

Post Deregulation Performance of State-owned Banks in Bangladesh: Imperative of Further Reform.

Mohammad Abul Kashem¹

ABSTRACT

State-owned banks have always raised questions by their business performance in Bangladesh since its inception in 1971. Therefore, the country has implemented a massive reform in the mid-1990s to increase the financial performance of all banks by switching to a greater deregulated and market based banking sector. This paper attempts to conduct a comparative assessment of this deregulation effort on different groups of banks in Bangladesh. We have conducted both statistical analyses and econometric investigations on the comparative performance of the government and other types of commercial banks only for their post-deregulated operation period. The study has found an overwhelming support of lower performance by the government banks compare to the private and foreign commercial banks even though government banks were doing business not only in a level playing field but also with additional supports from the government and regulatory authorities (i.e. central bank etc.) of the country. Thus, the findings of this study indicate that reform for shifting in a deregulated market based banking regime has not improved the financial performance of the government banks in Bangladesh. So, the government banks in this country should contemplate in cost reduction, explore more profitable and technology based banking services, and cost efficient business operations to ameliorate their financial performance in future.

Keywords: Bank Performance, Financial Reform, Bangladesh.

JEL Classification: B 26, D 53, & E 44.

¹ PhD Student, Graduate School of Global Governance, Meiji University, Tokyo, Japan
Views expressed in the paper is authors' own only and does not represent the stand of Bangladesh Bank.

1. Introduction

As a developing country Bangladesh is trying to eradicate poverty level in a rapid speed. Keeping this target as its main goal, the country is trying to be an Upper Middle Income Country (UMIC) and High Income Country (HIC) by 2031 and 2041 respectively. These targets are ambitious but not impossible. However, there are many challenges in achieving this target as well. There are number of sectors those to be reformed immediately to make the economy congenial to the development trajectory as versioned and, of course, banking sector is one them that demands high priority. Without a dynamic and lively banking sector, monetary and exchange rate policies by central bank cannot be properly implemented, and therefore, targets of these policies would not be achieved. So, if the country really has a vision to be a HIC, banking sector cannot stay lag behind and thus remain inefficient. None has any doubt that besides of having efficiency in financial policy formulation and implementation by the central bank, having high efficiency of banking sector is a major precondition for becoming a high income country. However, still banking is not well developed in Bangladesh (Sadiq, 2020). Thus, to ensure an effective financial intermediation process an urgent priority for the country is to establish a robust, competitive and sustainable banking sector.

In literature, banking sector is recognized as one of the important determinant of economic development of a country (McKinon and Shaw, 1973). Therefore, hundreds of studies later have emerged based on their hypothesis to highlight the importance of this sector in economic development. The sector works as a major catalyst in the growth of a country by expedition of the investment and resource mobilization. In the present world, since global economic environment is highly interconnected, financial sector of a country cannot lag behind in uncompetitive and inefficient stage which persistently incurs loss and, hence, subsidy by the government. In particular, banking sector which keeps economy spirited by resource mobilization which is tantamount to the blood circulation of human body. A significant level of the financing in Bangladesh is still provided by the government banks (Table 1).

In recent times, Bangladeshi government banks are entangled with many further problems like increased default culture, frequent writing-off bad loans, constant increase of Nonperforming Loans (NPLs), and consequently needs to recurrent capital injection by the government from tax revenue, unable to fulfill the central bank requirement in keeping Cash Reserve Ratio (CRR), Statutory Liquidity Reserve (SLR), Advance-Deposit Ratio (ADR), provision against NPLs, etc. These failures are not only making trouble in protecting the depositors' interest, and keeping financial intermediation process viable, but also seriously hampering monetary policy target achievement by the central bank.

The rest of this paper arranged as follows. Section 2 reviews structure of banking sector in Bangladesh. Section 3 critically analyses the present condition of banking sector and government banks of Bangladesh. Section 4 reviews the existing literature particularly on bank performance and subsequently, identifies the existing lacuna. An elaborated narrative of estimation methodology of this study is presented in section 5. Data issues are presented the section 6. Estimated Results and their analyses are placed in section 7. Section 8 gives the concluding remarks and policy suggestion.

2. Structural changes of the banking sector of Bangladesh:

In Bangladesh after independence all domestic banks were in the hand of government. Although private banks were allowed to run since mid-1980s, this utter dominance of government banks in the sector was effective until 2000. In January, 1996 banking sector was suddenly allowed to operate in a deregulated mode with a motive to more market based financial system. The central bank abolished its past interest rate settings strategy and sectoral directed lending practices. From that point of time all banks in Bangladesh can impose prices of their products, interest rates on credits, charges or fees for services etc. by themselves, and central bank does not interfere on such issues. After deregulation in 1996 the change of structure of the banking sector has got its momentum considerably. In the year 2000, major indicators like income and profit by the govt. banks were superseded by the private banks (Table 1).

Table 1: Total Income, Profit, and Branches of Government, Private, and Foreign Banks in Bangladesh

Year	Income in Hundred Million Taka			Profit in Hundred Million Taka			Number of Branches		
	Govt. Bank	Private Bank	Foreign Bank	Govt. Bank	Private Bank	Foreign Bank	Govt. Bank	Private Bank	Foreign Bank
1975	109.01	14.3	5.6	6.41	1.21	0.55	1442	169	14
1980	264.93	46.64	21.01	14.13	3.24	2.61	3376	445	19
1985	680.46	192.17	98.67	43.49	22.19	15.03	3837	1106	20
1990	1406.12	617.71	180.39	54.12	56.56	17.65	3545	1994	22
1995	1982.08	943.89	335.65	88.52	121.16	90.76	3611	2202	25
2000	3726.27	3267.62	967.51	112.37	309.97	220.46	3607	2449	30
2005	4836.34	9140.17	1367.59	365.93	954.71	470.18	3388	2930	37
2010	10260.46	32873.14	2632.77	945.63	6032.03	645.62	3394	3852	46
2015	20782.27	64033.43	5407.47	1176.26	6145.79	1692.81	3669	5462	51
2020	24064.51	94759.71	6782.25	49.26	8023.22	2313.30	3798	6883	71
2021	26872.24	91769.50	5595.46	429.25	6687.22	1538.70	3801	5421	67

Source: Monthly Economic Trends, various issues, Bangladesh Bank

Gradually, private banks have taken over the banking sector and since 2000 financial sector of the country is private bank intensive. Consequently, competition among intra and inter (like government, private, foreign & specialized) ownership of banks have intensified (Table 1 and Table 2).

Table 2: Deposits taken and Advances given by Government. and Private Banks in Bangladesh

Year	Deposits in Billion Tk.		Deposits in Percentage		Loans in Billion Tk.		Loans in Percentage	
	Govt.	Private	Public	Private	Public	Private	Public	Private
1995	342	168	67	33	231	137	63	37
2000	400	213	65	35	382	166	63	37
2005	544	515	51	49	387	420	48	52
2010	599	2768	16	84	737	1837	29	71
2015	1757	5967	23	77	1291	4070	24	76
2020	3193	8498	22	78	1802	6668	21	79
2021	3904	9533	22	78	1921	6854	20	80

Source: Monthly Economic Trends, various issues, Bangladesh Bank

In 1995, government and private banks have gleaned 67 and 33 percent of the total deposits of the banking sector respectively. However, in 2020 the structure

of the banking sector has drastically changed. Government and private banks have collected 22 and 78 percent of the total deposits of the banking sector respectively. Same paradigm shift has also been taken in case of loan distribution by the banking sector.

Table 3: Structure and spread of banking business in rural and urban area of Bangladesh.

Year	Percentage of Branches		Total Branches	Percentage of Deposits		Total Deposits in Billion Tk.	Percentage of Loans		Total Loans Billion Tk.
	Rural	Urban		Rural	Urban		Rural	Urban	
2000	59.80	40.20	6119	22.68	77.32	710	59.80	40.20	6119
2005	58.79	41.21	6402	15.40	84.60	1416	58.79	41.21	6402
2010	57.36	42.64	7658	12.93	87.07	3379	57.36	42.64	7658
2015	56.76	43.24	9397	19.84	80.16	7940	56.76	43.24	9397
2020	48.51	51.49	10588	20.72	79.28	12642	10.34	89.66	10487
2021	48.50	51.50	10793	21.29	78.71	14398	10.90	89.10	11389

Source: Bangladesh bank Annual Reports (Various Issues)

Deregulation policy has also have direct impacts on rural – urban banking setup. Before 2000 branch and loan distribution were greater in rural areas. However, in now formation of banking sector's changed and presently banking business is totally urban based. In present, concentration of the banking sector is mostly in the capital city Dhaka and major port city Chittagong.

From the above table 1, 2 and 3 it is revealed that banks business in Bangladesh is gradually shifting to the private sector from the government sector. It is seen that the key market share indicators like income, profit, branches, deposits, and loans-advances etc. were higher in the hand of government owned banks than privately owned banks in pre-deregulation period. However, scenery is totally opposite in the post-deregulation period. Further, the structure of the market is also changes in post-deregulation period. Rural-urban branch combination, share of loans and advances disbursement between rural and urban areas, share of credit distribution among agriculture, service and manufacturing sectors also changed considerably. In post deregulation phase, besides above changes, phenomenal changes have come in the other front of financial issues too. Exponential growth is visible in the areas of broad money, private sector credit (and thus private sector investment),

number of bank branches, number of bank account holders or financial inclusions etc. have contributed and snatched by the private sector banks. Also more macroeconomic changes regarding increasing financial deepening, customer service, financial product innovation, jobs in financial sector, industrial credit, etc. are discernible. Constant increase is seen in the mobile banking, agent banking, SME financing, and microcredit distributions as well. Further, decrease of central bank regulation regarding money, credit and foreign exchange markets, etc. are noticeable. It means that government banks have failed to keep up with such rapid changes occurred financial market. But private banks have been successful to earn the advantage of this changing situation.

Consequently, in this new financial environment private banks outperform than government banks in all aspects of operations. In short, deregulation has incurred changes and opportunities in the multiple fronts of banking business in Bangladesh but the existing data reveals that government banks have failed to capitalize these newly emerged advantages.

3. A Critical Analysis of the Government Bank Conditions in Bangladesh

It is true that banking sector of Bangladesh is afflicted with high level of NPLs both in regulated and deregulated period. However, government run banks are more affected by this curse than private sector banks (Table 5). Still they are staggering in above 20% loans as NPL. Table 5 shows that government banks loan portfolios are seriously affected by NPL among all type of banks in the sector. Private Bank's NPLs were also in alarming level though they have got over in a better position now due to the relaxation of NPL rules.

Table 4: Progress with Capital Adequacy (Percentage)

Bank Type	1995	2000	2005	2010	2015	2020	2021(Jun)
SCBs	6.6	4.4	5.2	8.9	6.4	6.9	6.8
PCBs	8.3	10.9	9.2	10.1	12.4	13.3	13.3
FCBs	16.7	18.4	17.1	15.6	25.6	24.4	28.5
Total	7.5	6.7	7.3	9.3	10.8	11.6	11.6

Source: Bangladesh Bank Annual Report, Various Issues

Such misery of public sector banks is actually due to weak management, continuous political interference, politically directed and motivated loans, adverse selection and moral hazards by themselves. In 2020 government banks offered only 21% of total loans in the economy. However, they have constituted 43% of total classified loans in the financial system which actually confirms that they are not financially solvent to run the business. Financial health of the government banks are now in very critical condition and their survival is dependent on to the boon of government intermittent capital injection. Thus, as state organizations both government bank themselves and judiciary system failed to protect depositors and credible clients' interests.

Table 5: Trend in NPL as Percent of Total Loans 1995-2020(Entire Sector)

Bank Type	1995	2000	2005	2010	2015	2020	2022(Sept)
SCBs	39.8	39.1	25.2	11.3	21.5	22.7	23.04
PCBs	31.2	22.1	4.2	2.9	4.9	5.9	6.20
FCBs	4.3	3.2	2.1	3.2	7.3	5.5	4.77
Total	37.1	35.1	11.4	6.1	8.8	9.2	9.36

Source: Bangladesh Bank Annual Report, Various Issues

NPLs in the banking sector of Bangladesh arises basically from the political maelstrom. Besides of political dimension there are some other associated arms which are deteriorating and intensifying this problem. There are inadequacy and weakness of financial law and judicial system of the country, weak supervisions and monitoring capacity of the central bank which is also partly as a result of the political reluctance and fiscal dominance, non-incentive for better bank management, lack of professional commitments by the staffs, enough efficient staffs, poor standard of services and products by the government run banks.

Table 6: NPL as percent of Total Loans 1995-2020 (of own loans)

Bank Types	1995	2000	2005	2010	2015	2020	2021(Jun)
SCB	37	39	25	11	22	23	20.6
PCBs	31	22	4	3	5	6	5.4
FCBs	4	3	2	3	8	6	3.9
Total	37	35	11	6	8	9	8.2

Source: Bangladesh Bank Annual Reports, various Issues

Throughout the post deregulation period, NPL of state-owned banks is higher than private and foreign commercial banks. Assets quality of government banks is inferior to private and foreign commercial banks. So, default risk of government banks is higher than private and foreign commercial banks. It also indicates that efficiency of government banks management is lower than private commercial banks. In a same financial market, though it is told that there is a level playing field for all organizations government banks are enjoying some extra benefit by having government deposits, negotiation of government high priced import LCs, etc. performance of government banks is persistently lower than other type of banks means that overall financial health of government banks is permanently inferior to others.

Table 7: Progress with Provision Adequacy with Required (in Percentage)

Bank Type	2000	2005	2010	2015	2020	2021(Jun)
SCBs	18.9	25.1	98.9	96.5	78.4	64.6
PCBs	82.1	86.8	99.1	100.9	103.1	112.7
FCBs	114.3	137.5	119.4	107.1	121.1	128.2

Source: Bangladesh Bank Annual Report, Various Issues

Government bank is also always fail to fulfill regulatory requirements like preserving capital requirements, CRR, SLR, AD ratio etc. as mentioned above. Further, for perpetual insolvency of their financial positions they also fail to keep required level of provisions and capital against risk weighted assets and NPLs. In maintaining such regulatory requirement, in Bangladesh government banks are always under performer than private and foreign commercial banks (Table 7). It means that they have been enjoying favoritism from the government and the central bank all along in maintaining regulatory obligations.

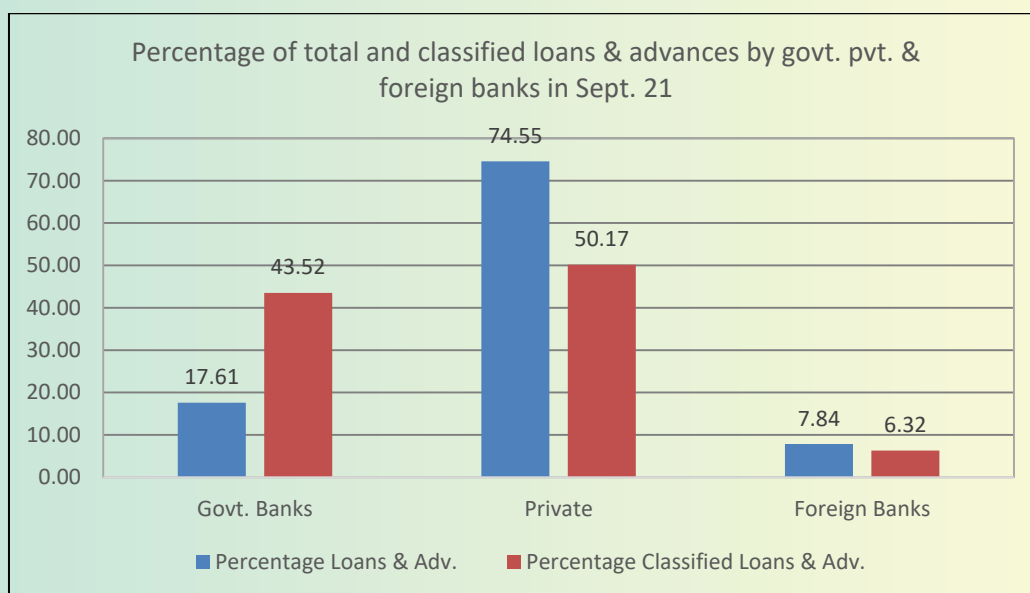
Table 8: Expenditure - Income Ratio by Types of Banks

Bank Type	1997	2000	2005	2010	2015	2020	2021
SCBs	99.4	98.8	101.9	80.7	84.5	85.8	86.99
PCBs	90.8	93.1	89.3	67.6	75.5	82.6	75.81
FCBs	77.7	80.3	70.8	64.7	47.1	45.5	43.79
Total	99.3	93.9	92.1	70.9	76.1	84.1	82.2

Source: Bangladesh Bank Annual Report, Various Issues

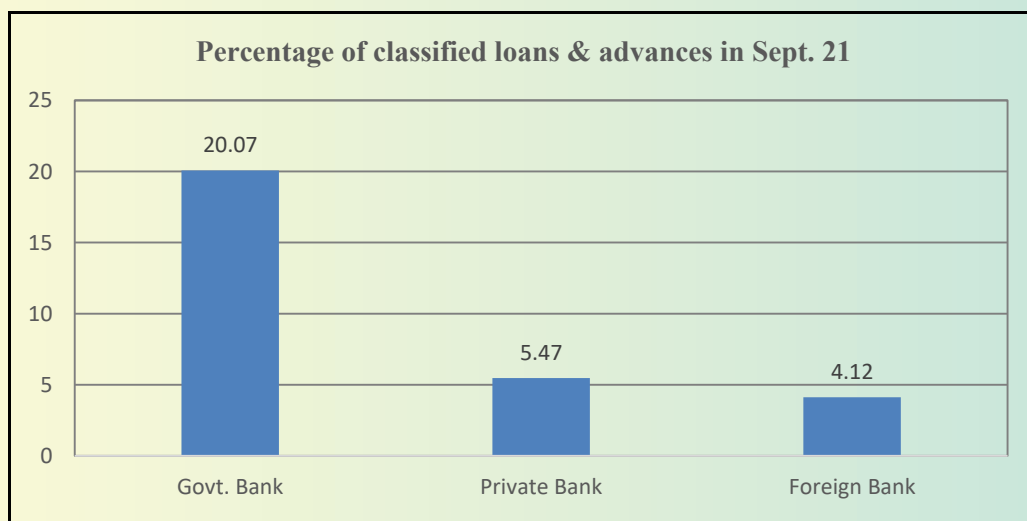
Expenditure – income ratio of government banks is almost always higher than private commercial banks means that cost efficiency of government bank is sustainably lower than private and foreign commercial banks. They have unnecessary cost and employees those are not spent or used for productive purpose. It also means that government banks have much scope to reduce cost in their business by using alternative combination of inputs. Further, it also shows that deregulation did not improve government banks financial health and competitive power by operation cost minimization in the industry which showed urgency of their further reform.

Figure 1: Present contribution of Bangladeshi banks in the total and classified loans



Source: Monthly Economic Trends, Bangladesh Bank

Contribution of government banks in total loans and advances of the economy is only 17.61 percent. However, contribution of classified loans and advances by government banks is 43.52 percent (figure 1).

Figure 2: Ratio of classified loans to the own total loans and advances

Source: Monthly Economic Trends, Bangladesh Bank

With respect to own loans and advances government banks have currently (Sept. 2021) highest rate classified loans (figure 2). They have endowed highest level of percentage of classified loans. They are the lowest contributor in credit supplying in the market. However, they are the highest producer of classified loans and advances in the market. Precisely, figure 1 and 2 postulate that asset quality of government banks are overwhelmingly poor than private and foreign banks.

4. Literature Review

After searching related papers, this author perception is that banking sector of Bangladesh is terrifically under researched. Reason of such gigantic research gap may be due to non-availability of data on Bangladesh banking sector on Bankscope. However, we shall discuss here about the papers we have got on impact factor journals only. They are chronologically as follows:

The status of NPLs in the banking sector of Bangladesh of 1990s has been examined by Adhikary (2006). His analysis indicates that over the years an alarming amount of NPLs is accumulated in Nationalized Commercial Banks (NCBs). The study concludes that, although the country has made progress in terms of classifying of loan standards, loan classification, and provisioning systems, the overall management of NPL is utterly unsuccessful.

Beck and Rahman (2006) concluded that, to ensure a sustainable expansion of the financial system, the present role of the government of Bangladesh is not acceptable, and the government should play the role of a watchdog not as the owner of banks. To this end, they suggested that, de-politicization of the certificating process, and following of an international standard and market-based bank failure resolution framework, concentration to the market oriented intermediation process is imperative to restore market discipline.

According to Beck (2008), fragility in the banking sector in Bangladesh over the period of his review was not related to deregulation of the sector rather it was related to both supervisory and management failure. Therefore, the author viewed that Bangladesh needs to establish essential institutional frameworks in its financial sector not market liberalization. According to him where there is a weak institutional framework, disbursing loan by political consideration can lead to a very fragile banking sector which is the actual case of Bangladesh. As a remedy he pointed out that the government should emphasize improving the institutional environment of the banking sector not merely deregulation.

Nguyen and Ali (2011) emphasized the ongoing challenges of the financial sector of Bangladesh and observed that the key challenge in case of the financial sector's lack of competition and market discipline. So, they underscored the excessive government and political intervention as well as managerial inefficiencies as the basic causes of various problems in Bangladeshi banking sector.

Iqbal et al. (2012) have got that government banks are in the most vulnerable position in Bangladesh whereas the foreign commercial banks are in the best performer.

Further, Hossain (2012), using data of individual banks and applying panel regression technique attempted to explain a relevance of persistent of unusually high IRS of Bangladesh. Moreover, he explained the reason behind the multiple IRS across the banks which hint serious market imperfection in financial sector. In his view, the main causes of high IRS across the sector are high operating costs due to unnecessary staffs of banks, persistently growing and unaffordable NPLs, lower market demand, and uncompetitive deposit markets in the country.

Mansur (2015) identified the lack of corporate governance of the banks in Bangladesh which is, as far as his understanding, directly related to political will only. Though he expressed anxiety over the rapid increase of NPLs, he believed NPLs of public sector banks to be a greater threat to the economy and stability to the banking sector of Bangladesh.

Exploring the determinants affecting the performance of banks, Rahman et al. (2015) found that lower capital strength and loan intensity have a positive and significant impact, and cost-efficiency and off-balance sheet activities have a negative and significant impact on bank performance in Bangladesh.

Relying on stochastic frontier approach (SFA), Robin et al. (2017) assessed twelve largest banks of Bangladesh by the bank-level data for the period of 1983–2012 to demystify the efficiency and productivity performance of the banking sector of Bangladesh. Their findings disclosed the positive effect of banking sector deregulation on costs efficiency. Their investigations further revealed that cost efficiency could be negatively affected by the politically appointed directors.

Considering the above discussion we can reach in the decision that there is no quality research regarding the relationship between bank ownership and bank performance, and about the tremendous literature gap on Bangladeshi banking sector are as follows: (a) there is no research on ownership issue of Bangladeshi banking sector, (b) no study is done by the data set that covers the full deregulated period, and (c) no study is done by the data of entire banking sector of the country rather they have conducted some studies for the partial data set of the sector.

To fill up the above gaps in literature the purpose of this study is to evaluate how bank performance is affected in Bangladesh by ownership. The results based on panel data estimation technique will answer a much discussed query that whether the state ownership of major banks in Bangladesh really making any trouble in the banking sector of Bangladesh in the post deregulated period or deregulation really incurs any improvement in the performance of state-owned banks in Bangladesh. Since government banks have been enjoying some additional facilities by government (such keeping government deposits in these banks on priority basis) and regulatory bodies (like relaxation of supervisory and regulatory requirements), their performance should have not inferior to other types of

banks like private and foreign banks. But the literature is revealing that non-government banks are persistently outperformer than government banks in Bangladesh. What are the determinants that led underperformance by the government banks in Bangladesh? The results will provide an answer of the question whether any necessity for further reform of state-owned banks of the country. Besides of filling up the gigantic literature gap the study will provide some policy suggestions on ownership, management performance, regulators and government future policy setting issues.

5. The Model

The aim of this article is to examine the impact of ownership of banks in Bangladesh on bank performance. To this end, we have followed used government owned, private and foreign bank data, where they worked in a same financial environment and almost in a level playing field. Since the used data are panel, which have both time series and cross section properties, we have considered stationarity, auto correlation and cross section dependence problems of the used data. We have assumed linear functional form about the bank performance function derived from the traditional industrial organization theory of the structural performance (SP) paradigm to investigate the relationship between the bank performance and ownership for detecting ownership impact on bank performance along with some other theoretically suggested control variable like concentration ratio or market concentration, market share, capital-assets ratio, loan-deposit ratio, asset size etc. of the government, private and foreign. Ownership variation is capture by the dummy variable technique. We are going to use very panel data model which are pooled OLS, Fixed Effect Model (FEM), and Random Effect Model (REM). To select the model suitability we have relied on Hausman test. In short, we have relied on vary typical and sophisticated methods of panel data estimation technique.

5.1 Basis of dependent variable selection

Bank is a business organization. Performance of a business organization is measured by its profitability. This profit making capacity is gauged by famous indicators like Return on Asset (ROA) and Return on Equity (ROE), Net Interest Margin (NIM) etc. Therefore, traditionally in the course of bank performance

evaluation researchers rely on these indicators. To this end, we have selected the most widely used two performance indicators namely ROA and ROE. ROA is the ratio of net profit and total asset of the bank. It reflects the ability of the bank management to earn profit using the existing assets of the bank. On the other hand, ROE is calculated dividing net profit by the total shareholders' equity. ROE helps to measure the efficiency of the bank management in using its equity to generate profits for the bank. So, following the existing literature and the textbook theories, ROE and ROA are considered as two different measures or indicators as shareholders' equity equals to total asset minus total debts of the bank. Since mode of operation, industry structure, economy where the banks are operating, and business motives are not uniform, similar performance indicators may not be useful for all banks of all countries in the world. So, third indicator we have used is Net Profit (NP) after tax, not the Net Interest Margin (NIM). NIM does not always indicate the profit capacity of the bank as net interest (interest earned on loans minus interest paid on deposits) is not the sole source of profit for the bank. A substantial amount of profit by the Bangladeshi banks is come from non-interest earning sources. Bangladeshi banks have a tendency to increase and to shift to non-interest based income when interest based income shrinks (Kashem, 2022). Further, from the side of regulatory perspective increase of NIM or so-called Spread Rate (SR) (lending rate minus borrowing rate) is considered as inefficiency of financial system as it increases the burden of borrowers and depositors, and dead-weight-loss of the economy (Kashem and Rahman, 2017). Hence, we have decided to use Net Profit (not NIM) of the bank as the third true representative performance indicator of the banks operating in Bangladesh.

5.2 Connectivity Between Dependent and Independent (or control) Variables

Market concentration ratio (CR): Bank concentration is an industry related determinant of bank performance (Robin, et. al. (2018). Bourke (1989) points out that higher concentration in banking markets inspires banks to hold less risky assets. This implies that an increased level of concentration is linked with higher profit of banks originated from the lower risky asset portfolios. Additionally, link between bank performance and concentration is probable as banks with higher concentration can enjoy greater market power and thus may earn higher profit in a concentrated market. However, he argues that the nexus between profitability

and concentration relationship is a confused one as this relationship can be overrun by other market factors. Empirically, Bourke (1989) finds a negative relationship between concentration and profitability once the other effects, (for example, efficiency and market share) are controlled. Likewise, Kosmidou (2008) also finds a statistically significant negative relationship between bank concentration and ROA in Greek banking. Pasiouras and Kosmidou (2007) find that no significant relationship between profitability and bank concentration. However, Williams (2003) finds that concentration increases profitability of banks. So, empirical findings are mixed in this issue. Therefore, effect of concentration on bank profitability can be either positive or negative. In our case, concentration is measured by the ratio of total asset of the bank and the total assets of the sector.

Measure of market share (MS) Huljak (2015) suggests that there is a positive relationship between performance or profitability and market share of the bank. Similarly, Wang et. al (2014) the difference in profitability between bank is not the results of differences in the quality of the management, but due to discrepancies of the market share at which the bank is operating. Following Robin et. al. (2018) in this paper ratio of total loans of the bank and total loans of the sector is used as a measurement of market share.

Capital - Assets ratio (CAPASS): Capital assets ratio simply measures the degree of solvency of a bank. A bank can incur losses due to its bad loans or other unhealthy assets. Thus, this ratio shows loss absorbing capability or power of the bank in question. Banking literature (Kosmidou, 2008) advocates that a bigger capital ratio may lessens the necessity of the external funding, so high cost associated with such emergency funding, and thus increases profitability of the concerned bank.

Loans - deposit ratio (LDEP): A ratio between loan and deposit is used as a measure of liquidity risk (Eric and Baimba, 2013). A higher value of this ratio implies that the bank is in higher illiquidity position which may incur higher fund management costs. So, if the value is higher there is a probability of lower profit. At the same time, since a higher value of this ratio indicates that the bank has more earning assets (if the given loan performs well) and, thus, the bank has

higher probability of higher interest earning from the paid loan. Therefore, relationship between bank performance and loan-deposit ratio can be either positive or negative.

Asset size (LTA): Total assets is considered as a measurement of size of the bank. Size of the bank can work as determinant of cost reduction if economies of scale is valid in its case. Berger (1995) argues that profit of the bank is realized through economies of scale. Further, Large banks may have a large comparative advantage in lending to large customers as smaller banks are unable to finance them. But it is also true that if size increases the bank can be less efficient for over staffing, poor management of the fund and other assets, bureaucratic complexity and unnecessary time killing for decision making, weak supervision and control etc. That's why existing banking literature has mixed views over the impact of size of the bank.

5.3 Panel Unit Root Tests

The existence of non-stationarity or unit root is an unacceptable flaw for the data that have time series dimension as it provides spurious estimated results. This problem generates low standard error and thus, inflated coefficients or elasticities, and ultimately corresponding p-values. To detect whether our data set suffering from this wicked problem we have conducted five very widely used panel unit root tests suggested by literature. Specifically, they are Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher ADF, and Fisher PP and Hadri (2000) panel unit root tests. Among them predominantly, Levin, Lin and Chu (2002), Breitung (2000) are thought very convenient as panel unit root tests as they are estimated considering individual autoregressive structure for each of the series used in the model.

5.4 Pooled Ordinary Least Squares (OLS)

Assuming all coefficients and intercepts are uniform or fixed for all years and regression can be estimated for panel data which is called as pooled model. In this case, all effects of time and bank type variation are reflected in the error terms of the model. The following equation (1) derived from the traditional industrial organization theory of the structural performance (SP) can be such model for our assumed bank performance function:

$$\mu_{it} \text{ or } ROE_{it} \text{ or } ROA_{it} = \alpha_0 + \alpha_1 CR_{it} + \alpha_2 MS_{it} + \alpha_3 CAPASS_{it} + \alpha_4 LDEP_{it} + \alpha_5 LTA_{it} + \alpha_6 OWNER_{it} + \varepsilon_{it} \dots (1)$$

Where

μ_{it} = Performance based on Profit_{it}, or

ROE_{it} = Return on Equity; or

ROA_{it} = Return on Assets

Here Profits or ROA or ROE are dependent variable, and three distinct measures of bank performance.

CR = concentration ratio representing the measure of market concentration,

MS = a measure of market share of the bank.

CAPASS = the capital to total assets ratio, and

LDEP = ratio of loans to deposits, and

LTA = asset size of banks.

Here, CR and MS act as proxy for the market structure. If $\alpha_1 > 0$ and $\alpha_1 = 0$, which implies that profitability is the result of a monopoly behavior measured by concentration and profitability is not affected by the monopoly behavior measured. Similarly, if $\alpha_2 > 0$ and $\alpha_2 = 0$, the market share does and does not affect a bank's profitability respectively. That is, the efficiency structure hypothesis holds if $\alpha_2 > 0$. This implies that firms with a large market share are more efficient to perform better than their rivals and thus earn higher profits. It is expected that CAPASS would be negatively related to three dependent variables (i.e., $\alpha_3 < 0$) and LDEP would be positively related ($\alpha_4 > 0$). The asset size of banks (LTA) is included to take account of differences brought about by size, such as scale economies. The LTA variable is expressed in logarithmic form and expected to be both negative and positive depending on the bank condition. The last variable is the dummy variable, Ownerships, which accounts whether bank is run by government or private or foreign ownership. Where the ownership of ith bank is represented by the binary value 1 for publicly (government) owned banks and 0 for all other commercial banks.

This prototype pooled OLS model is estimated by ignoring time and bank type variations. It will be just a pooled OLS regression model considering that intercept terms and slope coefficients are same over the years from 1995 to 2020, and across three types of banks considered in our model. This is the simplest and possibly naive approach that disregards any sort of variation arises from the

changes of time and individual bank. Therefore, obviously all such variations are absorbed by the error terms of the estimated econometric functions.

Therefore, error term can be segregated into two parts dedicated to time and bank types as follows:

$$\varepsilon_{it} = \theta_i + u_{it} \dots \dots \dots (2)$$

where, $u_{it} \sim (0, \sigma_u^2)$

Here u_{it} is considered as part of the ε_{it} originated from time varying factors of the panel data. Further, θ_i surrogates unobserved heterogeneity arises from bank categories and other factors.

5.5 Fixed Effect Model (FEM)

The FEM described in equation one is a special type of model that does not reflect the true FEM where individual bank and year needs to have a separate constant and slope coefficient. In this case each to represent each type of bank and year we need to include a dummy variable. In a true FEM, each individual bank type and years have to have an individual intercept term but we do not consider those as introducing them in the model will incur very high level of costs in terms of degrees of freedom. As the intercepts and slope coefficients are fixed effects over the whole considered period, this model is also called as least-squares dummy variable (LSDV) model.

5.6 Random Effect Model (REM)

Since the fixed effect or LSDV model needs to use an individual dummy variable for all types of banks and years, such model is highly expensive model in terms of degrees of freedom. To overcome this unbearable cost of degrees of freedom, REM or Error Component Model (ECM) is suggested by econometricians. The basic idea of this model stands is as follows:

$$\text{Performance} = \alpha_i + \alpha_1 \text{CR}_{it} + \alpha_2 \text{MS}_{it} + \alpha_3 \text{CAPASS}_{it} + \alpha_4 \text{LDEP}_{it} + \alpha_5 \text{LTA}_{it} + \alpha_6 \text{OWNER}_{it} + v_t \dots \dots \dots (3)$$

In this model we have that instead of treating α as fixed, it is assumed that α_i is a random variable with a mean value of α_0 . And the intercept value for an individual bank type can be expressed as

$$\alpha_i = \alpha_0 + w_i \dots \dots \dots (4)$$

where $i = 1, 2, \dots, n$. In our case $n = 3$ (type of banks), and w_i is a random error term with a mean value of zero and variance of σ_w^2 .

Now equation (3) stands as

$$\text{Performance} = \alpha_0 + \alpha_1 \text{CR}_{it} + \alpha_2 \text{MS}_{it} + \alpha_3 \text{CAPASS}_{it} + \alpha_4 \text{LDEP}_{it} + \alpha_5 \text{LTA}_{it} + \alpha_6 \text{OWNER}_{it} + w_{it} + v_{it}$$

$$\text{So, Performance} = \alpha_0 + \alpha_1 \text{CR}_{it} + \alpha_2 \text{MS}_{it} + \alpha_3 \text{CAPASS}_{it} + \alpha_4 \text{LDEP}_{it} + \alpha_5 \text{LTA}_{it} + \alpha_6 \text{OWNER}_{it} + \Omega_{it} \dots (5)$$

$$\text{Where } \Omega_{it} = w_{it} + v_{it}$$

The composite error term Ω_{it} consists of two components, w_{it} which is the cross-section, or bank type-specific, error component, and v_{it} is the combined time series and cross-section error component.

The usual assumptions made by Error Component Model are that

$$w_{it} \sim N(0, \sigma_w^2) \text{ and } v_{it} \sim N(0, \sigma_v^2)$$

Further, covariance between w_{it} and v_{it} is also zero which means that the individual error components are not correlated with each other and are not auto correlated across both cross-section and time series units.

5.7 Model Selection

To select the suitable model for our data avoiding all econometric complications we have relied on famous Hausman (1978) test. Precisely, this test infers if the potential results of FEM and REM estimators have any substantial difference. The test statistic of this famous test follows the chi-square distribution. In this test if the null hypothesis is rejected, FEM is preferable to REM.

6. Data

Keeping the view with the objective of the study we have collected data from the various issues of Annual Reports and Monthly Economic Trend published by Bangladesh Bank (which is the central bank of Bangladesh). Subsequently, they have been compiled in the Microsoft Excel sheets to make series full for the period of 1995 to 2020. Since no data is missed from the constructed series our data is a balanced panel. In this study we have considered only the post

deregulation period of banking history of Bangladesh. In 1990 Bangladesh has launched a Financial Sector Reform Project (FSRP) to unveil the way to deregulate the financial sector. It is believed that in the 1970s and 1980s banking sector of the country was plagued due to the massive financial repression due to the highly regulated nature of the governance by the central bank and ministry of finance (MoF). Such utter regulation of market caused misallocation of the resources. So, shifting to market based unregulated financial regime was the imperative. It is widely believed that from 1995 a major shift of financial market of Bangladesh was done since directed lending tradition and credit rationing to various sectors were abolished, and market based interest rate system was restored as per the suggestion of FSRP committee report. Therefore, 1995 is considered as the point of inflexion or the dismissal year of regulated banking system in Bangladesh. So, the data period is chosen keeping consistency with the motive of the study of focusing only on the post-deregulated banking history of Bangladesh.

6.1 Summary Statistics:

Table 9: Summary Statistics of the variables used.

Summary Statistics for the Sample period: 1995-2020							
	CAPASS	LDEP	LNLTA	LNNETPR	MS	ROA	ROE
Mean	0.587321	0.901758	1.981661	6.436826	0.186378	0.481591	6.839015
Median	0.691755	0.961705	1.942279	6.818224	0.265000	0.600000	9.150000
Maximum	0.699970	1.404780	2.235964	8.990095	0.440390	2.100000	26.20000
Minimum	0.348330	0.427280	1.795378	2.819592	4.00E-05	-1.300000	-29.60000
Std. Dev.	0.136957	0.257240	0.133781	1.912095	0.156708	0.692529	11.95905
Skewness	-0.524079	-0.169434	0.319434	-0.290484	-0.217027	-0.086020	-0.618710
Kurtosis	1.445056	2.226619	1.894695	1.885209	1.282619	2.822485	3.369704
Jarque-Bera stat	6.446887	1.307075	2.988063	2.897184	5.752630	0.112034	3.057793
Probability	0.039818	0.520202	0.224466	0.234901	0.056342	0.945523	0.216775
Sum	25.84211	39.67734	87.19310	283.2203	8.200630	21.19000	300.9167
Sum Sq. Dev.	0.806557	2.845404	0.769588	157.2125	1.055973	20.62265	6149.816
Observations	66	66	66	66	66	66	66

Source: Authors own calculation.

The summary statistics says that except ROE all other variables have no much ups and downs in the data. All the selected variables are hovering around the mean values meaning that the variable has fair level of variability and perhaps estimation will not be unreliable. Difference between maximum and minimum values and standard errors are also small which confirms that our selected data is not suffering from the sudden shocks or outliers.

6.2 Correlation Matrix

Table 10: Correlation Matrix of variables used.

	CAPASS	CR	ROA	ROE	LNNETPR	MS	LNLTA	LDEP
CAPASS	1.000000							
CR	-0.898071	1.000000						
ROA	-0.737966	0.610644	1.000000					
ROE	-0.554746	0.450724	0.922499	1.000000				
LNNETPR	0.416028	-0.474424	-0.250299	-0.348769	1.000000			
MS	0.948527	-0.764137	-0.678125	-0.537858	0.383901	1.000000		
LNLTA	-0.39282	0.405299	0.074312	-0.118614	0.428383	-0.404966	1.000000	
LDEP	-0.278547	0.106915	0.373839	0.247203	0.519517	-0.333102	0.639686	1.000000

Source: Author own compilation

Correlation matrix says that capital assets ratio (CAPASS = market risk) is highly negatively correlated with market concentration ratio (CR), Return on Assets, and Return on Equity. However, this market risk indicator has utter positive correlation with market share (MS). Obviously, market concentration ratio is moderately positively correlated with ROA, ROE and Assets size (LNLTA) of the bank. But it is negatively related with loan-deposit ratio, and market share. Further, ROA and ROE show their usual relationship and are highly positively correlated. However, ROA and ROE are negatively correlated with market share and loan deposit ratio. Additionally, loan-deposit ratio is moderately and positively related with assets size and net profit. This net profit is also positively related with loan deposit ratio. It means that correlation matrix shows largely expected bi-variate relationship among the variables.

7. Econometric Investigation of Comparative Performance of Govt. and Private Banks

7.1 Unit Root Test

Results of our unit root tests are presented in the following table 10.

Table 11: Results of Unit Root Test

Name of the test	CAPASS	CR	ROA	ROE	G (NETPR)	G(MS)	G(LTA)	DEP
Levin, Lin & Chu (2002)	I(0)	I(0)	I(0)	I(1)	I(0)	I(0)	I(0)	I(0)
Breitung (2000),	I(0)	I(0)	I(0)	I(1)	I(0)	I(0)	I(0)	I(0)
Im, Pesaran and Shin (2003)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Fisher ADF	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Fisher PP	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
Hadri (2003)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)

Unit Root Test at 10 % level of significance

It is seen that except ROE all the variables are in stationary at level by all types of test statistic considered by us. Since we have all variables have unit root at level by maximum test method we can rely on OLS method for estimation the impact of explanatory variables on dependent variable. The result of such estimation is postulated in the results section of table 12.

7.2 Results Analysis

Since Hausman test (where null hypothesis is that random effect model is appropriate) suggests that when ROA and ROE are the dependent variable as performance indicator of banks random effect model is effective and when growth of net profit is dependent variable as performance indicator fixed effect model is suitable. We have followed this recommendation Hausman test. The results of the proposed models are shown in the following table 12.

Table 12: Results of the fitted models

Variable Names	ROA (REM.)	ROE(REM)	Growth of Net Profit (FEM)
Constant (C)	10.38720***	100.0350*	22.18132***
Concentration Ratio (CR)	3.046255*	84.47827**	-9.020070**
Growth of MS	-5.117823	*-87.40360	-8.255392
Capital-Asset Ratio (CAPASS)	-3.911958	-60.22579	-25.43455***
Loan-Deposit Ratio (DEP)	1.447274***	29.18513***	2.191460***
Growth of Asset or Size (LTA)	-4.280063***	-84.82811***	3.265130
Ownership Dummy	-1.924459*	-2.844020**	-9.887795***
R-Squared	0.763435	0.653272	0.866226
Adjusted R-Squared	0.731893	0.607042	0.844533
DW Statistic	2.115713	2.064459	1.952341
F-Statistic	24.20380***	14.13082***	39.93103***
Hausmann Statistic	5.633824	9.413220	27.432776
P-value of Hausman Test	0.4654	0.1516	0.0001

Following the literature we have chosen three dependent variables ROA, ROE, and growth of net profit as performance indicators for all three types of (government, private, and foreign) banks in Bangladesh and fitted them in the traditional industrial organization theory of the structural performance model to find out the determinants of banking sector performance. After numerical and tabular analysis we relied on the panel data techniques of estimation to figure out

the relationships between dependent and independent variables. The results in each three models including statistical analysis say that concentration ratio, loan-deposit ratio, size, and ownership status of the banks are key and significant determinants for bank performance in Bangladesh. Ownership is considered the target variable and remaining all others are control variables of this research. Relevant diagnostic tests (Appendix A) also have confirmed that our estimation is econometrically reliable.

Our result has both agreement and disagreement with the past researches. In case of concentration this result is opposite of Bourke (1989) and Kosmidou (2008). However, our result supports the findings of Williams (2003). However, in case of market share, the findings of this research do not support the conclusion drawn by Wang et. al. (2014) and Huljak (2015). Similarly, findings related to capital - asset ratio also does not match with the findings of Kosmidou (2008). However, result of this research regarding loan - deposit ratio and size of the bank support the finding originated by Eirc and Biamba (2013) and Berger (1995) respectively.

If we look at the past researches regarding Bangladeshi banks ownership discussed in the literature review section, they can be divided into two parts where one part is based on data of pre-deregulation period, and others are based on the data of both pre- and post-deregulation periods. Almost all of these past researches have given disappointing results regarding the banks in Bangladesh under government ownership. One of the fundamental differences of this paper over past researches is that it considers only the data of post deregulation period. However, result of this paper based on such updated data is also giving us the evidence that the situation of the government banks in Bangladesh did not improve in post deregulation period. Result of this study is similar to the findings of Adhikari (2006), Beck and Rahman (2006), Nguyen and Ali (2011), Iqbal et. al. (2012), and Mansur (2015) whose researches concern were also banking sector of Bangladesh.

This study includes the data only for the post deregulated banking period of the country. Thus, it also indicates that the financial deregulation does not perceptibly help the government banks to improve their performance. In Bangladesh ownership significantly matters to bank performance in post deregulation period. Here, banks run by private sector are outperformer compare to the government

run banks. Government banks are less efficient and, thus, less profitable. Moreover, government banks are the less profitable perhaps due to less productive, less efficient bank staffs, less business oriented, appointment of politically motivated management and directors, insider lending for political reasons. This study provides evidence in support of the privatized and ongoing deregulated banking system. It is an essential strategy for the country's long march to switching to the less regulated, market based, and privatized banking system. The findings of this paper reiterated the evidence that commercial banks in Bangladesh should be operated based on business ideologies to be profit oriented. Government intervention on the business decision process should be detrimental for banking business, and therefore, government should gradually retreat from all sorts banking business in the future. Lower profitability by government banks also means that the higher level of government guarantee cannot help government banks to reduce borrowing costs, deposit collection, and increase revenue those in turn improve banks performance in general.

Government bank managers may have lack of incentive to make the bank better performed and lack of knowledge of the market. Besides, scarcity of the managerial skill and knowledge may also hamper their business decision and activities, which constrains their earnings, profitability and ultimately performance. Lower profitability may be caused also by the fact that government run banks suffer to attract customers who have failed to make a good business relationship with the lenders. Moreover, limited facilities and customer services, lower number loan products and in time services, unavailability of enough ATM booths, credit and debit (cash) card services, single counter utility bills accepting services etc. make them less performed. Domestic private and foreign banks exhibit very good performance relative to the government owned banks, implying that they may have superior human resources with higher motivations, expertise, experience, technological knowledge, and bank governance.

Other facets of this result are also not ignorable. Private Banks play an increasingly important role in the funding of SME businesses. Government banks are more interested to finance in large projects only. They do not glean the SME and retail banking potentials. So, government banks should switch and broaden their business networks to make them better performed. Additionally, it is true

that Bangladesh has been showing impressive records in the economic development across last two and half decades (Mahmud et. al, 2010). The finding further suggests that strong economic growth can lead to significant efficiency gains for banks in Bangladesh but government banks seem to fail to keep up their business with this economic progress. Looking at differently, country's progress speed in urban areas is bit quicker and have relatively more mature private sector economies than rural areas (Warren, 2007). Private and foreign commercial banks are more interested to set up their branches and business installations in the urban areas than agriculture based rural areas. Therefore, in their business activities privately owned banks may enjoy this urban based economic development financing advantage relatively in a higher scale than rural based branch networks of government run banks. Perhaps this is also one of the reasons for private banks for their exhibition of better performance. Thus, economic status of the geographical area in which the bank is located plays a role in determining its performance in Bangladesh. It also suggests that bank performance is positively related to the level of economic development in the region in which they are located (Clarke, 2004, Alam et. al. 2021). That is why government banks should postpone their economically unviable branches in remote hinterlands of rural Bangladesh to reduce loss incurring business networks.

It is argued that the government can influence the financial intermediation activities, and, thus, performance of government banks by manipulation of business opportunities (Like, government LCs, securities, etc.) distribution. Besides, as a largest legal authority of the country, government can play very big role as a big depositor and/or a big borrower of the country which ultimately defines the performance of the banks. As a developing country, scenario of Bangladeshi banking industry is not out of this trend. In this country, government-owned banks can enjoy more facilities than privately-owned banks. Further, relaxation of regulatory requirements for government banks is a very common and pervasive in here (Table 4 and 7). This is in other way partly reasoned as not having independence of central bank of the country. Given this all facilities for the government-owned banks in Bangladesh fails to perform reasonably well. In this bleak backdrop, government should rethink whether it would keep so large number of banks in its hand or handover them to the more efficient private sector?

Last, but not least, the finding of this paper has important policy implications and message for the government of Bangladesh. Continuous and intermittent capital injection or bailouts by the government revenue fund to keep these banks alive is not an economically viable option for the long-run. This suggests that government, policy makers and regulators should be cautious about such strategies, as the performance level is not improved by the multiple recapitalization in past. Such funding provides an insurance to the government bank managements as an enduring job security but no incentive to improve the performance of their banks.

8. Conclusion

The interrelationship between ownership and financial performance of banks is proved an empirical issue in the literature particularly for the developing countries. In some countries government banks are better but in other countries they do not perform well. Therefore, along with other factors this study investigates predominantly the relationship between the ownership and business performance of the banks in Bangladesh for the deregulated financial period using the panel data estimation technique in the traditional industrial organization theory of structural performance. We have conducted a thorough investigation resorting statistical and tabular analysis of performance related indicators, and graphical presentation of the latest performance scenarios. Additionally, we have conducted an econometric investigation using a suitable model. Along with all other examinations, the econometric analysis confirms that financial performance of the banks was strongly influenced by concentration ratio, loan-deposit ratio, size of the banks, and ownerships.

Bangladesh has implemented various projects (Money, Banking and Credit Commission of 1980, Bank Reform Committee of 1990, and, Financial Sector Reform Project (FSRP) of 1995) of banking reform and subsequently deregulation since early to mid-1990s. Among many others one of the intension of such reform works is to improve government banks performance by letting them to compete with ever expanding private and foreign banks of the country. However, our results show that reform and deregulation actions have less impact in improving public sector banks performance. This result reiterates and reinforces the constant

demand by the researchers that government banks in Bangladesh should be overhauled by massive reformor hand over them to the private sector for making them economically viable.

This result has important policy implications. Government banks are under performer even though they are getting multiple supports from government and regulatory authorities. Our analysis reveals that government banks can improve their performance by massive reform in operational and management issues, avoiding appointment of political directors and managements, improving human resources, using upgraded banking technology, withdrawing bank branches from economically unfeasible locations etc. Government banks can individually identify their losing leaks and faucets. Due to the constant capital erosion government occasionally needs to inject fresh fund as bailout to keep them alive with a hope that they will turn around in future. But past history indicates that the potential of such positive upshot is very low. So, it would be economically prudent decision if government stops such recapitalization and searches alternative solution based on established financial rules.

References

- Adhikary, B. K. (2006). Nonperforming loans in the banking sector of Bangladesh: realities and challenges, *Bangladesh Institute of Bank Management* 4(26), pp. 75–95.
- Ahmed, Sadiq. (2020). The imperative banking sector reforms in Bangladesh, *Policy Research Institute of Bangladesh (PRI)*, Dhaka.
- Alam, M. S, Rabbani, M. R, Tousif, M. R. and Abey, J. (2021). Banks' Performance and Economic Growth in India: A Panel Cointegration Analysis. *Economies*, 21 9(1), 38.
- Baltagi B. H. (2005). *Econometric Analysis of Panel Data*. 3rd edition. New York: Wiley.
- Baltagi B. H., Feng Q. & Kao C. (2012). A Lagrange multiplier test for cross sectional dependence in a fixed effects panel data model. *J Econom* 170(1), 164–177.
- Beck N., Katz J.N. (1995). What to do (and not to do) with time series cross section data? *Amer Pol Sc Rev* 89, 634–647
- Beck, T. (2008). Bank competition and financial stability: friends or foes?' Policy, Research working paper; no. WPS 4656. Washington, DC: World Bank.
- Beck, T. and Rahman, M. H. (2006). Creating a more efficient financial system: challenges for Bangladesh, Policy, Research working paper; no. WPS 3938. Washington, DC: World Bank.
- Berger, A. (1995). The profit - structure relationship in banking: Test of market power and efficient structure hypothesis. *Journal of money credit and banking*. 27(2) 404–431.
- Bourke, P., (1989). Concentration and other determinants of bank profitability in Europe, North America, and Australia. *Journal of Banking and Finance*, 13, 65–79.
- Breitung J. (2000). The local power of some unit root tests for panel data. *Adv Econ* 15, 161–177.
- Breusch T, Pagan A (1980). Thelagrange multiplier Ttest and its application to model specification in econometrics. *Rev of Econ Stud* 47, 239–254.

- Clarke, M. Z. (2004). Geographic Deregulation of Banking and Economic Growth. *Journal of Money, Credit and Banking*. 36(5), 929–942.
- Driscoll D & Kraay A (2001). Trade, growth, and poverty. The World Bank Policy Research Working Paper. World Bank, Washington No. 2615.
- Eric, O.A. & Baimba, A.B. (2013). Bank risk, capital, and Loan supply: evidence from Sierra Leone, *Journal of Finance and Economic Policy*, Bingley, 5(3), 256–271.
- Hossain, M. (2012). Financial Reforms and Persistently High Bank Interest Spreads in Bangladesh: Pitfalls in Institutional Development? *Journal of Asian Economics* 23, pp. 395–408.
- Huljak, I. (2015). Market power and stability of CEE banks. *Business Systems Research*, 6(2), 72–90.
- Im K.S., Pesaran M.H. & Shin Y. (2003). Testing for unit roots in heterogeneous panels. *J Econ* 115, 53–74.
- Iqbal, M. J., Vankatesh, S., Jongwanich, J. and Badir, Y. (2012) Banking sector's performance in Bangladesh – An application of selected CAMELS ratio. Asian Institute of Technology, School of Management, Thailand.
- Kashem, M.A. (2022). Impact of Covid-19 Pandemic on the financial performance of the banking sector of Bangladesh. *International Business Research*, 15(8), 2022.
- Kashem MA, Rahman M.M. (2017). Nexus between the banking sector interest rate spread and interbank borrowing rate: An econometric investigation for Bangladesh. *Research in International Business and Finance*. 43(3), 34–47.
- Kashem MA, Rahman MM (2020). CO2 emissions and development indicators: a causality analysis for Bangladesh. *EnvProc* 6(2):433–455.
- Kosmidou, K. (2008). The determinants of banks' profits in Greece during the period of EU financial integration. *Managerial Finance*, 34, 146–159.
- Levin A., Lin C. & Chu C.J. (2002). Unit root test in panel data: asymptotic and finite sample properties. *J Econ* 108, 1–24.
- Mahmud, W. Ahmed, S. and Mahajan, S. (2010). Economic reform, growth, and governance: The political economy of Bangladesh's development surprise. Commission on growth and Development. World Bank.

- Mansur, A. (2015). Financial Market Developments and Challenges, background paper of the 7th Five Year Plan, Government of Bangladesh. Dhaka.
- McKinnon, Ronald I. (1973). Money & Capital in Economic Development, Washington, D.C. The Brookings Institution.
- Nguyen, C. and Ali, M. M. (2011). The Current State of the Financial Sector of Bangladesh: An Analysis. AIUB Business and Economics Working Paper Series, AIUB-BUS-ECON2011-03.
- Pasiouras, F. & Kosmidou, K. (2007). Factors effecting the profitability of the domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, 21, 222–237.
- Pesaran, M.H. (2007). A simple panel unit root test in the presence of cross sectional dependence. *J App Econ* 27, 265–312.
- Rahman, M. M., Hamid, M. K., and Khan, M. A. M. (2015). Determinants of bank profitability: Empirical evidence from Bangladesh. *International Journal of Business and Management* 10(8).
- Reed R.W. & Ye H. (2011). Which panel data estimator should I use? *J Appl Econ*, 43(8).
- Robin, I., Salim, R. and Bloch, H. (2017). Cost Efficiency in Bangladesh Banking: Does Financial Reform Matter?. *Applied Economics*, 50(8).
- Wang, K., Huang, W., Wu, J. & Lui, Y.N. (2014). Efficiency measures of Chines commercial bank using an additive two stage DEA. *Omega*, 44, 5–20.
- Warren, M. (2007). The digital vicious cycle: Links between social disadvantage and digital exclusion in rural areas. *Telecommunication Policy*, 31(6-7), 374–388.
- Williams, B. (2003) Domestic and international determinants of bank profits: foreign banks in Australia. *Journal of Banking and Finance*. 27, 1185–1210.

Appendix A

To check the robustness of the conducted econometric investigations it is needed to test the normality, autocorrelation, cross section dependence, and Heteroscedasticity test of the residual terms. Simply, if residual terms are passed by such diagnostic tests it can be assumed that performed examinations are econometrically reliable. In our case, the results of these necessary tests are as follows:

Test for the residuals Normality

In least square (LS) regression models it is assumed that residuals are normally distributed. A violation of this assumption may give inflated standard error which may beget a high value of t-statistic, and thus lower the corresponding p-values. So, having normality of residuals are necessary in LS models. For this test this paper relied on Histogram Jarque-Bera (JB) normality test. The test results of our three regression models are as follows:

Normality Test when ROE, ROA and Net Profits are dependent variables:

Co-efficients Name	Dependent Variables		
	ROE	ROA	Ln(Net Profit)
Mean	-0.54405	-0.3822	-0.1851
Median	0.2619	0.0304	310.2200
Maximum	34.6257	3.6309	2017.8941
Minimum	-39.4639	-4.7973	-6808.786
Standard Deviation	14.5558	1.6802	1004.029
Skewness	-0.3561	-0.2723	-1.7484
Kurtosis	3.0057	3.0904	7.9083
JB Stat.	2.1119	1.2709	151.3226
Probability or (P-Value)	0.3479	0.5299	0.0000

In the JB Normality test, the null hypothesis is residuals are normally distributed. From the above table null hypothesis is not rejected when dependent variables are ROE and ROA the corresponding P-values are greater than 10 percent level of significance. So, in these cases, results are very robust.

Test of Serial Correlation

If the data has time dimension serial or autocorrelation of residual term is highly important. Simply, if the residuals suffer from autocorrelation, LS estimates

would not be BLUE and their standard error would be small and computed R-squared will be higher than it would be. Thus, the hypothesis tests done by the regression model ultimately will not be reliable. In this regard, we have relied on Correlogram test for autocorrelation for the residuals when ROE, ROA, and Net Profit are the dependent variables in level form up to 10 lags inclusion since data length is 26 years only. The counted Autocorrelation (AC) and Partial Autocorrelation (PAC) values for all residual series were within borders fixed by 95 percent confidence interval. It means that residuals are not suffering from any serial correlation. Further, since R-squared is less than DW-statistic and all DW-statistic are very close to 2.00, it may be inferred that perhaps no variable included in the model is suffering from autocorrelation.

Cross Section Dependence Test

According to Baltagi (2005) cross section dependence among variables used in the panel and times series data can incur similar consequence of autocorrelation for estimated regression coefficients in LS method. So, testing cross section dependence among the residuals generated from the four types of banks is necessary for the econometric examination used in this study. We relied Pesaran CD test method for this investigation. The results are as follows:

Residual Cross Section Dependence Test

Null Hypothesis: No Cross Section Dependence (i.e. Correlation) in Residuals.

Alternative Hypothesis: There is Cross Section Dependence (i.e. Correlation) in Residuals

Dependent Variable	Test Name	Statistic	Degrees of Freedom	Probability
ROE	Pesaran CD	-0.6892	6	0.4907
ROA	„	-0.2581	6	0.7964
Net Profit	„	1.1368	6	0.2551

From the outcome of the test it is seen clearly that null hypothesis is not rejected meaning that Pesaran CD test say that there is no cross section dependence among the residuals.

Heteroskedasticity Test

In case of HK test we have relied on White HK test to detect whether the error terms or residuals are homoscedastic or not. In our case Auxiliary regression has 6 degrees of freedom and 10 percent level of significance the Chi-Square (χ^2) statistic is 10.645 meaning that any value of the χ^2 less than this critical value the model is Homoscedastic. In case, White HK test our findings are as follows:

Dependent Variable	Test Name	Chi-Squared Statistic	Degrees of Freedom	Probability
ROE	White Test	5.6892	6	0.4907
ROA	„	3.2581	6	0.7964
Net Profit	„	7.1368	6	0.2551

From the above table P-values for regressions are less than critical value of χ^2 statistic. So, perhaps the model is not suffering from any HK Problem.