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Causal Analysis Between Liquidity and Profitability: Is There Any Difference Between Public and Private Commercial Banks in Bangladesh?

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ABSTRACT

This paper analyzes the causal relationship between liquidity and profitability for public and private commercial banks in Bangladesh. The augmented Dickey-Fuller test of stationarity is carried out first. As they are found to be integrated of the same order, the Engle-Granger test of cointegration is applied. Finally, the Granger causality test is applied to check if there is any causal relationship between liquidity and profitability for public and private commercial banks in Bangladesh from 2001 to 2019. Another aim of the paper is to see if there is any difference in the causal relationship between these two bank typologies. The results show that there is unidirectional causality from profitability to liquidity for public banks while no causal relationship is evident for private commercial banks in Bangladesh. The findings further confirm that different bank typologies behave differently in Bangladesh and hence policy makers should keep this in mind during policy formulation.

JEL Classification: C32; E58; G21

Keywords: bank liquidity, profitability, causality, public and private banks, Bangladesh

1. INTRODUCTION

The banking sector in Bangladesh plays a crucial role for the country's development. It has both direct and indirect contribution. In 2018-19, the direct contribution of this sector to GDP was 3.00 percent (Bangladesh Economic Review, 2019) while the indirect impact of the sector is manifold.

Bank profitability is regarded as one of the two most important indicators of bank performance. Different empirical studies have been done on the determinants of bank profitability. In most cases, liquidity is taken as one of the determinants of profitability (e.g. Agbade & Osuji, 2013; Dezfouli et al., 2014; Lartey et al., 2013; Maaka, 2013; Mahshid, 2011; Olagunju et al., 2011; Purbaningsih, 2014; Sushil & Bivab, 2013). Liquidity shows the ability of a person or an

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organization to meet their immediate and short-term needs. It reflects a bank's ability to meet both expected and unexpected cash and collateral obligations at a reasonable cost without incurring unacceptable losses (GARP, 2013). Liquidity can impact banks both positively and negatively. On the one hand, having a higher amount of liquidity can give banks advantage in funding markets, reducing their financing costs, and thereby increase profitability. On the other hand, a higher amount of liquidity means that banks can lend less and therefore have lower profitability.

However, there is ambiguity about using liquidity as an explanatory variable as not all studies have used liquidity as one of the explanatory variables for profitability. For example, Hu and Xie (2016) did not use liquidity as an explanatory variable for profitability in their study on China and neither did Ullah et al. (2016) in their study on Bangladesh.

On the other hand, when liquidity is the dependent variable, then profitability is not always used as one of the explanatory variables. For example, Moussa (2015), Singh and Sharma (2016), Sopan and Dutta (2018) and Yahya et al. (2017) used profitability as one of the explanatory variables of liquidity but Cucinelli (2013) did not use it. Because of this uncertainty, it is important to examine if any relationship exists between profitability and liquidity (Olaewaju & Adeyemi, 2015). This can be done by using Granger's causality analysis which can tell us if there is bidirectional, unidirectional or no causality at all between these variables (e.g. Granger, 1969, 1980; Verbeek, 2017).

Another possibility is that different banks or bank types have a different type of relationship. This is observed by Olaewaju and Adeyemi (2015) in their study on the Nigerian banking sector. They examined the causal relationship between liquidity and profitability for 33 banks individually and found that different types of causal relationship existed for different banks.

In this study on the banking sector in Bangladesh, rather than testing a causal relationship between profitability and liquidity for individual banks separately, bank typologies of public and private commercial banks are adopted to see if there is any causal relationship for these two types of banks and if there is any difference of causal relationship between these two types of banks.

This paper is organized as follows: a brief review of literature is presented in Section 2, Section 3 describes data source, variable definition and methodology. In Section 4, estimated results are presented along with their discussion and the paper concludes with some concluding remarks in the final section.

2. LITERATURE REVIEW

As stated before in the Introduction section, various papers addressed the relationship between profitability and liquidity differently. In most cases, liquidity is taken as one of the determinants of profitability but there were also cases where liquidity was included as one of the explanatory variables of profitability. Similar is the case where liquidity is the dependent variable where profitability was one of the explanatory variables in some cases while it was not taken as one of the explanatory variables in some other papers. These are described in a bit more detail in the following paragraphs.

The studies mentioned in this paragraph used liquidity as one of the explanatory variables of profitability. In their study on Nigerian banks, Agbade and Osuji (2013) collected primary data of 245 banks applying the random sampling method. In a separate study on Iranian banks, Dezfouli et al. (2014) investigated the relationship for 18 Iranian banks for a period of 2005 to 2011. They applied the GMM linear forecasting model. For Ghana, data of seven banks for a period of 2005 to 2010 were considered by Lartey et al. (2013). They found a very weak positive relationship between liquidity and profitability. In a study on Kenyan banks, Maaka (2013) examined the effect of liquidity on the profitability of banks using data of 33 banks for the period 2008–2012.

Using unbalanced panel data, Mahshid (2011) investigated the relationship between liquidity and profitability of Iranian banks applying the GMM for the period of 2002–2009. Olagunju et al. (2011) used both structured and unstructured questionnaires to collect primary data from commercial banks in Nigeria. They then used both primary and the secondary data and observed a significant relationship between profitability and liquidity. In a study on Indonesian commercial Sharia banks, Purbaningsih (2014) examined the determinants of profitability. In this study, data of 11 banks were taken into account for the period of 2010–2012. Sushil and Bivab (2013), in their study on Nepal, examined the impact of liquidity on financial performance using data of six commercial banks from 2002/03 to 2011/12.

However, not all papers used liquidity as one of the explanatory variables of profitability. For example, Hu and Xie (2016) investigated profitability of the Chinese banking sector using data of 14 banks for the period of 2004 to 2014 applying the Structural Equation Modeling (SEM) where they did not use liquidity as an explanatory variable for profitability in their study on China while this was done by Ullah et al. (2016) in their study on Bangladesh, where they applied the OLS method to eight insurance companies from 2004 to 2014.

Like in the cases of profitability as the dependent variable, when liquidity is the dependent variable, then profitability is not always used as one of the explanatory variables. Some of these are briefly stated here. For example, Moussa (2015) used data of 18 Tunisian banks for the period of 2000–2010 applying both fixed and random effect models depending on the result of the Hausman test. Singh and Sharma (2016) also applied the fixed effect and random effect models along with OLS using data of 59 Indian banks for the period of 2000–2013. In a separate study on Indian banks, Sopan and Dutta (2018) used data from 45 banks from 2005–2016. For Yemen, Yahya et al. (2017) used the descriptive multiple regression method and applied data of three Islamic banks for the period of 2010–2014. However, Cucinelli (2013), in a study on European banks using unbalanced data from 2006–2010 for 1080 European banks, did not include profitability as one of the explanatory variables of liquidity.

Another reason for embarking on this paper is the possibility that different banks or bank types can have a different type of relationship. For example, Olarewaju and Adeyemi (2015), in their study on 15 Nigerian banks for 2004–2013, found different types of causal relationship for different banks.

3. DATA AND METHODOLOGY

This section is divided into the following parts. In the first part, the source of data and the time period of this study are discussed. In the subsequent part, the measurement of variables discussed is followed by a graphical representation of liquidity and profitability of these two bank types. Finally, the methodology is provided in the final section.

3.1. Data

Generally, banks in Bangladesh are broadly divided into four categories: public, private, specialized and foreign. Out of these four types, public and private banks together hold 92.6 percent of the total assets as well as the same (92.6 percent) of total deposits (Bangladesh Bank Annual Report, 2019). In this study, aggregative data of both public and private commercial banks are considered from 2001 to 2019. These data are taken from various issues of annual reports published by the Bangladesh Bank, the central bank of Bangladesh.

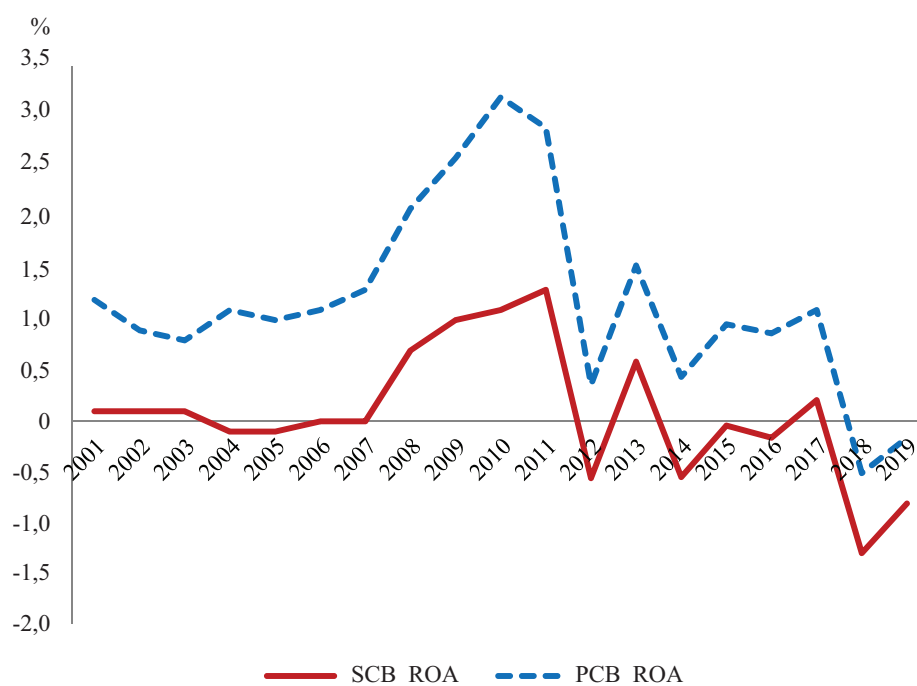
3.2. Variables

Causality between liquidity and profitability of public and private commercial banks is examined in this paper. The variable of profitability is measured by returns on assets (ROA) which is the ratio of net income to total assets while the liquidity variable is proxied by the percentage of liquid assets in total assets.

3.3. Graphical representation

In Figure 1, profitability of public and private commercial banks in Bangladesh is provided for the period from 2001 to 2019. Data are collected from various issues of the Bangladesh Bank Annual Report.

Figure 1
Profitability of public and private commercial banks (2001–2019)

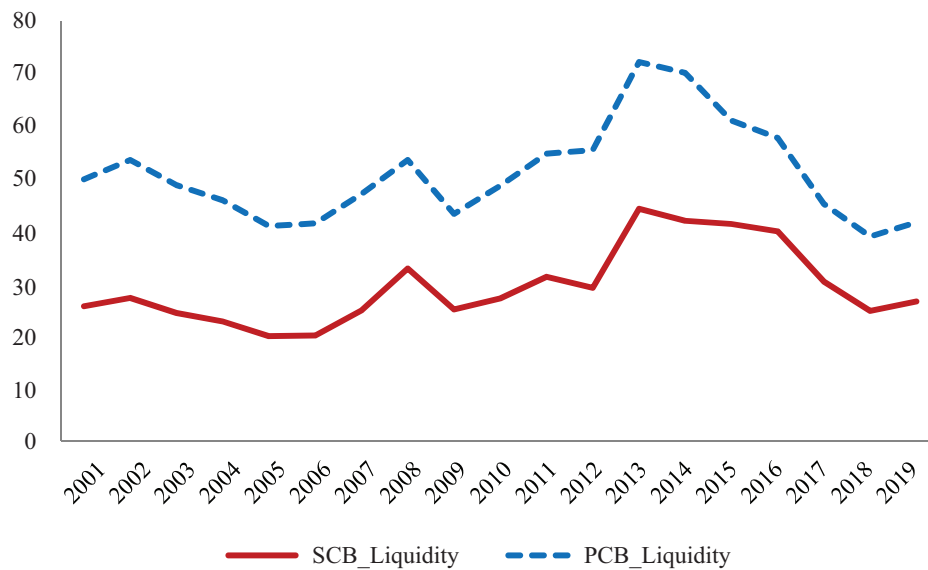


Source: Bangladesh Bank Annual Report, various issues.

Profitability of public commercial banks, also known as state-owned commercial banks (SCBs), remained steady in the first few years. Then it increased in the next few years. It sharply fell in the next year and fluctuated around zero in the following few years. Finally, it experienced a sharp fall again in 2018. Profitability of private commercial banks (PCBs) did not show any particular trend during the study period. It decreased in the first couple of years. Then it continuously increased in the next few years. It fell in the next couple of years but then steadied in the following years around point 1.00 mark.

Figure 2

Liquidity of public and private commercial banks (2001–2019)



Source: Bangladesh Bank Annual Report, various issues.

Liquidity of public and private commercial banks in Bangladesh is provided for the same period in Figure 2. Liquidity of public banks fell in the first few year of the study. Then it experienced a rising but fluctuating trend in the next few years. However, it fell again in the final years of the study and reached a similar stage like the beginning. Liquidity of private banks gradually declined in the first few year of the study. Then it experienced an increase in the next few years after the financial crisis. It started to fall again from 2015.

In Figures 1 and 2, very similar trends can be observed for both types of banks. However, two things should be noted from these figures. Firstly, there is a difference at the intercept level with a higher starting point for private commercial banks in both cases. Secondly, the gap between these two types of banks for both these variables decreased in the last few years of this study.

3.4. Methodology

In this causality analysis, Augmented Dickey-Fuller (ADF) tests of stationarity and the Engle-Granger cointegration tests are conducted first. Then the Granger causality test is applied to examine the causal relationship among the variables (Gujarati & Porter, 2009). The ADF test allows for a higher-order autoregressive process. It can handle more complex models than the normal DF test. For the cointegration analysis, the Johansen test is an improvement and hence preferred over the Engle-Granger test for multivariate analysis but this is when cointegration of three or more time series are checked. However, since this study includes only two variables, the Engle-Granger cointegration test is applied in this paper. Similarly, when the variables of interest are integrated of the same order and cointegrated, then the Granger causality analysis is generally applied.

Broadly, the possible results for public and private banks can be classified into the following three categories: (i) bidirectional causality between liquidity and profitability; (ii) unidirectional causality (either from liquidity to profitability or vice versa); or (iii) no causality among these two variables.

4. EMPIRICAL RESULTS AND DISCUSSION

This section is broadly divided into two parts. In the first part, the empirical results are reported in detail. In the following part, the results are discussed. EViews 10 was used for empirical estimation.

4.1. Empirical results

The results are reported in four parts. Firstly, the variables are tested for stationarity. As all the variables are found to be integrated of order 1, the test of cointegration is conducted to see if any long-run relationship exists among them. When it is observed that the variables are cointegrated, the Granger causality test is applied to check the causal relationship. Finally, some additional tests are reported for robustness.

4.1.1. Tests of stationarity

The results of the ADF test show that liquidity and profitability variables for both public and private commercial banks are nonstationary. The results are presented in Table 1.

Table 1
Augmented Dickey-Fuller test

Variable	t-Statistic	Prob.	Test critical values
			5% level
Public commercial banks			
LIQUIDITY	-1.650862	0.4377	-3.040391
ΔLIQUIDITY	-4.182342**	0.0056	-3.052169
ROA	-2.577581	0.1155	-3.040391
ΔROA	-7.578932**	0.0000	-3.052169
Private commercial banks			
LIQUIDITY	-2.388510	0.1598	-3.065585
ΔLIQUIDITY	-3.192782*	0.0384	-3.052169
ROA	-1.504433	0.5085	-3.040391
ΔROA	-3.541091*	0.0197	-3.052169

* significant at 5% level, ** significant at 1% level.

Source: Author's calculation.

4.1.2. Test of cointegration

As all the variables are integrated of order 1, the Engle-Granger test of cointegration is applied to see if there is any cointegrated relationship. The results of the cointegration tests are reported in the following table.

Table 2
Engle-Granger cointegration test

Variable	t-Statistic	Prob.	Test critical values
			5% level
Public commercial banks			
ECT	-3.459600*	0.0241	-3.065585
Private commercial banks			
ECT	-3.650530*	0.0177	-3.081002

* significant at 5% level.

Source: Author's calculation.

4.1.3. Granger causality

As the variables are integrated of order 1 and there is a long-run relationship between them as is evident from the stationarity and cointegration tests, the Granger causality test is applied to check if there is any causal relationship between liquidity and profitability. The results of the Granger causality test for the liquidity and ROA series are given below.

Table 3
Granger causality test

Null Hypothesis	F-Statistic	Prob.
Public commercial banks		
ROA does not Granger cause liquidity	3.98140*	0.0472
Liquidity does not Granger cause ROA	0.47733	0.6317
Private commercial banks		
ROA does not Granger cause liquidity	2.23548	0.1495
Liquidity does not Granger cause ROA	0.55071	0.5904

* significant at 5% level.

Source: Author's calculation.

4.2. Discussion of Results

The result of the ADF test given in Table 1 shows that both profitability and liquidity variables of public commercial banks are nonstationary. Both series become stationary after first difference, implying that they are integrated of order 1. Similarly, these variables of private commercial banks are found to be nonstationary when tested for stationarity. As a result, then they are tested for stationarity after differencing once. The estimates show that they then become stationary, implying that they are also integrated of order 1. As they are integrated of order 1, the Engle-Granger cointegration test is applied. The results presented in Table 2 show that the variables are cointegrated.

The results of the Granger causality test (reported in Table 3) suggest that there is a different relationship among the relevant variables for these two types of banks. For the public commercial

banks, there is a unidirectional causal relationship running from profitability to liquidity while no causality from either direction is evident for the private commercial banks.

It should be reported that a similar procedure of estimation was carried out for another profitability measure of returns on equity (ROE). This is the ratio of net income to shareholders' equity. A more or less similar result was obtained for this measure of profitability as well. This further strengthens the finding of this paper.

5. CONCLUSIONS AND POLICY IMPLICATIONS

This causal study on the banking sector in Bangladesh from 2001 to 2019 is carried out on public and private commercial banks separately. It is observed that the results are not the same for both types of bank groups. While no causal relationship is found for private commercial banks, it is found that profitability has a causal impact on liquidity. While varying relationships between liquidity and profitability were found in earlier studies (e.g. Bourke, 1989; Molyneux & Thornton, 1992; Goddard et al., 2004), a different causal relationship among different types of banks was also evident (e.g. Olarewaju & Adeyemi, 2015).

The findings also show that there is variation of the causal relationship between these two types of banks. They further confirm that different bank typologies behave differently in Bangladesh. For the public commercial bank analysis from 2001 to 2019, profitability should be included in the study of liquidity while it is not important to include profitability for a similar study on private commercial banks for the same time period. This paper also highlights the need for separate policies for different bank typologies, particularly for public and private commercial banks.

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