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# Measuring Performance of Commercial Banks in Bangladesh Using Financial Inclusion Index

Md. Main Uddin Ahammed

#### **Abstract**

The target of the study was to measure the performance of commercial banks using an index of financial inclusion (FII). Time series data about eight indicators of commercial banks have been used for the desired purpose. The study used both indicators indices  $(d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8)$ , and dimensions indices (D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub>) to form the financial inclusion index (FII). The variables used are deposit accounts, loan accounts, branches of banks, ATMs, outstanding deposits as % of GDP, and outstanding loan as % of GDP. Performance of commercial banks is increasing over time as a whole based on all indicators, except in outstanding deposits as % of GDP (d<sub>7</sub>) which has downward trend since 2015. Based on the index of financial inclusion of commercial banks, Bangladesh entered into medium level of financial inclusion in 2010 and high level of financial inclusion in 2015. Rather establishing new banks in the economy, Bangladesh needed to expand banking services to people through establishment of new branches of existing banks, ATMs, and agent banking outlets to ensure the financial inclusion of unbanked people.



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**Keywords:** measurement, performance, commercial banks, financial inclusion, financial inclusion index.

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#### Introduction

Commercial banks are very important participant of formal financial sector to provide sufficient financial services to people comparatively at low costs. They play significant role in the enhancement of financial inclusion by bringing people under formal financial network. For increasing investment by utilizing capacities and potentialities, people need to have sufficient funds at easier terms and conditions, and commercial banks help them to get the desired financial supports. Financial inclusion is the process that ensures adequate and suitable financial products and services for all people and groups in the society through the mainstream institutional players at reasonable costs and favourable terms (Chakrabarty, 2013). Ensuring the contribution of rural people with the main stream, financial inclusion helps a country to achieve inclusive growth (Goel and Sharma, 2017). It is important to measure the contribution of commercial banks in financial inclusion in terms of access, availability, and usage of financial products and services. It will explore the real contributions of commercial banks and help concerned authorities to make decision with respect to the determination of optimum number of banks in the economy and design suitable products and services for people. For this purpose an effective way is the use of index that considers many indicators and dimensions at a time to measure performance.

Many studies have been conducted round the globe to measure performance of banks using indices. Using five indicators, Park and Mercado (2015) develop financial inclusion index of commercial banks. Nandru and Rentala (2019) measure financial inclusion index of primitive tribal groups in India using demand side data. Goel and Sharma (2017) developed financial inclusion index for India. Gwalani and Parkhi (2014) conducted a study in India to assess various model in Indian context. Gupte et al. (2012) developed financial inclusion index of India using four dimensions. Many studies have also been conducted in Bangladesh on financial inclusion. The study of Hussain et al. (2019) investigated the effect of financial inclusion on financial resilience in Bangladesh and found positive effect. The study of Choudhury (2014) explored the background, issues, regulatory measures and challenges of financial inclusion in Bangladesh. Choudhury (2015) conducted a study on financial inclusion of two villages in Bangladesh. Though many research works are available on financial inclusion in home and abroad, we did not able to find one that measures the performance of commercial banks of Bangladesh separately using index of financial inclusion. So, the purpose of the study was to measure the performance of commercial banks in Bangladesh using financial inclusion index.

#### Literature Review

Lot of literatures are available that addressed the concept (World Bank, 2008; Fungáčová & Weill, 2014; Shettar, 2016; Nyagadza, 2019), significance (Kodan & Chhikara, 2013; Omar & Inaba, 2020; Sethi & Acharya, 2017; Beck et al., 2007), obstacles (Dabla-Norris et al. 2020; Diniz et al., 2012), determinants (Kombo, 2021, Kabakova & Plaksenkov, 2018; Soumaré et al., 2016; Kumar, 2013), components, indicators, dimensions, indices etc. of financial inclusion. For measuring financial inclusion, scholars throughout the world developed indices based on many indicators and dimensions. Sarma (2008, 2012, 2015, and 2016) developed financial inclusion index of banks using five indicators in her studies. The indicators are number of deposit bank accounts per 1000 adults, number of bank branches and ATMs per 100000 adults, and the volume of credit and deposit to adult individuals as a proportion of GDP. Park and Mercado (2015, 2018) calculated index of commercial banks using seven indicators that are ATMs per 100000 adults, commercial bank branches per 100000 adults, borrowers from commercial banks per 1000 adults, depositors with commercial banks per 1000 adults, domestic credit to GDP ratio, the percentage share of the adults with an account, and the share of the adults who borrowed and saved from a financial institution. The indicators used by Camara and Tuesta

(2014) are accounts, savings, loan, distance, affordability, documentation, lack of trust, number of ATMs and bank branches per 1000 km<sup>2</sup>, and the number of ATMs and bank branches per 100000 people. Ahamed and Mallick (2019) used the number of bank branches and ATMs per 100000 people, the number of bank branches and ATMs per 1000 km<sup>2</sup>, and the number of bank accounts per 1000 populations. Indicators used by Mialou et al (2017) are ATMs per 1000 km<sup>2</sup>, ODC branches per 1000 km<sup>2</sup>, total number of resident household depositors with ODCs per 1000 adults, and total number of resident household borrowers with ODCs per 1000 adults. To measure financial inclusion Nguyen (2020) used eight indicators following the methodology of Sarma (2016) based on access, availability and usage dimensions.

Using data relating to access, availability, and usage, Camara and Tuesta (2014) developed financial inclusion index of 82 countries. Dabla-Norris et al. (2015) compared the level of financial inclusion of 104 countries using households and SMEs dimensions. Mialou et al. (2017) ranked 31 countries based on access and usage dimensions of financial inclusion. Demirguc-Kunt and Klapper (2012) conducted a study to measure the use of financial services of 148 countries. The study of Islam and Mamun (2011) found the role of Central Bank in financial inclusion in Bangladesh. Khalily (2016) conducted a study addressing financial inclusion, financial regulation, and education in Bangladesh. The study of Akter (2016) presented an overview of financial inclusion in Bangladesh.

From the above-mentioned studies, it evident that many studies have been conducted throughout the world on different issues of financial inclusion. Performance of commercial banks of many countries has been measured collectively and separately using both time series and cross section data. But I did not find any study that measures the performance of commercial banks of Bangladesh alone, using time series data. The study aimed to fill this gap.

#### **Research Methods**

All commercial banks in Bangladesh are the population of this descriptive study and time series data over 2004-2019 have been used. The study collected secondary data of adult people of all Bangladeshi commercial banks from International Monetary Fund (IMF). Equations 1, 2, and 3 have been used to calculate indicator index (d<sub>1</sub>, d<sub>2</sub>, d<sub>3</sub>, d<sub>4</sub>, d<sub>5</sub>, d<sub>6</sub>, d<sub>7</sub>, and d<sub>8</sub>), dimension index (D<sub>1</sub>, D<sub>2</sub>, and D<sub>3</sub>), and final inclusion index (FII), respectively. The study uses eight indicators of commercial banks for index development. Following the methodology of the study of Sarma (2008) and Goel and Sharma (2017), this study uses the index that is similar to the Human Development Index (HDI) of United Nations Development Program (UNDP). Here, d<sub>i</sub> = index of a particular indicator,  $w_i$  = weight,  $A_i$  = actual value of a particular indicator,  $m_i$  = minimum value of a particular indicator,  $M_i$  = maximum value of a particular indicator,  $D_i$  = dimension index, n = number of indicators or dimensions, and FII = financial inclusion index. Equal weights are assigned to each indicator and dimension. Based on the value of financial inclusion index (FII), the years have been categorized into three group viz. low financial inclusion, medium financial inclusion, and high financial inclusion, as per the criteria presented in Table 1. The dimensions with corresponding indices are presented in Flowchart 1. Two explanatory variables i.e. deposit accounts and branches are used to determine the response variable, deposits. The regression model is deposits =  $\beta_0$  +  $\beta_1$ deposit accounts +  $\beta_2$ branches. The study confirms normality and linearity of variable through skewness, kurtosis, Kolmogorov-Smirnov, and Shapiro-Wilk tests.

$$d_{i} = w_{i} \frac{(A_{i} - m_{i})}{M_{i} - m_{i}}$$

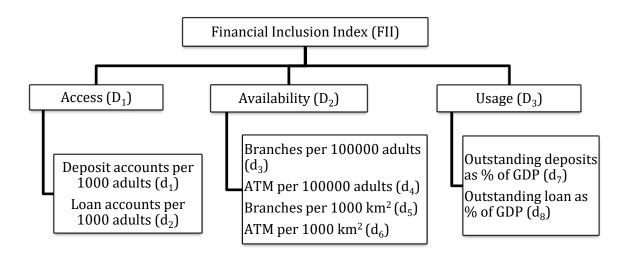
$$D_{i} = \frac{1}{n} \sum_{i=1}^{n} di$$
(1)

$$D_i = \frac{1}{n} \sum_{i=1}^n di \tag{2}$$

$$FII = \frac{1}{2} \left[ \frac{\sqrt{D_1^2 + D_2^2 + \dots + D_n^2}}{\sqrt{n}} + \left( 1 - \frac{\sqrt{(1 - D_1)^2 + (1 - D_2)^2 + \dots + (1 - D_n)^2}}{\sqrt{n}} \right) \right]$$
(3)

Table 1. Classification criteria based on index value

Range	Categories		
$0.0 \le \text{FII} \le 0.4$	Low financial inclusion		
0.4 < FII ≤ 0.6	Medium financial inclusion		
0.6 < FII ≤ 1.0	High financial inclusion		
FII = 0	Complete financial exclusion		
FII = 1	Complete financial inclusion		



Flowchart 1. Dimensions and indicators of financial inclusion of commercial banks

#### **Results and Discussion**

**Table 2.** Descriptive statistics of indicators of commercial banks (2004-2019)

Indicators		Minimum	Maximum	Mean	Std.
					Deviation
Deposit accounts per 1000 adults	16	351.394	927.063	572.280	189.915
Loan accounts per 1000 adults	16	88.775	95.903	91.640	2.2126
Branches per 100000 adults	16	7.070	8.999	7.9630	.732
ATM per 100000 adults	16	.129	9.391	4.1047	3.4490
Branches per 1000 km <sup>2</sup>	16	48.805	82.047	63.906	11.545
ATM per 1000 km <sup>2</sup>	16	.884	85.619	34.970	30.817
Outstanding deposits as % of GDP	16	35.779	53.033	46.416	5.905
Outstanding loan as % of GDP	16	28.366	42.794	37.455	4.916

**Source:** Authors compilation of data from IMF

Table 2 presents the descriptive statistics of eight indicators of commercial banks over sixteen years. The average numbers of deposit accounts and that of loan accounts per 1000 adults are 572.28 and 91.64, respectively. So, out of 1000 adults 572.28 had deposit accounts and 91.64 had loan accounts. The demographic coverage indicates that 7.96 branches of banks and 4.10 ATMs booth were available for each 100000 adults. The geographic coverage reports in each 1000 km² land area, the bank branches and ATMs were 63.91 and 34.97, respectively. The mean of outstanding deposits as % of GDP are 46.42, and the mean of outstanding loan are 37.46.

**Table 3.** Value of specific indicators of commercial banks

Year	$d_1$	$d_2$	d <sub>3</sub>	d <sub>4</sub>	$d_5$	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>
2004	.0000	.3431	.0283	.0000	.0000	.0000	.0000	.0000
2005	.0177	.7273	.0000	.0078	.0229	.0063	.0887	.1612
2006	.0365	.7881	.0157	.0243	.0601	.0195	.1971	.2534
2007	.0543	.0833	.0335	.0413	.0975	.0336	.2371	.1921
2008	.0834	.0650	.0588	.0771	.1380	.0636	.3319	.3336
2009	.0945	.0000	.1710	.1249	.2170	.1044	.4955	.4277
2010	.2339	.3203	.3055	.2142	.3085	.1819	.6441	.7442
2011	.3327	.6390	.4142	.3865	.3936	.3338	.8178	.9061
2012	.3913	.6287	.5208	.4222	.4798	.3719	.8948	.9103
2013	.4616	1.0000	.6121	.5211	.5609	.4676	.9340	.7220
2014	.5109	.0537	.7165	.6091	.6503	.5570	1.0000	.8256
2015	.6045	.0976	.7978	.7519	.7305	.7003	.9792	.8434
2016	.6831	.1383	.8504	.8529	.7975	.8088	.9487	.8322
2017	.7600	.5323	.9088	.8886	.8687	.8581	.8370	.9927
2018	.8749	.4188	.9712	.9457	.9429	.9296	.7310	1.0000
2019	1.0000	.5958	1.0000	1.0000	1.0000	1.0000	.7270	.9350

**Source:** Authors compilation of data from IMF

Table 3 reports the indexed value of each eight indicators of commercial banks. The indicators are deposit accounts per 1000 adults ( $d_1$ ), loan accounts per 1000 adults ( $d_2$ ), branches per 100000 adults ( $d_3$ ), ATMs per 100000 adults ( $d_4$ ), branches per 1000 km<sup>2</sup> ( $d_5$ ), ATMs per 1000 km<sup>2</sup> ( $d_6$ ), outstanding deposits as % of GDP ( $d_7$ ), and outstanding loan as % of GDP ( $d_8$ ). The values indicate that the intensity of financial inclusion is increasing over time as a whole, though  $d_2$  is highest in 2013. The value of  $d_7$  is decreasing after 2014.

**Table 4.** Value of dimensions and index of financial inclusion of commercial banks

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Year	$D_1$	$D_2$	D <sub>3</sub>	Financial Inclusion Index (FII)	Level of financial inclusion			
2004	.1716	.0071	.0000	.078	Low level			
2005	.3725	.0092	.1249	.191				
2006	.4123	.0299	.2253	.239				
2007	.0688	.0515	.2146	.121				
2008	.0742	.0844	.3327	.179				
2009	.0472	.1543	.4616	.242				
2010	.2771	.2525	.6942	.415	Medium level			
2011	.4858	.3820	.8619	.571				
2012	.5100	.4487	.9026	.611				
2013	.7308	.5404	.8280	.693				
2014	.2823	.6332	.9128	.597				
2015	.3510	.7451	.9113	.652	High level			
2016	.4107	.8274	.8904	.690				
2017	.6462	.8810	.9148	.801				
2018	.6469	.9473	.8655	.805				
2019	.7979	1.0000	.8310	.864				

**Source:** Authors compilation of data from IMF, (Though the index values exceed middle range in 2012 and 2013, we assume high level from 2015, since from this year FII is in constant upward trend)

Table 4 reveals the value of three dimensions namely, access  $(D_1)$ , availability  $(D_2)$  and usage  $(D_3)$ ; and the value of final index (FII) that is calculated based on all indicators and dimensions. The value of both  $D_1$  and  $D_2$  is highest in 2019 but  $D_3$  is highest in 2017. The value of final index is growing over time. The values of FII indicate, based on the commercial banks indicators, Bangladesh entered into medium level in 2010 and high level in 2015. Thus, Bangladesh does not need more commercial banks.

**Table 5.** Model summary of deposits, deposit accounts and branches

	<i>J</i> 1	, <u>1</u>	
R	R Square	Adjusted R Square	Std. Error of the Estimate
.999a	.998	.997	178285.039190

a. Predictors: (Constant), deposit accounts, branches

**Table 6.** ANOVA<sup>a</sup> of deposits, deposit accounts and branches

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	190111757038234.300	2	95055878519117.160	2990.537	.000b
Residual	413212217585.831	13	31785555198.910		
Total	190524969255820.160	15			

a. Dependent Variable: deposits, b. Predictors: (Constant), deposit accounts, branches

**Table 7.** Coefficients<sup>a</sup> of deposits, deposit accounts and branches

Model	Unstandardize	d Coefficients	Standardized Coefficients	t	Sig.
	B Std. Error		Beta		
(Constant)	-5127286.976	994767.810		-5.154	.000
branches	473.935	209.211	.199	2.265	.041
deposit accounts	.112	.012	.801	9.110	.000

a. Dependent Variable: deposits

Multiple regression has been used to predict deposits based on two explanatory variables deposit accounts and branches. Skewness, Kurtosis, Kolmogorov-Smirnov, and Shapiro-Wilk test ensure that the response variable is normal. Jointly, both deposit accounts and branches explain 99% variability in deposits since the value of R square is 0.998 (Table 5). The regression model is good fit because the value of adjusted R square is 0.997 (Table 5), F (2, 13) is 2990.537 (Table 6), and p is 0.000 (Table 6). The regression coefficient is significantly different from zero and null hypothesis is rejected since the F value is large and p value is quite small. From Table 7 it is said that holding the deposit accounts constant, the increase of one branch of commercial banks leads to the increase in deposits amounts by 473.935 units. This relation is significant since the p value is less than 0.05. Again, with the increase of one unit in deposit accounts, remaining the number of branches constant, the deposits amounts are increased by 0.112 units. This relation is highly significant since the p value is 0.000.

#### Conclusion

Bangladesh has enough number of banks to deliver banking service to people. Rather establishing new banks, it is better to expand the financial services through expanding branches of existing banks, ATMs and agent banking outlets. The position of deposits is better than that of loan in case of accessibility. The number of branches is about double than that of ATMs with respect to both demographic and geographic coverage which necessitate the availability of more ATM booths in our country. In case of usage, the gap between deposits and loan is not so much. Based on, only the indicator of commercial banks, Bangladesh achieves medium and higher level of financial inclusion from 2010 and 2015, respectively. Due to unavailability of data, only eight indicators have been used in the study. But use of more indicators of financial inclusion of commercial banks would generate more accurate and reliable picture.

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#### Appendix

**Table 1**. Commercial Banks' data on various indicators

Year	Banks	Branches	ATM	Deposit A/C	Loan A/C	Depositors	Borrowers	Deposits
2004	49	6304	115	31332685	8133876	22795768	7809116	1371377
2005	48	6404	184	32996923	8574401	23934903	8220939	1593386
2006	48	6565	330	34683049	8791275	24858359	8490686	1889771
2007	48	6727	486	36337158	8486138	25787022	8275157	2192002
2008	48	6902	816	38638909	8633490	26807288	8439919	2609368
2009	48	7244	1267	39986516	8747950	27491834	8529857	3125495
2010	47	7641	2121	48784254	9139579	33540746	8798976	3739908
2011	47	8009	3797	55578265	9554406	48869068	9133269	4568968
2012	47	8382	4217	60196294	9734484	57179153	9143357	5404547
2013	56	8724	5273	65666487	10205034	56077107	8651828	6221741.762
2014	56	9111	6259	70008283	9669536	58055942	8294349	7125966.1
2015	56	9458	7839	77285412	9887179	72197258	9250296	7984464.159
2016	57	9747	9036	83806878	10102494	78338557	9156340	9036523.764
2017	57	10055	9580	90411690	10608826	83757687	9523937	9922820.056
2018	58	10375	10368	99744363	10703908	91887649	9697205	10890373.25
2019	59	10621	11145	110018428	11039300	100739397	9844591	12286194.3

Source: IMF

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