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THE EFFECT OF CREDIT RISK AND CAPITAL ADEQUACY ON THE PROFITABILITY OF RURAL BANKS IN THE PHILIPPINES

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Abstract

This paper examines the credit risk and capital adequacy of the 567 rural banks in the Philippines to investigate how both variables affect bank profitability. Using the Arellano-Bond estimator, we found out that credit risk has a negative and statistically significant relationship with profitability. However, empirical analysis showed that capital adequacy has no significant impact on the profitability of rural banks in the Philippines. It is therefore necessary for the rural banks to examine more deeply if capital infusion would result in higher profitability than increasing debts. The study also implies that it is imperative for the banks to understand which risk factors have greater impact on their financial performance and use better risk-adjusted performance measurement to support their strategies. Rural banks should establish credit risk management that defines the process from initiation to approval of loans, taking into consideration the sound credit risk management practices issued by regulatory bodies. Moreover, rural banks need to enhance internal control measures to ensure the strict implementation of internal processes on lending operations.

Keywords: credit risk, capital adequacy, profitability, return on assets, return on equity

JEL classification: G00, G2, G21, G210

1. INTRODUCTION

Banking is a business of risk taking. Banks generally perform the intermediation role by accepting deposits from the savers and lending the money to borrowers. In doing so, they are exposed to various risks, which directly and/or indirectly influence their profitability (Sufian and Chong, 2008; Olweny and Shipho, 2011). Banks are vital to economic growth because the overall financial systems of most economies in the world are influenced by the banking system (Ali *et al.*, 2011). Largely, a sound and profitable banking system is in a better position to endure negative distress and contribute more significantly to the growth of the financial system (Aburime, 2009). Likewise, failures of individual banks adversely affect the economy and the society at large (Kolapo *et al.*, 2012).

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A core business of banks is credit provision, from which they generate profit. In this business, credit risk is one of their primary hurdles. Boahene *et al.* (2012) indicated that credit quality is a fundamental indicator of any bank's financial soundness and health. Since credit creation is the main income generating activity of a bank, poor credit or loan quality contributes enormously to bank failures. The Basel Committee on Banking Supervision (2000) underscored that the major causes of serious problems among banks continue to be directly related to lenient credit standards for borrowers and counterparties and to poor loan portfolio risk management. Ahmad and Ariff (2007) cited that most banks in countries like Thailand, Indonesia, Malaysia, Japan, and Mexico experienced high non-performing loans and significant credit risks, resulting in the closure of several banks. Indeed, defaults on loans pose serious setbacks not only to borrowers and lenders but to the entire economy of a country (Boahene *et al.*, 2012).

In the Philippines, the banking system consists of three categories of banks: (1) universal and commercial banks, (2) thrift banks, and (3) rural and cooperative banks. In 2013, the Bangko Sentral ng Pilipinas, or the BSP, reported that the Philippine banking system sustained a positive performance characterized by stronger profitability, firm liquidity position, improved asset quality, and higher capitalization. In the same year, credit expansion continued, although asset quality ratios remained below the desired levels. The BSP indicated that, compared to peers in Southeast Asia, the Philippine banking system is the only one rated "positive" by Moody's Investors Service. Furthermore, Standard and Poor's had a positive outlook on the banking system of the country, together with Singapore, Indonesia, and Thailand. Finally, the Fitch Ratings assessed the Philippines along with Malaysia as "stable" as opposed to emerging economies like the People's Republic of China (PRC), India, Indonesia, Mongolia, Sri Lanka, Thailand, and Vietnam which all received a negative outlook.

The rural banking sub-system, governed by a national law called the Rural Bank Act of 1992, was designed to make the needed credit available and readily accessible in the rural areas on reasonable terms. Rural banks are more popular in the countryside, primarily the rural communities. Their role is to promote and expand the rural economy by providing the people with basic financial services. They provide credit facilities to merchants and farmers, helping the latter through the various stages of production and marketing of their produce.

The BSP reported a total of 567 registered rural banks spread in 17 regions in the Philippines as of 31 December 2013. The number declined to 543 by the end of 2014 due to consolidation and closure. Nine rural banks were also closed in 2013. Philippine Daily Inquirer (2013) reported that the BSP closed exactly 100 rural banks in the past four years: 23 in 2012, 25 in 2011, 21 in 2010, and 31 in 2009. Figure no. 1 shows the distribution of rural banks in the country per region[1]. It can be observed that rural banks are least present in highly urbanized regions and in regions with armed conflict.

By the end of 2014, the Philippine rural banking industry remained well capitalized, with a 17.8 percent capital adequacy ratio that is well above the 10 percent statutory rate and the 8 percent required by BCBS. However, the rate had noticeably declined from a high of 21.9 percent in 2011, despite the continuous growth of qualifying capital. The total assets ballooned to PHP 219 billion (USD 4.7 billion) or a staggering growth of 71.22 percent from PHP128 billion (USD 2.7 billion) in 2010. Also, loan portfolio increased by PHP 58 billion (USD 1.2 billion) or 70.88 percent to register at PHP139 billion (USD 2.9 billion) by the end of 2014. However, the quality of loans is noticeably deteriorating on a year-to-year basis, as indicated by the industry's increasing level of past due accounts and items in litigation as well as by its non-performing loans, which registered at PHP 18.88 billion (USD 0.4 billion) and PHP 16.40 billion (USD 0.3 billion), respectively.

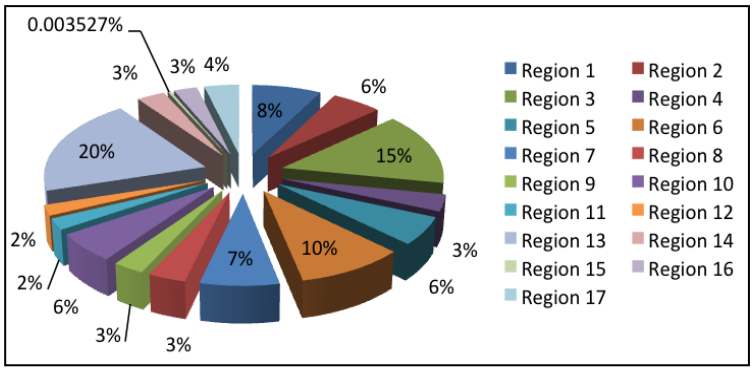

Figure no. 1 – Distribution of rural banks per region in the Philippines

As (rural) banks render credit services, they are exposed to credit risks. Defaults on loans can either be potential or real. When default materializes, it poses serious obstacles, primarily for the lender-banks. As rural banks directly influence the countryside, their impact on rural communities is more easily felt by and deeply embedded in the lives of the people. Meslier-Crouzill *et al.* (2012) found out the presence of rural banks, characterized by their expertise in financing micro-entrepreneurs and poor household needs, has a positive effect on economic development in a region. Incidentally, banks influence not only economic growth but also entrepreneurship, labor market conditions, and poverty (Barth *et al.*, 2013). Needless to say, rural banks must maintain sound financial health. The need to adequately protect rural banks from potential failure as a result of disregard on credit risk and capital adequacy has motivated the conduct of this study. As the propensity for failure of rural banks is affected by the credit service delivery, the need to assess the credit risk becomes more important.

Given this backdrop, we would like to inquire how credit risk and capital adequacy impact the profitability of rural banks in the Philippines. To answer this, we are going to establish the relationship between credit risk and net profit, as well as the relationship between capital adequacy ratio and net profit. The following specific research objectives are set:

1. To identify a measure of credit risk, capital adequacy, and bank profitability; and to propose an econometric model that will estimate its causation with profitability;
2. To determine if credit risk and capital adequacy ratio have a significant impact on the profitability, measured by return on assets (ROA) and return on equity (ROE), of rural banks in the Philippines; and
3. To generate policy recommendations on how rural banks must maintain sound financial health in order to hedge from potential failure as a result of disregard on credit risk and capital adequacy.

While previous studies have investigated various aspects of managing banks, most of them concentrated on commercial and other large banks. This study focuses on Philippine rural banks, providing empirical evidence on the unique status of their credit risk and capital adequacy profile. This study contributes to existing literature on risk management by providing sufficient basis to infer that credit risk impacts negatively on profitability of rural banks and that capital management remains to be a recurring concern of the bank. More importantly, the study reinforces the need to enhance the capacity of rural banks in identifying and assessing the risks that impact more significantly on their financial performance.

2. CREDIT RISK, CAPITAL ADEQUACY, AND PROFITABILITY

2.1 Credit Risk

The Basel Committee on Banking Supervision (2000) defines credit risk as "the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms." It can be construed that loans are the largest and most obvious sources of credit risk for most banks. Generally, borrowers are likely to default when investment projects funded by borrowed funds do not perform well (i.e., they fail to generate positive returns). Kargi (2014) cited that the most profound impact of high nonperforming loans in bank portfolio is the reduction in profitability.

Credit risk is measured by the ratio of loan loss reserves to gross total loans portfolio. It indicates how much of the total loan portfolio has been provided with the corresponding reserve but has not been charged off. This implies that the higher the credit ratio is, the poorer is the loan quality.

Incidentally, credit risk can be found in all activities in which success depends on counterparty performance. In the case of banks, credit risk arises any time bank funds are extended, committed, invested, or otherwise exposed through actual or implied contractual arrangements, whether reflected on or off the balance sheet (Kargi, 2014). Thus, banks also face credit risk in various financial instruments other than loans, including acceptances, interbank transactions, trade financing, foreign exchange transactions, financial futures, swaps, bonds, equities, options, and in the extension of commitments and guarantees, and the settlement of transactions.

The guidelines on sound credit risk management practices in the Philippines are embodied in Circular No. 855, series of 2014, issued by the Bangko Sentral ng Pilipinas (2014). It requires banks to develop and document a sound loan loss methodology that reasonably estimates provisions for credits in a timely manner. The effective management of credit risk, regarded as a critical component of a comprehensive approach to risk management, should cover the entire portfolio as well as the individual loans. Banks should also consider the relationships between credit risk and other form of diversifiable and non-diversifiable risks.

2.2 Capital Adequacy

Capital adequacy ratio is a measure of a bank's financial strength expressed by the ratio of its capital (net worth and subordinated debt) to its risk-weighted credit exposure in the form of loans (Economic Times Bureau, 2010). It is also known as capital risk-weighted assets ratio and is used to protect depositors and promote the stability and efficiency of financial systems.

The rationale for instituting standards for the capital adequacy ratio is that banks need to hold a minimum level of shareholders' equity depending on the amount of loans and their riskiness. The Basel Committee on Banking Supervision (2015) or the BCBS has expanded the composition of capital adequacy over the years. Two types of capital are measured: (1) tier one capital, which can absorb losses without a bank being required to cease trading, and (2) tier two capital, which can absorb losses in the event of a winding-up and provide a lesser degree of protection to depositors.

Iloska (2014) indicated that the strength and quality of capital influence bank profitability. Clearly, lower capital ratios imply higher leverage and risk leading to higher borrowing costs. Flamini *et al.* (2009) forwarded that capital is an important variable in

determining bank profitability and a well-capitalized bank could provide a signal to the market that a better-than-average performance should be expected. Well-capitalized banks are less risky and generate lower profits as they are perceived to be safer. Thus, a negative association between capital and profits is generally expected. On the contrary, Naceur (2003) expected a higher equity to asset ratio to result in a lower need for external funding and therefore higher profitability. Overall, a well-capitalized bank is believed to face reduced cost of funding and lower chance of going bankrupt.

2.3 Bank Profitability

Profitability is the earning power of a business entity. It is an important element of the bank's value creation and a critical step toward shareholders' wealth maximization. Previous studies have used ROA, computed by dividing the net income by the total assets of a bank, as the primary measure of bank profitability (Abbas *et al.*, 2014; Akhtar *et al.*, 2011; Ali *et al.*, 2011; Aremu *et al.*, 2013; Erina and Lace, 2013; Flamini *et al.*, 2009; Gizaw *et al.*, 2015; Iloska, 2014; Kargi, 2014; Kolapo *et al.*, 2012; Obamuyi, 2013; Poudel, 2012; Roman and Danuletiu, 2013; Scott and Arias, 2011; Staikouras and Wood, 2004; Vong and Chan, 2009). In addition, ROE has also been used by Abbas *et al.*, 2014; Akhtar *et al.*, 2011; Ali *et al.*, 2011; Ante and Ana, 2013; Aremu *et al.*, 2013; Erina and Lace, 2013; Roman and Danuletiu, 2013; Scott and Arias, 2011 and Gizaw *et al.* (2015). An alternative measure used by Naceur (2003) and Aremu *et al.* (2013) was net interest margin.

2.4 Relationship of Variables

Various studies have shown the negative impact of credit risk on profitability. Staikouras and Wood (2004) found out that credit risk has a significant negative influence on the ROA when they used Ordinary Least Squares (OLS) and fixed effect model of regression in studying the determinants of profitability of 685 banks in 13 European economies. Likewise, Ali *et al.* (2011) learned that credit risk has negative effect on ROA when they examined 22 commercial banks in Pakistan. This finding is consistent with the study of Kargi (2014) who concluded that credit risk has a significant negative impact on ROA based on the study of six banks in Nigeria. Likewise, Iloska (2014) identified loan loss provision as a driver of profitability that exhibited a negative relationship with ROA as a result of a study of 17 banks in Macedonia. Moreover, Erina and Lace (2013) and Abbas *et al.* (2014) have the same conclusion that credit risk negatively affects ROA and ROE. Erina and Lace (2013) made the conclusion when they used linear regression model in studying 31 commercial banks in Latvia. Furthermore, Abbas *et al.* (2014) came up with the same inference in their research of 21 banks in Pakistan.

Flamini *et al.* (2009) derived the same results when they investigated 389 commercial banks in 41 Sub-Saharan Africa economies through the application of the General Method of Moments (GMM). When Kolapo *et al.* (2012) used panel model analysis for five commercial banks in Nigeria, they concluded that credit risk has significant impact on ROA. Moreover, Gizaw *et al.* (2015) deduced that credit risk has significant impact on profitability when they studied 18 Ethiopian commercial banks. Finally, Aremu *et al.* (2013) resolved that credit risk is a significant driver that affected bank profitability both in the long run and the short run – an observation made when they used the cointegration and Error Correction Mechanism (ECM) in the First Bank of Nigeria.

Regarding capital adequacy ratio, Staikouras and Wood (2004) used OLS and fixed effect model of regression in investigating the 685 banks in 13 European economies and found out that equity to assets ratio has consistently the same sign and level of significance with profitability, suggesting that banks with greater levels of equity are relatively more profitable. Roman and Danuletiu (2013) also concluded that capital adequacy has a positive, direct relationship with profitability when they used multiple linear regressions to examine 15 commercial banks in Romania.

Vong and Chan (2009) discovered that capital ratio has significant impact on ROA when they used panel regression in five commercial banks in Macao SAR. They concluded that capital structure is of paramount importance in affecting bank profitability. Akhtar *et al.* (2011) similarly concluded that in six Islamic banks in Pakistan, capital adequacy has a positive effect on ROA. Obamuyi (2013) found out that capital has a statistically significant effect on ROA in their fixed effect regression model for 20 banks in Nigeria. Consistently, Akhtar *et al.* (2011) also found out that capital adequacy has positive effect on ROE, a finding coherent with Scott and Arias (2011) who discovered that there is a positive relationship between capital to asset ratio and ROE when they studied five banks in the United States of America (USA).

The only research with a unique result is that of Poudel (2012) who uncovered that capital adequacy ratio has an inverse impact on bank's profitability, based on a study of 31 banks in Nepal.

3. FRAMEWORK AND METHOD

3.1 Conceptual Framework

This study was premised on the risk bearing theory of profit developed by Hawley (1900). It espouses that the essential function of an entrepreneur is to take risks, a function that cannot be delegated to anybody else. It contends that profit is a reward for risk bearing. The theory further posits that some risks are inherent in every business enterprise in view of the speculative nature of business. Thus, in the business of banking, the management has to bear the risk in order to get profit being the reward for the risk taking. As Hawley (1900) pointed out, the degree of risk varies in different businesses, yet there is a positive relationship between risk and profit.

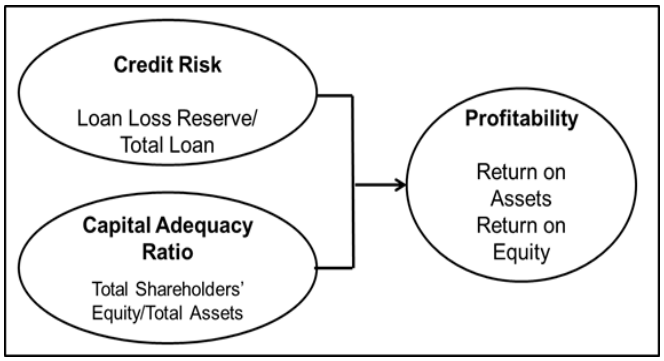

Figure no 2 – Conceptual Framework

Cognizant of the importance of profitability in a bank, we examined the impact of credit risk and capital adequacy ratio (exogenous variables) on profitability (endogenous variable), as seen from Figure no. 2. Credit risk is obtained by dividing the loan loss reserve by the total loan portfolio. A high credit risk index indicates that banks have a higher level of problematic loans. On the other hand, capital adequacy ratio is computed by dividing the total shareholders' equity by the total assets. A high capital adequacy ratio indicates that bank owners have share bigger than the creditors in the assets of the bank. Finally, profitability is measured in two aspects: ROA (net profit/total assets) and ROE (net profit/total equity).

However, since we are determining the causation between credit risk and capital adequacy with profitability, using ROA and ROE as endogenous variables is plagued with misspecification errors because total assets (component of capital adequacy ratio) also comprises ROA. Likewise, total shareholders' equity (also a component of capital adequacy ratio) also comprises ROE through total equity. Hence, in this study, we would just settle with net profit after taxes as a measure of profitability.

3.2 Method

Data on total loan portfolio, loan loss reserves, total assets, shareholders' equity, total equity, and net profit after tax were sourced to derive the figures for credit risk and capital adequacy. The data was sourced from the report furnished by the Systems and Reports Management Division of the BSP. We subject to the Arellano-Bond Dynamic Panel Data Estimation the five-year (2009-2013) financial data coming from 567 registered rural banks in the Philippines as of December 31, 2013. Banks with reported negative net profit (i.e., negative ROA and ROE) were excluded. Hence, 330 banks with positive values in these variables remained and were analyzed using Equation no. 1.

The data was logarithmically transformed before implementing the regression procedure. Logarithmic transformation is done in consideration of the non-linear relationship that may exist between the exogenous and endogenous variables (Gujarati and Porter, 2009). Moreover, according to Benoit (2011), using the logarithm of one or more variables makes the effective relationship non-linear, while still preserving the linear model. In addition, it is also a convenient method of transforming a highly skewed variable into one that is more approximately normal (Benoit, 2011). Lastly, Gujarati and Porter (2009) also emphasized that this is a way by which we can standardize the unit of analysis and take into consideration the presence of outliers.

$$\ln NPAT_{it} = f(\ln CRSK_{it}, \ln CADR_{it}) + \varepsilon_{it} \quad (1)$$

where:

- $\ln NPAT_{it}$ is the natural logarithm of net profit after taxes for the i^{th} rural bank at year t. This is the company's definitive "bottom line" for a given accounting period. It shows what the company earned after all its expenses, charge-offs, depreciation and taxes have been deducted.
- $\ln CRSK_{it}$ is the natural logarithm of credit risk for the i^{th} rural bank at year t. Credit risk is defined as the risk of default on a debt that may arise from a borrower failing to make required payments. This is computed as the ratio between Loan Loss Reserves and Gross Total Loan Portfolio.
- $\ln CADR_{it}$ is the natural logarithm of capital adequacy ratio for the i^{th} rural bank at year t. Capital adequacy ratio measures a rural bank's financial strength expressed by the ratio of its capital to its risk-weighted credit exposure in the form of loans. This is computed as the ratio of Total Shareholders' Equity and Total Assets.
- ε_{it} is the stochastic disturbance term that captures all other variables not included in the model.

We estimate Equation no. 1 using the Arellano-Bond Dynamic Panel Data Estimation. It is a GMM estimator used to estimate dynamic panel data models. Unlike static panel data models, dynamic panel data models include lagged levels of the dependent variable as regressors. Furthermore, traditional static panel data model estimators (e.g. fixed effects and random effects estimators) are inconsistent not only because lags of the dependent variable are necessarily correlated with the idiosyncratic error but also because of the presence of endogenous regressors (Greene, 2003).

Likewise, according to Mileva (2007), a number of econometric problems may arise from estimating Equation no. 1 using traditional panel data estimators. First, credit risk and capital adequacy are highly endogenous. Because causality may run in both directions – from capital inflows to investment and vice versa – these regressors may be correlated with the stochastic disturbance term. Second, time-invariant bank characteristics (fixed effects), such as geography and demographics, may be correlated with the explanatory variables. The fixed effects are contained in the stochastic disturbance term in Equation no. 1, which consists of the unobserved country-specific effects and the observation specific errors. Third, any presence of the lagged dependent variable on the right hand side of Equation no. 1 gives rise to autocorrelation. Fourth, the panel dataset has a short time dimension (t=5) and a larger country dimension (i=330).

To solve the first and second problem, one would usually use fixed-effects instrumental variables estimation (two-stage least squares or 2SLS). However, instruments would most likely be weak. With weak instruments, the fixed-effects IV estimators are likely to be biased in the way of the OLS estimators. Therefore, the Arellano and Bond (1991) difference GMM estimator, first proposed by Holtz-Eakin *et al.* (1988) is appropriate. Instead of using only the exogenous instruments, lagged levels of the endogenous regressors are also added. This makes the endogenous variables pre-determined and, therefore, not correlated with the stochastic disturbance term in Equation no. 1.

Furthermore, according to Mileva (2007) to cope with the second problem (fixed effects), the first-differenced lagged dependent variable is instrumented with its past levels. Finally, the Arellano-Bond estimator was designed for short time periods but large cross section panels.

4. RESULTS AND DISCUSSION

4.1 Credit Risk, Capital Adequacy, and Profitability Profile of Rural Banks

Rural banks register an average of 7.75 percent for credit risk from 2009 to 2013, as seen from Table no. 1. On the average, the sample rural banks have 7.75 percent of their total loan portfolio covered by reserves. The credit risk index is distributed in a leptokurtic (K=7.72) manner and positively skewed (S=2.24). The Jaque-Bera test supports that the credit risk is not normally distributed (JB=5,449.46). This distribution further shows that half of the rural banks had a credit risk index that is higher than 6.16 percent. Data show that while some banks have less than one percent credit risk index, others have as high as 55.18 percent.

Moreover, rural banks have a 40.67 percent mean capital adequacy ratio, which is far above the 10 percent statutory rate set by the BSP and the 8 percent required by BCBS. This indicates that rural banks are well-capitalized and have the high capacity to withstand shocks that could possibly be caused by loan defaults. While half of the rural banks have higher than 17.80 percent capital adequacy ratio, some have a negative capital adequacy ratio (minimum of -0.04300), implying the insufficiency of capital. It can be inferred that

the capital accounts of those with a negative ratio have been diminished by losses from operations and other direct capital charges, such as prior period adjustments on loan loss reserves. Also, their shareholders have yet to infuse the required capital to cover the bank's capital deficiency or prepare a capital build up plan acceptable to the BSP.

Table no. 1 – Descriptive Statistics

Descriptive Statistics	Credit Risk	Capital Adequacy Ratio	Return on Assets	Return on Equity
Mean (in '000)	0.0775	0.4067	0.0220	0.1033
Median (in '000)	0.0616	0.1780	0.0178	0.0876
Mode (in '000)	0.1084	0.1342	0.0396	0.1238
Standard Deviation	0.0598	2.6802	0.0185	0.0807
Kurtosis	7.7207	1,174.3537	10.0436	31.5830
Skewness	2.2421	32.1670	2.4631	3.5753
Minimum (in '000)	0.0086	-0.0430	0.0001	0.0004
Maximum (in '000)	0.5518	100.2669	0.1780	1.1804
Count	1,650	1,650	1,650	1,650
Jarque-Bera test	5,449.46	94,523,700	8,553.43	71,655.70
p-value	0.0000	0.0000	0.0000	0.0000

4.2 Profitability

From Table no. 1, profitability, measured in terms of ROA, is fairly low at 2.20 percent. ROA was likewise not normally distributed as indicated by the Jarque-Bera test (JB=8,553.43), with a leptokurtic (K=10.04) and positively skewed distribution (S=2.46), indicating that half of the rural banks had ROA higher than 1.7 percent. Data show that some banks have as high as 17.79 percent ROA while others have even less than one percent. ROE averaged at 10.33 percent; it was highly leptokurtic (K=31.58). Data also show that majority of the banks had a ROE of 12.38 percent and the maximum ROE was 118 percent. The distribution was highly positively skewed (S=3.57), with half of the rural banks having a ROE higher than 8.7 percent. Similarly, the distribution is not normal as indicated by the Jarque-Bera test (JB=71655.7).

The standard deviations for the four financial measures showed that the average variability of data from the mean is highest in capital adequacy ratio (2.6802) and lowest in ROA (0.0185).

4.3 Results of the Arellano-Bond Dynamic Panel Estimation

The results of the Arellano-Bond Dynamic Panel Estimation are shown in Table no. 2. We present the results of the regression using original and logged values. To verify the findings of the literature regarding the effects of credit risk and capital adequacy on profitability, we also estimated a model wherein original and logged values of ROA and ROE are the endogenous variables. However, due to endogeneity bias and the issues confronting the use of financial ratios as endogenous variable, we estimated Equation no. 1 using the original and logged values of net profit after taxes.

From the empirical results in Table no. 2, it can be seen that credit risk has a negative impact on both ROA and ROE but is statistically insignificant. However, it has a negative and statistically significant impact on net profit after taxes. This validates the negative

relationship between credit risk and profitability found by Staikouras and Wood (2004), Ali *et al.* (2011), Kargi (2014), Iloska (2014), Erina and Lace (2013), Abbas *et al.* (2014), Kolapo *et al.* (2012), Gizaw *et al.* (2015), and Aremu *et al.* (2013). This also confirms the GMM results generated by Flamini *et al.* (2009).

Table no. 2 – Results of the Arellano-Bond Dynamic Panel Estimation

Variables	$ROAS_{it}$	$ROEQ_{it}$	$lnROAS_{it}$	$lnROEQ_{it}$	$NPAT_{it}$	$lnNPAT_{it}$
Lag (1) of Y_{it}	0.5478^	0.0574	0.4556^	0.2905^	0.3130^	0.3416^
$CRSK_{it}$	-0.0133	-0.0014			-1.6023~	
$CADR_{it}$	1.2550^	-0.0320			-0.1672	
$lnCRSK_{it}$			0.0527	0.0049		0.0086
$lnCADR_{it}$			0.3846^	-0.0179		0.0236
Constant	-2.3076^	2.7785^	-0.0580*	-0.0430	879.7642^	4.4791^
# of Obs	1,701	1,701	1,701	1,701	1,701	1,701
# of Groups	567	567	567	567	567	567
Prob > chi^2	0.0000	0.3586	0.0000	0.0000	0.0000	0.0134

*Notes: ^ Statistically significant at the 1 percent; * Statistically significant at the 5 percent; ~ Statistically significant at the 10 percent*

The negative relationship between credit risk and profitability supports the validity of loan loss reserves as an indicator of credit risk or risk of default. Understandably, loan loss reserve is the portion of a bank's investible funds set aside to cover estimated losses in its loan portfolio. Hence, each time a loan is made, the credit risk increases and the said reserve increases correspondingly. However, when loans are repaid, this reserve shrinks accordingly.

Any bank that maintains a high level of loan loss reserves shows that its loan portfolio quality is weak – either most are non-performing or past due – which explains the maintenance of a corresponding higher level of loan loss provisioning. Consequently, if a bank's loan portfolio is saddled with non-performing and/or past due loans, the yield in the form of interest income from these loans decreases, resulting in lower net income, and therefore, lower ROA and ROE.

Conversely, if a bank prudently lends, there is a high probability that it is profitable. As required by the central bank, all banks need to adopt an adequate and effective credit risk management framework, including the implementation of sound credit risk management practices commensurate to their credit risk taking appetite. Prudent lending yields high quality loans, requires a lower amount of loan loss provisioning, and results in low credit risk index and higher net income, ROA, and ROE.

It can also be seen from Table no. 2 that capital adequacy has ambiguous and statistically insignificant effects on ROA, ROE (original and logged), and net profit after taxes (logged). In addition, its effect on net profit after taxes is negative and statistically significant. These results deviate from the positive and statistically significant findings of Staikouras and Wood (2004), Roman and Danuletiu (2013), Vong and Chan (2009), Akhtar *et al.* (2011), Obamuyi (2013), and Scott and Arias (2011). Likewise, this is also contrary to the principle that banks with more capacity to pay or cover for credit defaults tend to be more profitable.

We do not discount the fact that higher capital, being one of the sources of investible funds, and higher assets, being a direct source of income, would definitely result in profits, as long as these assets are earning or performing. However, the results we generated show otherwise. Our explanation for this finding arises from the impact of systematic risks, which

we did not explicitly capture. Furthermore, this could also be explained by the effect of financial crisis which makes profitability influenced more by economic factors rather than bank-specific factors.

Indeed, capital adequacy signals a bank's financial strength and resiliency. It is used to cushion off non-recurring losses. Hence, capital serves as an insurance to depositors, regulatory authorities, and the public about the bank's going-concern status and continued financial viability. A bank with capital adequacy provides the depositor the confidence that his/her money is safe and the public that the bank is in a position to give genuine consideration to its credit and other banking needs in both good and bad times. For regulatory authorities, a bank with adequate capital is the first step to prudent banking and an assurance of its ability to continuously operate and provide the necessary financial services. However, certain risks (i.e., diversifiable and non-diversifiable) have to be given weight in the analysis.

The methodology to derive the abovementioned results can be extended to other bank groupings (i.e., universal, commercial, and thrift banks) not only in the Philippines but also in other economies. Since banks are also governed by a number of policies that is local to their home country, there might be differences in the direction of relationships and magnitude of impacts. Likewise, the possibility of variations in results might be due to the velocity of money in a certain economy, degree of exposure to local and international risks, and other banking policies. Additional variables may also be necessary to deepen the results.

5. CONCLUSIONS AND RECOMMENDATIONS

Empirical evidence has consistently established that credit risk is negatively related with measures of profitability of rural banks in the Philippines. On the other hand, capital adequacy has an ambiguous effect on profitability, which is contrary to theory saying that banks with more capacity to pay for credit defaults should be more profitable. Despite estimating various models, capital adequacy also has a statistically insignificant effect on the profitability of rural banks in the Philippines. Such findings can be ascribed to the lingering effects of financial crisis and the role that risks play in the financial sector.

In addressing the first research objective, we have defined a rural bank's net profit after tax as a measure of profitability as opposed to ROA and ROE due to misspecification errors that will arise when applied in an econometric model. Meanwhile, we have followed the theoretical measures of credit risk and capital adequacy.

In addressing the second research objective, using the Arellano-Bond Dynamic Panel Estimation, we have determined that credit risk has a negative and statistically significant impact on profitability, whether it is ROA, ROE, or net profit after taxes. However, capital adequacy has an ambiguous yet statistically insignificant impact on the profitability of rural banks in the Philippines. Therefore, no definite conclusion can be established on the impact of capital adequacy ratio on the profitability of the rural banks.

In addressing the third research objective, considering the relationship between credit risk and profitability, rural bank managers must expand efforts to credit risk management, especially to control the non-performing loans. This meant that that there is a need for stricter measures in evaluating a borrower's ability to pay back. Furthermore, even though we were not able to establish a significant relationship between capital adequacy and profitability, we do not conclude that it is not a critical factor. We conclude that it is an essential aspect of a rural bank's risk management process, which should be given a huge amount of attention.

Likewise, results suggest that the profitability of rural banks varies with the riskiness of its loan portfolio. Hence, it may be imperative for the bank to understand other risk factors, which may have greater impact on its financial performance (i.e., ROA and ROE). While the study showed that capital adequacy has no significant impact on profitability, it suggests the need for rural banks to examine more deeply if capital infusion would result in higher profitability than increasing debts.

While ROA, ROE, and net profit after taxes are established measures for profitability, various studies have deemed that they are not the ultimate test of profitability. Hence, rural banks as well the bank regulators should come up with a better risk-adjusted performance measurement to support their strategies. Correspondingly, rural banks should establish credit risk management that defines the process from initiation to approval of loans, taking into consideration the sound credit risk management practices issued by regulatory bodies. Rural banks need to enhance internal control measures to ensure the strict implementation of internal processes on lending operations. They may also consider reducing operational risk by installing up-to-date systems of management information and technology. As a preventive mechanism, bank management needs to craft disaster recovery plans in light of frequently recurring and devastating natural disasters brought about by climate change.

It may also prove advantageous to banks to assess the minimum level of capital that is most efficient for them. The mean capital adequacy ratio of 40.67 percent (Table no. 1) suggests that many rural banks are over-capitalized. As such, they can potentially shed a portion of their capital through loan expansion but capped with stringent credit risk management that would result in higher profits. Under current regulations in the Philippines, the minimum capital adequacy ratio is set at 10 percent.

There might also be a need to scrutinize the level of loan loss reserves. The BSP may use a higher level of loan loss reserves ratio as a threshold or cut-off for point for stronger supervisory actions. It may be necessary to pin-point exactly the cut-off for loan loss reserves ratio. Moreover, it may consider requiring a minimum threshold for rural banks in terms of credit risk indicators in order to maintain competitiveness and capital adequacy.

As banks with capital inadequacy are vulnerable to financial distress, the BSP may consider enhancing its incentives on proposals for mergers, consolidations, and acquisitions among rural banks or other strategic alliances and business combinations, primarily for economies of scale and other valuable reasons. The BSP and other bank regulators need to strengthen the monitoring of banks, especially off-site monitoring, as a way to scrutinize the reports submitted regularly by the rural banks. This could supplement the spot examinations of rural banks which the regulatory government agencies cannot conduct regularly. An efficient and effective off-site monitoring may serve as an early warning system and expose various dealings and transactions that the rural banks might undertake relative to their loans and other non-performing assets. To realize these, the regulatory bodies need to be equipped with enhanced information technology systems that can monitor loan losses, capital adequacy, and other credit and profitability indicators off-site.

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Notes

[1] Region 1: Ilocos; Region 2: Cagayan Valley; Region 3: Central Luzon; Region 4: CALABARZON; Region 5: Bicol; Region 6: Western Visayas; Region 7: Central Visayas; Region 8: Eastern Visayas; Region 9: Zamboanga Peninsula; Region 10: Northern Mindanao; Region 11: Davao; Region 12: Soccsksargen; Region 13: National Capital Region; Region 14: Cordillera Administrative Region; Region 15: Autonomous Region in Muslim Mindanao; Region 16: Caraga; Region 17: MIMAROPA. It is only in 29 May 2015 that President Benigno Aquino III created Region 18: Negros Island Region, comprising the provinces of Negros Occidental (from Region 6) and Negros Oriental (from Region 7) by virtue of Executive Order No. 183.