



# INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ECONOMICS & MANAGEMENT SCIENCES



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To Link this Article: <http://dx.doi.org/10.6007/IJAREMS/v7-i3/4518> DOI: 10.6007/IJAREMS/v7-i3/4518

**Received:** 29 May 2018, **Revised:** 19 June 2018, **Accepted:** 03 July 2018

**Published Online:** 11 July 2018

**In-Text Citation:** (Irama, Abbasb, Nomanb, & Fatima, 2018)

**To Cite this Article:** Irama, R., Abbasb, Q., Nomanb, M., & Fatima, A. (2018). Impact of loan Securitization on the Soundness of Banks in Pakistan. *International Journal of Academic Research in Economics and Management Sciences*, 7(3), 185–197.

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Vol. 7, No. 3, July 2018, Pg. 185 - 197

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www.hrmars.com

ISSN: 2226-3624

## Impact of loan Securitization on the Soundness of Banks in Pakistan

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### Abstract

The worldwide financial crisis considered as a most severe economic outcomes and several huge financial organizations were on the threshold of disintegrate as a consequence of unnecessary disclosure to securitized assets. New sources of financing seems and the liquidity effect of securitization are clear in cash transactions. The research objectives contains distinctive research questions containing the critical assessment of the loan securitization, assessment of bank soundness and the empirical assessment of the impact of the loan securitization on bank soundness in Pakistan. Results shows that the overall value of the log likelihood for this model is -61.27 which shows a good fit of the model for our analysis. The smaller value of log likelihood justifies the reliability and better adoptability of the model. The coefficient of the independent variable indicates the average variation of logit with one-unit change of each independent variable. The positive or negative of the coefficient indicates the positive or negative effects of independent variables on the dependent variable. For example, the coefficient of liquid assets /total assets is 0.0148991 is greater than 0, which means liquid assets /total assets has a positive effect on securitization. The securitization's impact on bank soundness shows actually how much credit risk is being transfer to external investors so the basic aim of this work is to empirically investigation of securitization and credit risk. The study provides a valuable information to policy an decision makers.

**Keywords:** Loan securitization, Logistic Regression, Bank Soundness, Pakistan

### Introduction

To measure the securitization impact on bank soundless provides a valuable insights for policy making and decision making because financial crisis, the securitization played a prominent

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role, close down the payment of new securitization programs during the beginning of 2008 and during second half of 2007 (Giordani, 2015). However, the financial entities imperative need for liquidity motivated a rapid change 2008, and the volume issued continuously increased even up to 60% with passage of time (Timmer et al., 2013). During last decade, developed countries like Spain and UK have recognized a most productive securitized banking assets while during 1992 to 1998 it was an off balance sheet system and all assets were permitted with or without a mortgage guarantee. In spite of the noteworthy extension of the market, but still few empirical works focus on the particular characteristics of banks doing the securitization even though these specific characteristics were unclear till few years ago. recently securitization yielded a more safe and secure environment for banks and it yielded a financial stability in the banking system. Existing literature previous shows three major groups of motivation in securitizations (Ritwik and Joydeb, 2016).

Loan securitization is a financial procedure adopted by banks in which a bank transform its illiquid assets into standardized, homogeneous, suitable and liquid assets in order to sale to the third parties. Securitization have several characteristics such as it decrease asymmetrical flows in payments, transformation of the fundamental cash flows into continuous stable payments and conversion of illiquid assets into marketable securities to inaccessible bankruptcy and rights into the instrument (lu Bushev et al., 2005). Loan securitization has several advantageous such as securitization enables the banks to well manage their risk exposure. Securitization enables the banks to transfer the credit risk exposure and opted a strategy of diversify their funds. Such as if a banks have a comparatively higher degree of risky loans at its balance sheets which may decide to securitize in order to decrease their credit risk. Surely, the amount of credit risk which may bank can decrease its credit risk can differ. The research objectives contains typical research questions including, Critical assessment of the loan securitization ?assessment of bank soundness? Empirical assessment of the impact of the loan securitization on bank soundness in Pakistan. The critical assessment done by using a comprehensive set of variables such as the return on equity, return on asset, owner equity ratio and non performing loan as in independent variables while the loan securitization as dependent variable while these ratios has been evaluated to overview of the bank soundness.

Preciously published studies ignore the detailed analysis of securitization and banks soundness while as per best of authors' knowledge none of them conducted a related issues in Pakistan. Our study empirically measured the impact of loan securitization on the soundness of banks in Pakistan by using sample of 10 Pakistani banks. We have employed quantities analysis by using panel data from 2007 to 2015. Our study contributes by several ways as, we have conducted first time a quantitative investigation of loan securitization in Pakistan in order to ensure the bank soundness in Pakistan. We have used logit regression model and various ratios to conduct the analysis. Second, previously published studies used capital ratios but unlike others we have added several other variables such return on equity, return assets, owner equity and nonperforming loan as an independent variables to the relationship between measure loan securitization and bank soundness in Pakistan. We have added several new variable in the quantitative framework to measure to securitize the loan. Third, our study provides a detailed a brighter light between the loan securitization and return on equity, return assets, owner equity and nonperforming loan. More importantly we have studied and contributed a detailed literature in this line of research. Study provides a valuable information for various stakeholders such as

policy and decision makers, investors and board for governors. Rest of the paper is organized as follows section 2 contain literature review, section 3 explain data and methodology, section 4 explain results and discussions while section 5 concludes.

### **Literature Review**

The literature dealing with securitization to securitize bank loans, recommends four main determinants of the decision, the role of capital, the transfer of credit riskiness, the need for new sources of funding and the search for new profit opportunities. The first purpose of securitize is to linked liquidity and funding requirements. In order to fund assets banks may sell their loans without trying to attract more retail deposits, owing to their cost or shortage (Bardhan and Mukherjee, 2013). Furthermore, instead of raising deposits banks may securitize loans because they compete with commercial papers, if these are preferred by investors in order to attract long. The empirical literature analyses the effects of securitization instead of determinants of securitizations. It offers evidence that the option of transferring credit risk reduced in the USA, the incentives of banks to screen, monitor loans and lowered lending standards (Clark et al., 2017). The loan securitization reduces the importance of the bank lending channel due to the transmission mechanisms of monetary policy highlights. Actually the bank size is less important, as it reduce the amount of loans on the balance sheet.

The Bank liquidity come to be less perturbing because of the short term inflows of loan sales, also the capitalization of bank matter less because the credit risk reduces capital requirements and permits an increase of lending supply (Irani and Meisenzahl, 2017). This strand of research is satisfactory to infer three out of the four determinants of the decision to securitize term funds . It is significant to remind that the funding source provided by securitization has the advantage of not being subject to deposit insurance and reserve requirements (DeYoung et al., 2018). Risk expose is the second determinant as known loan securitization signifies one of the main mechanisms for transferring credit risk. Hence for thin order to reduce the burden on their balance sheets the banks with a higher share of risky loans may securitize more or to reduce the related expected losses (Laidroo, 2016).

To demonstrate, it is possible to list as a minimum five not mutually exclusive cases, wherein bank capital can affect securitization finance. First to adapt to mandatory capital adequacy ratios low-capitalized banks might securitize their loans, while adaptation to governing lowest requirements seems the least likely reason to release capital as banks (Zhou et al., 2012). Second most probably less capitalized banks may securitize loans to free up portions of capital for instance, in order to increase new and if likely additional profitable assets. Third, faster growing banks will see the advantage of being healthy and upholding low capital through securitization. Fourth, on a regular basis some banks might operate with lower average capitalization just because they choose to become skilled at securitizing loans (Yanushevsky and Yanushevsky, 2015) and (Changsheng and Yongfeng, 2012). Fifth, to flaunt higher so called capital cushions less-capitalized banks may securitize loans, as soon as, they are rewarded by rating agencies, or as a means of satisfying market requirements, they may keep levels of capital in excess of their minimum requirements. Numerous researchers (Central Bank of Sri Lanka, 2016), (Central Bank of Sri Lanka, 2014), (Hogan, 2015) and (Jokipii and Milne, 2011) highlight that there can be the risk of regulatory capital arbitrage as the determinants of loan securitization involve

bank capital, in the sense to decrease their regulatory capital requirements spuriously banks could use securitization (Varotto, 2011).

In a similar way, might be used loan securitizations with the issue of regulatory capital arbitrage, which would need an ad hoc analysis that goes beyond our purposes in this work. Unnecessary to say that the part of the single determinants reviewed up to now can be linked. For instance, with the goal of striking out towards new and more profitable investments a bank securitizes its loans to release capital, the underlying effect can be empirically found significant both for profits and capital (Beltratti and Paladino, 2016). Though, the effects may be completely independent. For instance, the banks can pursue new profits through securitization or solve funding needs even if they are well capitalized. Even if they have high profits they can also increase. The attention in studying bank loan securitization was already vindicated by their dramatic increase in the last decade. It has been further strengthened exactly by recent measures in the financial markets (Jiménez-Rodríguez et al., 2011) and (Rossi et al., 2018). While various methodologies has been developed to measure various statistics such as (Mohsin et al., 2018) and (Mohsin et al., 2018).

Although under the new Basel II framework using risk-sensitive capital ratios the incentive to use regulatory capital arbitrage will be reduced, it may have contributed to the growth in securitization in the early existences (Cai et al., 2017).

### Data and Methodology

This study uses the panel data of 10 banks from 2007~2015. Most data are collected from the annual reports of each bank. ATR indicates the ratio of current assets to total assets. OER stands for owner equity ratio. ROE indicates the rate of return on common stockholders' equity, and NPL stands for the non-performing loans. The indicators selected in this paper are shown in Table 1. The variable information is shown in Table 2. The correlation coefficient is shown in Table 3.

Table.1 Variable description

Variables	Variable description
SEC	Virtual variable of asset securitization. If the bank carried out asset securitization, then SEC=1, if not, SEC=0.
ATR	the ratio of current assets to total assets
OER	Owner equity ratio
ROE	the rate of return on common stockholders' equity
NPL	the non-performing loans

For banks this effect supposed to be strongest having capital ratios according to minimum requirement of regulatory body. In order to consideration of this, we creates a dummy variable (low tier 1) which is equal to 1 for the 10% of banks with the lowest capital ratios otherwise its value is considered as zero. A positive sign of this dummy variable shows that in certain banks the problems of requirements from regulatory constraints choose to securitize their loans. The risk variable has been taken which supposed to shows the situation of originator's credit risk by



assessing the bank's credit risk provision as compared to net interest income (Miles et al., 2013) and (Allen et al., 2014).

Model being used enables us for macroeconomic variables as an extra descriptive factors while among the firm particular factors, the amount of total assets has a considerably positive impact on the likelihood of loan securitization. All models shows that the larger banks engagement of likelihood of loan securitization while the riskiness of loans enhance as the likelihood of loan securitization increases. With the aim of observing either the Pakistani financial institutions have employed securitization for transferring region of their credit risk, This study use three variables for measuring this type of risk. On the basis of earlier descriptive variables, this works took into consideration three models for assessing a possible effect that is caused by the securitization process on the credit risk of the financial organization (Chatterjee and Hadi, 2006), (Kleinbaum and Klein, 2010) and (Kleinbaum et al., 2010). The baseline model which is given by,

$$CR_{i,t} = \beta_0 + \beta_1 SEC + \beta_2 NPL + \beta_3 LIQ + \beta_4 OER + \beta_5 ROE + \varepsilon_{i,t}$$

LIQ is liquid assets/total assets ratio,

OER is owner's equity ratio

ROE is Return on equity

NPL is non performing loan

SEC is a dummy variable

where the subscript  $i = 1, 2, \dots, 10$  is the financial institution;  $t = 1, 2, \dots, 5$  is the period, and  $\varepsilon_{i,t}$  is the disturbance. The next two models include the variables OER and ROE, respectively. As a consequence: This study uses panel data analysis. Likewise usual OLS methods for panel data analysis recovered in the literature for analyzing credit risk. Finally, this research affirm fundamental transmission channels and consequently, bring into focus the relationship enclosed by credit risk securitization and financial integrity by putting aside regressing the credit risk securitization on various components of the z-score ratio (ROAA, capital ratio, volatility of ROAA). Due to restricted dependent variable in our model, we has been designed and adopted a specific condition which can handle the necessities of binary dependent variables, whereas the observing probability value of one is as follows

$$P_r(Y_i = (1|x_i)) = 1 - F(-x_i\beta)$$

Where F is strictly increasing and continuous function which takes the real values and yielded a value ranging from 0 to 1. By adopting the logit function for F, it follows that

$$P_r(Y_i = (0|x_i)) = F(-x_i\beta)$$

By using such a specific condition, we can approximate the parameters of model by employing the of maximum likelihood method (Author and Silverman, 1982). The maximum likelihood function is as follows,

$$L(\beta) = \sum Y_i \log \frac{\exp(x_i\beta)}{1 + \exp(x_i\beta)} + (1 - Y_i) \log \frac{1}{1 + \exp(x_i\beta)}$$

The maximum likelihood's first-order conditions is nonlinear in nature, consequently the obtained parameter measures iterative solution. Furthermore we used the statistical program methods of second derivative for evaluation of covariance matrix to estimate the parameters.

Here point to be noted that the binary model estimated coefficients cannot be illustrated due to the marginal effect of the explained variables on the dependent variables. consequently the Logit coefficients shows a marginal effect of  $x_i$  on the log of the “odds”, whereas:

$$\text{"odds"} = \frac{P_r(Y_i = (1|x_i))}{1 - P_r(Y_i = (1|x_i))}$$

Hence our sample contain decision of yearly securitization of Pakistani banks. Some of them chose to securitize their loans only once, while others continually decided to issue securitized assets (Sigworth, 2007). According to the relief hypothesis of regulatory capital we comprise two proxies in order to know the equity situation of the inventor. Also According to the relief hypothesis of regulatory capital those banks who has lower capital ratios are more likely to securitize assets while higher capital ratios should be considered as less likely to hold less securitized assets.

This paper set “SEC” as the dependent variable. “SEC” stands for “securitization”. If the bank carried out asset securitization, then SEC=1, if not, SEC=0. The independent variables are set as ATR (liquid assets/total assets), OER(owner equity ratio), ROE(return on equity), NPL (non-performing loans). Since the loan securitization gives a permission to transfer the risk of the original portfolio to the capital market, so consequently we assumed that firms having higher asset risk contains a higher enticement to securitize.

### Results and Discussion

The logistic model uses the z test to determine whether the effect of the independent variable on the dependent variable is significant. Therefore, “z” is the statistic for a single coefficient test; “P>|z|” is the P value of the coefficient test; the last two columns are the 95% confidence intervals for the coefficient.

Table 2 Descriptive statistics

variable	mean	median	maximum	minimum	Standard deviation
ATR	1.2772	0.9613	8.8107	0.0973	1.6254
OER	2.0997	0.0761	46.3720	0.0205	7.2384
ROE	1.0749	0.2588	9.3189	0.0649	1.6569
NPL	318.6282	1.7405	15231	0	1616.6956

Table 3 Correlation coefficients

	ATR	OER	ROE	NPL
ATR	1.0000			
OER	-0.0341	1.0000		
ROE	-0.2394	-0.0948	1.0000	
NPL	-0.0024	-0.0544	-0.0311	1.0000

The correlation tables shows that the relationship between liquid asset/total asset to owner equity ratio is -0.0341 while the relationship between return on equity to liquid asset/total asset is -0.2394. The relationship between non performing loan to liquid asset over total asset is -0.0024. The relationship between return on equity to owner equity ratio is -0.0948

whereas the relationship between return on equity to non performing loan is -0.0544. The mean of liquid asset/total asset, owner equity ratio, return on equity and non performing loan is 1.27, 2.09, 1.07 and 318.62 respectively. The maximum value of liquid asset/total asset, owner equity ratio, return on equity and non performing loan is 8.810, 46.37, 9.31 and 15231 respectively. The minimum value of liquid asset/total asset, owner equity ratio, return on equity and non performing loan are 0.09, 0.02, 0.6 and 0 respectively. The standard deviation values of liquid asset/total asset, owner equity ratio, return on equity and non performing loan are 1.62, 7.23, 1.65 and 1616.69 respectively.

(1) This paper uses STATA to carry out a binary logit regression. The regression result is shown in Table 4.

Table 4 Regression result

variables	Coefficient	Std. Err.	Z-statistic	Pro.
C	-0.0031	0.3427	-0.01	0.088
ATR	0.0148	0.1344	0.11	0.509
OER	0.0221	0.0321	0.69	0.387
ROE	0.0685	0.1353	0.51	0.508
NPL	0.0002	0.0003	0.69	0.007

The result can be shown as:

$$\text{Logit}(\text{SEC}) = -0.0031 + 0.0148\text{ATR} + 0.0221\text{OER} + 0.0685\text{ROE} + 0.0002 \text{NPL}$$

As we argued that the smaller the “log likelihood” value, the better the adaptability of the model; the larger the value, the worse the effect of the model. The overall value of the log likelihood for this model is -61.27 which shows a good fit of the model for our analysis. The smaller value of log likelihood justifies the reliability and better adoptability of the model.

The coefficient of the independent variable indicates the average variation of logit(SEC) with one-unit change of each independent variable. The positive or negative of the coefficient indicates the positive or negative effects of independent variables on the dependent variable. For example, the coefficient of ATR is  $0.0148991 > 0$ , which means ATR has a positive effect on securitization (SEC). Our results shows that the bank’s liquidity decreases the likelihood of issuing a collateralized loan option. While an enhancing impact is completely found for the return on asset ratio variable. Interestingly, capital ratios in model 1 and mode 2 does not shows a noteworthy effect on a bank’s decision regarding issuance of collateralized loan option. Additionally from model (1) and (2) we can deduced that banks in the decile of greatest risk have a considerably positive tendency towards the activity of loan securitization.

Interestingly, corresponding the risk variable behaviors, it is founded that the liquidity regressor and extreme decile shows a reverse direction while the lowest capital tier shows a non significant but negative impact on loan securitization attitude in financial institutions. Hence it can be argued that the capital role of regulatory framework does not impact the decision of securitization while types of bank dummies variables shows a positive and major impact for all businesses except for investment banks. They are comparatively analogous exist in total sample having different magnitude of different variables. Again, liquidity, credit risk, bank size, return on equity and nonperforming loans are major drivers for the loan securitization decision.



The logarithmic values of coefficients for group 2 are -0.0031 for constant variables, 0.0149 for ATR, 0.0221 for OER, 0.0685 for ROE while NPL value of coefficients are 0.0002. The coefficient of the independent variable indicates the average variation of logit(SEC) with one-unit change of each independent variable. The positive or negative of the coefficient indicates the positive or negative effects of independent variables on the dependent variable. As we argued that the coefficient of the independent variable indicates the average variation of logit(SEC) with one-unit change of each independent variable. For example, for group 2 the coefficient of ATR is  $1.015 > 0$ , which means ATR has a positive effect on securitization (SEC), the coefficient of OER is  $1.022 > 0$ , which means OER also has a positive effect on securitization (SEC), the coefficient of ROE is  $1.070 > 0$ , which means ROE also has a positive effect on securitization (SEC) and similarly the coefficient of NPL is  $1.000 > 0$ , which means NPL also has a positive effect on securitization (SEC).

$$\text{Logit}_{G2}(\text{SEC}) = 0.996 + 1.015\text{ATR} + 1.022\text{OER} + 1.070\text{ROE} + 1.000\text{NPL}$$

For both the group 1 and group 2 the Z test values of independent variables for 0.11 for ATR, 0.491 for OER, 0.613 for ROE, 0.69 for NPL and -0.01 for constant variable. Whereas the " $P > |z|$ " values are 0.11 for ATR, 0.912 for OER, 0.491 for ROE, 0.613 for NPL and 0.933 for constant variable for both group1 and group 2. The last two columns shows the 95% confidence intervals for the coefficient. For group 2 the values of 95% confidence intervals are ATR value is 0.7800 to 1.320, OER value is 0.9599 to 1.088, ROE value of 95% confidence intervals is 0.8214 to 1.396, NPL value is 0.9996 to 1.000 while the value of 95% confidence intervals for constant variable 0.5093 to 1.951.

Also as we concluded that organizations having low capital ratios and greater risk of lower quality seems loan securitization so in this regard the first women bank has low chances of loan securitization while Silk and Soneri bank has lowest chances of loan securitization among all banks in our study analysis because owner equity ratio is concern the first women banks has the highest value of 0.66 while the Silk and Soneri bank have the values 0.06 and 0.07 respectively and we can see the values from table 2. It can be seen that the financial institutions seems loan securitization those having higher non performing loan. By virtue of nonperforming loan the Islami bank has at top list while the HBL banks has at lowest list among the all panel of banks in our study because Islami bank has highest value of nonperforming loan which is 2350 million rupees while HBL has no nonperforming values. As for return on equity ratios concerned HBL bank has highest value of 0.96 while the First bank has lowest value containing 0.08 while as for nonperforming loan the Islami bank has highest value of nonperforming loan which is 2350 million rupees while HBL has no nonperforming values.

The credit enhancements cost is the major expense in banking structure and accounting rules needed to securitized the assets while securitization is responsible of either as secured borrowings or sales. In order to transfer the financial assets to a special purpose entity (SPE) to meet the criteria for sale secretarial management, it should strictly meet the underlying criteria: (1) the underlying assets must be inaccessible from the transferor even the creditors in bankruptcy; (2) the special purpose entity has pledge right or exchange the assets into desired financial assets.

(3) the transferor does not uphold effectual organizing power and control. Exposed risk is also a major factor of loan securitization and it is the foremost instrument for transfer the credit risk. The funding source offered by securitization has several benefits such as not being subject to put

down insurance and financial reserve supplies. Securitization of banks in high quality loans and to retain low-quality loans happens during the time of economic capital market regulation is substantial less than regulated capital while the extremely risk assets lies between the return and safety. For example the banks can sold out high quality loans, and the profit margin goes to riskier borrowers in order to rising the probable returns by no change in capital requirements. If banks hold a diversified portfolio, the capital requirements, decrease the risk taking incentive. Nevertheless the fundamental result on securitization would not impact of the quality of loans during the availability of capital requirements while the profit considerations determinants of securitization in this case. The determinant of securitization impact the profit opportunities precisely especially when the market values of loans exceed their book values then the securitization enables banks to distinguish the accounting gains and overvaluation of the retained interest which is accepted at fair market value. Moreover the banks can reallocate their vended loans in order to generate more profitable business environment. Banks can securitize loans planned specially for an intermediation profit and the bank capital involves in securitization.

Summary of our results shows that, securitization process looks strongly affected by firm-specific distinctiveness whereas we do not completely reject the impact of banks' incentives to decrease quantity of regulatory capital required by regulatory body. It might be expected that the bank engaging in loan securitization probability increased the size of the bank size and to reduce the bank's liquidity. Moreover, we examine that those banks expected credit risk is high the banks are more likely to securitize loans hence its concluded that securitization is being used as a risk-transfer tool in commercial and saving banks at public and private banks.

Further results shows that the large organizations doing loan securitization having low capital ratios, low liquidity and greater risk of lower quality seems to performed low. The organizations doing loans securitization mostly engaged in investment banking activities to generate fee income. Relationship of macroeconomic variables and loan securitization shows that a greater probability of credit rating downgrades, credit default and interest rates looks to be a favorable for loan securitization. On the other hand, risk-transfer outcomes is to be limited, because banks having the greater credit risk decile are decrease their securitization action as well as higher credit risk. Interestingly, the "quality" of the banks' risk which is measured by ratio of gross interest income to gross outstanding accounts, shows a tendency to effects the issuing decision optimistically.

### **Conclusion and Policy Implication**

This study undertook an empirical evaluation of the loan securitization and bank soundness in Pakistan . The comprehensive theoretical framework takes realistic consideration of measuring the loan securitization and bank soundness in by including a comprehensive set of indicators such as the return on equity, return on asset, owner equity ratio and non performing loan as in independent variables while the loan securitization as dependent variable while these ratios has been calculated to over all overview of the bank soundness. The overall value of the log likelihood for this model shows a good fit of the model for analysis. and the lesser value of log likelihood validate and give good reason for the reliability and better adoptability of the proposed model in the study. The coefficient of the independent variable shows that the average variation of one-unit change in independent variable while he positive or negative values shows the positive or negative impact of decision variables on the dependent variable.

Logistic regression and several ratios has been used to combine all these results in a holistic way. We have also incorporated country risk profile of Pakistan banking system. Securitization process powerfully affected by firm-specific uniqueness and it is not possible to refuse the collision of banks' incentive to reduce quantity of regulatory capital obligatory by regulator. The bank appealing in loan securitization likelihood enlarged the size of the bank and to decrease the liquidity. Furthermore, if the credit risk of the banks is high the banks are more likely to securitize loans therefore the securitization is being used as a risk-transfer tool in banks.

Long-term interest rates and spreads exaggerated the issuance of collateralized loan option and the regulatory arbitrage effect have considerably less than those banks having high capital. Results shows that a negative impact of tax consideration while a positive impact of the market-to-book ratio for bank which are listed in stock market.

We recommend the there should be conducted an empirical study to increased the securitization process and suggest a policy framework in order to reduce the bank risk. Capital requirement and bank's securitization exposures under Basel Accord should be studied. Finally, assessing securitization in view of greater view should be conducted and we recommend the sensitivity analysis for future research. As for methodology is concerned we employed logistic regression and various other ratios (return on equity, return assets, owner equity and nonperforming loan as an independent variables) to measure the relationship between loan securitization and bank soundness in Pakistan.

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