Are Basel Capital Standards Implemented Successfully in Pakistan?

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This paper basically examines implementation of Basel Accords in Pakistan and investigates to what extent; these accords have positive or negative impact on economy. Two types of capital, Tier 1 and Tier 2 are examined under Basel II for the first time for a developing country. Both have impact on capital management but their mechanisms are different. For this purpose, two models, capital buffer model and provisioning models are used for the estimation through GMM one step and two steps for the period of 2001-2012 for 47 Pakistani commercial banks. Results show that Basel II Capital accord is pro-cyclical. Sample is divided into two regimes. Tier 1 capital is positively related and Tier 2 is negatively related to loan loss provisions in the pre Basel regime while the results are reversed in the post Basel regime. Business cycle fluctuations are positively related to loan loss provisions in the pre Basel regime and negatively related in the post Basel regime providing the evidence that new capital regulation is pro-cyclical.

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Introduction

Basel II implementation has got specific attention internationally and also within Pakistan but the effective implementation of this new accord faced many issues and challenges. With the development in risk sensitive financial markets, the supervisors and regulators are also challenged for risk management issues. To tackle risk management issues, banks have developed more effective risk management models.

The development of effective risk management models also focused the modern techniques to mitigate risk and sufficient capital to cover potential losses. Different types of risks are associated with both types of losses, expected losses and unexpected losses. If banks fail to identify these different types of risks (Credit risk, market risk, liquidity risk, operational risk, legal risk, country risk, reputational risk etc.), it'll bear high cost for banking industry as well as for the whole economy.[4] Because of energetic global response towards new Basel Accord, State Bank of Pakistan has decided to adopt this new accord and chalked out a road map for its implementation in Pakistan.

In Pakistan, State Bank of Pakistan is responsible for the soundness and stability in the banking sector. CIB department of SBP is especially responsible to keep an eye whether banks are adequately capitalized and whether they have efficient policies and systems to handle all risk associated to banking operations. The major objective of this department

[4] Khawaja & Din (2007)

is to implement the new Basel II Accord in the banking sector.[5] The tasks include the participation for the capacity building activities of banking sector in order to understand, adopt, implement and monitor the implementation of Basel Accord.
The objective of this paper is to examines and analyze the implementation of Basel I and Basel II accords in Pakistan using data of all Pakistani Banks for the period of 2001-2012.

Basel Capital Regulations in Pakistan

Basel Accord, a set of agreements, is given by the Basel Committee on Bank Supervision (BCBS). It provides banking regulations for 1) capital risk, 2) market risk and 3) operational risk. Basel aims to develop a uniform approach that banking sector regulators may use across the globe. "The specific objectives of Basel Accord are
To ensure that the capital allocation is more risk sensitive.
To enhance disclosure requirements
And to ensure that the credit risk, market risk and operational risk are quantified on the basis of data and formal techniques. "
The State Bank of Pakistan has outlined a roadmap implementation of different approaches of Basel II in banking sector. "Banks would be required to adopt Basel II as under:
Standardized Approach for credit risk and Basic Indicator / Standardized Approach for operational risk from 1st January 2008
Internal Ratings Based Approach from 1St January 2010. (Banks interested in adopting Internal Ratings Based Approach for capital requirement

[5] www.sbp.org.pk

against credit risk before 1st January 2010 may approach SBP for the purpose." [6]

It is argued that, capital market developments are slow in the developing countries because the banks are mostly state-owned in those countries. Less transparent banking system, lack of motivation for the managers and capital market imperfections also exist in those countries. Contrary to this, developed countries have more liquid capital markets and sound management system.

In Pakistan, a survey study conducted by *Masood & Fry (2011)* explored the issues regarding the implementation of Basel II accord. Their results inferred that private banks are better prepared to adopt new Basel accord than public banks. On the other hand, findings of another study by *Din & Khawaja (2007)* argued that IRB Approach is more beneficial than Standardized Approach but IRB Approach requires fixed initial investment, human expertise, software etc. They also speculated that only larger banks would be able to adopt IRB Approach as they are able to bear initial fixed costs.

There are three versions of Basel standards evolved step by step with development of banking industry.

Basel I

Basel I was introduced in 1988 that mainly focused on credit risk management. Bank assets are classified into five major groups based on credit risk having weights 0%, 10%, 20%, 50% and up to 100%.

The major criticism was the method, which determines the actual amount of capital to be held by the banks is not associated to the risk, the banks are facing. It didn't differentiate the low risk assets and high risk assets.

[6] Roadmap for the implementation of Basel II in Pakistan (SBP)

The basic problem of Basel I is that it doesn't deal with operational risk as well as other types of risks such as liquidity risk, concentration risk etc.

BASEL II

After the consultations Basel Committee on Banking Supervision revised the Basel standards named as ***"International Convergence of Capital Measurement and Capital Standards: A Revised Framework".*** This is also called Basel II. Basel II was introduced to create international standard and to control the requirement of capital needed against major risks. Basel Committee on Banking Supervision set the new Minimum Capital Adequacy Requirement for the assessment of credit risk in June 2004. The new accord contains risk management techniques and enforces the banks to improve risk management capabilities. Basel II includes more risk sensitive capital allocation for major important risk categories.

Three pillars of Basel II developed by the Basel Committee (2006) are minimum capital requirements which is 8% of risk weighted assets (Pillar 1), supervisory review (Pillar 2), and market disclosure requirements (Pillar 3). Under this new accord, three approaches are used to calculate the banks regulatory capital requirement, the standardized approach based on external credit ratings and an internal ratings based approach based on banks internal credit risk models and third one is advanced internal rating based approach[7].

Pillar one deals with the credit risk and to measure credit risk, internal rating based (IRB) approach and standardized approach are proposed. Internal Ratings Based Approach use their own internal credit rating

[7] Under the revised standards, a mapping of external credit ratings to risk weights is defined such that loans to corporate entities rated AAA to AA- receive the 20% risk weight, loans to entities rated A+ to A- receive the 50% risk weight, and the 100% risk weight is assigned to corporate loans rated BBB+ to BB- and those loans that are unrated. Finally, loans rated below BB- receive the new 150% risk weight.

models for calculating the adequate capital needed to cover unexpected losses. The minimum capital required remained at 8% of risk weighted assets, with Tier 1 capital making up not less than half of this amount. Banks that decide to adopt the standardized ratings approach must rely on the ratings generated by external agencies. Certain banks used the IRB approach as a result.[8]

The current regulations have some basic problems. *First* is that the current accord is not able to capture the risks of banks sufficiently. *Second* problem is that too little attention has been paid for liquidity management of banks. In current regulation, there exists no policy set for banks to handle their liquidity risk. At the same time, Liquidity is the main risk for the banks which arises mainly through maturity mismatch between assets and liabilities. *Finally*, pro-cyclical tendency of Basel II reinforce the crisis. During upswing that preceded the crisis, when risks were low, banks were able to expand their balance sheets and present good capital adequacy ratios. When period of recession starts and risks increased more capital is needed to meet minimum capital requirement. Due to high risk losing confidence, capital adequacy requirements of market also increased and Banks were forced to reduce their balance sheet size to meet these requirements in many countries. This will result in reduced lending to private individuals and companies. This will further reduce the demand and investment activity which reinforced the downswing in global economic activity.

[8] Keynote Address delivered by Dr. Shamshad Akhtar, Governor, State Bank of Pakistan

BASEL III

The BCBS was proposed Basel III in September, 2010 named as, "*A Global Regulatory Framework for More Resilient Banks and Banking Systems,"* Basel III reflects that the Basel Committee on Banking Supervision tried to apply lessons learned from the financial crisis and apply them to the existing framework of banking regulation. The primary purpose of Basel III is to improve the ability of banks to absorb asset losses without affecting the rest of the economy. In aspect of capital regulation, Basel III emphasizes mainly on the quantity and quality of capital held by banks.[9] But Basel III is not implemented yet, so this study discusses about Basel II.

IMPACT OF GLOBAL FINANCIAL CRISIS ON ECONOMY AND BANKING SECTOR OF PAKISTAN

Global financial crisis resulted in macroeconomic imbalances. In 2008, there was worst economic recession across the world which indirectly affected the banking sector of Pakistan due to liquidity constraints in global financial markets.[10] Other factors such as energy crisis, underutilization of industrial capacity, and rise in cost of production & new circular debt, decline in foreign direct investment, inflation and fiscal deficit are the major reasons for rise in nonperforming loans of the banking sector.[11] Public sector is heavily dependent on banks to finance the needs of Public Sector Enterprises (PSE's) and budgetary support. But a rising trend has been shown in banks assets from 2005 to 2009 due to increase in

[9] Speech by Mr Stefan Ingves, Governor of the Sveriges Riks bank
[10] Pakistan Banking Sector by Consulate General of Switzerland
[11] Pakistani Banking Sector by Consulate General of Switzerland

investment. As banks are required to meet minimum capital requirement by SBP, the equity base has also increase to 17.3%.

THEORATICAL BACKGROUND

There are following two models used in this study.

Loan Loss Provision Model

Following the profitability model of *Cavallo and Majnoni (2002)* and *Bikker and Metzemakers (2002)* in relation to business cycle, earnings, tax and capital ratio with provisioning, this study also agrees that lending rate of profit maximizing bank is determined by four major determinants, *risk- free interest rate (r_B), expected loss ratio E(d), the risk premium (k)*[12] and *operating cost c.* Expected losses *E(d)* is considered as a rate of return per unit of time and loan losses *(⊿BL)* are subtracted from bank lending equation to get earning before tax and provisions represented by following equation

$$\pi = \tilde{L}\left[\left(r_B + E(d) + k\right) - r_D\right] - \Delta B\tilde{L} \qquad (3.1.1)$$

In Equation 3.1.1, subscripts on some variables indicate stochastic nature of these variables with a cyclical pattern because of Loans and loan losses. Loan losses are negatively related to business cycle while Loans are positively related.

The equation can be interpreted as during cyclical downturn, lower interest income and high default rates cumulate their negative effects on profits before tax while during economic upswing loans increases because of high interest and write offs remains below average, it provides an additional boost to profits. This study supposes partial provisioning where loan loss

[12] The risk premium under the CAPM model could be quantified by the relation k = rm +rf (rm - rB), where rm is the rate of return of the market portfolio.

provisions are taken as a fraction of the expected default ratio E (d) represented by following equation

$$\pi = L[(r_B + E(d) + k) - r_D] - OC - BL - [\gamma E(d) L - BL]$$

(3.1.2)

During good conditions, the bank saves the provisions in excess of write offs'. The last term of equation shows the amount of net provisions, taken by the difference between gross *provisions (γE(d)L)* and *write offs (⊿BL)*. In poor economic conditions right offs increases and net provisions become negative, it shows previously accumulated loan loss reserves are gradually drawn down. From equation 3.1.2, following empirical equation of loan loss provisioning equation is constructed where loan loss provisions is taken as dependent variable and the explanatory variables are grouped into bank specific and macroeconomic variables, has been constructed and lags of dependent variable are added in the final empirical equation to check whether banks adjust their provisions slowly to recognize potential losses.

$$\left[\frac{LLP}{TA}\right]_{i,t} = \alpha + \gamma_1\left[\frac{LLP}{TA}\right]_{i,t-1} + \gamma_2\left[\frac{LLP}{TA}\right]_{i,t-2} + \beta_1\left[\frac{Tier1}{RWA}\right]_{i,t} + \beta_2\left[\frac{Tier2}{RWA}\right]_{i,t} + \beta_3\left[\frac{EBPT}{TA}\right]_{i,t} +$$

$$\beta_4\Delta\left[\frac{EBPT}{TA}\right]_{i,t} + \beta_5\left[\frac{NPL}{TL}\right]_{i,t} + \beta_6\left[\frac{TL}{TA}\right]_{i,t} + \beta_7\Delta GDP + \beta_8 TD + \upsilon_i + \varepsilon_{i,t}$$

(3.1.3)

Where, $\frac{LLP}{TA}$ is ratio of loan loss provisions to total assets, $\frac{Tier1}{RWA}$ *and* $\frac{\text{Tier 2}}{\text{RWA}}$ are the ratios of tier 1 to risk weighted assets and Tier 2 to risk weighted assets respectively (proxy for capital management), $\frac{EBPT}{TA}$ is ratio of earning before tax and provisions to total assets (proxy for earning management), $\Delta\frac{EBPT}{TA}$

$\Delta\frac{EBPT}{TA}$ is the change in ratio of earning before tax and provisions to total assets (proxy for signaling), $\Delta\frac{NPL}{TL}$ is the change in ratio of Nonperforming loans to total loans (Proxy for Credit Quality), $\Delta\frac{TL}{TA}$ is ratio of total loans to total assets (Proxy for Credit Quality), ΔGDP is change in real gross domestic product (Proxy for Business Cycle).

Coefficient of Tier 1 is positive but net effect of Loan Loss Provisions on Tier 1 is negative tax-shield. Loss reserves are included in tier 1 capital but not included in tier2 capital and due to this reason there is tax shield benefit in the case of using tier2 capital. The positive coefficient of Tier 2 indicates banks can choose to inflate Tier 2 by increasing Loan Loss Provisions. B_3 and β_7 indicates whether provisioning is pro-cyclical or not. If both coefficients are positive, it means banks tend to accumulate provisions during expansion and use them in recession. To capture the affect that provisions are pro-cyclical with business cycle, change in GDP is added in the empirical equation. In addition, $\mathbf{v_i}$ are individual bank fixed effects, stable through time and $\varepsilon_{i.t}$ are random errors. Year control dummies (TD) are used to capture time-specific effects, such as trends in the regulatory stance. The dependent variable in the regression equation is the level of loan loss provisions divided by the one period lag of total assets. Lagged values of stock variables and current values of flow variables are used to avoid potential endogeniety problems. Loan Loss Provision at time t correspond to provisions during the year t, while assets at time $t-1$ correspond to the stock of bank assets at the beginning of year t. Hence, $(LLP/A)_t$ is measured as LLP_t/A_{t-1}. Earnings are less affected by volatility in credit losses with the business cycle in the case of perfect income smoothing. As a result, loan loss reserves would increase in economic boom and decrease in recession.

Capital Buffer Model

This study follows the theoretical model given by *Ayuso Juan et al (2004)* to observe the relation between capital buffer and business cycle in Pakistan. *Estrella (2004)* presented major determinants for holding capital buffers and also proposed theoretical as well as empirical model. *First* determinant of holding buffer is cost of holding capital which is direct cost of holding excess capital. Due to high cost of equity funding, direct cost increases. Return on Equity is used to reflect the direct cost of excess capital. *Second* type of cost of holding capital is cost of failure which is also called bankruptcy cost. Non-performing Loan ratio reflect the risk profile and it is used for the proxy of cost of failure. *Third* type of cost is cost of adjustment which is captured by first lag of dependent variable according to partial adjustment model. In line with *Estrella and Ayuso et al.* this study also used lagged dependent variable to capture the cost of adjustment. All these three types of costs are inserted in the following equation.

$$C_t = (\alpha_t - \gamma_t) K_t + \frac{1}{2}\delta_t I_t^2$$

(3.2.1)

Where, α_t shows the cost of remunerating the capital, γ_t reflects the costs of failure and δ_t represents the existence of adjustment costs. For simplicity, it is assumed there is asymmetry in adjustment cost and linearity in remunerating and failure cost. Now, the following equation clearly shows that capital buffer depends on three types of costs mentioned above.

$$(K_t - K^*)_t = (K_t - K^*)_{t-1} + E_t\left[\frac{1}{\delta_t}\sum_{I=0}^{\infty}\beta^i \gamma_{t+1}\right] - E_t\left[\frac{1}{\delta_t}\sum_{I=0}^{\infty}\beta^i \alpha_{t+1}\right] + \varepsilon_t$$

(3.2.2)

Accordingly, to estimate the effects of the position in the cycle on the capital buffer consistently, this paper controls for the effects of -i.e. to

include in the RHS of our empirical equation- i) lagged dependent variable, which captures the relevance of adjusting costs and should therefore have a positive sign; ii) variables related to the (expected) costs of remunerating capital, which should have a negative sign; and iii) variables capturing the (expected) bank failure costs for the bank, which are linked both to the bank's attitude towards risk. To test the capital buffer hypothesis, best proxies are plugged in the final equation, following empirical model of *Ayuso Juan et al (2004),* and an empirical equation is constructed, in which Capital Buffer is dependent variable and lag of dependent variable is added to capture the cost of adjustment, return on equity is a proxy for cost of holding capital, risk is added to capture the cost of failure.

$$Buffer = \beta_0 + \beta_1 ROE_{i,t} + \beta_2 Risk_{i,t} + \beta_3 Buffer_{i,t-1} + \beta_4 Size_{i,t} + \beta_5 GDP + \eta_i + \varepsilon_{i,t}$$

(3.2.3)

Whereas Capital buffer is measured by Tier1 Capital Ratio minus minimum regulatory capital requirement, ROE is ratio of Profit after tax to Total Equity. Risk is measured by Non-performing Loan to Total Assets. Size is measured by Log of Total Assets. ε_{it} is a standard random shock and it is iid with mean zero and constant variance. Bank size and business cycle are considered to be exogenous and therefore used as their own instruments. Size is added as control variable and to test the too big to fail hypothesis which states that whether practice of holding capital buffer is same in small and large sized banks. Coefficient of *Buffer* also shows the speed of adjustment. A large coefficient of capital buffer means that speed of adjustment is slow and vice versa. GDP is included in the model to examine the additional effect of business cycle on capital buffer held by the banks and to test whether banks hold buffer or not in good economic conditions.

METHODOLOGY

This paper is based on the data collected from Financial Statement Analysis published by State Bank of Pakistan for all 47 banks, incorporated in Pakistan and listed at KSE since 2001 for the period 2001-2012. The sample includes all Pakistani commercial banks including public banks, private banks, specialized banks, Islamic banks and foreign banks. No mergers and acquisitions are accounted for.[13] The data is divided into two time periods 2001-2006 and 2007-2012 as Basel II was implemented in 2006.

The paper used generalized method of moments (GMM) first differences estimators developed by Arellano and Bond (1991) for dynamic panel data models. GMM can address relevant econometric issues using this approach i.e. Autoregressive behavior of loan loss provisions, potential endogeniety problem of explanatory variables and unobserved bank specific effects. This approach is also suitable for unbalanced panel data and covers the problem of heterogeneity and endogeniety while OLS generates biased results in this regard. This approach requires the number of cross section should exceed the time series observations. *Laeven and Majnoni (2001), Cavallo & Majnoni (2002), Ayuso et al (2004), Ghosh and Nachane (2003), Liebig et al (2004), Bouvatier and Laetitia (2007), Perez yet al (2008), Jokipii (2011)* and many others used this estimation technique.

[13] The dataset formed, is unbalanced because of new entries, mergers & acquisitions, bankruptcy cases and lack of data availability.

Result Discussion

Impact of Pre and Post Basel Regimes using LLP Model

Table 5.1 gives the estimation results for the time wise sample split into two regimes, 2001-2005 (pre-Basel II regime) and 2006-2012 (post Basel II regime).

Table 5.1

Evidence of Procyclicality of new Capital Regulation under Basel II (Dependent Variable = LLPTA, Banking Sector Pre and Post Basel Regime

Variables	Pre-Basel II Regime	Post-Basel II Regime
LLPTA(-1)	0.1384 (0.1806)	0.3554** (0.1681)
TIER1C	0.3868** (0.1531)	-0.1978*** (0.0719)
TIER2C	-2.4160** (0.9532)	0.0711 (0.2097)
ER	-3.8508*** (0.7288)	-0.7021** (0.3403)
GER	0.8699** (0.3089)	0.6041*** (0.1887)
TLR	0.2043*** (0.0335)	0.2242* (0.1272)
GNPLTL	-0.1763*** (0.0563)	-0.0041 (0.0511)
GDPG	0.0076* (0.0037)	-0.0030** (0.0010)
Sargon Test (p-value)	0.0915**	0.9396
Wald Test (coefficients)	170.3849***	589.9170***
Wald Test (Time period)	24.7331***	6.0015***
m1 Stat	16.9071***	24.2326***

m2 Stat	16.9071***	24.2326***

Notes

LLPTA is dependent variable. TIER1C and TIER2C represent the capital management. ER is the proxy income smoothing. GER is used for signaling hypothesis. TLR and GNPLTL are used to capture risk. GDPG is added as a proxy for business cycle in order to check whether LLP behave pro-cyclically with business cycle.

Time dummies are included. But not reported.

*, ** and *** shows significance at 10%, 5%, and 1% respectively.

Standard Errors are in parentheses.

Sargon test is use to check the over-identified restrictions.

m1and m2 are used to detect 1st order auto correlation and second order serial correlation.

Firs lag of dependent variable is insignificant in pre-Basel II regime but it is significant at 5% in post Basel II regime. The estimation results in both columns represent the results of pre-Basel II and post Basel II regimes. The results of *TIER1* capital and *TIER2* capital are significantly different in both regimes.

TIER1C is positively related to Loan loss provisions in the pre-Basel II regime and negatively related to loan loss provisions in post-Basel regime. Similarly, *TIER2C* is negatively related to Loan loss provisions in the pre-Basel II regime and positively related to loan loss provisions in post-Basel regime. Initially loan loss reserves were included in the Tier 1 capital (Primary capital), that why banks could increase provisioning via increasing loan loss reserves. But after the implementation of Basel II, loan loss reserves were excluded from the primary capital and added in the secondary capital (Tier 2 capital). *Zhou (2007)* also found that *TIER1C* is positively associated to loan loss provisions and TIER2C is negatively related to loan loss provisions under Basel I regime.

The sign of *TIER2C* is consistent with the literature but it is insignificant meaning that capital requirements are not fully implemented. Practically,

the completion time period for the implementation of new accord is 2006-2013 and the implementation of IRB approach was started in 2008 which directly affect the risk weighted asset and indirectly influence the Tier 1 capital ratio via risk weighted assets. Tier 2 capital is used as an alternative for capital management along with Tier1 capital as new accord included loan loss reserves in Tier 2 capital. So banks increase loan loss provisions to increase Tier 2 capital.

No different patterns found for income-smoothing and signaling practices in both of the regimes. Also no difference has been noticed in *TLR and GNPLTL* in both of the regimes. The estimation results of GDPG in column 2 & 3 (Table 5.1) are different in both regimes. It is found that *GDPG* is positively related to *LLPTA* in the Pre- Basel II regime and negatively related. This indicates that new Basel capital regulation is pro-cyclical.

Impact of Pre and Post Basel Regimes using LLP Model

The table 5.2 presents the results of pre-Basel II and Post-Basel II regimes. The sample is divided in to two regimes 2001-2005 (pre-Basel II regime) and 2006-2012 (post Basel II regime). The coefficient of *BUFFER(-1)* in second column shows that speed of adjustment is very slow in pre-Basel II regime. But this speed of adjustment is high in post-Basel II regime given in column 3.

Tabel 5.2

Evidence of Procyclicality of new Capital Regulation under Basel II (Dependent Variable = BUFFER)(Different Regimes)

	Pre-Basel II Regime	**Post-Basel II Regime**
Variables	**Coefficients**	**Coefficients**
BUFFER(-1)	0.9164*** (0.0465)	0.3847*** (0.0126)
ROE	0.0099 (0.0156)	0.0012** (0.0005)
NPLTL	0.0967*** (0.0369)	-0.1940*** (0.0129)
SIZE	-0.0395*** (0.0124)	-0.0086** (0.0039)
LGDP	0.0577*** (0.0090)	0.4561*** (0.0326)
Sargon Test (p-value)	0.6790*	0.6357*
Wald Test (coefficients)	5897.8660***	5157.8400***
Wald Test (Time period)	9.6043***	90.5875***
m1 Stat	51.2785***	27.6420***

Notes:

BUFFER is dependent variable. BUFFER(-1) represents the cost of adjustment. ROE is the proxy used for cost of equity. NPLTL is used to capture the cost of failure. SIZE is used to check too big to fail hypothesis and GDP is added in the equation to check the effect of business cycle.
Time dummies are included. But not reported.
*, ** and *** shows significance at 10%, 5%, and 1% respectively.
Standard Errors are in parentheses.
Sargon test is use to check the over-identified restrictions.
m1 is used for 1st order auto correlation.
Wald 1 and Wald 2 represent joint significance of coefficients and time dummies.

The coefficient of *ROE* is positively related to capital buffer in both of the regimes. But the coefficient of *ROE* is significant in post Basel II regime. This positive relationship however implies that there is information asymmetry and banks keep a portion of profit as retained earning which is a cheap alternative as compared to external funds for raising capital levels. It is concluded that banks have limited access to capital markets. The banks having more risky portfolios retained high capital level. The results are also supported by the findings of *Din and Khawaja (2007)*. They argued that Pakistani banking sector is under a wave of merger and acquisition. Their results revealed that some banks that are unable to raise equity are opting for mergers and acquisitions.

The results of *NPLTL* are significantly different in both of the regimes. This means that if a bank experiences a positive shock to risk, will increase capital buffer and vice versa. The reason behind this is banks that have risky loan portfolios hold more capital than others and capital is adjusted to target level keeping in view the risk varying profile of the bank. The findings are consistent with *Ayuso et al (2004), Bikker and Metzemakers (2004), Stoltz (2005), Lindqvist (2004), Jokipii Milne (2006).*

The relationship between capital buffer and *GDPG* is found to be positively significant in both of the regimes which is consistent with the findings of *Ayuso et al. (2004), Bikker and Metzemakers (2005)*. A bank with forward looking approach, build up capital buffer at a cheaper rate during upturn to offset the negative effects of next recession.

Conclusions

This study empirically examined the cyclical implications of Basel capital regulation in Pakistani Banking Sector. For deeper analysis, this research

explored how banks manage their capital level. The issue of pro-cyclicality is investigated through two broad channels for the first time in this study, via loan loss provisions and capital buffers. Two types of capital, Tier 1 and Tier 2 are examined under Basel II for the first time for a developing country. Both have impact on capital management but their mechanisms are different.

TIER1 capital is negatively related to loan loss provisions. The results are consistent with capital management hypothesis. The findings are contradictory with the literature because loan loss reserves are shifted from Tier 1 to Tier 2 capitals. Hence, banks choose to increase Tier 1 capital by decreasing loan loss provisions. In contrast, Tier 2 capital is positively related to loan loss provisions but Pakistani commercial banks do not increase their capital via Tier 2 capital. Pakistani Banks increase Tier 2 capital by increasing loan loss provisions.

Pakistani commercial banks don't use income smoothing through loan loss provisions. The results are not consistent with income smoothing hypothesis. But this result also support capital management hypothesis. *TLR* is positively related to loan loss provisions and *NPLTL* is negatively related as expected. The negative relationship between loan loss provisions and *GGDP* is also consistent with the hypothesis and gives the evidence that capital requirements are highly pro-cyclical. This result also confirms that banks don't use forward looking loan loss provisioning approach. Rather they tend to post pond provisioning in good economic conditions. The analysis of pre Basel and post Basel regime found that Tier 1 capital is positively related and Tier 2 is negatively related to loan loss provisions in the pre Basel regime while the results are reversed in the post Basel regime. This is due to shifting of loan loss reserves element from Tier 1 capital to

Tier 2 capitals. Business cycle fluctuations are positively related to loan loss provisions in the pre Basel regime and negatively related in the post Basel regime providing the evidence that new capital regulation is pro-cyclical.
Cost of raising new equity, cost of failure and adjustment costs are the major costs associated with capital buffer, consistent with the literature and hypothesis. The negative relation of capital buffer with bank size confirms too big to fail hypothesis. On the other hand, the positive relationship between capital buffer and business cycle is also consistent with capital buffer hypothesis that capital buffers behave counter-cyclically. The results are also same for pre and post Basel regimes except cost of failure. Cost of failure is associated with capital regulation in post Basel regime. On the basis of results, it is concluded that new capital regulation is pro-cyclical. Banks use loan loss provisioning for capital management and signaling but not income smoothing. The results also supported that capital buffers are counter-cyclical. And, Cost of raising new equity, cost of failure and adjustment costs are the major determinants of capital buffer.
This study supports Basel III and recommends Pakistani commercial banks to adopt Basel III accord which is about holding capital buffers to overcome the problem of procyclicality.

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