Division wise Loan Disbursement and Profitability of Bank: Evidence from Bangladesh

Lima Akter Antora[1], Sujan Chandra Paul[2], Md. Harun-Or-Rosid[3*]

[1,2,3]**Dept. of Accounting & Information Systems, University of Barishal, Bangladesh**
E-mail: [1]limaakterantora123@gmail.com, [2]sujan9099@gmail.com, [3]mhorosid@bu.ac.bd
[*)]**Corresponding Author**

Abstract

Research Originality: Loan disbursing in economically and industrially developed divisions of Bangladesh have profound impact on a bank's profitability remaining other factors in considerations.

Research Objectives: This study aims to investigate the effect of divisional loan disbursement on profitability and financial health of the banking sector in Bangladesh.

Research Methods: The analysis is based on panel data from 44 banks, totaling 520 observations over an eighteen-year period from 2005 - 2022. To conduct this study, different models like Ordinary Least Square (OLS), Pooled Ordinary Least Square (POLS), Second Stage Least Square (2SLS), Generalized Method of Moments (GMM) are utilized.

Empirical Results: The study found that there is favorable association between profit after tax and total revenue in all the model employed in the study. As opposed, PAT has an unfavorable association with Rangpur division's loan disbursement and a total asset in all the model used in the study. In addition, the connections between PAT and loan disbursed in other is mixed but insignificant in nature.

Implications: The empirical implications of this study are – lending economically and industrially developed or underdeveloped divisions of Bangladesh has too delicate relationship with a bank's profit after tax.

Keywords:

Banks; profitability; divisional loan disbursement; non-performing loan

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INTRODUCTION

Banking is a crucial part of all economic activities today, and it can determine a country's socio-economic future. Banks are a country's central hub for finance and economics and serve as a barometer of its economic prosperity. Banks, in particular, serve an important function as intermediaries, facilitating the reallocation of cash and the infusion of resources to promote profitable economic activity. Arun and Turner (2009) point out the relevance of banks in developing countries, especially in light of fragile and premature financial markets. Profitability is a robust financial metric used to assess an organization's or activity's effectiveness. The banking industry encounters similar situations in foreign countries, such as Bangladesh. Bank lending policies can be influenced by various factors such as socio-economic stability, inflation rates, interest rates, credit risk, portfolio investments, GDP, non performing loans, and financial and economic conditions (Birhanu et al., 2021). A bank's loan distribution strategy globally often considers regional economic and infrastructure development as it relates to profitability. Loans disbursed in economically and financially advanced provinces tend to create higher profits than other provinces.

There have been different studies on the relationship between profitability and different factors that can affect or influence banking profitability, performance, and financial health. However, until now, there have been few studies conducted to uncover or explore the relationship between divisional loan disbursement and the profitability of the banking industry of Bangladesh. Bangladesh is a developing country with a collapsing banking system, notably in the quality of service and customer care given by government-owned banks. Private banks have recently attempted to emulate the financial landscapes of more developed countries; however, this effort is usually threaded by inexperienced or politically motivated government regulations adopted by Bangladesh Bank, the bank that governs the nation (Bangladesh Bank, 2021). Historically, Banking operations have been driven primarily by profit, yet aggressive lending can result in hazards such as nonperforming loans and credit risks (Do et al., 2020). It facilitates a company's operations and shows its success and effectiveness. Profitability provides a relative evaluation, whereas profit is an absolute indicator of earning capacity (Tulsian, 2014).

Internal and external variables influence a bank's profitability. Internally, important factors include bank size, capital sufficiency, managerial efficiency, liquidity volatility, and credit risk (Edi, 2022). Externally, market concentration, inflation, and GDP are significant (Indriani et al., 2022). Management efficiency, liquidity risk, and market concentration are important considerations. Koroleva et al. (2021) identified various characteristics influencing profitability, including banking ratios and inefficiencies. Operational aspects such as BOPO, NPF, and FDR also play an important role.

Dietrich and Wanzenried (2011) investigated 372 Swiss banks from 1999 to 2009 and discovered that bank-specific, industry-specific, and macroeconomic factors influence profitability. Trujillo-Ponce (2013) investigated Spanish banks and connected profitability

to loans, deposits, operational efficiency, and capital ratios. According to Akter and Roy (2017) and Ozili (2019), nonperforming loans considerably influence net profit margins for Dhaka Stock Exchange-listed banks. Hossain and Ahamed (2015) discovered that capital strength, asset quality, and managerial performance increase ROA and ROE, whereas NPLs reduce profitability.

The Bangladesh Bank (2020) predicted a booming banking system, with assets expected to exceed Tk. 34.5 trillion by 2020, while regional discrepancies in loan availability persist. Lee et al. (2015) and Islam & Nishiyama (2016) discovered that bank capital and equity financing improve profitability. According to Ruziqa (2013) and Nelson (2020), credit risk, particularly nonperforming loans, has a negative impact on ROE and ROA. Other studies, support the negative consequences of credit risk (Gizaw et al., 2015; Abbas et al., 2019; Opoku et al., 2016; Ekinci & Poyraz, 2019; Islam & Nishiyama, 2016). Customer deposits affect a bank's lending capacity and profitability, with higher deposits potentially increasing earnings (Lee &Hsieh, 2013; Haddawee & Flayyih, 2020; Ozgur & Gorus, 2016). In contrast, fewer liquid assets increase liquidity risk and reduce profitability (Waleed et al., 2016; Abdelaziz et al., 2022). According to research, the influence of liquidity on profitability is mixed (Nisar et al., 2015; Islam & Rana, 2019; Al-Matari, 2023).

Bank size is connected to profitability via economies of scale, with larger banks typically benefiting (Sahyouni & Wang, 2018; Adelpo et al., 2018; Ali & Puah, 2019; Almaqtari et al., 2019; Bolarinwa et al., 2019; Sahyouni & Wang, 2018; Zolkifli et al., 2019). The bank size-profitability relationship is positively correlated up to a specific limit in the presence of economies of scale. However, Batten and Vo (2019) report a negative association. Rahman et al. (2015) stressed the need to manage nonperforming loans and capital. Do et al. (2020) discovered that rising NPLs diminish ROA, whereas Sazzad et al. (2019) provide mitigation techniques. According to Aliu and Çollaku (2021), nonperforming loans (NPLs) considerably influence profitability.

The COVID-19 pandemic has aggravated credit losses and lowered profitability in several locations (Hladika, 2021; Omaliko et al., 2021; Hossain & Ahamed, 2021). Haider and Mohammad (2022) discovered that bank size and liquidity were critical during the epidemic, although capital ratios decreased. Agricultural and non-farm rural credit disbursements declined, with varying effects across sectors (Bangladesh Bank, 2020). Hemavathy Nithyanandhan (2011) showed that greater loans in specific regions may result in more NPLs, damaging financial health.

The research aims to examine correlations, assess risk exposers, and comprehend the influence of banking industry profitability. This research aims to determine whether divisional disbursement of loans and bank profitability are related. In order to have a healthier financial situation, this study also helps investors decide which areas to invest in. Additionally, by identifying patterns and trends in the loans distributed throughout various divisions, this analysis can assist in informing judgments about policy

and resource allocation. For instance, it may be necessary to implement targeted actions to increase credit availability if some divisions routinely receive smaller loan amounts than others. Furthermore, knowing how division-wise loan disbursement affects bank profitability can help banks manage risk and assure long-term sustainability by informing lending policies and strategies. By identifying the factors influencing loan disbursement patterns and profitability, banks can better tailor their lending practices to meet the needs of different divisions and customers while maintaining financial stability and maximizing returns.

METHODS

The study focuses on banking industry of Bangladesh as shown in Table 1. The Table 1 shows that Bangladesh has 67 banks. The study's sample is based on panel data from 44 banks that collected 520 observations for an eighteen-year period from 2005 - 2022. Notably, the study attempts to include the whole banking industry of Bangladesh, which includes state-owned commercial banks, specialized banks, private commercial banks (both conventional and Islamic Shariah-based), and so on, which comprises around 65% of the country's banking system. The criteria for selecting these banks depends on data availability during the study period.

Table 1. Variable Descriptions

	Variable	Descriptions
Dependent	Profit After Tax (PAT)	Profit After Tax is the leading variable of this article which is denote as PAT. Profit After Tax is determined by deducting tax amount from profit before tax. It is the prominent factor to determine a bank's performance with in a period.
Independent	Dhaka Division (DD) Barishal Division (BD) Chattogram Division (CD) Khulna Division (KD) Rajshahi Division (RD) Rangpur Division (RPD) Sylhet Division (SD)	Among eight divisions of Bangladesh, this article considers only seven divisions based on the availability of data pertaining divisional loan amount. Besides, the hypothesis of this article is based on the thought that loan disbursement in economically and industrially developed divisions can lead to provide higher profit after tax to the banking industry. But the result is that there is no significant relationship between divisional loan disbursement and profitability of a bank without Rangpur Division as it has unfavored relationship with profitability.
Control	Total Assets (TA) Total Revenue (TR) Non-performing Loan (NPL) Total Loan (TL)	Total assets, total revenue, non-performing loan and total loans are control variable those are remain constant in the article. These are controlled as this could influence the outcomes of the article.

The present research effort will be quantitative in nature, depending on secondary data. The secondary data are gathered from the annual reports of the 44 banks chosen for the study. The period of the study will be approximately eighteen years from 2005 to 2022. These data will include various categories of banks, such as state-owned commercial banks (SOCBs), private commercial banks (PCBs), consisting of conventional and Islamic Shariah-based banks, foreign commercial banks (FCBs), and non-scheduled banks (NSBs).

The study has some limitations. Data has been collected from 2005 to 2022 which had excluded the impact of factors before that timeframe. There is unavailability of data about many variables and quantitative factors which may have significant impact on the banks' profitability. The study did not include primary or confidential or unpublished data. So, it's dependent on secondary data. As a result, the outcome is determined by the credibility of the secondary data. The primary difficulty encountered when performing the research was a lack of pertinent data.

This article presents a systematic model-based analysis, which involves several steps. First, the relationship between profitability and divisional loan disbursement variables is analyzed using the Ordinary Least Squares (OLS) model for 44 examined banks. The link between these variables is then evaluated using the Pooled Ordinary Least Squares (POLS) model. Divisional loan disbursement variables, followed by the Generalized Method of Moments (GMM) to reveal key explanatory factors for the connection between profitability and particular Divisional loan disbursement variables. Different variables will be used in this study, these can be Control variable, Dependent Variable and Independent variable. The description of research variables shows in Table 1.

RESULT AND DISCUSSION

Upon compiling the data, it was systematically processed. Initially, log normalization was applied to ensure normality, encompassing all independent variables to maintain analytical consistency with PAT. Robust regression models, such as Ordinary Least Squares (OLS), Pooled Ordinary Least Squares (POLS), Two-stage Least Squares (2SLS), and Generalized Method of Moments (GMM), were employed to explore the nature and strength of relationships among the variables. OLS is a widely used method due to its simplicity and ease of interpretation, especially when linear models can reasonably approximate the relationships between variables. Salman and Yazdanfar (2012), Sivathaasan et al. (2013), Mahbuba and Farzana (2013), Ozili and Ndah (2021), and Ozili (2017) use the ordinary least square model to assess the correlation with profitability.

Table 2 displays the link between tax net profit (PAT) and different factors such as total assets, total revenue, non-performing loans, total loans, and loan disbursement in various divisions (Dhaka, Barishal, Chattogram, Khulna, Rajshahi, Rangpur, and Sylhet) using the ordinary least squares (OLS) method. The OLS approach assesses how explanatory variables influence the target variable. The regression model shows an R-value of 0.280, indicating that around 28% of PAT differences are accounted for by independent variables. Notably, there are coefficients for Total Revenue and negative coefficients for Total Assets and the Rangpur Division, which suggest that PAT might decrease with increased loan disbursement in the Rangpur Division. The Pooled Ordinary Least Square (POLS) Method, which is regarded as the most reliable regression estimate technique, shows the overall quality of minimized variance and bias.

Table 2. Linear regression

LnPAT	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
LnTA	-2.113	1.104	-1.91	.056	-4.281	.056	*
LnTR	2.108	.16	13.21	0	1.794	2.421	***
LnNPL	-.084	.127	-0.66	.507	-.333	.165	
LnTL	1.879	2.413	0.78	.436	-2.862	6.62	
LnDD	-.712	1.787	-0.40	.691	-4.223	2.8	
LnBD	.139	.098	1.41	.159	-.054	.332	
LnCD	.022	.263	0.08	.934	-.494	.538	
LnKD	-.02	.147	-0.14	.891	-.308	.268	
LnRD	.001	.15	0.01	.995	-.294	.296	
LnRPD	-.112	.064	-1.74	.083	-.238	.015	*
LnSD	-.14	.218	-0.65	.519	-.568	.287	
Constant	.39	10.023	0.04	.969	-19.302	20.082	
Mean dependent var	18.875	SD dependent var		9.169			
R-squared	0.280	Number of obs		520.000			
F-test	17.949	Prob > F		0.000			
Akaike crit. (AIC)	3632.405	Bayesian crit. (BIC)		3683.451			

*** p<.01, ** p<.05, * p<.1

Table 3. Regression results

LnPAT	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
LnTA	-1.978	1.093	-1.81	.07	-4.12	.163	*
LnTR	1.821	.158	11.53	0	1.512	2.13	***
LnNPL	-.025	.126	-0.19	.846	-.271	.222	
Lentil	2.083	2.487	0.84	.402	-2.792	6.957	
LnDD	-.841	1.904	-0.44	.659	-4.574	2.891	
LnBD	.116	.098	1.18	.238	-.077	.309	
LnCD	-.094	.252	-0.37	.708	-.588	.399	
LnKD	.029	.147	0.20	.844	-.259	.317	
LnRD	.038	.151	0.25	.8	-.257	.334	
LnRPD	-.148	.063	-2.35	.019	-.271	-.025	**
LnSD	-.116	.215	-0.54	.589	-.538	.305	
Constant	1.71	10.913	0.16	.876	-19.679	23.098	
Mean dependent var	18.875	SD dependent var		9.169			
Overall r-squared	0.277	Number of obs		520.000			
Chi-square	150.877	Prob > chi2		0.000			
R-squared within	0.129	R-squared between		0.707			

*** p<.01, ** p<.05, * p<.1

Pooled Ordinary Least Square (POLS) Method Table 3 shows the relationship between profit after tax, total asset, total revenue, non-performing loan, total loan, Dhaka, Barishal, Chattogram, Khulna, Rajshahi, Rangpur and Sylhet divisions disbursed loan. The regression model has an overall R-squared of 0.129, which means that the set of

independent variables in the model can explain approximately 12.9% of the difference in PAT. This model reveals a substantial negative association between profit after tax and loans disbursed in the Rangpur division but a significant positive relationship between profit after tax and total assets and income. This result means that profit after tax may decrease due to higher loan disbursement in Bangladesh's Rangpur banking industry. On the contrary, other control and independent variables, such as non-performing loans, total loans, and loans disbursed in Dhaka, Barishal, Chattogram, Khulna, Rajshahi, and Sylhet divisions, have a mixed but irrelevant relationship with PAT despite the entire model being significant at the 10% level.

By isolating the exogenous variance in the possibly endogenous regressors using instrumental variables, the 2SLS approach successfully overcomes endogeneity problems. Empirical research, particularly in economics, where endogeneity is a common worry due to the inclusion of omitted variables, measurement mistakes, or simultaneity, frequently uses it. Yazdanfar & Öhman (2015), Anwar et al. (2019), and Roy et al. (2019) examine the association with profitability using a two-stage least squares model.

Table 4. Instrumental variables (2SLS) regression

LnPAT	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
LnTA	-2.113	1.104	-1.91	.056	-4.281	.056	*
LnTR	2.108	.16	13.21	0	1.794	2.421	***
LnNPL	-.084	.127	-0.66	.507	-.333	.165	
LnTL	1.879	2.413	0.78	.436	-2.862	6.62	
LnDD	-.712	1.787	-0.40	.691	-4.223	2.8	
LnBD	.139	.098	1.41	.159	-.054	.332	
LnCD	.022	.263	0.08	.934	-.494	.538	
LnKD	-.02	.147	-0.14	.891	-.308	.268	
LnRD	.001	.15	0.01	.995	-.294	.296	
LnRPD	-.112	.064	-1.74	.083	-.238	.015	*
LnSD	-.14	.218	-0.65	.519	-.568	.287	
Constant	.39	10.023	0.04	.969	-19.302	20.082	
Mean dependent var		18.875		SD dependent var		9.169	
R-squared		0.280		Number of obs		520.000	
F-test		17.949		Prob > F		0.000	
*** p<.01, ** p<.05, * p<.1							

Table 5 depicts the correlation between net profit after tax and total assets, total revenue, non-performing loans, total loans, and loans disbursed in Dhaka, Barishal, Chattogram, Khulna, Rajshahi, Rangpur, and Sylhet divisions using the Second Stage Least Square (2SLS) model. Here, the set of independent variables in the regression model may account for roughly 28% of the variation in PAT, according to the model's overall R-squared of 0.280. It is found that profit after tax has a significant positive relationship with total revenue. In contrast, profit after tax has a significant negative relationship between total assets and loans disbursed in the Rangpur division. It implies that profit

after tax may cause a reduction due to the increased loan disbursement in the Rangpur division of the banking industry of Bangladesh. There is no significant relationship between profit after tax and non-performing loans, total loans, and loans disbursed in Dhaka, Barishal, Chattogram, Khulna, Rajshahi, and Sylhet divisions. However, the model is significant at the 10% level.

Table 5. GMM Estimation Results

LnPAT	1	2	3	4	5	6	7	8
LLnPAT	0.18***	0.193***	0.192***	0.196***	0.197***	0.194***	0.185***	0.196***
	(3.44)	(3.78)	(3.78)	(3.84)	(3.80)	(3.80)	(3.65)	(3.85)
LnTA	-4.516***	-4.741***	-4.911***	-4.891***	-4.874***	-4.836***	-4.598***	-4.794***
	(-3.02)	(-3.21)	(-3.33)	(-3.30)	(-3.30)	(-3.28)	(-3.13)	(-3.25)
LnTR	0.504***	0.509***	0.523***	0.522***	0.522***	0.523***	0.523***	0.518***
	(2.75)	(2.78)	(2.87)	(2.86)	(2.86)	(2.87)	(2.88)	(2.84)
LnNPL	0.013	0.137	0.057	0.114	0.113	0.084	0.114	0.058
	(0.07)	(0.89)	(0.36)	(0.74)	(0.71)	(0.54)	(0.76)	(0.36)
LnTL	-0.336	-1.213	2.403	2.782*	2.711*	2.451	3.362**	2.372
	(-0.08)	(-0.30)	(1.52)	(1.70)	(1.70)	(1.54)	(2.12)	(1.50)
LnDD	3.019	3.494						
	(0.85)	(1.01)						
LnBD	0.209		0.146					
	(1.03)		(0.98)					
LnCD	-0.084			-0.163				
	(-0.20)			(-0.39)				
LnKD	-0.028				-0.61			
	(-0.11)				(-0.28)			
LnRD	0.021					0.123		
	(0.09)					(0.56)		
LnRPD	-0.233***						-0.215***	
	(-2.69)						(-2.58)	
LnSD	0.367							0.301
	(1.16)							(0.96)
Observations	432	432	432	432	432	432	432	432
Mean dependent var	18.924	18.924	18.924	18.924	18.924	18.924	18.924	18.924
SD dependent var	9.195	9.195	9.195	9.195	9.195	9.195	9.195	9.195
Chi-square	62.727	53.448	53.288	52.465	52.268	52.801	59.551	53.453

***p<.01, **p<.05, *p<.1, t statistics in parentheses ***, ** and * denote significance at 1,5 and 10% respectively

Due to its versatility and the fact that it does not have to reveal the full probability distribution of the data, GMM is widely applied in econometrics and other related subjects. Instead, it depends on moment factors, which are frequently more straightforward to obtain and use in real-world scenarios. Utilizing the Second Stage Least Square model, Ozili (2017), Isik et al. (2017), Odusanya et al. (2018), Yüksel et al. (2018), Anwar

et al. (2019), Al-Homaidi et al., (2020), Horobet et al., (2021), Ozili & Ndah (2021) examine the connection with profitability.

In the GMM model, we calculate the model by incorporating the control variables listed in column (1) of Table 5. In the preceding part, we present seven independent variables in Dhaka Division, Barishal Division, Chattogram Division, Khulna Division, Rajshahi Division, Rangpur Division, and Sylhet Division. These variables are listed from column (2) to (8). The control variables exhibit the expected patterns overall, although only a few are statistically significant. As anticipated, the lagged value of PAT is a reliable indicator of current profitability. Moreover, the coefficient possesses a positive value of less than 1, which guarantees the stability of our models. The total asset and revenue coefficients are negative and positive, respectively, and have a high significance level in all models. Total loan coefficients are also favorable and significant in some models. The loan disbursement in the Rangpur division also significantly negatively impacts the GMM model. This finding shows that the more the total asset increases, the more the PAT is decreasing. Besides, the more the total revenue and total loan (in specific areas) increase, the more the PAT increases. This study also concludes that providing loans to the Rangpur division has a significant negative output, so banks should be careful about lending money to this division. According to this model, NPL, Dhaka division, Barishal division, Chattogram division, Khulna division, Rajshahi division, and Sylhet division loan disbursement have no significant impact on PAT.

In summary, the study's findings indicate that an increase in total assets has a negative impact on net profit after tax (PAT) since it necessitates a comparable rise in operational expenses to sustain the expansion of infrastructure and operations. These costs include amortization and depreciation, labor, utilities and maintenance, rent or lease payments, insurance, and fees. PAT benefits from total revenue since we know that PAT will rise on its own if total revenue rises. Given Rangpur Division's economic and industrial shortcomings, increasing lending to this region could result in a higher percentage of non-performing loans, which would be detrimental to a bank's profitability. In the case of other divisions, the results are unclear, indicating a mixed impact that may be influenced by other factors such as industry, population density, earning ability, and living level.

CONCLUSION

An economy's development depends heavily on its banking system. Investing in new projects and expanding operations can be accomplished through banks, which channel funds from savers to borrowers. Financial stability in a more excellent economy depends on the banking sector's stability. A bank can provide liquidity and support during times of economic crisis as a means of stabilizing financial markets and avoiding systemic risks. The study shows that expanding lending in economically and industrially developed divisions can increase profitability and lower credit risk using analytical tools, including OLS, POLS, 2SLS, and GMM models. Previous studies indicate that various factors

can significantly affect a bank's positive and negative profitability in Bangladesh and other nations. In this study, we attempt to validate the assumption that banks can be more profitable than others when they distribute loans in Bangladesh's economically and industrially developed divisions, such as Dhaka, Chattogram, Rajshahi, and Sylhet. The empirical findings show that bank loan disbursement in different divisions of Bangladesh has no significant relationship with banks' profitability. The findings here also make it clear that loans given in the Rangpur division may have an unfavorable impact on the profitability of the Bank of Bangladesh. However, loan distribution in other divisions of Bangladesh, including Dhaka, Barishal, Khulna, Rajshahi, Chattogram, and Sylhet, has no substantial impact on a bank's profitability.

The study's conclusions highlight that financial institutions must embrace diversity, innovation, and efficient resource management to sustain long-term profitability and provide insightful information for strategic decision-making in response to the shifting banking landscape. Thus, these segments are crucial to the health of the economy. The state of the economy improves as various sectors grow wealthier. Because of this, lending money to these areas makes them more vibrant, benefiting the whole economy. Because of this, the banks ought to exercise greater caution and awareness when making loans to specific divisions and put some workable plans into place to accelerate loan repayment and stimulate the economy. No matter how hard someone works to achieve the optimal outcome, there will always be limitations, and nothing in this life is flawless. Similar to this, this study has certain limitations as well. For instance, it did not include primary and confidential data; the primary obstacle to the research was the lack of readily available data relevant to the investigation, and the variables that could be analyzed could restrict the investigation. For example, the chosen profitability metrics and divisions may not adequately represent the complex relationship between profitability and divisional loan disbursement. As a result, more research on this subject may have been done using more precise factors, such as the return of a specific bank and the breakdown of non-performing loans by division. The outcomes of a study are more credible and competent when these factors are present.

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