Factors Affecting the Profitability of Banks in Developing Countries

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Abstract

This study investigates the determinants of the profitability of banks in developing countries. We estimate multiple linear regression models by the least-squares fixed effects estimator, using bank-level panel data for 230 banks from 31 countries, for the years 2011 to 2016. The results of this study show that many bank-specific factors significantly affect banks' profitability, including capital ratio, bank size, management efficiency, credit risk, and diversification. Furthermore, we find that there is a quadratic relationship between profitability and capital ratio, and there is an optimum level of capital ratio that maximizes profitability. Similarly, we find a quadratic relationship between profitability and bank size. The results show that various country-specific variables significantly affect banks' profitability, including per capita GDP, inflation, and corruption perception index. The findings of this study would be useful to the policymakers in the management of banks.

Keywords: Banks, Net interest margin, Profitability, Return on assets, Developing countries, Return on equity

Introduction

The banking sector plays a very important role in the economy. As the literature on the importance of the banking sector grows, increasingly there is a focus on the measurement of its performance, and ascertaining the determinants thereof. There are different approaches to measure banks' performance. The profitability of banks is the main indicator (Makkar & Singh, 2013), and is commonly measured by Return on Equity (ROE), Return on Assets (ROA), and Net Interest Margin (NIM). It is observed that some banks are more profitable, while others are less profitable. The main issue is what determines the profitability of banks. Information on the determinants of banks' profitability would help policymakers and management in designing strategies for stable and sustainable development of the banking sector (Dietrich & Wanzenried, 2009).

The factors affecting the profitability of banks include bank-specific characteristics and country-specific characteristics, also referred to as internal factors and external factors, respectively. Bank-specific characteristics include capital ratio, bank size, management efficiency, credit risk, diversification, and liquidity ratio. Country-specific factors include the per capita GDP, broad money growth rate, inflation rate, and

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corruption perception index. For the policymakers, it is also important to investigate how the macro-level variables affect the banking sector and the profitability of banks.

Banks in developing countries are operated differently as compared to developed countries. The proportion of government securities in banks' investment portfolio is larger in developing countries as compared to developed countries (Abbas & Espinoza, 2016). Lending in developing countries is more focused on companies, while in developed countries consumer lending is increasing. Furthermore, the reserve requirement is a major tool of monetary policy in developing countries. According to Buzeneca and Maino (2007), 90% of developing countries use reserve requirements as compared to 70% of developed countries. It has been observed that the improvement in the banking sector has not equally occurred across the countries. Specifically, progress in the banking and financial system has deepened in developed countries, whereas the deepening has been insignificant in developing countries (Beck, Demirguc-Kunt, & Levine, 2009). Thus, there is a need to examine what determines the profitability of banks in developing countries. The main objective of this study is to identify the determinants of the profitability of banks in developing countries.

Literature Review

This section reviews the existing literature on the determinants of banks' profitability to identify the research gap in the existing literature and the contribution of this study. Bank size is the main characteristic of a bank that affects its profitability, and it is most commonly measured as total assets. Previous studies by Demirgüç-Kunt and Huizingha (1999), Dietrich and Wanzenried (2009), Sufian and Habibullah (2009), Akbas (2012), Obamuyi (2013), and Francis (2013) found that bank size has a negative effect on the bank's profitability, while Afzal and Mirza (2010), Mirzaei and Mirzaei (2011), Aljbiri (2013), Hirindu and Kushani (2017), Alarussi and Alhaderi (2018), and Sahyouni and Wang (2018) found a positive effect. The previous studies have assumed a monotonic relationship, showing either a positive or negative effect. However, economic theory shows that there may be economies of size up to a level of the firm's size, after which there may be diseconomies. Therefore, in the present study, we test and identify whether there exists a non-monotonic relationship by estimating a quadratic functional form.

The capital ratio is also an important determinant that may affect banks' profitability. Some previous studies, assuming a monotonic relationship, found that there is a positive impact of capital ratio on profitability (Abreu & Mendes, 2001; Bashir, 2003; Brouke, 1989; Islam & Nishiyama, 2016; Mirzaei & Mirzaei, 2011; Molyneux & Thornton, 1992; Obamuyi, 2013; Samad, 2015; Satrial *et al.*, 2018). However, Scott (1976) developed a theoretical model and has shown that there is an optimum level of

capital ratio for firms. Thus, in the present study, we test whether there is a quadratic relationship between the profitability and capital ratio, and empirically estimate an optimal level of capital ratio.

There are also country-specific factors that influence the profitability of a bank. Per capita GDP is the main determinant of a bank's profitability and it is favorable when comparing the countries since it displays the relative country's performance. A higher level of per capita GDP indicates a higher level of productivity and economic activities (Petriaa, Caprarub, & Ihnatovc, 2015). Another important determinant of bank's profitability is the inflation rate. How inflation impacts profit depends on the forecasting skills. An ability to predict the correct inflation rate will most likely have a positive impact on profit. The broad money growth rate is used to examine the impact of money supply on profit. Broad money generally includes components like demand deposits and time deposits maintained with banks in addition to components of narrow money like currency in circulation. Corruption perception index is an indicator calculated to assess the level of corruption in a country. Arshad & Rizvi (2013), conclude that Corruption has a positive effect on profitability. These country-level variables have a profound impact on banks' profitability.

Most of the previous studies examined the determinants of profitability using data from a single country, such as USA (Scott,1976), USA (Cornett, Ors, & Tehranian, 2002), Tunisia (Naceur, 2003), Italy (Acharya, Hasan, & Saunders, 2006), Germany (Hayden, Porath, & Westernhagen, 2007), Greece (Kosmidou, 2008), Bangladesh (Sufian & Habibullah, 2009), Pakistan (Afzal & Mirza, 2010), Nigeria (Ayanda, Christopher and Mudhashiru, 2013), Ghana (Gyamerah & Amoah, 2015), USA (Deng, 2016), Sri Lanka (Hirindu & Kushani, 2017), Saudi Arabia (Javaid & Alalawi, 2018) and Turkey (Isik, Kosaroglu & Demirci, 2018). The other studies focused on a group of countries, such as European countries (Molyneux & Thornton,1992), developed and developing countries (Demirgüç-Kunt & Huizingha, 1999, 2001), MENA countries (Khediri & Khedhiri, 2009; Bashir, 2003), Sub-Saharan countries (Francis, 2013), EU27 countries (Petriaa, Capraru, & Inhatov, 2015), BRICS countries (Umar & Sun, 2016), post-Soviet countries (Yüksel *et al.*, 2018), and ASEAN countries (Satrial *et al.*, 2018).

The previous studies have analyzed the determinants of profitability using data from either one country or a group of few countries in a region. The exception is Demirgüç-Kunt and Huizingha (1999), who used data from many countries across the world. They found that the bank size had a negative effect on profitability, while market concentration had a positive effect. This is an old study, based on data from 1988-95. Furthermore, the major limitation of their study was that they assumed a monotonic relationship between bank size and profitability, resulting in the negative effect of bank

size on profitability. However, as discussed above, there may be a non-monotonic relationship between bank size and profitability.

In the present study, we examine the determinants of profitability using a rich dataset of 230 banks from 31 countries from 2011 to 2016. Furthermore, this study tests to identify whether there exists a non-monotonic effect of bank size and capital ratio on profitability.

Research Methodology

Data

Bank-specific data are collected from the Orbis Focus Group database and country-specific data are obtained from the World Development Indicators (WDI) database and Transparency International's website. According to the World Development Indicator report, countries have been categorized in the following groups with a new classification: low-income, lower-middle-income, upper-middle-income, and high-income, based on their Gross National Income (GNI) per capita (World Bank Group, 2016). As this study focuses on developing countries, high-income group countries are not considered in the data analysis. Furthermore, due to the unavailability of complete data from low-income countries, we used data from two income groups: lower and upper groups of middle-income countries. We constructed a panel data of 230 banks for the period 2011 to 2016 from 31 countries. In this study, we take 16 countries from the lower group of middle-income countries: Bangladesh, Egypt, Ghana, Indonesia, India, Kenya, Sri Lanka, Morocco, Nigeria, Nicaragua, Philippines, Pakistan, El Salvador, Tunisia, Ukraine, and Vietnam. We take 15 countries from the upper group of middle-income countries: Bulgaria, Brazil, Botswana, China, Colombia, Croatia, Mexico, Malaysia, Peru, Romania, Serbia, Russian Federation, Thailand, Turkey, and South Africa. While picking the banks, the only point kept in mind was the availability of data for six years.

Conceptual Framework and Variables

Based on the existing literature and banking related concepts, we develop the conceptual framework presented in Figure 1 while we define the variable in Table 1. As discussed above, the profitability of banks is measured by NIM, ROA, and ROE. In the literature, some studies used one or two of these profitability measures (Goddard, Molyneux, & Wilson 2004; Gyamerah & Amoah, 2015; Islam & Nishiyama, 2016; Samad, 2015), while others used all three measures (Bashir, 2003; Dietrich & Wanzenried, 2009; Isik *et al.*, 2018; Javaid *et al.*, 2011; Kosmidou, 2008; Mirzaei & Mirzaei, 2011; Sahyouni & Wang, 2018). In this study, we use each of these three measures of profitability as the dependent variable. There are two types of independent variables. Bank-specific characteristics include the capital ratio, bank size, management efficiency, credit risk, diversification, and liquidity ratio. The country-specific factors are

macroeconomic variables which include per capita GDP, broad money growth rate, inflation rate, and corruption perception.

Bank-specific Variables

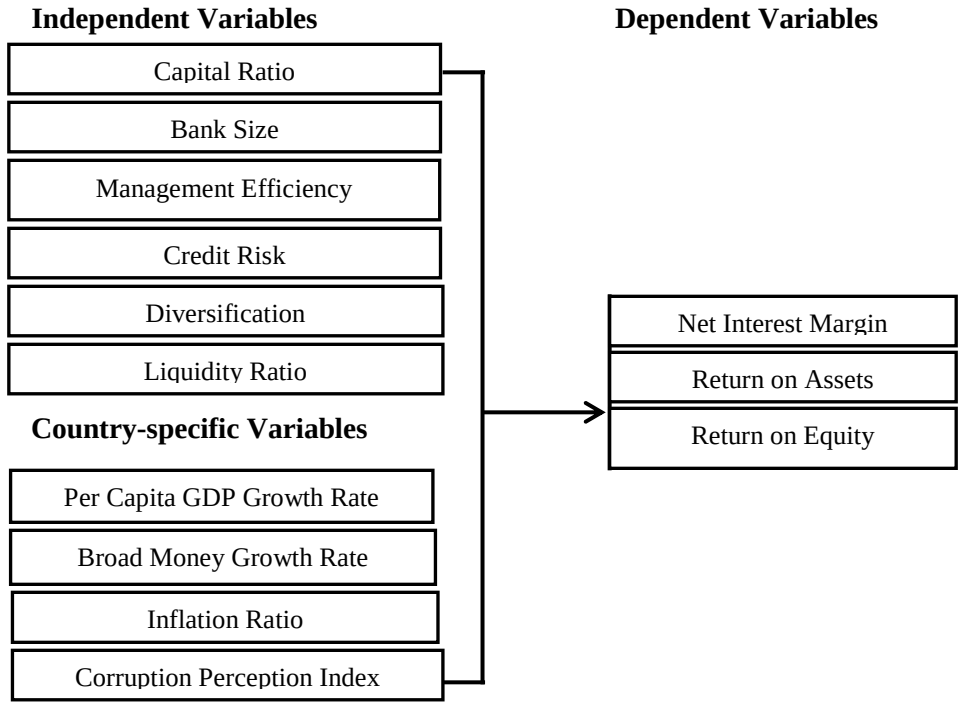

Fig. 1: *Conceptual Framework*

Source: Developed by the authors based on the literature review.

Econometric Model and Estimation Methods

We specify the following econometric model based on the theoretical framework.

$$Profitability_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 CR_{it}^2 + \beta_3 BS_{it} + \beta_4 BS_{it}^2 + \beta_5 ME_{it} + \beta_6 CRE_{it} + \beta_7 DIV_{it} + \beta_8 LR_{it} + \beta_9 GDP_{it} + \beta_{10} BMG_{it} + \beta_{11} INF_{it} + \beta_{12} CP_{it} + a_i + u_t + \varepsilon_{it} \quad (1)$$

Here, *i* is the index for the bank, *t* is the index for year, and all other variables are defined in Table 1. The above model is estimated using each measure of profitability (NIM, ROA, and ROE). Here, a_i is the unobserved other bank-specific factors that vary across banks but do not vary over time. As each bank belongs to a specific country in the data, including bank-specific fixed effects also addresses the country-specific fixed effects, which account for unobserved country-specific factors that are time-invariant. u_t is the unobserved year-specific variable that is common to all banks, and ε_{it} is the random error term, which is assumed to be normally distributed. In this study, the sample

size is large (1380 observations). The central limit theorem states that the Ordinary Least Square (OLS) estimator is approximately normally distributed if the sample size is large (Wooldridge, 2013).

The panel data includes 230 banks for six years. The unobserved year-specific effect u_t is considered as a fixed effect because the panel data is for six years, which is a small number and not a random variable. The unobserved bank-specific effects a_i can be treated as a fixed parameter or a random variable in estimating the above model. If these effects are considered as parameters, then it is referred to as a fixed-effects model. If these effects are considered as random, then it is referred to as a random-effects model. The panel data model with bank-specific fixed effects is estimated using the least-squares estimator. The random-effects model is estimated by Swamy and Arora's Estimated/Feasible Generalized Least Square (EGLS) estimator (Verbeek, 2012). The Hausman test is used to test whether the unobserved bank-specific effects are random or fixed.

In Equation (1), the independent variables include the capital ratio and its square. If both variables are significant, this will show a quadratic relationship between profitability and capital ratio. Similarly, there may be a quadratic relationship between profitability and bank size. The optimal levels of these independent variables that maximize profitability can be estimated as:

$$CR^* = -\frac{\hat{\beta}_1}{2\hat{\beta}_2} \qquad (2)$$

$$BS^* = -\frac{\hat{\beta}_3}{2\hat{\beta}_4} \qquad (3)$$

where $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$, and $\hat{\beta}_4$ are the coefficient estimates from equation (1). Profit will be maximum at a positive level of capital ratio if $\hat{\beta}_1$ is positive and $\hat{\beta}_2$ is negative, and similarly, profit will be maximum at a positive level of capital ratio if $\hat{\beta}_1$ is positive and $\hat{\beta}_2$ is negative.

Empirical Results

Descriptive Statistics

Table 1 shows the descriptive statistics of the variables over the six years. The table shows the descriptive statistics for lower, upper and all middle-income countries. The statistics show the banks in the lower group of middle-income countries, on average, have a higher mean NIM (5.5%) as compared to the upper-middle-income countries (4.5%). However, NIM for the lower group of middle-income countries has also been more volatile than that for upper-middle-income countries, as indicated by their standard

deviation. The results of our study are similar to the previous study by Demirgüç-Kunt and Huizingha (2001), who found that profitability is lower in the developed countries as compared to developing countries. The overall mean ROA is 1.3%. Like NIM, the mean ROA is also higher in the lower group of middle-income countries (1.4%) as compared to the upper group of middle-income countries (1.1%). The overall mean ROE is 10.5%. However, we find that it is lower in the lower-middle-income countries (10.1%) as compared to the upper-middle-income countries (10.9%). The capital ratio measures the equity as a percentage of the total assets. Its mean value is 11.6% in both the lower group and upper group of middle-income countries. This indicates that banks tend to have a relatively low share of equity in their assets. The bank size is measured by the total assets. The mean total assets are $38.8 billion. The average bank size is larger in upper-middle-income countries ($65.6 billion) as compared to the lower group of middle-income countries ($17 billion).

Table 1: *Descriptive Statistics from 2011-2016*

Variables	Formulas	Lower-middle-income countries		Upper-middle income countries		All middle-income countries	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Net interest margin	$\frac{Interested\ earned - Interest\ expensed}{Total\ assets}$	5.53	4.35	4.53	3.15	5.08	3.89
Return on assets	$\frac{Net\ Income}{Total\ assets}$	1.40	1.85	1.15	1.62	1.29	1.75
Return on equity	$\frac{Net\ Income}{Total\ equity}$	10.10	27.96	10.92	12.43	10.47	22.38
Capital ratio	$\frac{Total\ equity}{Total\ assets}$	11.59	6.88	11.63	6.35	11.61	6.64
Bank size (Total assets in	Total assets	17.03	42.96	65.66	310.00	38.81	211.00
Efficiency ratio	$\frac{Total\ cost}{Total\ Income}$	57.18	21.89	55.29	21.16	56.33	21.58
Credit risk	$\frac{Impaired\ loan}{Gross\ advance}$	7.54	9.67	7.03	10.34	7.31	9.98
Diversification	$\frac{Other\ Operating\ Income}{Total\ Operating\ Income}$	39.09	34.14	40.82	25.43	39.86	30.55
Liquidity ratio	$\frac{Net\ loan}{Total\ Assets}$	54.94	15.48	58.61	14.90	56.58	15.33
Per capita GDP ($)	$\frac{GDP}{Population}$	2365.02	978.13	9985.81	2970.23	5777.81	4341.28
Broad money growth rate	the sum of currency outside banks including demand deposits and time deposits.	13.67	6.95	10.39	6.08	12.21	6.77
Inflation rate	Percentage changes in consumer price index (CPI)	6.72	3.71	4.82	3.51	5.87	3.74
Corruption perception index	Indicator to assess the corruption level in a country, estimated by Transparency International (2016). Range from 0 to 100. Higher the score a country earns, lesser the corruption in that country.	31.95	5.72	38.82	8.49	35.03	7.87
Observations		672		618		1380	

Notes: All variables are reported as a percentage except bank size and per capita GDP. Bank size is in billion US dollars while per capita GDP is in US dollars.

Correlation of Independent Variables

Table 2 shows the correlation between the independent variables. The correlation analysis is used to find the relationship between the variables. Checking correlation is also used as a method for detecting multicollinearity. Table 4 reports that the highest correlation is .543, between inflation rate and broad money growth rate. All other variables have correlations much less than .543. Multicollinearity is usually an issue when the correlation is very high, such as .8 or higher (Kennedy, 2008). Therefore, variables in this study do not appear to have a multi-collinearity issue, based on the correlation analysis.

Table 2: *Correlation Matrix*

Variables	CR	BS	ME	CRE	DIV	LR	GDP	BMG	INF	CP
CR	1									
BS	-.10	1								
ME	-.15	-.13	1							
CRE	.11	-.10	.34	1						
DIV	-.11	-.00	.12	-.01	1					
LR	-.08	-.03	-.33	-.18	-.14	1				
GDP	-.06	-.08	.01	-.02	.05	.02	1			
BMG	-.11	.06	.06	-.12	-.06	.02	.33	1		
INF	-.14	-.05	.18	-.00	-.00	.01	.33	.54	1	
CP	.07	-.01	-.12	-.06	.01	-.00	-.20	-.29	-.35	1

Notes: CR: Capital ratio, BS: Bank size, ME: Management efficiency, CRE Credit risk, DIV: Diversification, LR: Liquidity ratio, GDP: Per capita GDP, BMG: Broad money growth rate, INF: Inflation rate, CP: Corruption perception index.

Regression Results

Table 3 presents the Hausman test to evaluate whether there are fixed effects or random effects for bank-specific effects in the model, as discussed in the methodology. The results show that the p-value of the chi-square statistic is less than .01, for both lower and upper group middle-income countries. Therefore, the null hypothesis of random effects is rejected at the 1% level. For year-specific effects, we use fixed effects as the panel data is for six years, which is a small number and not a random variable.

Table 3: *Results of Hausman Test for NIM, ROA and ROE*

Dep. Var.	Banks in Countries	Chi-Square Statistic	Degrees of Freedom	p-value
NIM	All middle-income countries	115.96	13	.00
	Lower group	159.15	13	.00
	Upper group	32.54	13	.00
ROA	All middle-income countries	82.08	13	.00
	Lower group	48.17	13	.00
	Upper group	98.17	13	.00
ROE	All middle-income countries	12.69	13	.47
	Lower group	31.95	13	.00
	Upper group	60.00	13	.00

Note: NIM: Net interest margin, ROA: Return on assets, ROE: Return on equity, Lower group: Lower-middle-income countries, Upper group: Upper-middle-income countries

Table 4 shows the regression results for profitability, measured by NIM. This table presents the regression results for the middle-income countries, along with the results for the two sub-sample: the lower group and upper group of middle-income countries. The results show that capital ratio and its square are statistically significant at 1%, as the p-value is less than .01 in the lower group of middle-income countries. It shows a quadratic relationship between NIM and capital ratio. As the coefficient estimate on the capital ratio is positive and the coefficient estimate on capital ratio square is negative, the quadratic relationship has a parabolic shape. This shows that the capital ratio has a positive effect on profitability up to a threshold level of capital ratio and has a negative effect after this threshold level. Furthermore, there is an optimum level of capital ratio, which is estimated at 19%, based on the coefficient estimates. In the case of upper-middle-income countries, the capital ratio has a positive effect. For the banks from all countries, the capital ratio has a quadratic relationship with NIM, and its optimum value is 15.5%. These findings are consistent with Scott (1976).

The results show that bank size and its square are statistically significant for the lower group of middle-income countries, as the p-value is less than .01. As the coefficient estimate on bank size is positive and the coefficient estimate on bank size square is negative, we find evidence of a quadratic relationship. In contrast, the results show that bank size does not affect NIM in upper-middle-income countries. These results show that the management of the banks in upper-middle-income countries is capable, irrespective of bank size, and thus profitability is not affected by bank size.

The result of management efficiency shows that the cost to income ratio is statistically significant for lower-middle-income, upper-middle-income as well as for all middle-income countries in the sample. The results show a negative relationship between cost to income ratio and NIM. If a bank has a lower cost to income ratio, then the NIM

would be higher. Similar evidence has been obtained in previous studies (e.g., Abreu & Mendes, 2001; Dietrich & Wanzenrie, 2009; Grigorian & Manole, 2006; Khediri & Khedhiri, 2009; Mirzaei & Mirzaei, 2011; Petriaa *et al*., 2015).

The results of our study show that credit risk has no significant impact on NIM in both income group countries. In our study, diversification is non-significant and has no impact on profitability (NIM) in both income group countries. Similar results were obtained in a previous study by Acharya *et al.* (2006), who showed that diversification of banks' assets is not assured to produce banks profitability.

The liquidity ratio in upper-middle-income countries is significant and has a positive impact on NIM. On the other hand, the liquidity ratio in lower-income countries is non-significant. In the previous study, there is a mix of results for the liquidity ratio. Some studies concluded a positive, while other studies concluded a negative relationship between liquidity ratio and profitability (Athanasoglou, Brissimis, & Delis, 2008; Sahyouni & Wang, 2018; Singh & Shahid, 2016).

For country-specific variables, per capita GDP income has a significant relationship and a positive impact on the profitability (NIM) in the lower group of middle-income countries. On the other hand, per capita GDP is non-significant in upper-middle-income countries. In the literature, there is a mix of results for per capita GDP (Cornett *et al.*, 2002; Dietrich & Wanzenried, 2009). Broad money growth rate and corruption perception index have no statistically significant effect on profitability. The inflation rate is statistically significant for both the lower group and upper group of middle-income countries. In the lower group of middle-income countries, the inflation rate has a positive impact on NIM. In contrast, in the upper-middle-income countries, it has a negative relationship with NIM. In previous studies, some authors found positive, while others found a negative impact of inflation on profitability (Cornett *et al.*, 2002; Naceur, 2003; Petriaa *et al.*, 2015).

Table 4 also reports the value of the R-squared for the lower-middle, upper-middle and all middle countries as .95, .94 and .94, respectively. The p-value for F-statistic is less than .01, which means that the model is overall statistically significant at the 1% level.

Table 4: *Regression Results for net interest margin (NIM) From 2011-2016*

Variables	Lower-middle-income countries		Upper-middle income countries		All middle income countries	
	Coeff. Est.	p-value	Coeff. Est.	p-value	Coeff. Est.	p-value
Bank-Specific Variables:						
Constant	-16.63	.20	34.15**	.02	-9.26	.33
Capital ratio	.15***	.00	-.03	.12	.03*	.07
Capital ratio squared	-.00***	.00	.00***	.00	-.00***	.00
Logarithm of Bank size	3.73**	.03	-3.36*	.07	2.59**	.04
Logarithm of Bank size squared	-.16***	.00	.09	.13	-.11***	.01
Management Efficiency	-.02***	.00	-.04***	.00	-.02***	.00
Credit Risk	.01	.58	-.01	.20	-.00	.70
Diversification	-.00	.39	-.00	.65	-.00	.29
Liquidity ratio	.00	.59	.05***	.00	.02***	.00
Country-Specific Variables:						
Per capita GDP	.00***	.00	.00	.11	.00***	.00
Broad money growth rate	.01	.10	-.01	.44	.00	.84
Inflation rate	.08***	.00	-.06***	.00	.02	.28
Corruption perception index	.01	.37	-.01	.42	.01	.53
No of Obs.	762		618		1380	
R-squared	.95		.94		.94	
F-statistic	82.23		65.37		72.92	
Prob (F-statistic)	.00		.00		.00	

*Notes: *, **, & *** denote significant at 10, 5, & 1 percent, respectively. In the regression, the dependent variable is the net interest margin. The F test is conducted for the overall significance of the model.*

Table 5 shows the regression results for ROA as a dependent variable. The results show a quadratic relationship between capital ratio and ROA, and this relationship also has a parabolic shape. We also find that a lower level of cost to income ratio indicates a higher level of management efficiency, which has a statistically significant effect on profitability. Credit risk is measured by impaired loans as a proportion of gross advance. We find that credit risk has a statistically significant and negative effect on ROA in lower-middle-income countries. This shows that a higher proportion of non-performing loans would lead to a lower rate of return. On the other hand, credit risk is statistically positive in upper-middle-income countries. In previous studies, some authors found positive, while others found a negative impact of credit risk on profitability (Akbas,

2012; Athanasoglou *et al.*, 2008; Petriaa *et al.*, 2015; Samad, 2015; Sufian & Habibullah, 2009).

For country-specific variables, the broad money growth rate is statistically significant at the 1% significance level and has a positive effect on ROA. Similarly, the corruption perception index has a positive effect on ROA. As defined in methodology, the higher the score of the corruption perception index a country has, the lesser the corruption in that country. Thus, the regression results show that a reduction in corruption has a positive effect on ROA. This result confirms and complements the previous work by Aburime (2009) and Arshad and Rizvi (2013), who find similar evidence for Nigerian banks and Islamic banks.

Table 5 reports the value of R-square in the lower group, upper group, and all middle-income countries as .73, .55, and .61, respectively. In each case, the p-value for F-statistic is less than .01, which means that the model is overall statistically significant at the 1% level.

Table 5: *Regression Results for Return on Assets (ROA) From 2011-2016*

Variables	Lower-Middle income countries		Upper-middle income countries		All middle income countries	
	Coeff. Est.	p-value	Coeff. Est.	p-value	Coeff. Est.	p-value
Bank-Specific Variables:						
Constant	-56.25***	.00	-35.34*	.08	-40.63***	.00
Capital ratio	.27***	.00	.17***	.00	.18***	.00
Capital ratio squared	-.00***	.00	-.00**	.04	-.00***	.01
Logarithm of Bank size	6.74***	.00	3.61	.17	4.71***	.00
Logarithm of Bank size squared	-.20***	.00	-.03	.33	-.13***	.01
Management Efficiency	-.04***	.00	.01	.14	-.02***	.00
Credit Risk	-.05***	.00	.02**	.02	-.00	.59
Diversification	.00	.16	-.00	.25	.00	.38
Liquidity ratio	-.01	.33	-.01	.19	-.01	.17
Country-Specific Variables:						
Per capita GDP	.00	.66	.00*	.06	.00***	.01
Broad money growth rate	.03***	.00	.00	.10	.03***	.00
Inflation rate	.03	.13	-.08**	.01	.00	.98
Corruption perception index	.03**	.02	.00	.81	.02*	.09
No of Observations	762		618		1380	
R-squared	.73		.55		.61	
F-statistic	11.42		5.00		7.02	
Prob (F-statistic)	.00		.00		.00	

*Notes: *, **, & *** denote significant at 10, 5, &1 percent, respectively. In the regression, the dependent variable is the return on assets. The F test is conducted for the overall significance of the model.*

Table 6 shows the regression results for the ROE as a dependent variable. Like ROA, we get almost similar results for ROE. In the lower group of middle-income countries, capital ratio and it's square, bank size and it's square, management efficiency, assets quality, per capita GDP and the inflation rate is statistically significant. However, in the upper group of middle-income countries, capital ratio and it's square, bank size and it's square, management efficiency, asset quality, and diversification are statistically significant. Here, the value of R-square values in lower-middle, upper-middle and all developing countries are .36, .66, and .35, respectively. In each case, the p-value for F-statistic is less than .01, which means that the model is overall statistically significant at the 1% level.

Table 6: *Regression Results for Return on Equity (ROE) From 2011-2016*

Variables	Lower-Middle income countries		Upper-middle income countries		All middle income countries	
	Coeff. Est.	p-value	Coeff. Est.	p-value	Coeff. Est.	p-value
Bank-Specific Variables:						
Constant	-484.26	.10	-316.34**	.02	-151.12	.41
Capital ratio	2.94***	.00	-.89***	.00	.06	.85
Capital ratio squared	-.03**	.02	.03***	.00	.01	.17
Logarithm of Bank size	67.45*	.08	42.67**	.01	24.07	.31
Logarithm of Bank size squared	-2.12*	.09	-1.29**	.02	-.81	.30
Management Efficiency	-.15**	.03	-.41***	.00	-.28***	.00
Credit Risk	-1.44***	.00	-.16***	.00	-.56***	.00
Diversification	-.02	.64	.06***	.00	.01	.53
Liquidity ratio	.07	.75	.09	.15	.10	.40
Country-Specific Variables:						
Per capita GDP	-.02***	.00	.00	.72	-.00	.16
Broad money growth rate	.25	.18	.07	.42	.21*	.07
Inflation rate	-1.29***	.00	-.25	.22	-.36	.18
Corruption perception index	.26	.42	.00	.99	.03	.85
No of Obs.	762		618		1380	
R-squared	.36		.66		.35	
F-statistic	2.43		8.17		2.49	
Prob (F-statistic)	.00		.00		.00	

*Notes: *, **, & *** denote significant at 10, 5, &1 percent, respectively. In the regression, the dependent variable is the return on equity. The F test is conducted for the overall significance of the model.*

Conclusion

The findings of this study show that many bank-specific factors significantly affect banks' profitability, including the capital ratio, bank size, management efficiency, credit risk, and diversification. Furthermore, we find that there is a quadratic relationship between profitability and capital ratio and that there is an optimum level of capital ratio that maximizes profitability. Similarly, we find a quadratic relationship between profitability and bank size. A lower level of cost to income ratio indicates a high level of management efficiency that has a statistically significant effect on profitability.

Results show that various country-specific variables significantly affect the bank's profitability. In the lower group of middle-income countries, the per capita GDP, inflation, and corruption perception index have statistically significant effects on profitability. In the case of the upper group of middle-income countries, only the inflation rate significantly affects the profitability of the bank.

The findings of this study regarding the determinants of banks' profitability would be useful to policymakers for the management of banks. Based on the findings of this study, the policymakers can design short-term, as well as long-term strategies for improving the performance of the banks. Furthermore, the central banks can predict the impact of macroeconomic variables on the banking sector, and formulate policies for its stable and sustainable development.

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