

# Bank-specific and Macroeconomic Determinants of Profitability: Evidence from Conventional Private Commercial Banks Listed on Dhaka Stock Exchange

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## Abstract:

This paper intends to indicate the bank-specific and macroeconomic determinants of bank profitability. The study was conducted using panel data set from 18 conventional private commercial banks listed in Dhaka Stock Exchange over a period of 2010 to 2019. Return on Asset (ROA) was used as dependent variable as a proxy for profitability; nine bank-specific variables and three macroeconomic variables were used as independent variables. The study was conducted using panel data regression model and Hausman test was conducted to choose between fixed effect and random effects model. Empirical results show that Non-performing loan ratio, Equity multiplier, cost to income ratio, Net interest margin, Non-interest income to total asset ratio among the bank-specific variables and Real rate of interest, Economic growth among the macroeconomic variables have significant impact on profitability. An interesting finding is that banks profitability over this period has significant negative relationship with economic growth.



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**Introduction:**

Banking sector is called lifeblood of modern economy. Efficient and effective banking system is vital for proper functioning of any economy. So it is crucial to study what variables drive the profitability of banks. Bangladesh is now one of the few fastest growing economy in the world today. The financial system of Bangladesh is extensively dominated by banks and its economy is heavily dependent on banks for growth. So Bangladesh is not out of this global trend of examining what factors drive banks' profitability on a firm- and macro-level (Saimum & Faruque,2015).

After liberation war, banking sector in Bangladesh started its journey with 6 nationalized commercial banks, 3 state owned specialized banks and 9 foreign banks. In 1981, the first private bank of Bangladesh became operational. Till now there are 6 State Owned Commercial Banks,3 specialized banks, 42 private commercial banks of which are 34 conventional banks, 8 Islami Shariah based banks and 9 Foreign Commercial Banks in Bangladesh (Source: Bangladesh Bank Website). With increased competition due to a number of new entrants, many bank like nonbank financial institutions and increased risk of failure due to problem loans, it is crucial to scrutinize the drivers of bank profitability. This academic study tries to point out the bank-specific and macroeconomic drivers and their extent of impact on bank profitability. Indicating the determinants of profitability of commercial banks would certainly help policy makers in designing their plans to improve the banks performance(Reddy,2011).

In this study there are total 12 explanatory variables including 9 bank-specific and 3 macroeconomic variables to explain a dependent variable (ROA as a measure of profitability). Non-performing loan ratio, equity multiplier, bank size, loan to deposit ratio, cost to income ratio, capital Adequacy ratio, net interest margin, non-interest income to total asset ratio and total asset turnover are bank specific variables whereas real rate of interest, inflation rate, economic growth rate are macroeconomic variables. This study covers the impact of some important aspects of banking operation including liquidity, leverage, asset quality, operating efficiency, asset size, capital adequacy, noninterest income and some important macroeconomic variables on profitability.

**Review of literature:**

Several studies were conducted to examine the determinants of profitability in Bagladesh. Matin (2017); Jahan (2014), Rahman et al. (2015); Rahaman and Akhter(2015); Saimum and Faruque (2015) are some researchers conducted this study in Bangladesh. Petria et al. (2015) tries to evaluate the determinants of banks profitability in 27 member countries of EU. They conducted the study over the period of 2004-2011. They found that liquidity risk, credit risk, efficiency of management, diversification of business and market concentration have statistically significant relationship with profitability. One of their findings is that competition has positive and significant impact on profitability. Onofrei et al. (2018) conducted their study in order to find out the determinants of bank profitability. They collect data from 96 commercial banks of seven countries of central and eastern Europe over a period of 2003-12. They found that bank-specific factors: cost to income ratio, loan loss reserves and the bank size and macroeconomic factors: GDP growth and domestic bank credit to private sectors are found to be statistically significant. Kohlscheen et al. (2018) conducted their study in order to analyze the determinants of bank profitability in emerging markets. They analyze data of 534 companies of 19 emerging market economies over the period of 2000 to 2014.They used

return on asset as proxy for profitability and bank size, GDP growth rate, short term market rate, 10-year bond yield, CPI inflation rate, the spread of the sovereign 5-year credit default swaps as proxy aggregate risk, cost efficiency, liquidity as independent variable. They found that higher long term interest rate enhances profitability whereas higher short-term interest rate reduces profitability by raising funding cost. They showed that credit growth is more important for profitability than GDP growth. They also found that financial cycle does better in predicting profitability than business cycle. Palanisamy et al. (2017) examined the determinants of bank profitability considering profit function approach. They disaggregate the factors into input, output, social factors, risk factors, macroeconomic factors and examine the effect of these factors on profitability. They collect data from selected banks from Rwanda over the period of 2001-2015. Their results showed that employee cost is the most significant variable affecting profitability. Interest income and noninterest income, deposit per branch and credit to total asset ratio also affect profitability. Alshatti (2016) seeks to identify the critical determinants of bank profitability in Jordan. The author applies a panel data set of thirteen banks over a period of 2005-2014. The study used return on equity and return on asset as a proxy for profitability and found that capital adequacy, capital and leverage have positive impact on profitability and quality of asset have negative effect on profitability. HirinduKawshala & KushaniPanditharathna. (2017) conducted the study on 12 domestic commercial banks of Srilanka over the period of 2011-2015. They used bank size, deposit, liquidity and capital as independent variable and return on equity as dependent variable. Their study showed that bank size, deposit and capital have positive and significant impact and liquidity has negative but insignificant impact. Mirzaei and Mirzaei (2011) examined the determinants of profitability of 186 medium and large commercial, real estate, Islamic and investment banks of 12 middle eastern countries over a period of 1998-2008. The researchers used OLS and GMM techniques and found that capital strength, liquidity and efficiency are the main determinants of profitability. They also found that influence has negative impact on profitability under the period considered. Kosmidou et al. (2012) conducted study to investigate the influence of bank-specific, macroeconomic and financial market structure on the profitability of UK owned banks. They collect data from 32 UK owned banks over the period of 1995 to 2002 and apply fixed effect regression to conduct the study. They found that capital strength, expense management and bank size have significant and positive impact on profitability. They also found that macroeconomic and financial market structures measures of profitability have positive but insignificant impact on profitability. Iacobelli (2017) investigates the determinants of profitability of top sixteen global banks over a period of 1980 to 2015. They used fixed effect and GMM techniques to show impact of the bank-specific and country level factors on profitability. They found that bank capital and bank productivity enhance the profitability whereas credit risk and efficiency decrease profitability. Higher level of economic growth and inflation enhance profitability. Their study also suggests positive impact of business cycle on bank profitability. They also conclude that among the macroeconomic, industry structure and bank-specific variables, bank-related factors are most significant determinants of profitability.

### Data and Variables:

A total of 12 bank-specific and macroeconomic variables were regressed to describe the profitability of banks measured by return on asset. Financial data about bank-specific variables were collected from annual reports of 18 conventional private commercial banks listed on Dhaka Stock Exchange (DSE) over the period of 2010-2019. Only 18 banks out of 23 conventional banks listed in DSE were chosen on the basis of random sampling technique.

Data about macroeconomic variables were collected from world Bank website (worldbank.org). The dependent and independent variables, their measures, notation used and expected sign are stated below:

	Variables	Measure	Notation	Expected Sign
Dependent Variables	Profitability	Net Income/Total Assets	ROA	N/A
Independent variables Bank-specific	Credit Risk	Non-performing loan/ Total loans and Advances	NPL	-
	Financial Leverage	Total Assets/Total Equity	EM	-
	Bank Size	Natural Logarithm of Total Assets		+/-
	Capital Adequacy	Tier 1 +Tier 2 capital / Risk-weighted Assets	CAR	-/+
	Lending Propensity	Total loans / Total deposits	LDR	+
	Credit Quality	Net Interest Income/ Total assets	NIM	+
	Noninterest Income Ratio	Noninterest Income/ Total Assets	NII	+
	Asset Utilization	Total Operating Revenue/ Total Assets	AU	+
	Efficiency	Total Operating Cost/ Total Operating Income	CIR	-
Independent Variables Macroeconomic	Real Interest Rate	Inflation Adjusted Interest Rate	RRI	+
	Inflation Rate	Annual Inflation Rate	IR	+/-
	Economic Growth	GDP growth	EG	+

Source: Author's research framework and hypotheses

### Methodology and Model specification:

To empirically test the effect of bank-specific and macroeconomic variables on profitability, panel data regression model was used. To choose between fixed effect and random effect model, Hausman test was applied. Durbin-watson d statistic was used to test to autocorrelation of the residuals.

The following regression models were tested in this study:

1.  $ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 EM_{it} + \beta_3 BS_{it} + \beta_4 LDR_{it} + \beta_5 CAR_{it} + \beta_6 CIR_{it} + \beta_7 NIM_{it} + \beta_8 NII_{it} + \beta_9 AU_{it} + \beta_{10} RRI_{it} + \beta_{11} IR_{it} + \beta_{12} EG_{it} + U_{it}$
2.  $ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 EM_{it} + \beta_3 BS_{it} + \beta_4 LDR_{it} + \beta_5 CAR_{it} + \beta_6 CIR_{it} + \beta_7 NIM_{it} + \beta_8 NII_{it} + \beta_9 AU_{it} + U_{it}$

### Empirical results and Analysis:

Table 1 shows the descriptive statistics of dependent and independent variables used in the study. It shows that the mean value of Return on equity is 1.07%, Non-performing loan ratio 4.85%, Equity multiplier 12.83, Capital Adequacy ratio 12.13%, Cost to income ratio 48.7%, Net interest margin 2.49%, Noninterest Income to total asset 2.03%, Asset utilization ratio 5.4%, Real rate of interest 4.9%, Annual inflation rate 6.9% and Economic growth 6.8%. The standard deviation of all variables are low that to indicate the proximity of data set of each variable to the mean value. The higher level of standard deviations for Equity multiplier and bank size indicate that there is variation in the level of leverage employed and amount of total assets among the banks included in the sample of the study.

Table 1: Descriptive statistics

	ROA	NPL	EM	BS	LDR	CAR	CIR	NIM	NII	AU	RRI	IR	EG
Mean	.01071	0.0485	12.83	12.06	.8292	0.1213	0.487	0.0249	0.0203	0.054	0.049	0.069	0.068
Maximum	.03214	0.3307	20.15	13.07	.9986	0.1793	0.840	0.0542	0.0664	0.159	0.069	0.114	0.082
Minimum	-.00076	0.0118	6.48	9.81	0.6580	0.0631	0.206	0.0048	0.0061	0.020	0.031	0.055	0.056
Std. Dev.	.00564	0.0290	2.74	0.58	.0549	0.0172	0.121	0.0101	0.0096	0.023	0.011	0.017	0.008
Observations	180	180	180	180	180	180	180	180	180	180	180	180	180

Source: Author's calculation

Table 2 shows the correlation matrix of the variables. This shows that none of the pair of independent variables are highly correlated. Multicollinearity exists when coefficient of correlation is more than .80 (Bryman and Cramer, 2001). VIF test was conducted and found that multicollinearity problem does not exist in this data set.

Table 2: Correlation matrix

	NPL	EM	BS	LDR	CAR	CIR	NIM	NII	AU	RRI	IR	EG
NPL	1.00											
EM	0.12	1.00										
BS	0.22	0.12	1.00									
LDR	-0.03	-0.13	-0.14	1.00								
CAR	0.00	0.04	0.38	-0.14	1.00							
CIR	0.19	0.23	-0.05	-0.20	0.08	1.00						
NIM	-0.21	-0.13	-0.07	0.07	0.14	0.04	1.00					
NII	-0.14	-0.22	-0.44	0.27	-0.40	0.03	0.08	1.00				
AU	-0.19	-0.31	-0.25	0.04	-0.13	-0.15	0.69	0.41	1.00			
RRI	-0.11	-0.22	-0.21	-0.19	-0.18	-0.09	0.02	0.12	0.18	1.00		
IR	-0.29	-0.33	-0.44	0.17	-0.35	-0.20	0.09	0.39	0.35	0.33	1.00	
EG	0.28	0.38	0.52	-0.08	0.56	0.19	-0.10	-0.42	-0.39	-0.57	-0.55	1.00

Source: Author's calculation

### Results and interpretations of Model 1:

Table 3 is the summary of Hausman test for Model 1. Considering the P value (1.000), we do not reject the null hypothesis that random effect model is more appropriate.

Table 3: Hausman test of model 1

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0	12	1.000

Source: Author's calculation

Table 4 shows the panel data regression result of Model 1. Model 1 consider the effect of both bank-specific and macroeconomic variables on bank's profitability. The  $R^2$  value of 0.5979 indicate that 59.79% variability of ROA is explained the independent variables included in the model. With 1% level of significance non-performing loan ratio and cost to income ratio have negative and significant impact and at 5% level of significance, real rate of interest and economic growth have negative and significant impact on ROA. Economic growth does not show expected sign with profitability. Bank size has negative but insignificant impact on profitability(ROA).Net interest margin ratio and noninterest income ratio has positive and significant impact on profitability. Loan to deposit ratio, capital adequacy and asset utilization have positive but insignificant impact on profitability. Durbin-watson statistic shows that the problem of autocorrelation is not a matter of serious concern for our model as according to Field (2009) a value under 1 and above 3 is a definite cause for concern.

Table 4: Panel data regression outputs of model 1

Dependent Variable: ROE				
Method: Panel EGLS (Cross-section random effects)				
Periods included: 10				
Cross-sections included: 18				
Total panel (balanced) observations: 180				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.2150	0.1036	2.0759	0.0394
NPL	-0.3571	0.1045	-3.4192	0.0008
EM	0.0047	0.0012	3.8333	0.0002
BS	-0.0078	0.0063	-1.2349	0.2186
LDR	0.0584	0.0570	1.0230	0.3078
CAR	0.0405	0.2158	0.1876	0.8514
CIR	-0.1266	0.0277	-4.5617	0.0000
NIM	1.6937	0.4475	3.7851	0.0002
NII	2.0379	0.3964	5.1406	0.0000
AU	0.3593	0.2147	1.6738	0.0960
RRI	-0.6801	0.3106	-2.1896	0.0299
IR	0.0792	0.2007	0.3944	0.6938
EG	-1.5010	0.6242	-2.4045	0.0173
Effects Specification				
			S.D.	Rho
Cross-section random			0.00693	0.03746
Idiosyncratic random			0.03513	0.96254
Weighted Statistics				
Root MSE	0.036660483	R-squared	0.597926174	
Mean dependent var	0.110187013	Adjusted R-squared	0.569034642	
S.D. dependent var	0.057976904	S.E. of regression	0.03806065	
Sum squared resid	0.241918387	F-statistic	20.69555074	
Durbin-Watson stat	1.357375447	Prob(F-statistic)	2.92E-27	

Source: Author's calculation

### Results and interpretations of Model 2:

Table 5 shows the summary Hausman test of Model 2. Here we reject the null hypothesis that Random effect is appropriate. So we use fixed effect model for panel data regression.

Table 5: Hausman test of model 2

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	41.601288	9	3.89E-06

Source: Author's calculation

Table 6 shows the panel data regression outputs using fixed effect model of Model 2. Model 2 considers only bank-specific variables as independent variables. The result shows that 70.06% of the variability of profitability is explained by the independent variables included in the model. Non-performing loan ratio have significant negative impact on profitability at

5% level of significance. Cost to income ratio has negative and significant impact on profitability at 1% level of significance. Capital Adequacy has negative but insignificant impact on profitability. Asset utilization ratio is insignificant but with negative sign which is unexpected. On the other hand, Noninterest income ratio has significant and positive impact on profitability at 1% level of significance. Loan to deposit ratio and net interest margin ratio have positive and significant impact on ROA at 5% level of significance. Equity multiplier and bank size have positive sign but insignificant. Durbin Watson statistic shows that problem of autocorrelation does not exist in this regression model.

Table 6: Panel data regression outputs of model 2

Dependent Variable: ROE				
Method: Panel Least Squares				
Sample: 2010 2019				
Periods included: 10				
Cross-sections included: 18				
Total panel (balanced) observations: 180				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.04205	0.12633	0.33284	0.73971
NPL	-0.22963	0.10858	-2.11488	0.03606
EM	0.00178	0.00180	0.98593	0.32572
BS	0.00114	0.00863	0.13175	0.89536
LDR	0.13809	0.06270	2.20216	0.02915
CAR	-0.27409	0.20689	-1.32479	0.18722
CIR	-0.25027	0.04917	-5.09016	0.00000
NIM	1.47808	0.73488	2.01132	0.04605
NII	3.26861	0.52485	6.22776	0.00000
AU	-0.00260	0.26708	-0.00972	0.99226
Effects Specification				
Cross-section fixed (dummy variables)				
Root MSE	0.032439554	R-squared	0.70069	
Mean dependent var	0.129871414	Adjusted R-squared	0.64982	
S.D. dependent var	0.059459461	S.E. of regression	0.03519	
Akaike info criterion	-3.718876545	Sum squared resid	0.18942	
Schwarz criterion	-3.239933017	Log likelihood	361.69889	
Hannan-Quinn criter.	-3.524685568	F-statistic	13.77571	
Durbin-Watson stat	1.6376387	Prob(F-statistic)	0.00000	

Source: Author's calculation

### Conclusion and Recommendations:

The objective of this study was to identify the bank-specific and macroeconomic determinants of profitability of conventional private commercial banks operating in Bangladesh. For this purpose, the author collected data from a sample of 18 banks listed in Dhaka Stock Exchange over the period of 2010-2019 and conducted panel data regression analysis. The results of the study show that noninterest income and net interest margin ratio have positive and statistically significant impact on profitability of sampled banks. Non-interest income is the most significant factor that positively affect profitability. Non-performing loan ratio and cost to income ratio have statistically significant and negative impact on profitability. The direction of these relationship is found as expected. This result is consistent with Mahmud et al. (2016); Saimum & Faruque(2015); Matin(2017); Petria et

al.(2013); Ally(2014) ;Dietrich and Wanzenried (2014); Sakib and Hossain(2020) and others. Bank size, capital adequacy and asset utilization ratio have no significant impact on profitability. Loan to deposit ratio (LDR) have significant and positive influence on profitability in fixed effect while insignificant under random effect model. Financial leverage has significant and positive impact on profitability in random effect model but become insignificant in fixed effect model. Among the macroeconomic variables, Economic growth and real rate of inflation have statistically significant and negative impact on bank's profitability. The direction of the relationship of economic growth and real rate of interest is not consistent with expectation. Whereas inflation rate has positive but insignificant impact and this result conforms with Onofrei et al. (2018); Dietrich and Wanzenried (2014) and others. According to the results of the study, bank management should focus on reducing level of non-performing loan and reducing operating expense simultaneously to enhance profitability. The study finds a very strong relation of non-interest income to profitability. So bank management must emphasis on increasing noninterest income by widening the sources of fee and other noninterest income as well as interest income.

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