the variables are far away from symmetry. For instance, in case of GNPA mean (6.133) and median (3.805) values are considerably different and the distribution of the variable is positively skewed (skewness is 2.263). Similar results are found in case of NNPA. Among the independent variables, the distribution of HCE and RC are highly skewed (positive). This implies that the HCE and RC of some banks are considerably better than other banks. Nonetheless, the mean values of GNPA and NNPA indicate that the average credit risk of Indian banks is still very high as compared to the international standard.

Table 1: Descriptive statistics

Variable	*Mean*	*5% Trimmed Mean*	*Median*	*Skewness*
HCE	7.885	7.152	6.760	4.121
CAR	12.489	12.276	12.095	2.022
GNPA	6.133	5.571	3.805	2.263
NNPA	3.130	2.793	1.725	1.570
LnB	10.716	10.731	10.720	-0.117
RC	0.349	0.289	0.225	4.668
GGDP	7.314	7.379	7.510	-.531

4.2. Results of Panel Data Regression

Fixed effects regression results of model 1 and 2 are presented in table 2. The coefficient estimates of CAR for both the models are negative and significant at 1% level. This implies

that regulatory capital promotes bank stability in India. This is consistent with the 'Moral Hazard Hypothesis'(Berger and De Young, 1997) and the option-pricing model (Benstonet al., 1986; Keeleyand Furlong, 1990). The result is also consistent with the findings of earlier researchers in emerging markets (Lindguist, 2004; Das and Ghosh, 2004; Maji and De, 2015). The estimated coefficient of HCE is also negative and significant for both the models. This indicates that human capital plays important role in managing bank risk. By utilizing the efficiency of human resources a bank can reduce its credit risk. Similarly, the observed association between RC and bank risk (both NNPA and GNPA) is found to be negative and significant. The implication of this negative association is that by maintaining healthy relation with the customers bank can reduce the default and enhance the stability. Human capital and relational capital are two vital components of IC for banks. The observed results clearly demonstrate that intangible resources are the crux of enhancing bank stability in the knowledge economic environment.

The two control variables namely, bank size (LnB) and GDP growth (GGDP) are also inversely associated with bank risk. The negative association between size and bank risk implies that large banks have better opportunity to diversify risk and reduce the probability of default by employing corrective actions due to sufficient financial resources. On the other hand, the growth in GDP indicates the healthy economic environment and the increase in income of the customers enhances the ability to repay the loan obligations timely. The observed adj. R2 and significant F-statistic for both the models advocate in favour of the goodness of fit of the models employed for this purpose.

Table 2: Results of Fixed Effects Regression Model

Variable	*Model 1: Dependent variable NNPA*			*Model 2: Dependent variable GNPA*		
	Coefficient	*Adj. R2*	*F-statistic*	*Coefficient*	*Adj. R2*	*F-statistic*
Constant	32.845***			57.170***		
	(24.501)			(23.682)		
CAR	-0.298***			-0.429***		
	(-6.507)			(-5.199)		
HCE	-0.093***			-0.281***		
	(-3.683)			(-6.173)		
RC	-1.776***	0.613	20.946***	(-16.024)	0.586	18.793***
	(-5.503)			-2.627***		
LnB	-2.008***			-3.529***		
	(-16.419)			(-4.518)		
GGDP	-0.426***			(-4.518)		
	(-7.670)			(-6.461)		

Notes: Panel data test results:

For model 1: Breusch-Pagan test - Chi-square = 58.669***; Hausman test - Chi-square = 76.272***

For model 2: Breusch-Pagan test - Chi-square = 69.776***; Hausman test - Chi-square = 85.685***

t-statistics are shown in parenthesis; *** indicate significant at 1 percent level by two-tailed test.

Robustness Check

The Gaussian linear regression model is a widely used tool for obtaining the association between the dependent variable and a set of regressors based on the conditional mean function. However, this method may provide biased view of the relationship if the distribution of residuals is skewed. The results of the descriptive statistics shown in table 3 depict the skewed distribution of the response variables. The histogram of the NNPA (shown in fig. 1) also exhibits the positive skewness of the variable. To test the normality of residuals we have used the quantile-quantile (Q-Q) plot of the residuals. The Q-Q plot shown in fig. 2 also exhibits the existence of outliers at both the rights the tails of the distribution. Thus, we suspect the outcome of the results of fixed effects regression model. For robustness check, the present study has employed median regression, known as least absolute deviation (LAD) regression. Many renowned academicians have suggested that "the minimization of absolute deviations might be preferable to least squares when some sample observations are of dubious reliability" (Koenker and Bassett, 1978, p.35). The results of the LAD are shown in table 3. The estimated coefficients of all the explanatory and control variables are negative and significant. The results of LAD, thus, support the results of fixed effects regression model. Therefore, the results of fixed effects regression model are tenable and the findings support the hypotheses H1, H2 and H3.

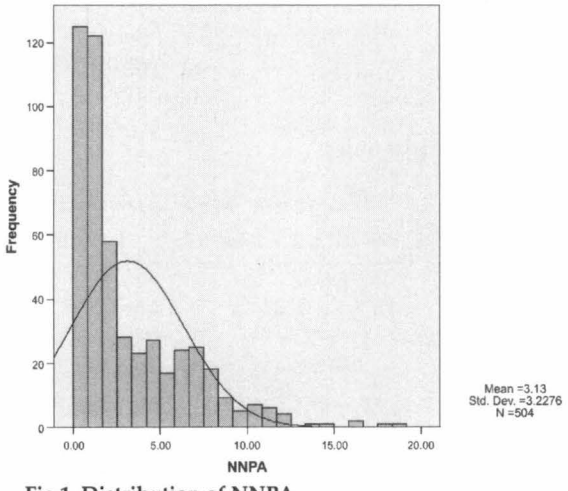

Fig.1. Distribution of NNPA

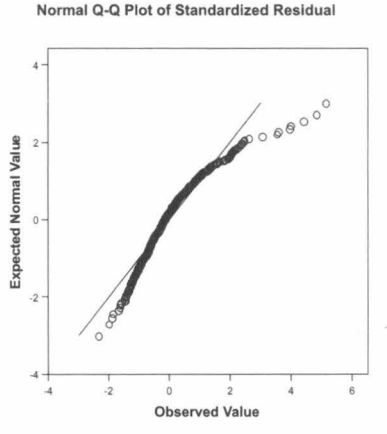

Fig. 2. Q-Q plot of Residuals of model 1

Table 3: Robust Estimation of Model 1 Using LAD Method

Variable	*Coefficient*	*t-statisti*	*p-value*
Constant	19.505	14.474	0.000
CAR	-0.326	-6.925	0.000
HCE	-0.077	-1.917	0.055
LnB	-0.658	-6.521	0.000
RC	-0.669	-2.038	0.042
GGDP	-0.665	-10.491	0.000
Median dependent var	1.725000	S.D. dependent var	3.227602
Sum absolute resid.	819.6775	Sum squared resid.	2923.893
Log-likelihood	-1098.459	Akaike criterion	2208.918
Schwarz criterion	2234.253	Hannan-Quinn	2218.856

4.3. Results of Quantile Regression

The results of quantile regression are shown in table 4. Quantile regression is employed to examine whether the influence of HCE and CAR on bank risk are homogeneous at different quantiles of bank risk. Simultaneous quantile regression model at seven interesting qunatiles (= 0.10, 0.15, 0.20, 0.50, 0.80, 0.85, 0.90 and 0.95) of the distribution of bank risk is employed and the results depict some interesting picture. The estimated coefficient of HCE is negative for all quantiles but not significant at upper quantiles ( ). Alternatively, HCE is negatively and significantly associated with bank risk at lower quantiles. The results demonstrate that HCE can significantly reduce the bank risk, or in other words, the banks can reduce its credit risk considerably by utilizing the human resources efficiently. On the other hand, the coefficient of CAR is negative and significant at all quantiles except one (= 0.10). However, the precision of the estimate increases when the quantile increases. This indicates that risk-based capital is not equally effective at all locations of the distribution of bank risk. Risk-based capital standard is found to be more effective at higher levels of bank risk. The observed results, thus, indicate that the influence of HCE and CAR are different at different locations of the conditional distribution of bank risk. The panel data regression model fails to capture this issue and hence a simultaneous quantile regression model is required. The results, thus, support the hypothesis H4.

Table 4: Results of Simultaneous Quantile Regression Model

Quantile	*Variable*	*Coefficient*	*t-statistic*	*Pseudo R2*
0.10	HCE	-0.120***	-9.47	
	CAR	-0.192	-1.63	0.123
	Constant	5.514***	3.55	
0.15	HCE	-0.107***	-6.59	
	CAR	-0.192*	-1.87	0.131
	Constant	5.103	3.70	
0.20	HCE	-0.181***	-4.61	
	CAR	-0.285**	-2.47	0.133
	Constant	9.535	6.06	
0.50	HCE	-0.077***	-3.58	
	CAR	-0.145**	-1.96	0.151
	Constant	3.944	3.72	
0.80	HCE	-0.112*	-1.81	
	CAR	-0.337**	-2.50	0.122
	Constant	12.160***	7.24	
0.85	HCE	-0.054	-0.92	
	CAR	-0.473***	-3.69	0.125
	Constant	13.916***	9.42	
0.90	HCE	-0.060	-0.83	
	CAR	-0.466***	-3.65	0.138
	Constant	15.159***	10.00	

0.95	HCE	-0.070	-0.69	
	CAR	-0.532***	-3.06	0.139
	Constant	17.357***	8.69	

Notes: Dependent variable is NNPA; ***,** and * indicates significant at 1%, 5% and 10% level respectively.

5. Concluding Remarks

By using data from listed Indian commercial banks this study tries to explore the role of regulatory capital and human capital in influencing the credit risk. The results of panel data regression model indicate that both CAR and HCE are negatively associated with bank risk. Further, the relational capital is also negatively and significantly associated with bank risk. The influence of both the control variables- bank size and growth in GDP is also negative and significant. The outcomes of the robust regression model (LAD) also demonstrate the results of fixed effects regression model. The results, thus, support the hypotheses H1, H2 and H3.

Nevertheless, the results of simultaneous quantile model reveal that the panel data regression model provides only a partial view of the relationship. The outcome of the quantile regression model depicts that HCE influences negatively the bank risk but the results are not significant at upper quantiles. In contrary, the negative influence of CAR is more at upper quantiles as compared to lower quantiles. The results of the study would help policy or decision makers in several ways. First, by utilizing the human resources judiciously banks can reduce the credit risk significantly. Second, the regulatory capital helps to enhance bank stability in India, but the CAR is not equally effective for all banks over the years. Risk-based capital standard is an effective tool for banks with high risk. Third, the financial variables are not sufficient to explain the bank risk. The role of intangible resources (human capital and relational capital) for reducing bank risk should be considered sincerely. This is consistent with the observations of Guimon et al., (2005) and Alwert et al. (2009).

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