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Determinants of Profitability of Commercial Banking in Bangladesh: A Panel Analysis

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Abstract

Profitability of commercial banks is a major concern as this helps grow the banks and hence contribute to the banking sector in particular and the economy in general. This study aims to investigate the determinants that influence the profitability of commercial banks in Bangladesh using balanced panel data spanning the period from 2009-2018. Three different measures of profitability, return on assets (ROA), return on equity (ROE) and net interest margin (NIM) are used as proxy. The profitability affecting determinants are categorized into internal and external factors. The internal factors include bank-specific factors namely bank size, capital adequacy, liquidity, deposit, operating efficiency and non-traditional activities that can be controlled by bank management. The external factors considered are macroeconomic factors such as GDP growth rate and inflation rate. We apply fixed effects (FE) model and random effects (RE) model, and the Hausman test is carried out to determine which of the models is appropriate. This test suggests that for three dependent variables ROA, ROA and NIM, the random effect model is more appropriate. Further, we apply the generalized methods of moment (GMM) to control effects of heterogeneity within and between panel groups. The random effect model provides results which reveal that bank size has had negative and significant impact, but capital adequacy has had positive and significant impact on profitability measurement of ROA, ROE and NIM. Furthermore, liquidity is inversely related to ROA and ROE. The experimental outcomes also report that deposit and operating efficiency have positive significant effect on ROA and ROE, whereas operating efficiency has negative effect on NIM. The other variable namely non-traditional activities have affected ROA and NIM positively and significantly. Finally, macroeconomic factor like GDP growth rate has negative impact on ROA and NIM. Generalized methods of moment estimation suggest that capital adequacy and non-traditional activities have positive and significant relationship on profitability. Liquidity has negative and significant impact on profitability, whereas deposit has positive significant relation to ROA. Without NIM, rests of the profitability indicators affect the operating efficiency positively and

significantly. With regard to macroeconomic variables, only inflation rate affects the NIM positively. As results are found to be mixed, policy makers would consider adopting strategic and factor-specific policies to reap the benefits from the variables.

Keywords: Determinants, Bank profitability, Random effect model, Generalized methods of moments, Commercial bank in Bangladesh

AMS Subject Classification: 91B28.

1. Introduction

The financial system of Bangladesh is dominated by the banking financial institutions that collect deposits from various individuals and organizations and provides loans. According to Fama (1980), banks are such types of business wherein deposits are taken into consideration as liabilities and issuing debt securities are considered as assets.

Recently, the banking sector has become the main driving force and pillar for accelerating economic growth of modern economics in Bangladesh. Almost all the economic activities are integrated with the functions of banks. But the health of banking financial institutions is critical to the health of the general economy at large. The banking sector of developing countries is less stable than developed countries (Sufian and Habibulla, 2009).

Bangladesh has a mixed banking system that comprises of six state- owned commercial banks (SCBs), forty private commercial banks (PCBs), nine foreign commercial banks (FCBs) and two Specialized banks (SDBs) (BB, 2018). Bangladesh bank acts as a central bank for our country and it formulates and implements monetary policies and regulates the banking sector of the country. Before the independence of Bangladesh, banking sector were private owned, urban based, profit oriented. But after the liberation in 1971, several banks were nationalized and renamed by the government of Bangladesh. The major banking activities or policies are to collect deposit and provide loan in order to maximize profit along with other activities.

Commercial banks play an important role in the economic development of Bangladesh. They provide investible funds to both the public sector and the private sector. Recently, 40 private and 9 foreign commercial banks run their activities in Bangladesh. They contain collectively Tk. 20,365.00 core as a deposit which is 35 percent of total credit. But, they do not loan out any money to agriculture sector as a credit. Industrial sector acts as a main sector of GDP in the developed countries but unfortunately, this sector’s performance is weak in our

country and contribution of sector to GDP is 17.79 percent. This sector gets the highest credit from commercial banks. Business sector has become major role playing sector in our economy. Now-a-days almost 14.47 percent of GDP comes from merchandise sector, which is lucid from different statistical data. In 1981, one reason of gets more credit in business sector is that the probability of default loan is comparatively low vis-a-vis other sectors (Financial Express, 2019). So, the performance of the financial system as well as the economy as a whole is very much dependent on the profitability of the banking sector of the country. This study seeks to examine the determinants of banks profitability in Bangladesh by focusing on bank-specific and macroeconomic factors. Specially, this paper investigates internal factors like the bank size, capital adequacy, deposit, liquidity, non-traditional activities and operating efficiency and the external factors like inflation rate and GDP growth rate that affects the determinants of commercial bank's profitability.

2. Review of Literature

Lots of studies in many countries and regions around the world have been conducted to investigate the factors that affect the profitability of banks. Most of the prior research has been measured profitability by ROA, ROE and NIM and profitability is influenced by various types of bank-specific and macroeconomic variables. Moreover, various explanatory variables have positive and negative impact on profitability by various researchers conducted in different countries. To understand the basic concepts and framework some prior literatures are reported.

Kiganda (2014) attempts to provide the effect of macroeconomic factors on bank profitability of commercial banks operating in Kenya using annual data for the period of 5 years spanning from 2008 to 2012. Ordinary least square method (OLS) results suggest that macroeconomic variables affect the bank profitability negatively at 5% level of significance, but bank-specific variables have positive and significant effects on bank profitability in Kenya.

Berger and Bouwman (2013) empirically estimate the impact of capital on bank's performance during financial crises and normal times which occur in the US over the past quarter century. This study finds out two results affecting the bank performance. Firstly, capital helps small bank to enhance their profitability of survival and market share at all times. Secondly, this study finds that capital increases the performance of medium and large in period of banking crises.

Palanisamy *et al.* (2017) analyze the effect of macroeconomic and bank-specific variables to predict the profit and profitability of selected commercial banks in

Rwanda during the period 2001-2015. The study adopts the profit function approach to show significant factors and risk factors on profitability. Result shows that the employee cost is considered as a most significant factor of profitability of commercial banks in Rwanda. Results also reveal that interest and non-interest income contribute towards profit and profitability along with deposit per branch and risk factor namely credit to total assets.

Adeusi *et al*. (2014) examine the factor affecting profitability of commercial banks operating in the Nigerian banking industry using panel regression analysis for 14 commercial banks spanning from2000 to 2013. The fixed effect and random effects estimations results indicate that asset quality, management efficiency, and economic growth are statistically significant on profitability. Results also show that asset quality is more significant on profitability in all models and credit risk is a major determinant of commercial banks' profitability.

Acaravci and Calim (2013) find out the relationship between the bank-specific and macroeconomic factors and the profitability of commercial banks in Turkish banking sector over the time period from 1998 to 2011. The experimental results reveal that macroeconomic variables bear less significant impact compared to bank specific variables. However, the real domestic product and real exchange rate are positive and statistically significant on profitability.

Alper and Anber (2011) point out the bank-specific and macroeconomic determinants of the bank profitability in Turkey covering the period from 2002 to 2010. The study includes 10 commercial banks as a sample size consisting of 90 observations. Results from empirical analysis indicates that asset size and non-interest income have positively and significant impact on bank profitability. Conversely, size of credit portfolio and loans under follow- up have negative impact on banks profitability. Among the macroeconomic variables, only real interest rate positively relates to the performance of banks profitability.

Ali *et al.* (2011) examine the profitability indicators of public and private commercial banks of Pakistan considering 22 public and private sector commercial banks covered the period of 2006-2009. Findings of regression analysis indicate that the efficient asset management and economic growth establish positive and significant relation with profitability. The operating efficiency tends to exhibit the higher profitability level as measured by return on equity (ROE) and the high credit risk and capitalization lead to lower profitability measured by return on assets (ROA).

Sayllgan and Yildrim (2009) assess the impact of determinants of return on assets (ROA), and return on equity (ROE) for a sample of Turkish banks during the

period from 2002 to 2007 using monthly data. Using multi-variable single equation regression method, results show that the profitability of the banking sector seems to increase along with declining inflation rate, consistently increasing industrial production index and improving budget balance. The results also show that the profitability is positively related to the capital adequacy in broad terms and negatively by growing off-balance sheet assets.

Bourke (1989) evaluates the concentration and other determinants of bank profitability in twelve countries in Europe, North America and Australia based on the financial statements of 90 banks in the ten years from 1972 to 1981. In this research, the term 'value added' is introduced to remove the difficulties in making comparisons between banks in different countries. However, results are in agreement with concentration and bank profitability studies for the domestic U.S. market and support is found for Me Edwards-Heggestad-Mingo hypothesis.

Athanasoglou *et al.* (2008) seek to investigate the effect of bank-specific, industry-specific and macroeconomic factors incorporating the traditional structure-conduct-performance (SCP) hypothesis. A panel data set taken from Greek banks for the period of 1985-2001 are evaluated employing generalized method of moments (GMM) technique. Findings suggest that factor influencing profitability in Greek banks is persisting to a moderate extent which explains that deviations from perfectly competitive market structures may not large. They also reveal that all bank-specific variables have significant impact except for bank size on profitability while business cycle is positively related to Greek bank profitability. Molyneux and Thorton (1992) state that there is a relationship between determinants of bank profitability and profit influencing indicators using panel data. The study considers a sample of 18 European countries for the period 1986-1989. Results exhibit significant positive relationship between the return on equity (ROE) and the level of interest rates in each country.

Ramadan *et al.* (2011) explore that the characteristics of internal and external factors that influence profitability of Jordanian banks using balanced panel data set. Results reveal that the relationship between macroeconomic determinants; inflation and economic growth and bank performance have positive insignificant impact on return on assets (ROA), but some of the differential slope coefficients are statistically significant. Petria *et al.* (2015) empirically investigate the bank-specific, industry specific and macroeconomic factors of bank's profitability in EU27 over the period 2004-2011. Findings reveal that management efficiency, credit and liquidity risk, the diversification of business, the market concentration/competition and the economic growth affect the bank profitability on ROAA and ROAE while competition has positive impact on bank profitability.

Rahman et al. (2015), Sufian and Kamaruddin (2012) and Sakib and Hossain (2020) and Islam et al. (2017) conducted some studies on determinants which are associated with profitability of commercial banks.

Rahman et al. (2015) empirically assess the bank specific and macroeconomic determinants of bank profitability by using unbalanced panel data consisting of 25 banks for a period ranges from 2006 to 2013. Results show that capital strength and loan intensity have positive and significant impact on profitability, but cost efficiency and off balance sheet activities have negative and significant impact on bank profitability. Results also show that the impact of credit risk, non-interest income, ownership structure, bank size, growth in GDP and inflation is not uniform across different measures of bank profitability. Finally, size of bank has a positive and significant impact on ROA, but inflation has a negative and significant effect on ROA and ROE.

Sufian and Kamaruddin (2012) investigate the nature of the relationship between the profitability of banks and the characteristics of bank-specific and macroeconomic factors using a sample of 31 commercial banks in Bangladesh over the period 2000-2010. The study employs the multiple regression analysis to estimate the data of all variables associated with bank's profitability. Result related to the macroeconomic determinants show a positive significant impact on profitability, but economic growth has negative effect. Finally, the coefficient of inflation is found to be statistically significant and positive effect.

Sakib and Hossain (2020) express the determinants of profitability of 30 DSE listed commercial banks of Bangladesh from 2010 to 2017. It includes multiple regressions to determine the impact of significant variables on profitability. The findings suggests that the net interest margin ratio, asset size, the ratio of operating expense are significant against the dependent variable called Return on Equity. Finding also suggests that if asset size increases, return on equity decreases and if operating expense ratio increases, return on equity decreases. Findings further suggest that commercial banks should be more careful while giving loans with diversified portfolio maintenance

Islam et al. (2017) investigate the determinants of profitability employing annual data for all the second generation private commercial banks of Bangladesh for the year 2014 and 2015. The data for regression analysis have been taken from annual report of each bank. In this research, asset size, capital adequacy, asset quality, deposit, income-expenditure structure and investment activities are used as explanatory variables and return on equity as dependent variable. The study applies multiple regression analyses to examine the significant determinants of profitability and to test hypothesis. The author has showed that asset size and net

interest margin have no significant effect on the profitability, but non-performing loans to total loans has most significant impact on profitability of banks. Moreover, investment activities have positive impact on return on equity. The empirical results suggest that diversified banking activities including the investment activities of commercial banks help to achieve more profitability.

Literature reveals that no study has been conducted to assess the profitability of commercial banks in Bangladesh using three measures of profitability simultaneously applying the econometric methods which are used in this research. To the best of our knowledge, this research is first of its kind.

3. Data, Variables and Methodology

This section provides a discussion of data, profitability indicators and its determinants, theoretical framework and model specification of this study.

3.1. Data

This study is conducted on secondary balanced panel data of 12 commercial banks in Bangladesh for the time period from 2009 to 2018. Among these 12 banks, Agrani bank limited, Janata bank limited and Basic Banks Limited are state-owned commercial banks. The other banks are private commercial banks that Dutch Bangla Bank Limited, Eastern Bank Limited, One Bank Limited, Prime Bank Limited, United commercial Bank (UCB) Limited, Mercantile Bank Limited, and Islami Shariah based private commercial banks like Exim Bank Limited, First Security Islami Bank Limited, Shahjalal Islami Bank Limited. To analyse the determinants of profitability, secondary panel data are collected from bank's annual reports. The study involves only listed commercial banks of Bangladesh due to unavailability of data of other banks. However, our sample consists of balanced data set accomplishing 120 total observations. Data of macroeconomic variables are retrieved from World Data Indicators (World Bank, 2019).

3.2. Profitability Indicators and its Determinants

To evaluate the determinants of profitability, eleven variables are included. Among these variables, three variables are used as dependent variables and rests of the variables are used as explanatory variables. The explanatory variables are categorised into bank-specific and macroeconomic variables.

Dependent Variables

This study investigates the profitability of commercial banks in Bangladesh utilizing three different measures of bank profitability which are proxied by return on assets (ROA), return on equity (ROE) and net interest margin (NIM).

Return on Assets (ROA)

Return on assets (ROA) is defined as the net profit after tax to total assets. Ben Naceur and Goaied (2008), Kosmidou (2008), Athanasoglou *et al.* (2006) and Flamini *et al*. (2009) useROA as a dependent variable in their research. It shows the profit per-taka of assets and gives signal that how effectively the bank's assets are being managed by authority to generate revenues. As ROA is utilized to evaluate the competence and operational performance of bank, it examines the profits generated from the assets invested by the bank (Jahan, 2012 and Golin, 2001).

Return on Equity (ROE)

Return on equity (ROE) is the other alternative measure of profitability which is the ratio of net profit after tax and total shareholder's equity. According to Dietrich and Wanzenried, 2011, though ROE shows the return to the shareholder's equity on their equity capital, this is not appropriate measure of profitability in the literature. Ramlal (2009), Bourke (1989), Molyneux and Thornton (1992), Athanasoglou *et al*. (2008), and Guru *et al.* (1999) also use the ROE in their research.

Net interest Margin (NIM)

Net interest margin (NIM) is referred to as the net interest margin to total assets. This reflects the difference between interest income and interest expense of a bank divided by its total assets. If a bank manager has done a good job of asset and liability management such that the bank earns substantial income on its assets and has low costs on its liabilities, profits remain higher. It shows the profit earned on interest activities (Dietrich and Wanzenried, 2011). NIM is used as a measure of bank profitability by Angbazo (1997), and Claeys *et al*. (2004).

Independent Variables

Several empirical evidences reveal that profitability of financial institutions specifically banks are affected by bank-specific and macroeconomic factors. The

internal determinants include bank-specific variables and the external factors reflect macroeconomic variables that are expect to affect the profitability of banks.

Bank-Specific Variables

The bank-specific factors are also known as internal factors that are related to internal efficiency and managerial decisions. Some internal factors are selected in this study on the basis of previous literature.

Bank Size (Size)

The bank size is measured as the natural logarithms of total assets (Size). This is the essential determinants of profitability of commercial banks. According to Flamini *et al*. (2009), the bigger the size of the banks, the lesser the requirement for profits whereby lower interest rates are changed to borrowers. Rahman *et al.* (2015) and Alper and Anbar (2011) find positive significant impact on profitability. Conversely, bank size has negative significant impact on profitability (Syafri, 2012).

Capital Adequacy (CAD)

Capital adequacy is defined as the ratio of shareholder's equity to total assets.The factor discusses the ability of a bank to withstand the unanticipated losses. This ratio investigates the linkage with the financial soundness of the bank between profitability and bank capitalization. It is expected that the banks associated with well-capitalization have high profitability. In developing economies, a healthy capital structure is significant for financial institutions, as it provides additional strength to withstand financial crises and increase safety for depositors during unstable macroeconomic conditions. Demirguc-Kunt and Huizinga (1999), Berger (1995) and Bourke (1989) state that the higher profit can get the higher profitability. In other words, a high capital asset ratio is assumed to be indicator of low leverage and therefore lower risk. Conversely, banks with lower capital adequacy are considered riskier relative to highly capitalized banks.

Liquidity (LQD)

Liquidity is the ratio of total loans divided by total deposit of banks. According to (Ongore and Kusa, 2014), liquidity is the bank's ability to meet its obligations, mainly those of depositors of funds to the bank. It is the ability of a firm, company, or even an individual to pay its debts without suffering catastrophic

losses. Investors, managers, and creditors use liquidity measurement ratios when deciding the level of risk within an organization. If an individual investor, business, or financial institution cannot meet its short-term debt obligations, it is experiencing liquidity. Molyneux and Thorton, 1992 and Guru, (2002) state that profitability and liquidity has negative significant relationship.

Deposit (DP)

Deposit of a bank is measured by deposit divided by total assets. Actually, deposit is the liability for a bank that is the main source of collecting fund for banks. Generally, any bank of a country can raise the loan scope to customer by raising the deposits of banks. As a result, rising loan is able to create more profit in future. In addition, there is positive linkage between deposit and profitability (Lee and Hsich, 2013). That is, more deposit of a bank can generate more profits and lower deposit can generate lower profits. Then, we can expect that there is positive relationship between deposit and bank profitability of commercial banks in Bangladesh.

Operating Efficiency (OEF)

Operating efficiency is computed as the ratio of total operating cost to total operating income of banks. It indicates the management's ability to control costs. If the efficiency ratio increases, it means a bank's expenses are increasing or its revenues are decreasing. Banks that focus more on cost control would naturally have a higher efficiency ratio, but they may also have lower profit margins. Some literature indicates that low operating costs leads to greater profitability of commercial banks. Heffernan and Fu (2008) take the cost to income ratio as operational efficiency ratio and show a negative relationship with profitability. On the other hand, Naceur (2003), Athnasoglou *et al.* (2005) use the ratio operating expense to total assets and find a positive relationship with bank's profitability.

Non-Traditional Activities (OBSTA)

Off balance sheet activities to total assets is considered as non-traditional activities (OFBSTA). This is another important determinant of bank profitability. The use of off-balance sheet activities may improve earnings ratios because earnings generated from the activities are included in the income numerator, while the balance of total assets included in the denominator remains unchanged. So this ratio is included in the regression equation that measure profitability to capture

off-balance activities. Finally, off-balance sheet activities help to increase their source of income without changing capital structure (Deelchand and Padgett, 2009).

Macroeconomic Variables

Like bank-specific factors, macroeconomic factors also affect the bank profitability. Several researchers have used GDP as a macroeconomic factor (Francis, 2013; Ongore and Kusa, 2013). The study conducted by Anbar and Alper, (2011); Pasiouras and Kosmidou, (2007) use the inflation rate. We use GDP growth rate and inflation rate.

GDP Growth Rate (GDPG)

The growth rate of gross domestic product (GDPG) is used as a measure of the macroeconomic conditions calculated as the annual change of the GDP. It measures the growth rate of the economy. It is the most commonly used macroeconomic indicator in the literature of bank profitability of commercial banks. A positive significant relation is expected between the profitability of the banks and GDP growth rate. According to the literature on the association between economic growth and financial sector profitability, GDP growth has positive relation on bank profitability (Demirguc-Kunt and Huizinga, 1999).

Inflation Rate (INF)

The inflation rate is used in this model to proxy the impact of inflation on profitability. Earlier literature shows that the impact of inflation on profitability depends on whether the inflation is anticipated or unanticipated. If inflation is fully anticipated, the interest rates are adjusted accordingly resulting in increased revenues of banks and a positive impact on profitability. However, if inflation is unanticipated, the banks may be slow in adjusting their interest rates, which results in a faster increase in banks costs that have a negative impact on bank profitability and vice-versa. The study conducted by Molyneux and Thornton (1992) and Bourke (1989) show a positive relationship between inflation and bank profitability. Table 1 lists the measurements of different variables, notations and their expected sign.

Table 1: Variables and their Expected Sign

Types	**Variables**	**Measurement**	**Notation**	**Expected sign**
Dependent variables	Return on assets	Net profit after tax/total assets	ROA	NA
	Return on equity	Net profit after tax/ equity	ROE	NA
	Net interest margin	Net interest income/total assets	NIM	NA
Bank-specific independent variables	Bank size	Natural logarithm of total assets	SIZE	+/-
	Capital adequacy	Equity/ total assets	CAD	+
	Deposit	Deposits/total assets	DP	+
	Liquidity	Total loans/Deposit	LQD	+/-
	Operating efficiency	Operating cost/operating income	OEF	+/-
	Non-traditional activities	Total of off-balance sheet activities/total assets	OFBSTA	+
Macroeconomic independent variables	Economic activity	GDP growth rate	GDPG	+
	Inflation rate	Annual inflation rate	INF	+/-

3.4. Theoretical Framework and Model Specification

We present models which determine the relative importance of each independent variable to determine banks profitability in Bangladesh. The methodologies applied in this study are fixed effect (FE) model or random effect (RE) model and generalized methods of moments (GMM). Fixed effect (FE) model and random effect (RE) model may not be applied together. In order to choose the suitable econometric model (i.e., either fixed effect or random effect) Hausman test is carried out. Hausman test decides which model is more appropriate. Generalized method of moments (GMM) is used by Berger *et al.* (2000), Goddard *et al.* (2004) and Athanasoglou *et al*. (2008) in their studies.

Fixed Effect or Random Effect Models

In the panel data, the model consists i cross-sectional units, denoted by i= 1,....,N, observed at each of T time periods, t = 1,…,T. In data set, the total observations are i × t. The basic framework for the panel data is defined as per the following regression model (Brooks, 2014).

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1)$$

Where, Y_{it} denotes the dependent variables (Profitability). Intercept term denoted by α, on the explanatory variables, β is a k × 1 vector of parameter to be estimated, and vector of observations is X_{it} which is 1 × k, t = 1, …, T, i= 1, …, N. ε_{it} indicates the error term.

Panel data models are estimated using either fixed effects or random effects models. Fixed effect models describe that the individual-specific effect is a random variable that is allowed to be correlated with the explanatory variables. The rationale behind random effect model is that, unlike the fixed effects model, the individual-specific effect is a random effect variable that is uncorrelated with the independent variables. Further, the Hausman test is conducted to decide the appropriate model between fixed and random effect models.

Model Specification for FEM or REM

Based on the earlier literature review, econometric models are specified in this study as follows:

Model 1:

$$\begin{aligned}&\mathrm{ROA_{it}}\\&= \alpha_0 + \alpha_1\mathrm{SIZE_{it}} + \alpha_2\mathrm{CAD_{it}} + \alpha_3\mathrm{LQD_{it}} + \alpha_4\mathrm{DP_{it}} + \alpha_5\mathrm{OEF_{it}} + \alpha_6\mathrm{OFBSTA_{it}}\\&+ \alpha_7\mathrm{GDPG_{it}} + \alpha_8\mathrm{INF_{it}}\\&+ \varepsilon_{it}\end{aligned} \quad (2)$$

Model 2:

$$\begin{aligned}&\mathrm{ROE_{it}}\\&= \beta_0 + \beta_1\mathrm{SIZE_{it}} + \beta_2\mathrm{CAD_{it}} + \beta_3\mathrm{LQD_{it}} + \beta_4\mathrm{DP_{it}} + \beta_5\mathrm{OEF_{it}}\\&+ \beta_6\mathrm{OFBSTA_{it}} + \beta_7\mathrm{GDPG_{it}} + \beta_8\mathrm{INF_{it}}\\&+ \varepsilon_{it}\end{aligned} \quad (3)$$

Model 3:

$$\begin{aligned}&\mathrm{NIM}_{it}\\&= \lambda_0 + \lambda_1\mathrm{SIZE}_{\mathrm{it}} + \lambda_2\mathrm{CAD}_{\mathrm{it}} + \lambda_3\mathrm{LQD}_{\mathrm{it}} + \lambda_4\mathrm{DP}_{\mathrm{it}} + \lambda_5\mathrm{OEF}_{\mathrm{it}} + \lambda_6\mathrm{OFBSTA}_{\mathrm{it}}\\&+ \lambda_7\mathrm{GDPG}_{\mathrm{it}} + \lambda_8\mathrm{INF}_{\mathrm{it}}\\&+ \varepsilon_{\mathrm{it}} \qquad (4)\end{aligned}$$

Where, profitability is measured by ROA, ROE and NIM and bank-specific variables include Bank size (SIZE), Capital adequacy (CAD), Liquidity (LQD), Deposit (DP), Operational efficiency (OEF), Non-traditional activities (OFBSTA) and macroeconomic variables includes GDP growth rates (GDPG) and inflation rate (INF). The term 'ε_{it}' indicates the error term. Finally, α_0, β_0 and λ_0 denotes the intercept term.

Generalized Methods of Moment (GMM)

Fixed effect or random effect models are usually applied for panel data analysis. However, it is argued that persistence of bank profitability over time can affect next year's profit (Athanasoglou *et al*., 2008). As a result, a difficulty arises with these models when a lagged dependent variable is concerned, particularly in the context of few time periods and many observations. To address this issue, Arellano and Bond (1991) develop the difference of generalized method of moments (GMM) model by differencing all regressors. It is a single left hand-side variable that is dynamic depending on its own past realizations.

This method is criticized by Arellano and Bover (1995) and Blundell and Bond (1998) who argue that the GMM difference estimator is inefficient if the instruments are weak. Hence, they develop a new method which is called GMM system estimator and includes lagged levels as well as lagged differences. The system GMM estimator assumes that first differences of instrumental variables are uncorrelated with the fixed effects. It also argues that both difference and system GMM estimators are suitable for situations with "small T, large N" panels. The specification for GMM proposed by Athanasoglou *et al*. (2008) is used to conduct the empirical analysis:

$$\Pi_{it} = C + \delta\Pi_{i,t-1} + \sum_{j=1}^{j}\beta_j X_{it}^{j} + \sum_{m=1}^{m}\beta_m X_{it}^{m} + \varepsilon_{it} \qquad (5)$$

Where, Π_{it} is the probability of bank i at time t, where i = 1…N, t = 1….T, C is the Constant term. $\Pi_{i,t-1}$= is the one period lagged value of dependent variable the speed of adjustment to equilibrium. A value of δ between 0 and 1 implies that profit persists, but eventually returns to their normal level. A value of δ close to 0 means that the industry is fairly competitive (high speed of adjustment), while a value of δ close to 1 implies less competitive structure (very low adjustment). X_{it} is the explanatory variables and ε_{it} the disturbance term, i.e., $\varepsilon_{it}= v_{it}+ u_{it}$, with v_{it} the unobserved bank-specific effect and u_{it} the idiosyncratic error. This is a one-way component regression model, where $v_{it}\sim$IIN (0, σ_v^2) and independent of $u_{it}\sim$ (0, σ_u^2). The X_{it} is grouped into bank-specific X^j_{it} and macroeconomic variable X^m_{it}.

Model Specification for GMM

The regression estimated using generalized methods of moment are based on the following equations:

Model 4:

$$\begin{aligned}&\mathrm{ROA_{it}}\\&=\alpha_0+\delta\mathrm{ROA_{i,t-1}}+\alpha_1\mathrm{SIZE_{it}}+\alpha_2\mathrm{CAD_{it}}+\alpha_3\mathrm{LQD_{it}}+\alpha_4\mathrm{DP_{it}}+\alpha_5\mathrm{OEF_{it}}\\&+\alpha_6\mathrm{OFBSTA_{it}}+\alpha_7\mathrm{GDPG_{it}}+\alpha_8\mathrm{INF_{it}}\\&+\varepsilon_{it}\end{aligned}\qquad(6)$$

Model 5:

$$\begin{aligned}&\mathrm{ROE_{it}}\\&=\beta_0+\delta\mathrm{ROE_{i,t-1}}+\beta_1\mathrm{SIZE_{it}}+\beta_2\mathrm{CAD_{it}}+\beta_3\mathrm{LQD_{it}}+\beta_4\mathrm{DP_{it}}+\beta_5\mathrm{OEF_{it}}\\&+\beta_6\mathrm{OFBSTA_{it}}+\beta_7\mathrm{GDPG_{it}}+\beta_8\mathrm{INF_{it}}\\&+\varepsilon_{it}\end{aligned}\qquad(7)$$

Model 6:

$$\begin{aligned}&\mathrm{NIM_{it}}\\&=\lambda_0+\delta\mathrm{NIM_{i,t-1}}+\lambda_1\mathrm{SIZE_{it}}+\lambda_2\mathrm{CAD_{it}}+\lambda_3\mathrm{LQD_{it}}+\lambda_4\mathrm{DP_{it}}+\lambda_5\mathrm{OEF_{it}}\\&+\lambda_6\mathrm{OFBSTA_{it}}+\lambda_7\mathrm{GDPG_{it}}+\lambda 8_8\mathrm{INF_{it}}\\&+\varepsilon_{it}\end{aligned}\qquad(8)$$

Where, α_0, β_0 and λ_0 denotes the intercept term. Profitability is measured by ROA, ROE and NIM of bank i at time t and bank-specific variables include Bank size

(SIZE), Capital adequacy (CAD), Liquidity (LQD), Deposit (DP), Operational efficiency (OEF), Non-traditional activities (OFBSTA) and macroeconomic variables includes GDP growth rates (GDPG) and inflation rate (INF). The term 'ε_{it}' indicates the error term. In the model, we can also see that $ROE_{i,t-1,}$ $ROE_{i,t-1}$ and $NIM_{i,t-1}$ are the lagged dependent variables used in generalized methods of moment (GMM).

4. Data Analysis and Results

This section provides descriptive statistics of variables, correlation matrix of explanatory variables, random effect regression and GMM regression results.

4.1. Descriptive Statistics of Variables

This section presents the descriptive statistics for the dependent and independent variables. As can be seen from Table 2, the mean values of three profitability measures like return on assets (ROA), return on equity (ROE) and net interest margin (NIM) are 0.009, 0.085 and 0.021 respectively. The maximum values for ROA, ROE and NIM are 0.042, 0.615and 0.045 whereas the minimum values are -0.073, -2.599 and -0.016 respectively. The standard deviation of ROA, ROE and NIM are 0.013, 0.32 and 0.0114which implies that ROA and NIM vary slightly from bank to bank, but ROE vary highly from bank to bank.

Table 2: Descriptive Statistics of Variables

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
ROA	120	.009	.013	-.073	.042
ROE	120	.085	.32	-2.599	.615
NIM	120	.021	.011	-.016	.045
SIZE	120	25.999	.664	24.534	27.487
CAD	120	.07	.037	-.134	.147
LQD	120	.906	.539	.538	6.612
DP	120	.797	.057	.624	.91
OEF	120	.627	1.56	.235	17.444
OFBSTA	120	.304	.133	.013	.597
GDPG	120	5.255	1.274	2.416	7.864
INF	120	6.259	2.301	2.007	11.395

In case of profitability influencing internal factors, the mean value of bank size is 25.99and standard deviation is 0.664 and the maximum and minimum values are 27.487 and 24.534 respectively. The mean value of capital adequacy (CAD) is 0.07 whereas the maximum value is 0.147 with a negative minimum value of -0.134. The standard deviation for CAD is shown by 0.037. Liquidity (LQD) is the important factor of profitability which implies that the average value is 0.906 and standard deviation is 0.539. The maximum and minimum values of liquidity are 6.612 and 0.538 respectively. The mean value of deposit (DP) is 0.797 whereas the maximum value is 0.91 and the minimum value is 0.624. The average value of operating efficiency is 0.627 with a standard deviation of 1.56, whereas the maximum and minimum values are 17.44 and 0.235 respectively. The off-balance sheet activities to total assets (OFBSTA) have a mean value of 0.304 and a standard deviation of 0.133 with a maximum value of 0.597 and a minimum value of 0.013.In case of profitability influencing external factors, the average values of GDP growth rate and inflation are 5.255 and 6.259 respectively. Finally, the maximum value of GDPG is 7.864 with minimum value of 2.416 and the maximum inflation is 11.395 with a minimum value of 2.007.

4.2. Correlations Analysis of Explanatory Variables

Table 3 presents the correlation coefficient between the explanatory variables used in the regression models. In the correlation matrix, there is no multicollinearity problem as is indicated by low degree of correlation coefficient between explanatory variables.

Table 3: Correlation Matrix of explanatory variables

variables	SIZE	CAD	LQD	DP	OEF	OFBST	GDPG	INF
SIZE	1.000							
CAD	-0.167	1.000						
LQD	0.014	-0.088	1.000					
DP	-0.149	-0.157	-0.126	1.000				
OEF	0.026	-0.569	-0.011	-0.070	1.000			
OFBSTA	-0.183	0.568	0.056	-0.307	-0.215	1.000		
GDPG	-0.225	-0.065	0.075	0.128	0.065	-0.020	1.000	
INF	-0.150	0.011	-0.008	0.160	0.048	0.011	0.164	1.000

From Table 3, we can see that the highest correlation coefficient is between off-balance sheet activities (OFBSTA) and capital adequacy (CAD) with a magnitude of 0.568. The implication of the correlation matrix is that there is no multicollinearity problem among the explanatory variables and hence results are efficient. According to Gujarati (2002), the multicollinearity problem can be considered if pair-wise correlation coefficient between two regressions is in excess of 0.8. Finally, since all independent variables have a correlation coefficient with a lower value than 0.8, so there is no existence of multicollinearity phenomenon.

4.3. Hausman Specification Test

Many studies have used fixed effect method (FEM) and random effect method (REM) to estimate the determinants of profitability of commercial banks. But both methods are not necessary. To determine which model is more appropriate, we run the Hausman test developed by Hausman (1978). Table 4 depicts the Hausman test results.

Table 4: Hausman Specification Test

Hausman test	**Prob>chi2**
Model 2 (ROA)	0.510
Model 3 (ROE)	0.348
Model 4 (NIM)	0.665

Table 4 shows that for three different dependent variables, there are three models. Hausman test suggests that if null hypothesis is accepted, then the fixed effect method may be more appropriate to be used compared to the random effect method. Since the p-value for three models are 0.510, 0.348 and 0.331 which are excess of 5% levels of significance, so the random effects model is an efficient estimator for the data as compared to the fixed effect model. Hence, the study adopts the Random Effects Model.

4.4. Random Effect Regression Results and Discussions

This section presents the results of the random effect regression analysis on the determinant factors of commercial banks profitability in Bangladesh. The regression results of three models are presented in Table 5.

Table 5: Impact of Explanatory Variables on ROA

Variables	**coefficient**	**t-value**	**p-value**
SIZE	-0.005***	-3.87	0.000
CAD	0.236***	8.05	0.000
LQD	-0.007***	-5.27	0.000
DP	0.056***	3.96	0.000
OEF	0.002***	3.00	0.003
OFBSTA	0.016**	2.23	0.026
GDPG	-0.001**	-2.17	0.030
INF	0.000	-0.97	0.334
Constant	0.074**	2.06	0.039
Model Summary			
Overall R^2	0.680	Number of obs	120.000
R^2within	0.583	Wald χ^2	235.718
R^2 between	0.886	Prob>χ^2	0.000
Note: ***, ** and * indicate the significance at 1%, 5% and 10% confidence levels respectively.			

As is seen from the Table 5, the overall R^2 of 0.683 indicates that about 68.3 % variation in dependent in the banking sector is explained by the included explanatory variables and the remaining 31.7 % variation is due to unobserved variables or error term. The Wald χ^2 statistic of 235.718 shows that the model is correctly specified and that the null hypothesis of variable inclusion is rejected at the 1% level of significance.

Table 5 shows that the coefficient value of bank size and liquidity are negative and statistically highly significant determinant of profitability for ROA model at 1% significance level. This negative result of bank size is consistent with the finding of Athanasoglou, *et al*. (2005). Molyneux and Thorton (1992) and Pasiouras and Kosmidou (2007) find a significant and negative relationship between liquidity and profitability. There is a positive and highly significant relationship between capital adequacy, deposit and operating efficiency and profitability measurement of ROA at 1% significance level. This positive empirical result of capital adequacy is consistent with studies of Pasiouras and Kosmidou (2007), and Demirguc-kunt and Huizinga (1999).The non-traditional activities are regarded as off-balance sheet activities to total assets which has a

positive coefficient of 0.016 and statistically significant at the 5% level of significance.

Table 6: Impact of Explanatory Variables on ROE

Variables	**Coefficient**	**t-value**	**p-value**
SIZE	-0.073***	-3.02	0.003
CAD	3.336***	5.47	0.000
LQD	-0.417***	-14.68	0.000
DP	0.811***	2.77	0.006
OEF	0.032***	2.68	0.007
OFBSTA	0.215	1.49	0.137
GDPG	-0.019	-1.59	0.112
INF	-0.003	-0.44	0.657
Constant	1.513**	2.03	0.042
Model Summary			
Overall R^2	0.760	Number of obs	120.000
R^2within	0.743	Wald χ^2	351.981
R^2 between	0.856	Prob>χ^2	0.000
Note: ***, ** and * indicate the significance at 1%, 5% and 10% confidence levels respectively.			

From Table 6, we see that the overall R^2 obtained from the model is 0.760. The estimated overall R^2 indicates that about 76.0% variation in dependent in the banking sector is explained by the included explanatory variables and the remaining 24% variation is due to error term. The Waldχ^2 value is 351.981 which measures the overall significance of regression model. In the Table 6, bank size and liquidity have been found to significantly determine the return on equity (ROE) and reported a negative coefficient which is significant at 1% level. In previous studies, Molyneux and Thorton (1992) and Pasiouras and Kosmidou (2007) find significant and negative relationship between liquidity and profitability. The coefficient of Capital adequacy, deposit and operating efficiency have positive and significant impact on ROE at 1% significant levels. Molyneux and Thornton (1992) show the similar results between capital adequacy and profitability and the positive result of deposit is in line with similar study which focuses on profitability of banks such as Ben and Goaied (2008).

Table 7: Impact of Explanatory Variables on NIM

Variables	Coefficient	t-value	p-value
SIZE	-0.004***	-2.87	0.004
CAD	0.074***	2.76	0.006
LQD	0.000	0.43	0.664
DP	0.006	0.36	0.718
OEF	-0.001*	-1.74	0.082
OFBSTA	0.022***	3.02	0.003
GDPG	-0.001**	-2.00	0.046
INF	-0.001	1.46	0.143
Constant	0.103**	2.41	0.016
Model Summary			
Overall R^2	0.387	Number of observation	120.000
R^2 within	0.443	Wald χ^2	83.635
R^2between	0.361	Prob>χ^2	0.000
Note: ***, ** and * indicate the significance at 1%, 5% and 10%confidence levels respectively.			

Table 7 finds that the estimated Overall R^2 indicates that about 38.7 % variation in dependent in the banking sector is explained by the included explanatory variables and the remaining 61.3% variation is due to error term. Although the overall R^2 is relatively lower, this is acceptable in this type of research work. Table 7 also presents the value of Wald χ^2statistics which is 83.635 with Prob> $\chi^2$of 0.000, which measures the overall significance of regression model.

The coefficients of variable 'bank size' show the negative and significance effect at 1% level in case of net interest margin (NIM). But if the size of the bank becomes larger, phenomenon of the diseconomies of scale appears, the more difficult for management to conduct surveillance and the higher the level of bureaucracy that has a negative impact on bank profits (Athanasouglau et al. 2005). The coefficient value of NIM model exhibits the positive and significant relationship with capital adequacy (CAD) at 1% level of significance. Operation efficiency is found significant in the determinant of commercial banks profitability at 10% level of significance. The non-traditional activities are the ratio of off-balance sheet activities to total assets which has a positive coefficient of 0.022 and statistically significant at the 1% level of significance. As expected, we get a positive relationship between non-traditional activities (OBSTA) and

NIM which implies that banks involving more off-balance sheet activities have higher level of NIM. The GDP growth rate has negative and significant at 5% level in terms of NIM regression model. The findings imply that 1 % increase in the GDP growth decreases 0.1% Bangladeshi bank profitability which exhibits the very slight negative relationship.

4.4. GMM Regression Results and Discussions

This study also applies the generalized methods of moments (GMM). Method deals with weak instrument problem by augmenting instruments. Furthermore, over-identification is tested using the Sargan's test. To determine the determinants of profitability of commercial banks in Bangladesh using system generalized method of moments (GMM), three models for three dependent variables such as ROA, ROE and NIM have been estimated which are described as follows.

Table 8: Impact of Explanatory Variables on ROA

Variables	**Coefficient**	**T-Value**	**P-Value**
L.ROA	-0.086	-1.44	0.149
SIZE	0.000	-0.13	0.896
CAD	0.275***	7.57	0.000
LQD	-0.008***	-5.11	0.000
DP	0.064**	2.31	0.021
OEF	0.003***	4.42	0.000
OFBSTA	0.063***	5.01	0.000
GDPG	0.000	-0.58	0.562
INF	0.000	-0.68	0.496
Constant	-0.063	-0.88	0.378
Wald χ^2	206.731, Prob>χ^2= 0.000		
Sargan test	χ^2= 84.05847, Prob>χ^2= 0.0002		
Number of obs	108.00		
Note: ***, ** and * indicate the significance at 1%, 5% and 10% confidence levels respectively.			

From Table 8, the model seems to fit the panel data reasonably well, having fairly stable coefficients, while the Wald χ^2 is 206.731 at 1% significance level that indicates fine goodness of fit and the Sargan-test value (84.05847) shows that there is no evidence of over-identifying restrictions.

Table 8 shows found that capital adequacy (CAD), operating efficiency (OEF) and non-traditional activities have a positive and highly significant impact on the profitability of commercial banks in Bangladesh at 1% level of significance. The finding of positive coefficient is consistent with previous studies of Masood and Ashraf (2012) indicating that banks with sound capital position located in Bangladesh face lower cost, which also suggests reduced cost of funding or lower need for external funding, implying higher profitability. There is positive and significant relationship between deposit and bank profitability at 5% significance level. This means that an increase in deposit leads to increase in profitability measure of ROA. The deposit of commercial banks is the main sources of funding. The deposits are transformed into loans and it raises the bank profitability. The coefficient of 0.064 indicates that 1% increases in deposit increase the 6.4% return on assets. Referring the impact of liquidity, negative and highly significant impact on the profitability of commercial banks is found 1% significant level. The negative coefficient implies that increase (decrease) in liquidity reduces (increases) the profits of commercial banks.

Table 9: Impact of Explanatory Variables on ROE

Variables	**Coefficients**	**T-Value**	**P-Value**
L.ROE	-0.042	-1.10	0.270
SIZE	0.012	0.25	0.801
CAD	3.696***	4.76	0.000
LQD	-0.445***	-15.21	0.000
DP	-0.130	-0.22	0.826
OEF	0.047***	3.88	0.000
OFBSTA	0.877***	3.36	0.001
GDPG	0.007	0.41	0.684
INF	0.006	0.73	0.465
Constant	-0.359	-0.24	0.811
Wald χ^2	339.905, Prob> χ^2=0.000		
Sargan test	χ^2= 61.8712, Prob>χ^2=0.0310		
Number of obs.	108.00		
Note: ***, ** and * indicate the significance at 1%, 5% and 10%confidence levels respectively.			

Table 9 shows that the model seems to fit the panel data reasonably well, having fairly stable coefficients, while the Wald χ^2 is 339.905 at 1% significance level

that indicates fine goodness of fit and the Sargan-test shows no evidence of over-identifying restrictions. The coefficients of capital adequacy, operating efficiency and non-traditional activities have positive relationship with profitability measure of return on equity (ROE) and it is statistically significant at 1% confidence levels. Positive relationship is expected from the capital adequacy to bank profitability because the banks with healthy capital face have lower chance of bankruptcy and decreased cost of funding (Bashir, 2003). Referring to liquidity, the ratio of loan and advance to total deposit is statistically highly significant and negatively related to the return on equity (ROE) at 1% significance levels. When the liquidity of banks increases by 1%, the return on equity decreases by 44.5% due to negative coefficient of 0.445. This negative result of liquidity is consistent with our expectations and some earlier studies (e.g. Molyneux and Thorton, 1992 and Guru et al., 1999).

Table 10: Impact of Explanatory Variableson NIM

Variables	**Coefficient**	**T-Value**	**P-Value**
L.NIM	0.575***	6.12	0.000
SIZE	-0.004***	-2.77	0.006
CAD	0.037	1.52	0.129
LQD	-0.002*	-1.70	0.089
DP	-0.024	-1.45	0.147
OEF	-0.001*	-1.88	0.061
OFBSTA	0.018**	2.34	0.019
GDPG	0.000	-0.40	0.691
INF	0.000*	1.76	0.079
Constant	0.121***	2.75	0.006
Wald χ^2	296.265, Prob> χ^2=0.000		
Sargan test	χ^2=73.47339, Prob>χ^2=0.0026		
Number of obs.	108.00		
Note: ***, ** and * indicate the significance at 1%, 5% and 10%confidence levels respectively.			

The models seem to fit the panel data reasonably well, having fairly stable coefficients, while the Wald χ^2 is 296.265 at 1% significance level that indicates fine goodness of fit and the Sargan-test of over-identifying restrictions is valid

It is seen from Table 4.9 that bank size has negative but significant impact on net interest margin (NIM) at 1% levels of significance. It does not confirm the existence of economies of scale as the relationship between bank size and NIM is

negative and significant. This means that 1% increase in bank size leads to 0.4% reduces in the profitability of commercial banks in term of NIM. From Table 10, it is observed that liquidity is negatively and significantly related with NIM at 10% significance levels which suggest that banks with a high level of liquidity earn less. This result is consistent with the finding of Pasiouras and Kosmiddou (2007) and Francis (2013).Operating efficiency (OEF) is the ratio of cost to income which is found to have negative and significant effects on profitability across the profitability measure of net interest margin (NIM) at 10% levels of significance. This finding is consistent with many previous studies, e.g. Athanasoglou *et al*. (2005), Sufian*et.al*, (2008) and Suzuki *et.al*, (2011). Non-traditional activities are the ratio of off-balance sheet activities to total assets (OFBSTA), which positively and significantly affects the profitability associated with Net interest margin (NIM) at 5% significance level. Referring to the macroeconomic determinants of commercial bank profitability, inflation rate is relevant and significantly related to the profitability of commercial banks. The result reveals that inflation is positively but statistically significant to the commercial banks profitability at 10% level of significance. The result is consistent with the finding of Al-Khouri (2011).

5. Conclusions

Banking sector plays a vital role in the economy of Bangladesh because it contributes a significant share to GDP of the country. Specially, commercial banks of Bangladesh are regarded as the essential sources of funding in the economy. So the objectives of this study are to identify the factors that influence the profitability of commercial banks in Bangladesh and to estimate the significant factors. Moreover, this study focuses on the internal and external factors that act as determinants of profitability. Random effect regression results suggest that bank size and liquidity have negative significant impact on ROA, ROE and NIM at 1% significance level, but positively and insignificantly related to NIM in case of liquidity. Capital adequacy and deposit are positively and significantly related to three profitability indicators at 1% level of significance. The operating efficiency has positive significant effect on ROA and ROE at 1% level of significance, but negative significant effect on NIM at 10 % significance level. So, the operating efficiency and capital adequacy would help the commercial banks to achieve more profitability. Finally, macroeconomic factors like GDP growth is negatively related to bank profitability and inflation rate has negative impact on ROA and ROE, but positive impact on NIM. Generalized method of moments

suggests that there is positive and highly significant relationship between capital adequacy, non-traditional activities and bank profitability measurement of ROA, ROE and NIM. Liquidity has negative significant effect on profitability, whereas the deposit has positive relation to ROA. The operating efficiency positively and significantly affect profitability indicator except NIM. With regard to macroeconomic variables, only inflation rate affects the NIM positively. Findings of operating system and capital adequacy impact the profitability of commercial bank more. So these two factors are more important for policy maker to achieve high profitability of commercial banks.

References

[1] Acaravci, S. K. and Calim, A. E. (2013). Turkish Banking Sector's Profitability Factors. International Journal of Economics and Financial Issues, Vol. 3(1), pp. 27-41.

[2] Adeusi, S. O., Kolapo, F. T. and Aluko, A. O. (2014). Determinants of Commercial Banks' Profitability: Panel Evidence from Nigeria. International Journal of Economics, Commerce and Management, Vol. II, Issue 12, pp. 1-18.

[3] Ali, K., Aktar, M. F. and Ahmed, P. H. Z. (2011). Bank-Specific and Macroeconomic Indicators of Profitability-Empirical Evidence from the Commercial Banks of Pakistan. International Journal of Business and Social Science, Vol. 2, No. 6, pp. 235-242.

[4] Alper, D. and Anbar, A. (2011). Bank Specific and Macroeconomic Determinants of Commercial Bank Profitability: Empirical Evidence from Turkey. Business and Economics Research Journal, vol. 2, No. 2, pp. 139-152.

[5] Angbazo, L. (1997). Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking. Journal of Banking & Finance, 21, pp. 55-87.

[6] Athanasoglou, P. P., Brissimis, S. N. and Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. International Financial Markets, Institutions and Money, 18, pp. 121-136.

[7] Athanasoglou, P., Delis, M. and Staikouras, C. (2006). Determinants of bank profitability in the South Eastern European Region. Bank of Greece Working paper, 06/47.

[8] Ben, N. S. and Goaied, M. (2008). The determinants of commercial bank interest margin and profitability: evidence from Tunisia. Frontiers in Finance and Economics, Vol. 5, No. 1, pp. 106-130.

[9] Berger, A. N. and Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crises? Journal of Financial Economics, 109, pp.146-176.

[10] Bourke, P. (1989). Concentration and Other Determinants of Bank Profitability in Europe, North America and Australia. Journal of Banking and Finance 13, pp. 65-79.

[11] Brooks, C. (2014). Introductory econometrics for finance. Cambridge: Cambridge University Press.

[12] Clayes, S. and Vennet, R. (2004). Determinants of Bank Interest Margins in Central or Eastern Europe. Working Paper, Ghent University, Belgium.

[13] Deelchand, T. and Padgett, C. (2009). The Relationship between Risk, Capital and Efficiency: Evidence from Japanese Cooperative Banks. ICMA Centre Discussion Papers in Finance DP 2009-2012.

[14] Dietrich, A. and Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. Journal of International Financial Markets, Institutions & Money, 21, pp.307-327.

[15] Duraj, B. and Moci, E. (2015). Factors influencing the bank profitability: Empirical evidence from Albania. Asian Economic and Financial Review, 5(3), pp. 483-494.

[16] Fama, E. F. (1980). Agency problems and the theory of the firm. Journal of Political Economy, 88 (2), pp. 288-307.

[17] Flamini, V., McDonald, C. A. and Schumacher, L.B. (2009). The determinants of commercial bank profitability in Sub-Saharan Africa. IMF working paper, No. 09/15, pp. 1-30.

[18] Francis, M. E. (2013). Determinants of commercial bank profitability in Sub-Saharan Africa. International Journal of Economics and Finance, 5(9), pp.134–147.

[19] Golin, J. (2001). The bank credit analysis handbook: A guide for analysts, bankers and Investor. John Wiley & Sons (Asia).

[20] Guru B. K., Staunton, J. and Balashanmugam, B. (1999). Determinants of CommercialBank Profitability in Malaysia. 12th Annual Finance and Banking Conference, Sidney.

[21] Guru, B. K. (2002). Determinants of commercial bank profitability in Malaysia. Journal of Money Credit, and Banking,Vol. 5(17), pp. 69-82.

[22] Heffernan, S. A. and Fu, X. (2010). Determinants of financial performance in Chinese banking. Applied Financial Economics, 20(20), pp. 1585-1600.

[23] Indranarain Ramlall (2009). Bank-Specific, Industry-Specific and Macroeconomic Determinants of Profitability in Taiwanese industry, MSc project paper, Addis Ababa University

[24] Islam, M. A., Sarker, M. N. I., Rahman, M., Sultana, A., Prodhan, A. Z. M. S., (2017). Determinants of Profitability of Commercial Banks in Bangladesh. International Journal of Banking and Financial Law 1(1): 1-11.

[25] Jahan, N. (2012). Determinants of Bank's Profitability: Evidence from Bangladesh. Indian Journal of Finance, 6(2), pp. 32-38.

[26] Kiganda, E. O. (2014). Effect of Macroeconomic Factors on Commercial Banks Profitability in Kenya: Case of Equity Bank Limited. Journal of Economics and Sustainable Development, Vol. 5, No. 2, pp. 46-56.

[27] Kosmidou, K. (2008). The determinants of banks' profits in Greece during the period of EU Financial integration, Journal of Managerial Finance, 34(3), pp. 146-159.

[28] Liu, H. and Wilson, J. O. S. (2010). The profitability of banks in Japan.Applied Financial Economics, 20(24), pp. 185-1866.

[29] Molyneux, P. and Thornton, J. (1992). Determinants of European bank profitability: A note. Journal of Banking and Finance, 16, pp. 1173-I 178.

[30] Ongore, V. O. and Kusa, G. B. (2013). Determinants of Financial Performance of Commercial Banks in Kenya. International Journal of Economics and Financial Issues Vol. 3, No. 1, pp.237-252.

[31] Palanisamy, G., Mane, A., Meera, S. N. and Rao, M. S. (2017). Determinants of Profit and Profitability of Rwanda Commercial Banks: A Profit Function Approach. International Journal of Business and Applied Sciences Vol. 6, No. 2, pp. 26-41.

[32] Pasiouras, F. and Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European. Union Research in International Business and Finance, 21, pp. 222–237.

[33] Petria, N., Capraru, B. and Ihnatov, I. (2015). Determinants of banks' profitability: evidence from EU 27 banking systems. Procedia Economics and Finance, 20, pp. 518-524.

[34] Rahman, M. M., Hamid, M. K. and Khan, M. A. A. (2015). Determinants of Bank Profitability: Empirical Evidence from Bangladesh. International Journal of Business and Management; Vol. 10, No.8, pp.135-150.

[35] Roodman, D. (2006). How to do xtabond2: An introduction to difference and system GMM in Stata. Center for Global Development Working Paper (103).

[36] Sakib, R. H. and Hossain, D. A., (2020). Determinants of Profitability of Commercial Banks in Bangladesh, International Journal of Science and Business, IJSAB International, vol. 4(9), pp 1-16.

[37] Sayilgan, G. and Yildirim, O. (2009). Determinants of Profitability in Turkish Banking Sector: 2002-2007, International Research Journal of Finance and Economics, Issue 28, pp. 207-214.

[38] Sufian, F. and Habibullah, M. S. (2009). Determinants of bank profitability in a developing economy: Empirical evidence from Bangladesh. Journal of Business Economics and Management, 10(3), pp. 207-217.

[39] Sufian, F. and Kamarudin, F, (2012). Bank-Specific and Macroeconomic Determinants of Profitability of Bangladesh's Commercial Banks. Bangladesh Development Studies Vol. XXXV, No. 4, 1-19.

[40] Syafri (2012). Factors Affecting Bank Profitability in Indonesia. The International Conference on Business and Management. Phuket, Thailand.