

DOES BANK DIVERSIFICATION SIGNIFICANTLY AFFECT PROFITABILITY? A LONGITUDINAL STUDY ON BANGLADESH

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ABSTRACT- This paper examines the effect of the bank diversification (i.e., income diversification and asset diversification) on the profitability of banks in Bangladesh. We analyze an unbalanced panel data of 32 banks covering 318 bank-year observations from 2007 to 2016 by employing dynamic panel data model with one-step system Generalized Methods of Moments (GMM) and Ordinary Least Squares (OLS) regressions. The results show that income diversification and assets diversification have a significant positive relationship with bank profitability. Thus, the results imply that banks can benefit from the income diversification and assets diversification if diversified activities yield a high return, while it may hurt banks if confronted with low return. This study is one of the unique attempts at examining the relationship between diversification and profitability in the bank industry of Bangladesh. We expect that the findings have significant implications for the bank regulators in Bangladesh and other similar economies.

KEYWORDS: Income Diversification; Assets Diversification; Bank Profitability; Dynamic panel model; GMM; OLS

1. INTRODUCTION

In the past few decades, the financial sector especially the banking industry in the developing, as well as developed countries, have experienced substantial changes. Due to globalization, increased competition, and deregulation has intensified banks to undertake diversified lines of businesses besides the bank interest-oriented traditional activities. Nowadays, non-interest based activities are more popular among the banks in generating a profit because of the changing market condition. Bank can diversify the portfolio of assets by adding new income sources or new assets, such as providing investment, brokerage services, trading securities and underwriting services (Meslier et al., 2014). Most of the prior studies argue that non-interest income not only yields a higher profit but also produce risk because of their uncertainty (Moudud-Ul-Huq et al., 2018). By investigating on South Asian banks, Nguyen et al. (2012) argue that if banks diversify their income across both interest and non-interest sources then become more stable. Assets diversification reduces profits and increases costs (Berger et al., 2010). Edirisuriya et al. (2015) argue that banks performance is not improved due to assets diversification. It has observed that the prior studies show inconclusive results on the association between diversification and bank profitability. Thus, we have introduced two research questions on Bangladeshi banking industry: i) What are the impacts of income diversification on bank profitability? ii) Is there any significant association between assets diversification and bank profitability?

The prior studies related to diversification focused mostly on the developed countries (i.e., the USA and Europe). Very few studies have found on emerging economy and provide different results (Moudud-Ul-Huq et al., 2018). Deesomsak et al. (2004) claim that Asian banks are the vital source of finance for investing in the private sector business. Furthermore, the banks of the Asian region also have affected by the banking crisis, and some of the countries are continuing restructuring programs. Moreover, it has observed that there is a dearth of research on the Asian banks. Thus, Lee and Hsieh (2013) argue that the banking industry in the Asian regions is the interesting and crucial laboratory for the investigation.

By considering the lack of research on the Asian economy, we examine the impact of income diversification and assets diversification on bank profitability on Bangladesh. We use an unbalanced panel data set of 32 commercial banks from Bangladesh over the period 2007-2016; which yields a total of 318 bank-year observations. We have employed one-step system GMM and OLS regression with dynamic panel data model for the analysis. In this empirical analysis, we find that income diversification and assets diversification are the significant positive factor to increase profitability in the commercial banks of Bangladesh.

The present study contributes to the existing literature in several ways. First, we investigate by taking a sample of 32 banks from Bangladesh over 2007-2016. To the best of our knowledge, this is the unique study using such a rich data set on Bangladesh in this topic. Second, the most of the prior studies focus mainly on the association between non-interest income and risk, but very little attention on the relationship between non-interest income and profitability as well as non-interest bearing assets and profitability. Third, we use four proxies of bank profitability to ensure the robustness of the findings which are rare in the empirical literature. Fourth, the study employed a one-step system GMM regression technique with dynamic panel data model, while the related studies focused on Asian countries are mostly employed static panel data model. Finally, the study will be the complements of other studies on Asian countries (Nisar et al., 2018, Lee et al., 2014b, Ahamed, 2017, Berger et al., 2010, Nguyen et al., 2012).

This article is organized as follows. The next section shows the literature review. Section 3 describes the research methodology while Section 4 discusses the empirical results. The final section provides conclusion and policy implications.

2. LITERATURE REVIEW

In this section, this study reviews the existing literature on the impacts of diversification on bank profitability. Theoretically and empirically, there is a puzzle whether diversification improves profitability. By referring portfolio theory, Elsas et al. (2010) argue that the diversified activities of a bank can provide benefit from economies of scope which ultimately reduces bank risk and improve performance. Boyd et al. (1993) claim that the diversification cost may outweigh the advantages if the diversified activities are riskier than the traditional banking activities. Using the sample of developed and developing countries, Doumpos et al. (2016) conclude that the developing countries can gain more advantages from revenue diversification as compared to developed countries.

Concerning to the impacts of income diversification on bank profitability, the existing literature shows mixed results. For example, Stiroh (2004) investigates on US community bank and finds a negative association between diversification and bank profitability. Mercieca et al. (2007) find an inverse relationship between non-interest income and bank profitability using data from small European credit institutions from 1997-2003. Using an unbalanced panel data on 88 Chinese banks, Berger et al. (2010) argue that diversification increases costs and deteriorates profitability.

Another group of studies reports positive impacts of bank diversification on profitability. For example, the recent study of Nisar et al. (2018) examine the impact of revenue diversification on bank profitability on eight south Asian countries and conclude that non-interest income has a positive impact on profitability. Another recent study by Moudud-UI-Huq et al. (2018) investigates on ASEAN emerging economies and find that the diversified banks have lower risks and higher performance. Lee et al. (2014b) examine on 22 Asian countries which results show that non-interest income reduces risk and increases bank profitability in the middle and low-income countries, while raise risk for the high-income countries. Baele et al. (2007) highlight positive impacts of income diversity on the long-term value of the firm by examining on European banks. By investigating on Italian banks, Chiorazzo et al. (2008) find that income diversity increases bank risk-adjusted returns. Using data from Canada, Australia, Italy, France, Germany, Switzerland, Spain, the US, and UK bank, Elsas et al. (2010) find that diversification improves bank profitability.

Furthermore, some of the studies use two types of diversification measures such as income diversification and assets diversification. For example, the study of Moudud-UI-Huq et al. (2018) differentiates between revenue and assets diversification. Their study results conclude that the effects of assets diversification vary from one country to another country. Most of the studies based on US economy find that assets diversification increases bank performance such as Hughes et al. (1999) and Deng et al. (2007). Other studies find negative impacts of assets diversification on profitability (Acharya et al., 2006, Hughes et al., 1996, Rose, 1996). Using listed public banks on south Asian countries, Edirisuriya et al. (2015) explore that diversification of assets does not improve bank performance.

The prior research results indicate inconclusive findings. Thus, by following the previous literature, the study differentiates diversification measures like income and assets diversification and investigates whether different diversification has different effects on bank profitability in Bangladesh.

3. RESEARCH METHODOLOGY

3.1 Data and sample

The sample size for this study consists of 32 commercial banks listed on the Dhaka Stock Exchange (DSE) of Bangladesh. Now, a total of 57 scheduled banks are working in Bangladesh. But, the study excluded 25 banks due to unavailability of data. In addition, some banks are new thus excluded from the study. Our final dataset includes an unbalanced panel data which covering from 2007 to 2016 and yielding a total of 318 observations. Data are taken from the audited financial statement of each bank which is available on the bank's website as well as DSE. The study also uses macroeconomic control variables which are available in the World Bank database¹. Moreover, we use different books, journals, and online resources.

3.2 Model specification, variables, and estimation techniques

The empirical model specification is as follows:

$$Y_{it} = C + \delta Y_{i,t-1} + \lambda DIV_{it} + \sum_{j=1}^j \beta_j X_{it}^j + \epsilon_{it}$$

Where, Y_{it} Indicates the proxy of bank profitability (Return on assets; return on equity; risk-adjusted return on assets; risk-adjusted return on equity) of bank t and year i . $Y_{i,t-1}$ is the one period lagged of bank profitability measures. C is the constant term; δ shows the speed of adjustment to the equilibrium level. DIV_{it} indicates the proxy of bank diversification (Income and assets diversification). X_{it} with superscripts j represents control variables (Liquidity, capitalization, bank size, credit risk, cost management, concentration, gross domestic product, inflation) use in the study. ϵ_{it} indicates the idiosyncratic error term. λ and β_j represents the coefficients to be estimated. The definitions of all the variables and their references are represented in Table 3.1.

The above dynamic panel model is estimated by using Generalized Methods of Moments (GMM) estimator developed by Arellano and Bover (1995) and Blundell and Bond (2000). We use a one-step system GMM rather than two-step system GMM because the former one produces a smaller standard deviation of the estimation and smaller bias (Judson and Owen, 1999). The advantages of using GMM is it avoids autocorrelation and heteroskedasticity problems in the model, and it gives better results compared to OLS.

¹ data.worldbank.org

Table 3.1: Descriptions of variables

Variables	Symbol	Definition of Variables	References
Dependent variables			
Performance measures			
Return on Assets	ROA	Net income/Total assets	(Gang Tian and Zeitun, 2007)
Return on Equity	ROE	Net income/Total shareholder's equity	(Tan, 2016)
Risk-adjusted return on assets	SHROA	ROA/Standard deviation of ROA	(Chiorazzo et al., 2008)
Risk-adjusted return on equity	SHROE	ROE/Standard deviation of ROE	(Chiorazzo et al., 2008)
Independent variables			
Diversification measures			
Income diversification	INDIV	Non-interest income/Total income.	(Majumder and Uddin, 2017, Akter et al., 2018)
Assets diversification	ADIV	Non-interest bearing assets/Total assets.	(Edirisuriya et al., 2015)
Control variables			
Liquidity	LIQD	Total loans and advances/Total assets	(Goddard et al., 2013)
Capitalization	EQTA	Total shareholder's equity/Total assets	(Zheng et al., 2017)
Bank size	BSIZE	Natural logarithm of total assets.	(Lee et al., 2014b)
Credit risk	NPLTL	Non-performing loans/Total loans	(Lee et al., 2014a)
Cost management	CMGT	Total overhead cost /Total assets	(Tan, 2016)
Concentration	CON3	Total assets of the largest three banks/Total assets of the bank industry	(Tan, 2016)
Gross domestic product	GDP	Annual GDP growth rate	(Majumder and Uddin, 2017)
Inflation	INF	Annual inflation rate	(Tan, 2016)

4. RESULTS AND DISCUSSION

4.1 Descriptive statistics

The descriptive statistics of all the study variables are presented in Table 4.1. The table shows that the minimum value of bank profitability (ROA, ROE, SHROA, & SHROE) indicates a negative figure which is due to negative earnings of some state-owned banks (see Rupali bank ltd. - 2007 & 2016; Agrani bank ltd. - 2012 & 2016; Janata bank ltd. - 2012 & Sonali bank ltd. - 2007 & 2012) and negative shareholder's equity of some state-owned banks (see Rupali bank ltd. - 2007, 2008, & 2009). Those state-owned banks are still operating because of support from the Government of Bangladesh. Interestingly, we find that the average return on assets (ROA) of Bangladeshi banks is 1.1% which is higher than 0.93% as calculated by Nisar et al. (2018) on 8 South Asian countries and 0.844% as found by Lee et al. (2014b) on 22 Asian countries. The return on equity is 13.1% which also indicating 8.67% higher than the study of Lee et al. (2014b) and 11.85% of the study of Nisar et al. (2018). The study shows that the banks in Bangladesh have earned on an average 27.6% of their income from non-interest income sources which is lower than 65.58% as measured by Lee et al. (2014b) on Asian countries and 31.954% as found by Nisar et al. (2018) on South Asian countries. The average non-interest bearing assets 33.5% of total assets is also playing a role for enhancing bank profitability in Bangladesh. The results of the standard deviation of bank size (BSIZE) 77.5% are showing that there is variability of bank assets in Bangladesh.

Table 4.1: Descriptive statistics

Variables	Mean	SD	Min	Max	Obs
Dependent variables					
Performance measures					
ROA	0.011	0.012	-0.135	0.051	318
ROE	0.131	0.217	-2.741	1.044	318
SHROA	2.312	1.466	-3.008	5.498	318
SHROE	2.468	1.542	-3.049	6.211	318
Independent variables					
Diversification measures					
INDIV	0.276	0.095	0.030	0.564	318
ADIV	0.335	0.087	0.163	0.678	318
Control variables					
LIQD	0.665	0.087	0.322	0.837	318
EQTA	0.079	0.027	-0.129	0.154	318
BSIZE	11.79	0.775	10.04	13.99	318
NPLTL	0.060	0.062	0.002	0.446	318
CMGT	0.022	0.007	0.007	0.047	318
CON3	0.314	0.046	0.275	0.415	318
GDP	6.248	0.619	5.000	7.100	318
INF	6.989	0.801	5.700	8.200	318
Note: Return on assets (ROA); Return on equity (ROE); Risk-adjusted return on assets (SHROA); Risk-adjusted return on equity (SHROE); Income diversification (INDIV); Assets diversification (ADIV); Liquidity (LIQD); Capitalization (EQTA); Bank size (BSIZE); Credit risk (NPLTL); Cost management (CMGT); Concentration (CON3); Gross domestic product (GDP); Inflation (INF). Standard deviation (SD); Minimum (Min); Maximum (Max); Observations (Obs).					

4.2 Correlation analysis

Table 4.2 shows the Pearson's correlation coefficient matrix, from which it has been observed that the highest correlation among the independent variables is 0.67 between liquidity (LIQD) and assets diversification (ADIV). Gujarati (2009) suggests that multicollinearity is a serious problem when the correlation value of the two independent variables exceeds 0.80. Thus, the study suggests no serious problem of multicollinearity in the interpreting the regression results.

Table 4.2: Pearson correlation matrix

	INDIV	ADIV	LIQD	EQTA	BSIZE	NPLTL	EFF	CON3	GDP	INF
INDIV	1									
ADIV	0.57***	1								
LIQD	(0.47)***	(0.67)***	1							
EQTA	0.05	(0.23)***	0.18***	1						
BSIZE	0.21***	0.44***	(0.34)***	-0.06	1					
NPLTL	0.48***	0.63***	(0.53)***	(0.39)***	0.46***	1				
EFF	0.27***	0.14**	(0.12)**	0.15***	-0.07	-0.08*	1			
CON3	0.04	(0.17)***	0.16***	(0.24)***	(0.66)***	-0.03**	-0.08*	1		
GDP	(0.10)*	0.05	-0.04	(0.11)*	0.17***	0.09	-0.01	-0.01	1	
INF	-0.09	-0.07	0.05	0.04	(0.20)***	-0.06	0.01	0.13**	-0.08	1

Notes: Total number of observations 318; ***Correlation is significant at 1% level (2-tailed); **Correlation is significant at 5% level (2-tailed); *Correlation is significant at 10% level (2-tailed); All variables are winsorized at the 1% level.

4.3 Regression Analysis

4.3.1 The effects of bank diversification on profitability

Table 4.3 reports the empirical results of the impact of bank diversification on profitability. Here, we use four proxies of bank profitability as a dependent variable such as return on assets (ROA), return on equity (ROE), risk-adjusted return on assets (SHROA), risk-adjusted return on equity (SHROE) in model 1 to 4 and 5 to 8 respectively. The study uses two proxies of bank diversification as independent variables. Income diversification uses in the model 1 to 4 and asset diversification uses in the model 5 to 8. All models represent the significant positive coefficient of the lagged dependent variables, which confirms the degree of persistence exists in all models and the dynamic character for specifying the models.

The study results show that income diversification (IDIV) is positively and significantly impact on the profitability of Bangladeshi commercial banks in all models; which indicating that the more diversified activities for earning non-income lead to higher profitability; the results supported by the study of Jiang et al. (2003). We also found that asset diversification has significant positive impacts on profitability; which implies that the more non-interest bearing assets generate more profit. This is in line with Edirisuriya et al. (2015).

Concerning to the control variables, we find a positive association between liquidity and bank profitability except in models 5 & 8. The high ratio indicates a large amount of loan sanction to the customers which generate more interest income; thus increasing profitability. This is supported by the study of Nisar et al. (2018). The equity to total assets ratio (EQTA) indicates a significant positive association with profitability in model 1, 5, 6 & 7; indicating that the higher the bank's equity capital generates higher earnings. Our result is in line with Zheng et al. (2017), Casu et al. (2016), and others. Bank size (BSIZE) is significant negatively associated with profitability; showing the large banks have the difficulty of management compared to smaller banks thus reducing profit. This result is in line with Tan (2016) and Majumder and Uddin (2017). The study noticed that credit risk (NPLTL) negatively impacts on bank profitability; indicating the poor loan quality reduces profitability. The similar results find by the study of Almekhlafi et al. (2016), Zhang et al. (2013), and Lin et al. (2005); but not consistent with Naceur and Omran (2011). Cost management (overhead cost to total assets ratio, CMGT) indicates a significant negative association on profitability. The low ratio indicates efficient cost management; this evidence is in line with Rahman et al. (2015). The study results show that concentration (HHI) is significant and positively associated with bank profitability; which is in line with the study of (Tan and Floros, 2012a). The study uses two macroeconomic control variables such as GDP and inflation. The gross domestic product (GDP) has a significant positive relationship with bank profitability; indicating that higher the GDP growth in Bangladesh higher the profitability. The evidence is consistent with (Tan, 2016). Regarding to the inflation, the results indicate the significant positive impact on profitability in all models except model 1 to 3; which is supported by the study of (Tan and Floros, 2012b, Majumder and Uddin, 2017).

Table 4.3: The effects of bank diversification on profitability

Variables	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8
ROA _{t-1}	0.32*** (0.102)	-	-	-	0.35*** (0.116)	-	-	-
ROE _{t-1}	-	0.45*** (0.161)	-	-	-	0.41*** (0.101)	-	-
SHROA _{t-1}	-	-	0.335*** (0.097)	-	-	-	0.342*** (0.095)	-
SHROE _{t-1}	-	-	-	0.520*** (0.077)	-	-	-	0.489*** (0.085)
INDIV	0.024*** (0.006)	0.247** (0.079)	1.332* (0.72)	0.391** (0.16)	-	-	-	-
ADIV	-	-	-	-	0.019** (0.008)	0.026*** (0.008)	5.245** (2.115)	4.734*** (1.186)
LIQD	0.013* (0.007)	0.057** (0.029)	1.837* (1.05)	1.055* (0.60)	0.008 (0.021)	0.160*** (0.053)	5.658* (3.154)	4.988 (3.134)
EQTA	0.126*** (0.035)	0.224 (0.311)	8.050 (4.920)	2.146 (3.596)	0.152*** (0.037)	0.551* (0.302)	8.342** (3.684)	1.554 (3.262)
BSIZE	-0.011** (0.005)	-0.010* (0.005)	-0.033*** (0.011)	-0.015** (0.006)	-0.016*** (0.005)	-0.014** (0.007)	-0.172*** (0.065)	-0.192* (0.114)
NPLTL	-0.055* (0.031)	- 1.147** (0.184)	-7.788*** (2.537)	-6.809*** (2.029)	-0.044 (0.029)	-1.047*** (0.180)	-6.958*** (2.152)	-6.789*** (2.053)
CMGT	-0.01*** (0.003)	- 0.375** (0.098)	-1.078* (0.561)	-5.033** (2.262)	-0.036*** (0.013)	-0.195** (0.109)	-0.811*** (0.173)	-8.588 (11.016)
CON3	0.036** (0.017)	0.646** (0.187)	7.051*** (2.572)	8.800*** (2.308)	0.056*** (0.020)	0.894*** (0.240)	4.563* (2.587)	5.735** (2.673)
GDP	0.012*** (0.001)	0.022** (0.006)	0.341** (0.130)	0.132 (0.125)	0.002*** (0.001)	0.023*** (0.007)	0.411*** (0.105)	0.192 (0.115)
INF	-0.0001 (0.0001)	-0.003 (0.003)	-0.100 (0.066)	-0.196*** (0.058)	-0.001* (0.000)	-0.008** (0.003)	-0.150** (0.062)	-0.213*** (0.058)
F-Test	204.66** *	159.19* **	228.12** *	151.25** *	273.16** *	185.10** *	253.88** *	197.35** *
Hansen Test ¹	P = 0.30	P = 0.45	P = 0.29	P = 0.26	P = 0.31	P = 0.48	P = 0.39	P = 0.27
AR(1) ²	Z = - 3.19 P = 0.001	Z = - 2.41 P = 0.016	Z = -4.56 P = 0.000	Z = -3.77 P = 0.000	Z = -3.31 P = 0.001	Z = -2.39 P = 0.017	Z = -4.55 P = 0.000	Z = -3.97 P = 0.000
AR(2) ³	Z = - 0.79 P = 0.43	Z = 0.55 P = 0.58	Z = -0.76 P = 0.48	Z = -0.22 P = 0.79	Z = -0.99 P = 0.36	Z = 0.28 P = 0.83	Z = -0.87 P = 0.41	Z = -1.11 P = 0.28
No. of instruments	11	11	11	11	11	11	11	11
Observations	286	286	286	286	286	286	286	286

Note: The estimation technique is a one-step system GMM dynamic panel estimators. The dependent variable is the profitability measured by return on assets (ROA), return on equity (ROE), risk-adjusted return on assets (SHROA), and risk-adjusted return on equity (SHROE) respectively in Model 1 to 4 as well as in Model 5 to 8. Income diversification (INDIV) is the independent variable in Model 1 to 4, whereas asset diversification (ADIV) is the independent variable in Model 5 to 8. *, **, *** denote significance at 10%, 5%, and 1% levels respectively. Robust standard errors are presented in parenthesis. ¹Test of over-identifying restrictions (H₀: over-identifying restrictions are valid). The tests accept the null hypothesis that over-identifying restrictions are valid. ²Arellano-Bond test for the first-order autocorrelation (H₀: no autocorrelation). ³Arellano-Bond test for the second-order autocorrelation (H₀: no autocorrelation). The tests results of AR(1) and AR(2) indicates there is autocorrelation exists in the first-order but not in the second-order. All variables are winsorized at the 1% level.

4.3.2 Robustness of results

We have performed a robustness test by switching the regression method from GMM to OLS. As can be observed in Table 4.4, income diversification (INDIV) and asset diversification (ADIV) has shown the expected significant positive

relationship with different measures of bank profitability. Concerning to the control variables, we found a similar association with profitability as in previous methods in Table 4.3; which confirms the robustness of our results.

Table 4.4: The effects of bank diversification on profitability

Variables	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8
ROA _{t-1}	0.24*** (0.066)	-	-	-	0.332*** (0.108)	-	-	-
ROE _{t-1}	-	0.394*** (0.125)	-	-	-	0.136*** (0.047)	-	-
SHROA _{t-1}	-	-	0.583*** (0.045)	-	-	-	0.585*** (0.045)	-
SHROE _{t-1}	-	-	-	0.666*** (0.041)	-	-	-	0.666*** (0.041)
INDIV	0.024*** (0.005)	0.250*** (0.056)	1.241* (0.66)	0.413** (0.194)	-	-	-	-
ADIV	-	-	-	-	0.021** (0.009)	0.032*** (0.009)	4.495** (1.929)	3.746*** (0.983)
LIQD	0.012* (0.006)	0.057** (0.026)	0.948*** (0.358)	0.235* (0.135)	0.001 (0.006)	0.193*** (0.071)	0.314** (0.133)	0.025 (0.903)
EQTA	0.124*** (0.018)	0.216 (0.203)	5.559** (2.818)	0.171 (2.658)	0.151*** (0.018)	0.555*** (0.194)	7.216*** (2.640)	0.727 (2.477)
BSIZE	-0.011*** (0.004)	-0.009** (0.004)	-0.138*** (0.041)	-0.124* (0.016)	-0.018*** (0.003)	-0.014*** (0.001)	-0.114*** (0.016)	-0.166*** (0.010)
NPLTL	-0.055*** (0.010)	-1.151*** (0.117)	-4.401*** (1.680)	-5.170*** (1.545)	-0.043*** (0.010)	-1.025*** (0.117)	-3.898** (1.657)	-5.012*** (1.519)
CMGT	-0.018*** (0.005)	-0.384* (0.227)	-4.200* (2.356)	-9.031** (3.866)	-0.036** (0.015)	-0.110** (0.045)	-1.228*** (0.423)	-8.041 (7.204)
CON3	0.030* (0.016)	0.632*** (0.183)	4.995* (2.578)	5.573** (2.409)	0.056*** (0.015)	0.886*** (0.180)	6.318** (2.457)	6.010*** (2.286)
GDP	0.002*** (0.001)	0.022*** (0.008)	0.394*** (0.115)	0.178 (0.109)	0.002*** (0.001)	0.023*** (0.009)	0.400*** (0.116)	0.180* (0.108)
INF	-0.000 (0.000)	-0.003 (0.005)	-0.237*** (0.076)	-0.260*** (0.070)	-0.001 (0.000)	-0.009 (0.005)	-0.259*** (0.075)	-0.267*** (0.069)
Constant	0.008*** (0.003)	0.017*** (0.006)	4.094* (2.080)	3.693* (1.965)	0.009*** (0.003)	0.027** (0.013)	4.132** (2.086)	3.710* (1.963)
R-square	0.581	0.556	0.667	0.725	0.541	0.524	0.664	0.725
Observations	286	286	286	286	286	286	286	286

Note: The estimation technique is OLS estimators. The dependent variable is the profitability measured by return on assets (ROA), return on equity (ROE), risk-adjusted return on assets (SHROA), and risk-adjusted return on equity (SHROE) respectively in Model 1 to 4 as well as in Model 5 to 8. Income diversification (INDIV) is the independent variable in Model 1 to 4, whereas asset diversification (ADIV) is the independent variable in Model 5 to 8. *, **, *** denote significance at 10%, 5%, and 1% levels respectively. Robust standard errors are presented in parenthesis. All variables are winsorized at the 1% level.

5. CONCLUSION AND IMPLICATIONS

In this paper, we investigate the impact of income diversification and assets diversification on bank profitability in Bangladesh. For the empirical analysis, the study uses a one-step system GMM methodology with dynamic panel model for 32 commercial banks from Bangladesh over the period 2007-2016; yielding a total of 318 bank-year observations. The study also uses OLS regression for the robustness checking. We use four proxies of bank profitability (return on assets; return on equity; risk-adjusted return on assets; risk-adjusted return on equity) as a measure of the dependent variable and two proxies of diversification (income and assets diversification) as a measure of the independent variable. The other control variables also consider for the study such as liquidity, capitalization, bank size, credit risk, cost management, concentration, gross domestic product, and inflation.

The study findings are indicating that income and assets diversification have significant positive impacts on the bank profitability of the commercial banks in Bangladesh. Regarding control variables: liquidity, capitalization, concentration, and gross domestic product have significant positive impact on profitability. In contrast, bank size, credit risk, cost management, and inflation have significant negative relationship with bank profitability.

Our results have significant policy implications for regulators and managers in the banking sector of Bangladesh as well as for the developing and emerging economies. The study implies that banks are still generating majority portion of income from the traditional interest-generating sources and interest-bearing assets. Hence, banks should search for alternative sources of

income such as non-interest income sources, as well as non-interest bearing assets as those sources, are significantly and positively impact on banks profitability.

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