Bank-Specific and Macroeconomic Determinants of Profitability of Bangladesh's Commercial Banks

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The study identifies bank specific characteristics and macroeconomic determinants of profitability in the Bangladesh's banking sector over the years 2000 to 2010. The study uses relevant data from a sample of 31 commercial banks in Bangladesh. The determinants are identified using multiple regression analysis. The generalised least squares method has been applied consisting of fixed effect model rather than random effect model and tested by Hausman test. The results bring out five bank specific determinants that are important in influencing profitability: capitalisation, non-traditional activities, liquidity, management quality, and size of the bank. Besides, three macroeconomic determinants significantly influence profitability including growth in GDP, inflation and concentration.

I. INTRODUCTION

The links between financial intermediation and economic growth focus on the key functions of financial systems in the saving-investment-growth nexus. Nissanke and Stein (2003) assert, these include effective channelling of funds from surplus to deficit units and ensuring an efficient transformation of funds into real productive capital. According to Levine (1998), the efficiency of financial intermediation affects country's economic growth and, at the same time, the bank (financial intermediation) insolvencies could result in systemic crises which have negative consequences for the economy as a whole. The financial intermediation also changes the maturity of the portfolios of savers and investors

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while providing the sufficient liquidity to the system as the need arises. In addition, the diversification and techniques of risk sharing and pooling affect to the reduction of risks. The banking sector in Bangladesh is one of the most important mechanisms of its financial system. In maintaining the stability of the banking system its sustainable profitability is very important.

The financial services include short and long-term credit, mortgages, pensions, savings, payments, leasing and factoring. All these services that are offered by the banking sector could reduce the incidence of poverty in Bangladesh. The profitability of the banks could ensure the sustainability of economic growth in this country.

This study has investigated the performance of the Bangladeshi banking sector using the recent financial data from 2000 to 2010. The period covered include a time of significant reforms in the country's banking sector and also the global financial crisis in 2007 to 2008 (Sufian and Habibullah 2009). Since the National Commission of Money, Credit and Banking recommendations (1986) for broad structural changes in Bangladesh's financial intermediation system, a series of actions was taken by the Bangladesh Bank to improve performance of the banks. These measures included actions such as deregulate interest rates, improve transparency, strengthening loan classification standards, improve transparency and reducing Bangladesh Bank's control over financial transaction and loan recovery. All the measures resulted in the improvement in non-performing loan ratios and significant rise in interest-related income for all Bangladeshis. Although a series of actions have been taken by the Bangladesh Bank to improve the performance of the banking system, overall profitability has remained unstable.

Meanwhile, the global financial crisis may also create an impact to the performance of the banking sector. This financial crisis really started to show its effects in the middle of 2007 and into 2008. Around the world, stock markets have fallen, large financial institutions have collapsed or been bought out. Besides, governments in even the wealthiest nations have had to come up with rescue packages to bail out their financial systems. In the case of Bangladesh, the several precautionary measures have been taken by ministries and financial institutions even though the Bangladesh government has formed a high-level technical committee.

Therefore, this study tries to examine the determinants that influence the profitability of the Bangladeshi banking sector during the period of the programme of reform and global financial crisis. The bank efficiency or

profitability could be influenced by the internal and external determinants (Sufian and Chong 2008, Athanasoglou, Brissimis and Delis 2008). The internal determinants focus on bank-specific features and are mainly influenced by a bank's management decisions and policy objectives. While the external determinants, the macroeconomic characteristics, are not related to bank management but reflect the economic and legal environment that affect the operation and performance of financial institutions.

Most of the earlier studies had found the factors that influenced the profitability or performance of the banking industry in developed countries. Nevertheless, a few literature looked into the profitability of the banks in the developing countries (Akhavein, Berger and Humphrey 1997). The existing gap evidenced through the literature has been addressed in this paper by identifying the potential internal and external determinants that may improve the profitability of the Bangladesh's commercial banks. The results of the study are likely to be useful to the concerned stakeholders such as policy makers, investors and also to the banking itself.

The paper is organised as follows: section II provides the review of relevant literature, while section III outlines the data and methodology. Section IV reports the empirical results and section V concludes the paper.

II. REVIEW OF RELEVANT LITERATURE

The determinants of banks profitability are comprised of internal or bank specific characteristics and external or macroeconomic determinants. Most of the literature related with these determinants show that they influence the performance of bank profitability all over the world. The internal determinants consist of assets quality, capitalisation, bank's non-traditional activities, management quality, liquidity and size of bank. On the other hand, the external determinants include economic growth, inflation and financial crisis (Sufian and Chong 2008, Athanasoglou, Brissimis and Delis 2008).

One group of researchers focused on the profitability analysis of either cross-country or individual country banking system (Short 1979, Brouke 1989, Demirguc-Kunt and Huizinga 2000). The other group which covers more recent studies focussed on the different scope and emphasised on the bank profitability and business cycle relationship (Bikker and Hu 2002). Berger, Hanweck and Humphrey (1987) and Barajas, Steiner and Salazar (1999) examine the banking system in the US or the emerging economies. All the above studies investigated the internal (bank specific characteristics) and external (macroeconomics) determinants of bank profitability and produced different results.

Kosmidou (2008) examined the determinants of performance of Greek banks during the years 1990 to 2002—the period of EU financial integration. The results suggested that the high return on average assets (ROAA) was found to be associated with well-capitalised banks and lower cost to income ratios. Size was positive in all cases but statistically significant only when the macroeconomic and financial structure variables entered the models. The GDP had a significant and positive impact on ROAA, meanwhile inflation has a significant negative impact. This study concludes money supply growth has no significant impact on profits, whereas the ratio of banks' assets to GDP, stock market capitalisation to banks assets and concentration are all significant and negatively related to ROAA.

Goddard, Molyneux and Wilson (2004) examined the performance of European banks across six countries. They reported a relatively weak relationship between size of bank and profitability that measured by return on equity (ROE). Only British banks explained a significantly positive relationship between off-balance-sheet business and profitability.

Molyneux and Seth (1998) analysed the performance of foreign banks in Australia over the period 1989 to 1993. The main finding of this study is that foreign banks with a full Australian license have a significantly lower market share with a return on asset (ROA) as dependent variable. The coefficients that are significantly positive include a foreign banks' home country GDP growth, and the Australian net interest margin and non-interest income.

A study by Bonin, Hasan and Wachtel (2005) examined the effect of three ownership variables (strategic foreign, majority foreign and state) on bank performance for 11 transaction countries in a panel of 225 banks from 1996 to 2000. The study generates an interesting result because none is significant when ROA is the dependent variable. This is because such measure provides mixed signals about bank performance, given the undeveloped and evolving nature of the banking sector in transition economies.

Heffernan and Fu (2008) analysed the performance of different types of Chinese banks during the 1999 to 2006 period. They suggest economic value added and the net interest margin do better than the more conventional measures of profitability, namely return on average assets (ROAA) and return on average equity (ROAE). Some financial ratios and macroeconomic variables are significant with the expected signs.

Demirguc-Kunt and Huizinga (1999) used the bank level data for the period of 1988 to 1995 for 80 countries to examine how bank characteristics and the overall banking environment affect both interest rate margins and bank returns.

This study provides a decomposition of the income effects of a number of determinants that affect depositor and borrower behaviour. Results suggest that macroeconomic and regulatory conditions have a significant impact on interest rate margins and profitability. Lower market concentration ratios lead to lower margins and profits, while the effect of foreign ownership varies between industrialised and developing countries. The foreign banks have higher margins and profits than domestic banks in developing countries, while the opposite holds in developed countries.

Saunders and Schumacher (2000) investigated the determinants of interest margins in six countries of the European Union and the US during the years 1988 to 1995. They suggest that macroeconomic volatility and regulations have a significant impact on bank interest rate margins. Besides, the results also find an important trade-off between ensuring bank solvency, as defined by high capital to asset ratios, and lowering the cost of financial services to consumers, as measured by low interest rate margins.

Angbazo (1997) studied the US banks during the years 1989 to 1993 and found that net interest margins reflected primarily credit and macroeconomic risk. Furthermore, there is evidence that net interest margins are positively related to core capital, non-interest bearing reserves, and management quality, but negatively related to liquidity risk.

Brouke (1989) and Molyneux and Thornton (1992) find out bank expenses is also a very important determinant of profitability, closely related to the notion of efficient management. Their studies suggest a positive relationship between better quality management and profitability. The similar result was also found by Guru, Staunton and Balashanmugam (2002) who examined the determinants of bank profitability in Malaysia. The study used a sample of 17 commercial banks during the 1986 to 1995 period. The determinants of the profitability consist of internal and external determinants. They reported that the efficient expenses management was one of the most significant in explaining high bank profitability. Among the macroeconomic (external determinants) indicators, high interest ratio was associated with low bank profitability and inflation was found to have a positive effect on bank performance.

A study by Molyneux and Thornton (1992) examined the determinants of bank performance across 18 countries for a period of 1986 to 1989 and found a negative and significant relationship between the level of liquidity and profitability. By contrast, Brouke (1989) investigated the performance of banks in 12 countries or territories in Europe, North America and Australia and examined the internal and external determinants of profitability. The study

reported an opposite result from a study that was conducted by Molyneux and Thornton (1992). Meanwhile, Miller and Noulas (1997) suggested the effect of credit risk on portfolio appeared to be clearly negative.

Smirlock (1985) finds a positive and significant relationship between size (internal determinant) and bank profitability that indicates that larger (smaller) the size of banks higher is (lower) the profitability of banks. Another study was done by Akhigbe and McNulty (2005) compared the profit efficiency of small (under $100 million in total assets), medium (between $100 million and 1 billion) and large (over 1 billion) commercial banks for the period of 1995 to 2001. They examined the sources of profit efficiency for each bank size. They found that the large banks were more profit efficient than small banks.

Sufian and Habibullah (2009a) have studied the determinants of the Chinese bank profitability. They assert all the determinants variables have statistically significant impact on Chinese banks' profitability. Nevertheless, the impacts are not uniform across bank types.

Mamatzakis and Remoundos (2003) investigated the determinants of the performance of Greek commercial banks over the period 1989 to 2000. This study used financial ratios, size of bank, ownership, stock market performance, market concentration, money supply and consumer price index as independent variables and found that profit was mainly explained by the financial ratios. In addition, they also found that economies of scale and money supply significantly influenced the profitability of bank.

III. DATA AND METHODOLOGY

3.1 Data Collection

The present study has gathered data from all Bangladesh commercial banks from 2000 to 2010. The source for financial data is the BankScope database produced by the Bureau van Dijk which provides the banks' balance sheets and income statements. Bankscope database contains specific data on 25,800 banks world-wide, including commercial banks in Bangladesh.

Furthermore, BankScope database presents the original currencies' data of the specific countries and provides the option to convert the data to any other currencies. The data are updated monthly. Bangladeshi Taka (BDT) is used in this study as the study involves commercial banks in Bangladesh. The information on the macroeconomics variables are retrieved from *World Development Indicators* (WDI) database.

The actual number of domestic commercial banks in Bangladeshi banks increased from year to year. However, this study selects 31 commercial banks and their operation from the year 2000 to 2010 and this is listed in Table I. In order to maintain the homogeneity, only state-owned commercial banks (SCBs) and private commercial banks (PCBs) are included in the analyses. Foreign commercial banks (FCBs) and specialised development banks (SDBs) are excluded from the sample.

TABLE I
COMMERCIAL BANKS IN BANGLADESH DURING 2000-2010

No.	Bank	Banking system
1	Agrani Bank	SCB
2	Arab Bangladesh Bank Limited - A.B. Bank Ltd	PCB
3	Bangladesh Commerce Bank Ltd	PCB
4	Bank Asia Limited	PCB
5	BRAC Bank Limited	PCB
6	City Bank Ltd	PCB
7	Dhaka Bank Limited	PCB
8	Dutch-Bangla Bank Limited	PCB
9	Eastern Bank Limited	PCB
10	Export Import Bank of Bangladesh Limited	PCB
11	First Security Bank Limited	PCB
12	Investment and Commerce Bank Limited	PCB
13	Islami Bank Bangladesh Limited	PCB
14	Jamuna Bank Ltd	PCB
15	Janata Bank	SCB
16	Mercantile Bank Limited	PCB
17	Mutual Trust Bank	PCB
18	National Bank Limited	PCB
19	National Credit and Commerce Bank Ltd.	PCB
20	One Bank Limited	PCB
21	Premier Bank Ltd (The)	PCB
22	Prime Bank Limited	PCB
23	Pubali Bank Limited	PCB
24	Rupali Bank Limited	SCB
25	Shahjalal Bank Ltd	PCB
26	Sonali Bank	SCB
27	Southeast Bank Limited	PCB
28	Standard Bank Limited	PCB
29	Trust Bank Ltd (The)	PCB
30	United Commercial Bank Ltd	PCB
31	Uttara Bank Limited	PCB

Source: Bankscope Database.

The variables used to measure profitability and its determinants are listed in Table II. This study also includes the notation and the expected effect of the determinants according to the literature.

TABLE II
DESCRIPTION OF THE VARIABLES USED IN THE REGRESSION MODEL

Variable	Description	Proxy	Hypothesised Relationship
Dependent			
lnROAA	Return on average total assets		
lnROAE	Return on average total equity	Profitability	
lnNIMs	Net interest margin		
Independent			
Bank specific characteristics (internal determinant)			
lnLLRGL	Loan loss reserve over gross loan	Asset quality	-
lnETA	Total book value of shareholders equity over total assets	Capitalisation	+/-
lnNIITA	Non-interest income over total assets	Non-traditional activities	+
lnNIETA	Non-interest expenses over total assets	Management quality	+/-
lnLOANSTA	Total loans over total assets	Liquidity	+/-
lnTA	Log of Total assets	Size	+/-
Macroeconomic (external determinants)			
lnGDP	Log of Gross domestic product	Economic growth	+/-
lnINFL	Consumer price index	Inflation	+/-
lnCR3	Three largest banks assets concentration ratio	Banking sector concentration	+/-
DUMCRIS	Dummy variables that take a value of 1 for the global financial crisis, 0 otherwise	Global financial crisis	-

Note: Internal determinants are obtained from Bankscope Database and external determinants are obtained from World Development Indicators (WDI) database.

3.2 Multiple Regression Analysis (MRA)

The main purpose of this study is to identify the potential bank specific determinants and additional control variables (macroeconomic) that influence the profitability of the Bangladeshi banking sector. Most of the previous studies used multiple regression model in order to focus on the relationship between bank profitability and explanatory variables to identify the determinants of the profitability (such as Maudos, Pastor, Francisco and Javier 2002, Sufian and Habibullah 2009b).

To examine the relationship between the efficiency of the Bangladeshi banks and explanatory variables, the standard regression model is used and it could be defined as follows for observation (bank) *i* (Coelli, Prasada-Rao and Battese 1998, Khan and Lewbel 2007, Asimakopoulos, Brissimis and Delis 2008):

$$y_{it} = \beta\, x_{it} + \varepsilon_{it} \qquad\qquad i = 1,...,N, \tag{1}$$

Where:

y_{it} is the efficiency (total, technical or allocative, as appropriate) of bank i at time t

x_{it} is the matrix of the explanatory variables (determinant)

β is the vector of coefficients

ε_{it} is a random error term representing statistical noise

i is a number of bank

t is a year

N is a number of observations in the data set

By using the profitability scores as dependent variable, this study extends equation (1) and estimates the following model:

$$\ln(\pi)_{jt} = \alpha_t + \beta_{jt}\,(\ln LLRGL_{jt} + \ln ETA_{jt} + \ln NIITA_{jt} + \ln NIETA_{jt} + \ln LOANSTA_{jt} + \ln TA_{jt}$$

$$+ \ln GDP_{jt} + \ln INFL_{jt} + \ln CR3_{jt} + DUMCRIS_{jt}) + \varepsilon_{jt}$$

Where:

In $(\pi)_{jt}$ is the profitability (ROAA, ROAE, & NIM of the j–th bank in the period t)

LLRGL   is a loan loss reserve to gross loan (asset quality)

ETA   is equity to total assets (capitalisation)

NIITA   is non-interest income over total assets (non-traditional activities)

NIETA   is non-interest expense over total assets (management quality)

LOANSTA is total loan over total assets (liquidity)

TA   is total assets (size of bank)

LNGDP   is log of gross domestic product (gross domestic product)

INFL   is customer prices index (inflation)

CR3   is concentration ratio of three largest banks assets

DUMCRIS is dummy variable of global financial crisis

j is number of bank

t is a year

α is a constant term

β is a vector of coefficients

ε_{jt} is normally distributed disturbance term

3.3 Dependent Variables

In most of the previous literature, bank performance is basically measured by return on average assets (ROAA), return on average equity (ROAE), and net interest margins (NIM). These three financial ratios are usually expressed as a fuction of internal and external determinants. Internal determinants are factors that are influenced by a bank's management decisions and policy objective, while the external determinants refer to the industry and macroeconomic situations. The examples of internal determinants are capitalisation, size of bank, management quality and asset quality. On the other hand, inflation and gross domestic products represent the example of the external determinants.

According to Hassan and Bashir (2003), many regulators believe ROAA is the better measure of bank profitability. ROAA is not distorted by high equity multipliers and ROAA represents a better measure of the ability of the firm to generate returns on its portfolio of assets (Rivard and Thomas 1997). On the other hand, the financial ratio of ROAE reflects how effectively a bank management is using its shareholders funds. As ROAA tend to be lower for financial intermediaries, most banks utilise financial leverage heavily to increase return on equity to a competitive level (Hassan and Bashir 2003). According to Heffernan and Fu (2008), the net interest margin (NIM) is a better way to measure the profitability as compared to the conventional measures which are ROAA and ROAE. Therefore, these three financial ratios have been used in this study to measure the profitability of the bank.

3.4 Independent and Determinants Variables

3.4.1 Asset Quality

The first specific determinant of bank's profitability is its asset quality proxied by loan loss reserve over gross loan (lnLLRGL) and is predicted to have negative coefficient (Sufian 2009, Sufian and Habibullah 2009b). Kosmidou (2008) showed that the ratio of loan loss reserves to gross loans (LLRGL) indicates how much of the total portfolio has been provided for, but not charged off, and is used as a measure of bank's asset quality. The similar measurement was also used by Ismail, Davidson and Frank (2009), Cornett, Mcnutt and Tehranian (2006), McNulty, Akhigbe and Verbrugge (2001) and Miller and Noulas (1997). The coefficient is expected to be negative because bad loans (non-performing loans) could reduce the bank's efficiency level. A better quality asset is described as having lower non-performing loans or ratio of LLRGL

(Ismail, Davidson and Frank 2009, Wang 2003). In this direction, Miller and Noulas (1997) asserted that greater is the financial institutions exposure to high risk loans, higher is the accumulation of unpaid loans, and this lowers the profitability. Therefore, the asset quality is better if the coefficient is lower. A lower coefficient contributes to a higher asset quality which can increase the profit of the banks.

3.4.2 Capitalisation

The second specific determinant of bank's profitability is capitalisation, represented by earning over total assets (lnETA) and this coefficient is expected to be positive (Abreu and Mendes 2001, Casu and Girardone 2004, Carvallo and Kasman 2005, Athanasoglou, Brissimis and Delis 2008, Sufian 2009). The positive coefficient of capitalisation signifies the positive relationship between capitalisation and profitability of bank where larger is the capitalisation of the banks, higher is the profit. The regression result may show that the well-capitalised banks would increase banks' profitability due to the lower expected costs of financial distress, lower expected bankruptcy costs, and lower risk of portfolio and such advantages will then be translated into high profitability (Bourke 1989, Berger 1995, Angbazo 1997, Demirguc-Kunt and Huizinga 1999). However, according to Berger (1995), a lower capital ratios suggests a relatively risky position, one might expect a negative coefficient on this variable.

3.4.3 Non-traditional Activities

The third specific determinant of bank's profitability is non-traditional activities, measured by non-interest income over total assets (lnNIITA) and this coefficient is expected to have positive relationship with bank profitability. According to Sufian and Habilbullah (2009a) and Sufian and Habibullah (2010), banks in recent years have increasingly been generating income from "off-balance sheet" business, the ratio of NIITA is entered in the regression analysis as a proxy for non-traditional activities. Non-interest income consists of commission, service charges and fees, guarantee fees, net profit from sale of investment securities and foreign exchange profit. The ratio is also included in the regression model as a proxy measure of bank diversification into non-traditional activities.

3.4.4 Management Quality

The variable of management quality is proxied by non-interest expense over total assets (lnNIETA) that used in this study as the bank specific determinant of profitability. lnNIETA is applied to provide the information on variation in operating costs across the banking system. It reflects total amount of wages and

salaries, as well as the cost of running branch and corporate office facilities. The lower or higher cost represents a good management quality. Bourke (1989) argued that reduced expenses tend to improve the profitability of the financial institutions. Therefore, a higher ratio of lnNIETA is assumed to affect performance negatively because efficient banks are expected to operate at lower costs. Moreover, the wages expenses could be reduced due to the usage of the new technology such as automated teller machines (ATMs) and other automated means of delivering services. Nevertheless, Molyneux and Thornton (1992) showed a contradictory finding in which they observed a positive relationship, suggesting that higher profits earned by banks may be appropriated in the form of higher payroll expenditures paid to more productive human capital. Therefore, the expected coefficient could be negative or positive. The studies that employed the similar variables are Berger (1997), Berger and DeYoung (1997), Berger, Demsetz and Strahan (1999), Athanasoglou, Brissimis and Delis (2008), Sufian (2009a, 2009) and Sufian and Habibullah (2009b).

3.4.5 Liquidity

Total loan over total assets (lnLOANSTA) is the proxy for the liquidity that is applied in this study as the fifth bank specific determinant of profitability. lnLOANSTA is used to measure the bank specific lending intensity. Bank loans are assumed to be the main source of profitability and are expected to affect performance positively. Nevertheless, the coefficient could also be negative, which indicates a negative relationship between liquidity and profitability because loan-performance relationship depends significantly on the expected change of the economy. In a strong economy, only a small percentage of loans will default (lower percentage of unpaid loans). On the other hand, banks may be depressingly affected in a weak economy as borrowers are likely to default on their loans. Preferably, banks should capitalise favourable economic environments and shield themselves during adverse conditions (Sufian 2009a, 2009, Sufian and Habibullah 2009b).

3.4.6 Size of Bank

The sixth specific determinant of bank is its size proxied by logarithm of total asset lnTA and the coefficient is expected to be positive. This positive coefficient of size indicates positive relationship between size of banks and profitability where larger the size of banks, higher is the profitability. This regression outcome may suggest that the large bank size is able to become more efficient due to the benefits obtained from increase in profitability, service quality and higher leverage from financial capital (Akhavein, Berger and Humphrey 1997, Sufian 2009, Sufian and Habibullah 2009). Meanwhile,

Eichengreen and Gibson (2001) suggest that the effect of a growing bank's size on profitability may be positive up to certain limit. Beyond this point the effect of size could be negative due to bureaucratic and other reasons. Hence, the size-profitability relationship may be expected to non-linear. In short, the first factor can lead to a positive relationship between size and bank profitability, if there are significant economies of scale, while the second to a negative one, if increased diversification leads to lower credit risk and thus lower returns (Bourke 1989, Molyneux and Thornton 1992, Akhavein, Berger and Humphrey 1997, Bikker and Hu 2002, Goddard, Molyneux and Wilson 2004).

3.4.7 Macroeconomic Variables

According to Athanasoglou, Brissimis and Delis (2008), the macroeconomic variables are important to be included into the estimation as control variables because they can deal with the bank efficiency sufficiently. Although studies such as Short (1979), Bourke (1989) and Demirguc-Kunt and Huizinga (2000) showed that it is possible to conduct a meaningful analysis of bank profitability with the bank specific variables, some issues cannot be dealt with sufficiently because there is no investigation of the effect of the macroeconomic environment.

Therefore, this study has also included the macroeconomic variables in the estimation models. The first macroeconomic variable that is included in this study is gross domestic product (lnGDP). Sufian (2009a), Sufian and Chong (2008) and Kosmidou (2008) measured GDP by natural logarithm of gross domestic product (lnGDP). lnGDP is among the most commonly used macroeconomic indicator to measure total economic activity within an economy. The lnGDP is expected to influence numerous factors related to the supply and demand for loans and deposits. Favourable economic conditions would positively influence bank profitability.

Another macroeconomic variable is inflation (lnINFL). Flamini, Mcdonald and Schumacher (2009) measured the lnINFL based on the current period of consumer prices index (lnCPI) growth rate. Inflation may have direct effects such as increase in the price of labour, and indirect effects such as changes in interest rates and asset prices on bank performance (Staikouras and Wood 2003). Abreu and Mandes (2001) and Sufian and Chong (2008) suggested that inflation is negatively related to bank's profitability, implying that the higher inflation will contribute to the lower profit. However, Sufian (2009) found that the inflation has positive effects on bank's profit efficiency. Perry (1992) suggested that the effects of inflation on bank performance depend on whether the inflation is anticipated or unanticipated. In the anticipated case, the interest rates are adjusted

accordingly, resulting in faster increase of bank revenues than costs and subsequently gives positive impact on bank performance. In the unanticipated case, banks may be slow in adjusting their interest rates, resulting in a faster increase of bank costs than revenue, thus, gives negative effects on bank performance.

Third macroeconomic variable is concentration ratio of the three largest banks (CR3) in terms of assets, which is entered in the regression model as a proxy variable for the impact of banking sector concentration on the profitability of Bangladeshi banks. The structure-conduct-performance (SCP) theory posits that the banks in a highly concentrated market tend to collude, and therefore earn monopoly profits.

3.4.8 Dummy Variables

The dummy global financial crisis is introduced in the regression model in order to capture the determinants of profitability of the Bangladeshi banking sector during the global financial crisis. DUMCRIS is a binary variable that takes a value of 1 for global financial crisis year, and it is 0 otherwise. As expected, this coefficient is to be in negative sign which indicates that the banking sector has been relatively less profitable during the global financial crisis period. The summary of statistics of the dependent and independent variables is presented in Table III.

TABLE III
SUMMARY STATISTICS OF DEPENDENT AND INDEPENDENT VARIABLES

Variable	Min	Max	Mean	Std. Dev
Dependent Variables				
lnROAA	-4.605	1.802	-0.049	1.044
lnROAE	-3.219	6.746	2.230	1.567
lnNIM	-2.813	1.886	0.805	0.622
Independent Variables				
Bank-specific characteristics (internal determinants)				
lnLLRGL	-6.700	3.020	0.594	1.029
lnNETA	-0.842	4.232	1.501	0.826
lnNIITA	-1.347	2.078	0.807	0.586
lnNIETA	0.000	2.968	0.955	0.505
lnLOANSTA	0.000	4.402	3.586	1.409
lnTA	0.000	13.306	9.047	3.669
Macroeconomic (external determinants)				
lnGDP	0.000	8.191	6.883	2.658

lnINFL	0.697	2.209	1.682	0.518
lnCR3	3.651	3.906	3.817	0.079
DUMCRIS	0.000	1.000	0.182	0.386

Note: The table presents the summary statistics of the variables used in the regression analysis.

3.5 Estimation Method

3.5.1 Panel Data Regression Model

This study uses panel data regression to test the model because several advantages could be attained from regression that runs independently cross sectional or time series. Gujarati (2002) mentioned three kinds of advantages in using panel regression. Firstly, panel data make the data more informative with variability, reduce collinearity among the variables, and give more degree of freedoms to the data. Secondly, panel data could construct better detection and measurement of effects that simply could not be observed in pure cross-sectional or pure time series data. Thirdly, panel series provide the data to be available into several thousand units and this can minimise the bias that might result if individuals or firms level data are divided into broad aggregates.

Gujarati (2002) also pointed out several estimation and inference problems. Since such data involve both cross-section and time dimensions, problems that plague cross-sectional and time series data (such as heteroscedasticity and autocorrelation) need to be addressed. There exist some additional problems such as cross-correlation in individual units at the same point in time. So, several estimation techniques are used to address one or more of these problems. The two most prominent ones are the fixed effects model (FEM) and random effects model (REM). In FEM, the intercept in the regression model is allowed to differ among individuals in recognition to the fact that each individual or cross-sectional unit may have some special characteristics of its own. Meanwhile, REM assumed that the intercept of an individual unit is a random drawing from a much larger population with a constant mean value. If it is assumed that the error component β and X's regressors are uncorrelated, REM may be more suitable, whereas if β and X's are correlated, FEM may be appropriate.

Hausman test can be used to differentiate between FEM and REM. The null hypothesis underlying the Hausman test is that the FEM and REM estimators do not differ significantly. The test statistics developed by Hausman has an asymptotic Chi-Square (X^2) distribution. If null hypothesis is rejected (at 1% to 5% significant levels only), the FEM may be more appropriate to be used compared to the REM. But, if null hypothesis is failed to reject or is significant at only 10%, the REM is more suitable to be used.

Table IV provides information on the degree of correlation between the explanatory variables used in the multiple regression analysis. The matrix shows that in general the correlation between the bank specific variables is not strong

thus suggesting that multicollinearity problems are not severe. Gujarati (2002) asserted that in detecting the multicollinearity problem in regression model, the problem could be considered as serious if the pair-wise or zero-order correlation coefficient between two regression is in excess of 0.8, which is not the case here.

TABLE IV
SPEARMAN AND PEARSON CORRELATION MATRIX BETWEEN EXPLANATORY VARIABLES

	lnLLRGL	lnETA	lnNIITA	lnNIETA	lnLOANSTA	lnTA	lnGDP	lnINFL	lnCR3	DUMCRIS
lnLLRGL	1.000	0.037	.263***	.364***	.224***	.457***	.369***	0.024	-0.106	0.019
	.	0.491	0.000	0.000	0.000	0.000	0.000	0.661	0.051	0.731
lnETA		1.000	.504***	.323***	.470***	.217***	.587***	0.050	-242***	-0.057
		.	0.000	0.000	0.000	0.000	0.000	0.358	0.000	0.293
lnNIITA			1.000	.583***	.490***	.387***	.525***	0.065	-241***	-0.071
			.	0.000	0.000	0.000	0.000	0.232	0.000	0.189
lnNIETA				1.000	.318***	.367***	.380***	-0.051	-0.087	-109**
				.	0.000	0.000	0.000	0.345	0.111	0.044
lnLOANSTA					1.000	.545***	.665***	.204***	-266***	0.021
					.	0.000	0.000	0.000	0.000	0.705
lnTA						1.000	.734***	.177***	-343***	0.005
						.	0.000	0.001	0.000	0.921
lnGDP							1.000	.428***	-568***	0.095
							.	0.000	0.000	0.081
lnINFL								1.000	-291***	.671***
								.	0.000	0.000
lnCR3									1.000	.224***
									.	0.000
DUMCRIS										1.000

Note:***Correlation is significant at the 0.01 level (2-tailed). **Correlation is significant at the 0.05 level (2-tailed). *Correlation is significant at the 0.1 level (2-tailed).

3.5.2 Generalised Least Square (GLS)

The Generalised Least Square (GLS) is used in this study rather than the Ordinary Least Square (OLS) as a method to estimate the panel data regression. The decision is made following Gujarati's (2002) suggestion that GLS may overcome the heteroscedasticity, resulted from utilising financial data with differences in sizes. Due to the fact that the sample employed in this study consists of small and large banks, differences in sizes of the observations are expected to be observed.

The usual practice of econometrics modelling assumes that error is constant over all time periods and locations due to the existence of homoscedascity. Nevertheless, problems could arise which lead to heteroscedasticity issues as variance of the error term produced from regression tends not to be constant, which is caused by variations of sizes in the observation. Therefore, the estimates of the dependent variable will be less predictable (Gujarati 2002).

Using OLS estimation will solve the problem since it adopts the minimising sum of residual squares condition. The OLS allows all errors to receive equal importance no matter how close or how wide the individual error spread is from the sample regression function. On the other hand, GLS minimises the weighted sum of residual squares. In GLS estimation, the weight consigned to each error term is relative to its variance of the error term. Error term that comes from a population with large variance of error term will get relatively large weight in minimising residual sum of squares (RSS). Consequently, if a problem of non constant error arises, GLS is able to produce estimators in BLUE version because it accounts for such a problem by assigning appropriate weight to different error terms, which, in turn, produces the ideal constant variable (Gujarati 2002).

IV. EMPIRICAL RESULTS

The regression results focused on the relationship between bank profitability (ROAA, ROAE and NIM) and the explanatory variables (lnLLRGL, lnETA, lnNIITA, lnNIETA, lnLOANSTA, lnTA, lnGDP, lnINFL, lnCR3, DUMCRIS). Hausman test was used in order to decide which estimation technique is more appropriate between FEM and REM. Table V shows the Hausman test on FEM and REM. As the entire chi square (X^2) in all models is significant at 1% and 5%, the test suggests that the FEM is more appropriate rather than REM for the estimation technique.

Table VI shows the MRA models on the relationship between profitability and explanatory variables using FEM rather than REM and all explanations are

based on this table. This table has produced the results of the potential determinants of the profitability of the Bangladeshi banks.

The regression model results may be seen in Table VI. It is interesting to note that the coefficient reveals a relatively insignificant relationship with bank profitability. This indicates that the quality of the assets in the Bangladeshi banks does not influence the profitability of the bank during the years 2000 to 2011. This result contradicts with the studies that were conducted by Sufian (2009), Sufian and Habibullah (2009b), Kosmidou (2008) and Cornett, Mcnutt and Tehranian (2006).

Referring to the relationship between capitalisation (lnETA) and performance, the result shows that the coefficients are having positive sign and statistically significant at the 1% and 5% level in lnROAA and lnNIM regression model (Model 2, 3, 7, 8 and 9). This result is consistent with earlier research providing support to the argument that well-capitalised banks face lower costs of going bankruptcy (Isik and Hassan 2003, Staikouras and Wood 2003, Goddard, Molyneux and Wilson 2004, Kosmidou 2008). Therefore, the lower their cost of equity funding, or lower the needs for external funding would be resulting in higher profitability. However, strong capital structure is essential for financial institutions in emerging economies as it provides additional strength to withstand financial crises and increases safety for depositors during unstable macroeconomic condition.

The relationship between non-traditional activities (lnNIITA) and profitability is mixed. The coefficient of lnNIITA is statistically positive and significant at 1% in the lnROAA and lnROAE regression model (Model 1, 2, 3, 4, 5 and 6). The positive results imply that banks which derive a higher proportion of its income from non-interest sources such as fee based services tend to report a higher level of profitability. The study by Canals (1993) also suggests that revenue generated from new business units has significantly contributed to improve bank performance. Meanwhile, the relation between non-traditional activities (lnNIITA) and bank performance is negative and significant at 5% in the lnNIM regression model (Model 8 and 9). The results indicate the banks will experience a lower profitability even though they have a higher income from non-interest sources. The empirical findings provide support to earlier studies by, among others, Stiroh and Rumble (2006). To recap, Stiroh and Rumble (2006) find that diversification benefits of the U.S. financial holding

companies are offset by the increased exposure to non-interest activities, which are much more volatile but not necessarily more profitable than interest generating activities.

Concerning the impact of overhead costs, the coefficient of lnNIETA shows a positive and significant value at 1% and 5% level in lnROAE and lnNIM regression model (Model 4, 5, 6, 7, 8 and 9). The results imply that an increase (decrease) in these expenses enhances (reduce) the profits of banks operating in Bangladesh. There are a few plausible explanations. Firstly, Sathye (2001) argue that the more highly qualified and professional management may require higher remuneration packages and thus a highly significant positive relationship with profitability measure is natural. Secondly, as suggested by Claessens, Dermiguc and Huizinga (2001), although overstaffing may lead to the deterioration of bank profitability levels in the middle-income countries, it will produce different results for the banks operating in the middle and high-income countries

The relationship of coefficient of lnLOANSTA variable and performance that entered the regression model produces mixed results. The indicator of liquidity (lnLOANSTA) is statistically significant and negative in the lnROAA regression model. Athanasoglou, Brissimis and Delis (2008) suggest poor asset quality and low levels of liquidity are the two major causes of bank failures. During periods of increased uncertainty, financial institutions may decide to diversify their portfolios or raise their liquid holdings in order to reduce their risk. In this regards, risk could be divided into credit and liquidity risk. The negative relationship between the coefficient of lnLOANSTA and bank performance indicates the profitability of banks could be affected in a weak economy, because borrowers are likely to default on their loans. Ideally, bank should capitalise on favourable economic conditions and insulate themselves during adverse conditions. Molyneux and Thomton (1992), among others, find a negative and significant relationship between the level of liquidity and profitabilty. On the other hand, the relation between liquidity (lnLOANSTA) and bank performance is positive and statistically positive at 1% and 5% level in Model 8 and 9 in the lnNIM regression model. The findings imply that banks with higher loans to asset ratios tend to be more profitable. Therefore, in the case of Bangladeshi banking sector, bank loans seem to be more highly valued than alternative bank outputs such as investments and securities. The result is consistent with the earlier studies conducted by Bourke (1989), Guru, Staunton and Balashanmugam (2002) and Pasiouras and Kosmidou (2007).

It is also interesting to note the relationship between size (lnTA) and performance. The coefficient of lnTA is positive and statistically significant at 1% and 5% in the ln ROAE and lnNIM regression models (Model 7, 8 and 9). Hauner (2005) offers two potential explanations for which size could have a positive impact on bank performance. First, if it relates to market power, large banks should pay less for their inputs. Second, there may be increasing returns to scale through the allocation of fixed costs (such as, research or risk management) over a higher volume of services or from efficiency gains from a specialised workforce. Therefore, assuming that the average cost curve for Bangladeshi banks is U-shaped, the recent growth policies of the small and medium Bangladeshi banks seem to be consistent with the drive to minimise costs. The significant economies of scale in the Bangladeshi banking sector lead to the positive relation between size (lnTA) and bank profitability. The similar results are also found by Smirlock (1985), Akhavein, Berger and Humphrey (1997), Bourke (1989), Bikker and Hu (2002) and Goddard, Molyneux and Wilson (2004). Other researchers, however, conclude that marginal cost savings could be achieved by increasing the size of the banking firm, especially as the market develops (Boyd and Runkle 1993, Miller and Noulas 1997, Athanasoglou, Brissimis and Delis 2008).

The empirical findings suggest that there is impact of macroeconomic conditions on bank performance. The relationship between economic growth (lnGDP) and bank performance is negative and significant at 1% level in the lnNIM regression model (Model 8 and 9). Demand for financial services tends to grow as economies expand and societies become wealthier. Nevertheless, during the period of study, the Bangladeshi economy experienced volatile economic growth, i.e. from a robust 5.61 per cent average growth in 2000 and 2001, and declined to record 4.42 per cent growth in 2002. The economic growth increased in 2003 and 2004 (5.26 per cent and 6.27 per cent) and again declined in 2005 to 5.96 per cent. The GDP growth showed volatility through the following years and finally recovered to register a 6.07 per cent growth in 2010. The volatility in economic growth could have resulted in banks to suffer from lower demand for their financial services, increased loan defaults and thus lower output. The result is similar with that of Sufian and Parman (2009) but contradicts with Pasiouras

and Kosmidou (2007) and Kosmidou (2008) that supported the argument of positive association between economic growth and banking sector performance.

The coefficient of lnINFL is significant at 1% and positive in the lnROAA regression model (Model 2 and 3). The positive sign showed that inflation was anticipated. This indicated that the interest rates were adjusted accordingly, resulting in revenues to increase faster than costs; thus, created a positive impact on Bangladeshi bank performances. Other studies (Molyneux and Thornton 1992, Demirguc-Kunt and Huizinga 1999, Pasiouras and Kosmidou 2007, Sufian 2009) have also shown a positive relationship between inflation or long-term interest rate and profitability.

Turning to the concentration ratio variable, the coefficient of lnCR3 is significant at 5% and negatively related to bank profitability that can be observed in lnROAA regression model (Model 2 and 3). The empirical findings seem to reject the Structure-Conduct-Performance (SCP) hypothesis. To recap, the SCP hypothesis states that banks in highly concentrated markets tend to collude, and therefore earn monopoly profits.

Finally, the global financial crisis could not influence the profitability of the Bangladeshi banks since the coefficient of DUMCRIS is statistically insignificant. It may be due to the agricultural base of Bangladesh having less focus on the technological operation. The global financial crisis affected the developed and developing countries, especially those countries that are more technological operation based.

TABLE V
HAUSMAN TEST

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Chi-Sq. Stat (X^2)	27.890***	23.967***	23.692***	26.239***	24.141***	24.087***	16.5213**	23.924***	23.869***
Prob. X^2	0.000	0.004	0.009	0.000	0.004	0.007	0.011	0.004	0.008
No. observation	341.000	341.000	341.000	341.000	341.000	341.000	341.000	341.000	341.000
Est. tech	FEM	FEM	FEM	FEM	FEM	FEM	FEM	FEM	FEM

TABLE VI
MULTIPLE REGRESSION ANALYSIS MODELS UNDER FIXED EFFECT MODEL

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	ROAA			ROAE			NIM		
CONSTANT	-0.051	0.032	-0.004	-0.088	-0.039	-0.093	−0.139**	-0.079	-0.089
Std. Error	0.139	0.140	0.150	0.175	0.181	0.194	0.067	0.067	0.072
Determinants Variables									
lnLLRGL	0.010	0.007	0.004	0.040	0.039	0.033	-0.019	-0.021	-0.022
Std. Error	0.054	0.053	0.053	0.068	0.068	0.069	0.026	0.025	0.025
lnETA	0.215*	0.356**	0.348**	−0.266*	-0.145	-0.157	0.213***	0.418***	0.416***
Std. Error	0.123	0.157	0.157	0.154	0.202	0.203	0.059	0.075	0.075
lnNIITA	0.975***	0.696***	0.700***	0.976***	0.811***	0.818***	-0.031	−0.179**	−0.178**
Std. Error	0.145	0.158	0.158	0.182	0.204	0.204	0.070	0.076	0.076
lnNIETA	0.073	0.106	0.105	0.723***	0.765***	0.763***	0.176**	0.277***	0.277***
Std. Error	0.151	0.156	0.156	0.189	0.202	0.202	0.072	0.075	0.075
lnLOANSTA	−0.576***	-0.101	-0.099	-0.198	0.119	0.122	-0.025	0.366**	0.367***
Std. Error	0.167	0.240	0.240	0.210	0.310	0.310	0.080	0.115	0.115
lnTA	0.098	-0.015	-0.018	0.213**	0.184	0.181	0.064**	0.138***	0.137***
Std. Error	0.068	0.097	0.097	0.085	0.125	0.126	0.033	0.047	0.047
Macroeconomic Variables									
lnGDP		0.025	0.045		-0.093	-0.062		−0.319***	−0.313***
Std. Error		0.229	0.231		0.296	0.299		0.110	0.111
lnINFL		0.344***	0.318***		0.157	0.119		-0.023	-0.030
Std. Error		0.113	0.120		0.146	0.154		0.054	0.057
lnCR3		−0.434**	−0.450**		-0.180	-0.206		-0.055	-0.060
Std. Error		0.208	0.210		0.269	0.271		0.100	0.101
DUMCRIS			0.083			0.125			0.024
Std. Error			0.126			0.162			0.060
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
R²	0.466	0.500	0.501	0.625	0.630	0.631	0.654	0.677	0.678
Adj R²	0.402	0.435	0.434	0.581	0.582	0.581	0.613	0.636	0.635
Durbin Watson	1.386	1.455	1.464	1.491	1.502	1.508	1.365	1.346	1.349
F-statistic	7.355***	7.713***	7.517***	14.099***	13.138***	12.808***	15.983***	16.206***	15.761***

Note: *** Correlation is significant at the 0.01 level (2-tailed). ** Correlation is significant at the 0.05 level (2-tailed). * Correlation is significant at the 0.1 level (2-tailed).

V. CONCLUSIONS

The study was carried out with the main purpose of identifying the potential bank specific and macroeconomic determinants of bank profitability in Bangladeshi banking sector. To recap, there are few literature that examined the profitability of the bank in the developing countries compared to the studies that were conducted in the context of developed countries. This study examined the performance of 31 Bangladeshi commercial banks during the period 2000 to 2010.

The six bank specific determinants that were examined consist of asset quality, capitalisation, non-traditional activities, management quality, liquidity and size of bank. Meanwhile, gross domestic product, inflation, concentration and global financial crisis were four macroeconomics or external determinants. To identify the significant relationship between profitability and those potential determinants, the study used the Multiple Regression Analysis (MRA). Furthermore, Generalised Least Square (GLS) method was applied in this study and followed by Fixed Effect Model (FEM) rather than Random Effect Model (REM) and Hausman test.

The study found that all bank specific determinants influenced the profitability of the Bangladeshi banking sector except the asset quality. The empirical findings of this study suggest that bank specific characteristics such as capitalisation, management quality and size of bank have positive and significant impacts on bank performance, while non-traditional activities exhibit negative relationship with bank profitability. During the period under study, the results suggest that the impact of non-traditional activities and liquidity is not uniform across the various profitability measures employed. The empirical findings suggest that non-traditional activities and liquidity have a mix (positive and negative) impact on bank profitability. As for the impact of macroeconomic indicators, GDP and market concentration have negative and significant impacts on bank performance. On the other hand, inflation shows negative relationship with the profitability of the Bangladeshi banking sector. However, the global financial crisis has no significant impact on the profitability of banks in Bangladesh.

The findings of this study offer considerable policy relevance. It could be argued that the more profitable banks will be able to produce more products and services and directly improve the economy of the country. In addition, to ensure the competitiveness of the Bangladeshi banking sector, the capability to

maximise risk adjusted returns on investment and sustaining stable and competitive returns represent a significant element. Thus, from the regulatory perspective, the performance of the banks should be considered based on their efficiency and profitability.

Moreover, in view of the increasing competition attributed to the more liberalised banking sector, bank management as well as the policymakers will be more inclined to identify the effective and efficient ways to obtain the optimal utilisation of capacities. Therefore, the resources will be fully utilised and eliminate the wastage during the production of banking products and services.

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