The effect of capital structure, operating efficiency and non-interest income on bank profitability: new evidence from Asia

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Abstract

Purpose – The Asian banking system has been appreciated with many distinct qualities including consistent in profitability. Many studies have examined the profitability of Asian banking sector from diverse perspectives. However, studies on bank profitability in connection to the capital structure, operating efficiency and non-interest income are only a few. This study investigates the influence of capital structure as estimated by leverage ratio and long-term debt, operating efficiency and non-interest income on the profitability of the banking industry in 28 countries of Asia.

Design/methodology/approach – This paper utilizes fixed effect regression model by involving panel data with sample of 492 banks from 28 countries of Asia for the time span of 15 years from 2004 to 2018.

Findings – The results confirm that an increase in total debt ratio increases the profit margin of the bank as supported by the agency cost theory, suggesting that the debt financing increases the profitability of the firm. In addition, the findings reveal that lowering the operating expenses and managing of costs effectively can boost the profitability of bank. Furthermore, non-interest income plays a vital role when the interest rates are lower. Hence the study suggests that a careful investment in this sector can generate income as well as increase the profit margin of the banking arena.

Originality/value – The paper examines the profitability of bank by including impact of leverage ratio and long-term debt as a measure of capital structure along with the influence of operational efficiency and non-interest income which contributes to the understanding of the existing literature.

Keywords Capital structure, Operating efficiency, Non-interest income, Asia

Paper type Research paper

1. Introduction

Profitability in the banking industry is an increasing topic of concern for the policymakers, shareholders as well as bank authorities. Following the great recession in 2008, the subject

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has gathered a lot of interest from research experts. Numerous studies have intended to identify aspects that characterize the bank profitability. Empirical evidence reveals the use of optimal capital structure concept on increasing the profit margin of the banking industry. Moreover, one of many primary concerns in the field of financial management is the capital structure, or the blend of debt ratio and equity ratio along with its probable effect on the performance of firm. A range of arguments have been placed to examine the correlation between firm profitability and capital structure. However, there has been an extensive debate regarding the capital structure and its impact on the banking sector as observed in the study of Modigliani and Miller (1958). Every firm tries to maintain an optimal level of capital to maximize the profit margin. Again, Meslier *et al.* (2014) in his study revealed that the bank profitability is boosted from non-traditional business activities in emerging economies. Furthermore, operational efficiency is also considered to be an important factor influencing the bank profitability (Ayayi and Sene, 2010). Hence, this study aims to investigate, to what extent the capital structure, operational efficiency of a firm and non-interest income influence the profitability of the banking industry in the context of Asia.

Regarding the relationship of capital structure with the profitability, a number of research works has been made following the M&M model as proposed by Modigliani and Miller (1958). Later on, M&M published a revised paper by including the corporate tax and made a modification of their hypothesis. From then, numerous investigations have been conducted in line or in contradiction with the M&M model. However, the capital structure theory explained by Modigliani and Miller (1958) was mostly based on "perfect capital market". Later on, Jensen and Meckling (1976) came with the concept of debt financing and revealed that the debt financing increases a firm's profitability. One of the major benefits of debt financing is the tax shield that it provides which was later proved to contribute largely in the capital structure theory. Again, pecking order theory proposed by Myers and Majluf (1984) suggests a firm to utilize their retained earnings first to finance their assets before turning into debt, eventually safeguarding the firm from the risk of external financing. In addition, prior literature explains the theory of agency cost proposed by Jensen (1986) which explains the role of debt financing in solving the internal conflict between firm managers and stakeholders. Therefore, it is evident that literature suggests a number of contradictory arguments regarding the use of optimal capital structure on the bank performance. Therefore, based on the conflicting hypotheses proposed by a number of researchers, this study finds the interest in analyzing the influence of capital structure on bank performance by using two measures namely –total debt ratio and long-term debt unlike most of the study (Rao and Lakew, 2012) which utilized capital asset ratio as a measure of capital structure.

Similarly operating efficiency is considered as a vital factor influencing the bank profitability. Operating efficiency refers to a firm's effective management of expenses. In fact, operational efficiency is regarded to be the most significant predictors of a bank's long-term viability, profitability and productivity (Ayayi and Sene, 2010; Ghosh and Sanyal, 2019), because the overall performance of a bank is largely dependent on how effectively the organization is utilizing its resources. However, few prior researches highlighted the existence of relationship between operational efficiency and bank profitability (Ayalew, 2021). But most empirical research works performed a number of studies discussing the relationship between operational efficiency and bank stability (Rahman *et al.*, 2021). Some of the researchers, for instance, Zhang *et al.* (2013) also claimed a trade-off relationship between efficiency and soundness of the banking industry. Empirical evidence in the study of Fiordelisi *et al.* (2011) also suggest that, advancement in efficiency of bank lessens the likelihood of default, eventually increasing the marginal profit. Therefore, owing to the influence of operational efficiency in determining the performance of bank as per prior evidences, this study draw concentration on analyzing the extent to which operational efficiency can exert impact on the profitability of banking industry in Asia.

Apart from this, non-interest income is vital when the rate of interest is lower in a bank. Since, it is hardly possible for bank to gain profit from such lower rate of interest so most of the time banks need to depend on non-interest income to earn profit. Furthermore, non-interest income is a potential means of generating revenue for banks. However, a narrow study has been made regarding the influence on non-interest income on bank profitability. Hence, this study aims to undermine the influence of non-interest income in the profitability of banking industry by considering 492 banks from 28 countries of Asia.

The main purpose of this study is to fill the gap in the research evidence by investigating the capital structure, non-interest income and operational efficiency that influence the profitability of the banking industry by taking into account 28 countries of Asia from our data set. We observe several articles that studied the influence of capital structure on profitability of bank by centering their attention on low-income emerging economies for instance, Ethiopia as observed in Ayalew (2021). Again, we observe prior research that made analysis by focusing on one of the developing countries of Asia for example, Bangladesh (Rana-Al-Mosharrafa and Islam, 2021). However, to our knowledge, an insignificant and limited number of researches have been made by taking into account a large number of countries from Asia that involves a mix blend of both emerging and developed economies. Moreover, prior studies as observed in Ayalew (2021) considered only the private banking industry of a specific country. This study considered a total of 492 banks from both private and public for a total of 28 countries in Asia. In addition, the study implemented total debt to total asset as a leverage ratio to measure the capital structure rather than considering capital ratio (CAP) as a substitute of capital structure like most prior studies utilized (Rao and Lakew, 2012) and trickled the leverage ratio to the long-term debt ratio to gain a complete knowledge of the subject. Hence, the study disintegrated the capital structure into leverage ratio (total debt ratio) and long-term debt to establish a clear impact on the profitability. To the best of our knowledge, a limited number of studies have been made by considering these two factors as a measure of capital structure, therefore it is worthwhile to consider these two variables (Sufian and Habibullah, 2009).

Prior studies narrowed their interest on identifying the influence of only capital structure on bank profitability (Ayalew, 2021), while some laid their interest on analyzing the influence of non-interest income on profitability (Hossain and Ahamed, 2021). But, a limited study has been made in considering the influence of capital structure, operational efficiency and non-interest income altogether on the profitability of the banking industry. Therefore, the study feels the urge of centering the attention in considering the influence of these factors on a bank's profit margin in the context of Asian countries. In addition, to examine the credibility of the findings, the study considers an alternative measure of bank profitability by creating two segments as an additional analysis. Furthermore, the research considers a total of 492 banks from 28 Asian countries and further takes into account a time span of 15 years from 2004 to 2018 which covers some major changes in financial markets due to the global recession of 2007/2008. Lastly, the study includes a fixed effect regression model which considers both cross sectional and time series data while some studies utilized cross-sectional technique to analyze the influence on bank profitability. Hence, we conclude that the purpose of the study add new insights to the existing literature by filling in the gaps.

The remaining of the paper is structured as follows: section 2 portrays review of literature and development of hypothesis. Section 3 discusses the methodology of the research. Section 4 outlines the analysis and results of the study. Section 5 concludes the study.

2. Background and hypotheses development

Empirical research evident an extensive debate regarding the influence of capital structure on the value of the firm (Modigliani and Miller, 1958). There are some investigations that

criticized the M&M model as outdated (Eckbo, 1986; Smith and Warner, 1979), leading to an erroneous assumptions in their theory. However, majority recognized that the M&M's initial hypotheses are distinctive and the foundation for future corporate finance debate, conflicts, and study. Following M&M's efforts, the "classical" theory of the capital structure and the performance of the firm underwent significant advancement (Myers, 2001). Hence, the M&M hypotheses are widely mentioned as standards in the study of capital structure (Myers, 2001). Afterward, M&M issued a revision paper that included the presence of corporate tax and hence modified one of the hypotheses of their prior work. By this way, they introduced a unique theory of corporate finance that reveals that, because of having a "tax shield advantage", the debt has incentive over equity (Modigliani and Miller, 1963). Following then, Miller (1977) addressed the effect of debt finance rather than equity on the development value of the firm by evaluating variations in the value of the firm and corporate taxation and including the taxation effect of the financial gains together with corporation taxes in the framework of the US corporate enterprises in a research. Later on, a number of investigations have been made in compliance or to contradict the preliminary research of M&M.

As per Harris and Raviv (1991), a number of theories related to the capital structure centered on modifying the hypotheses of the previous model of M&M. For instance, the agency cost theory reveals conflicting consequences of debt on profitability. The result is positive when equity is considered between shareholders and managers. Again, when debt is considered, the effect is negative between lenders and shareholders (Kebewar and Shah, 2012). However, Jensen and Meckling (1976) identifies that agency conflict arises between shareholders and managers when there exists separate ownership structure and controlling power of a firm. The reason is, since the managers owe only a limited portion from the marginal gain, they try to use shareholder's cash to fulfill their causes (Ayalew, 2021). Nevertheless, Harris and Raviv (1991) reveal that debt financing minimized the amount of surplus cash to managers since the firm is obliged to make a periodic payment to the bondholders, which is advantageous for solving the conflict. The investigation complies with Barclay *et al.* (1995), that the agency cost of equity is minimized when debt is utilized over equity. However, as per Harris and Raviv (1991), debt grants stockholders an advantage to utilize the cash obtained from the bondholders in riskier projects, leading to a contradiction between shareholders and creditors. On the other hand, the pecking order theory identified by Myers (1984) and Myers and Majluf (1984) reveals a unique concept of capital structure. The theory suggests that business utilizes their existing internal capabilities at first before turning to debt. In fact, as per the theory, raising equity is the last option. Furthermore, the theory examines that the number of debt financing diminishes as the firm grows more profitable. However, according to Frank and Goyal (2003), there is no empirical support for the idea. Nevertheless, these theories have encouraged several researchers to analyze the influence of capital structure on bank profitability and hence, later on, a study revealed negative influence of debt ratio on profit margin in Ethiopian banking sector (Birru, 2016). However, Demirgüç-Kunt and Huizinga (1999) revealed a statistical positive relationship between the capital structure and the profitability, signifying banks which are well-capitalized tends to have lesser default rates and can minimize costs thus enhancing the profitability. The findings are consistent with (Adesina *et al.*, 2015; Anafo *et al.*, 2015). Hence, we can hypothesize that:

H1. Total debt ratio increases the bank profitability.

H2. Long-term debt increases the bank profitability.

The influence of income diversification on bank profitability remains a mystery, despite that an intensive controversy has raged over the subject for the past decade. Income diversification may

be defined as a bank's effort to minimize its concentration on interest income derived by debtors' loans (Tolangga and Ulpah, 2021). As per Elsas *et al.* (2010), non-traditional operations might provide higher incentive to banks with a varied portfolio of income. Those opportunities come from effective allocation of resources from the internal financing mechanisms, greater usage of the economies of scale and premium quality in comparison to the competition. Additionally, Goddard *et al.* (2008) identifies that there is a minimal susceptibility to individual risk for the banks that have a major income diversification, reinforcing the financial system. Moreover, Chiorazzo *et al.* (2008) looked into the Italian banking sector and Elsas *et al.* (2010) examined the banking sector of developed nations and revealed that the bank profitability is positively influenced by the diversified income. However, the latent cost of varying income sources may exceed the value achieved (Tolangga and Ulpah, 2021). The problems related to the agency conflict as addressed by Goddard *et al.* (2008) revealed that a conflict of interest arises when managers attempt to gain greater returns through income diversification by engaging heavily in more risky projects rather than accomplishing what shareholders expect. Furthermore, Stiroh (2004) identifies that the revenues obtained from varying sources are more uncertain than conventional activities that generate less revenue. Nevertheless, Meslier *et al.* (2014), in his study related to the developing economy investigates that the bank profitability is strengthened by a move toward non-traditional businesses and international banks gain more from variation than state banks. Nguyen *et al.* (2012) further examines that banks in South Asia having greater market dominance are more sustainable and provide a more extensive portfolio of income. Therefore, the empirical study of diversified income ratio on developed and developing economy allows us to draw the following hypothesis in the context of Asian country:

H3. Non-interest income ratio increases the bank profitability.

Operational efficiency illustrates the capability of management to regulate expenditures. Specific factors such as knowledgeable and skillful workers, utilization of capital (Gupta and Raman, 2020), technological input (Mohapatra and Mohanty, 2017) all had a role in the firm's operational efficiency. Moreover, financial institutions such as bank provides premium banking services by maintaining lower level of operating cost, exhibiting operational efficiency (Allen and Rai, 1996; Jimborean and Brack, 2010). In addition, Ayayi and Sene (2010) and Ghosh and Sanyal (2019) examines operational efficiency which is regarded to be the most significant predictors of a bank's long-term viability, profitability and productivity. Furthermore (Adam *et al.*, 2018; Ch, n.d.; Christaria and Kurnia, 2016), demonstrates that bank profitability significantly enhances when a bank adopts limited operational cost. However, past research studies highlight an association between operational efficiency and profitability that is both negative and noteworthy (Alexiou and Sofoklis, 2009; Athanasoglou *et al.*, 2008; Trujillo-Ponce, 2013; Zafar *et al.*, 2016) whereas (Olson and Zoubi, 2011), in his study examines that the operational efficiency in the banking industry of Middle East and North Africa (MENA) regions has negligible influence on the profit margin of bank. Therefore, we can hypothesize that:

H4. Operational efficiency enhances the profitability of bank.

3. Methodology

We employed panel data estimations to investigate the influence of capital structure, non-interest income and operational efficiency on the profitability of banking industry in 28 countries of Asia. We constructed panel data since it considers both cross-sectional and time series data. The estimated model utilized in this research conforms with (Gebrayel *et al.*, 2018; Mercier-Suissa *et al.*, 2018; Salloum *et al.*, 2019; Salloum *et al.*, 2015). Additionally, panel data estimations incorporates panel and bank-specific influences that

account for consistent heterogeneity across time and are involved in randomized element, therefore leading to an efficient result (Arellano and Bover, 1995). Furthermore, this econometric model permits examination of dynamic effects that are frequently hard to establish applying cross-sectional or time-series studies (Athanasoglou *et al.*, 2008).

This study is conducted with a sample of 492 banks from 28 countries of Asia consisting of the banking sector and having a total of 7,425 observations for the time span of 15 years from 2004 to 2018. In addition, the study consists of only banking industry and excludes non-financial sector for avoiding any regulatory biases. Table 1 contains the list of 28 countries from Asia along with the number of banks that were studied for each country. Moreover, we consider the banks having positive net equity to avoid the risk of bankruptcy. However, the information utilized in the study is compounded from a variety of sources; for instance, Fitch Connect, DataStream, World Bank data and company annual published data. Nevertheless, the format of the panel data is strongly balanced, reflecting that the time points are equal for every panel and non-existence of gaps in between the time series.

Existing literature used various measures of profitability. The market values are harder to achieve which is why many past investigations have employed book value as indicators of profitability for instance return on asset (ROA), return on equity (ROE), net interest margin (NIM) and earnings per share (EPS). For instance (Ercegovac *et al.*, 2020; Flamini *et al.*, 2009; Obamuyi, 2013), considered ROA as a measure of profitability while (Abor, 2005; Rachdi, 2013; Soana, 2011; Yao *et al.*, 2018) utilized both ROA as well as ROE to estimate profitability. Moreover, few researchers considered NIM ratio to measure profitability along with ROA and ROE (Niresh, 2012). Due to considerably lower equity of banks in emerging countries, ROA is the most often used indicator of bank profitability (Flamini *et al.*, 2009; Saona, 2016). This study utilizes ROA as the prime measure of bank profitability. ROA is computed as the ratio of net income to total assets. However, ROE, as another indicator of profitability has been considered for robustness check in the analysis.

Table 2 summarizes the explanatory variables and the control variables along with their related computations. The prime explanatory variables is the leverage ratio and the long-term debt ratio (LDTA) which is used to measure the capital structure and investigate their influence on the profitability of the banking industry in 28 countries of Asia. These measures have been employed as explanatory drivers of profitability in prior research (Anafo *et al.*, 2015; Musah, 2018; Salim and Yadav, 2012; Samuel and Samuel, 2018; Siddik *et al.*, 2017).

To measure the influence of control variables on the profitability of the banking sector, bank size, operational efficiency, credit risk has been considered. We estimated bank size

Table 1.
List of countries and number of banks selected

Serial no.	Country name	Number of banks	Serial no.	Country name	Number of banks
1	China	47	15	United Arab Emirates	17
2	Saudi Arabia	12	16	Malaysia	10
3	Taiwan	20	17	Indonesia	43
4	Japan	85	18	Palestine	5
5	Qatar	9	19	Turkey	12
6	Bangladesh	30	20	Kazakhstan	6
7	Bahrain	8	21	Philippines	14
8	Jordan	15	22	Lebanon	6
9	Kuwait	11	23	Russia	12
10	Pakistan	21	24	Thailand	11
11	Sri Lanka	11	25	Colombia	9
12	Oman	8	26	Cyprus	3
13	Vietnam	13	27	Singapore	3
14	India	41	28	Israel	10

Variables	Measure	References	Expected outcome
ROA	Measure of bank profitability, computed by the ratio of net income after tax to total assets	Ercegovac *et al.* (2020), Flamini *et al.* (2009), Obamuyi (2013)	
ROE	Measure of bank profitability, computed by the ratio of net income after tax to total equity	Abor (2005), Rachdi (2013), Soana (2011), Yao *et al.* (2018)	
Leverage Ratio	Computed by the ratio of total debt to total assets	Ayalew (2021), Mkadmi *et al.* (2021)	+
SIZE	Bank size, computed by the natural logarithm of total assets ln(TA)	Adusei (2015), Ali and Puah (2019)	+/−
LDTA	Long-term debt, computed by the ratio of total long-term debt to total assets	Anafo *et al.* (2015), Ayalew (2021), Salim and Yadav (2012), Samuel and Samuel (2018)	+
NII ratio	Non-interest income ratio, computed by the ratio of non-interest income to total assets	Hossain and Ahamed (2021), Mkadmi *et al.* (2021)	+
Operating Efficiency	Computed by the ratio of non-interest expense to total assets	Ahmed *et al.* (2021)	+
CAP	Capital ratio, computed by the ratio of total equity to total assets	Rana-Al-Mosharrafa and Islam (2021), Shrieves and Dahl (1992)	+
Credit Risk	Computed by the ratio of net loans to total assets	Ali and Puah (2019), Rana-Al-Mosharrafa and Islam (2021)	+/−

Table 2. Variable description and measures

by the natural logarithm of total assets which is denoted as ln(TA) as suggested by Adusei (2015) and Ali and Puah (2019). Furthermore, an efficient banking industry raises the profitability rate of that sector. Hence, to estimate the operational efficiency of the banking industry, the ratio of non-interest expense to total assets has been considered which conforms to (Ahmed *et al.*, 2021). However, Ayalew (2021) estimated cost to income ratio as a measure of operational efficiency of bank. In addition, being a significant driver of bank profitability, we estimate credit risk as the ratio of loans to total assets, complying with (Ali and Puah, 2019; Ayalew, 2021; Rana-Al-Mosharrafa and Islam, 2021).

Apart from our control variables, the study further investigates the influence of non-interest income and CAP on the bank profitability. The non-interest income is estimated by the ratio of non-interest income to total assets proxied as NII ratio which is similar with (Hossain and Ahamed, 2021; Mkadmi *et al.*, 2021). Moreover, the CAP, proxied as CAP is computed by the ratio of total equity to total assets to analyze the influence of adequate capital in determining the profitability of the Asian banking industry. Lastly, we include dummy variable year and country to account for any variations during the time span of the study.

The dependent variable ROA is computed by the ratio of net income after tax to total assets. The greater value of ROA, the more profitable a firm is (Ali and Puah, 2019; Ercegovac *et al.*, 2020).

The study employs panel data estimations and establishes the following econometric model for fulfilling the objective of the study:

$$\begin{aligned} ROA \; &= \beta_0 + \beta_1 Leverage\ Ratio + \beta_2 SIZE + \beta_3 LDTA + \beta_4 NII\ ratio \\ &+ \beta_5 Operating\ efficiency + \beta_6 CAP + \beta_7 Credit\ risk + Year\ Dummies \\ &+ Country\ Dummies + \varepsilon_{it} \end{aligned}$$

$$ROE = \beta_0 + \beta_1 Leverage\ Ratio + \beta_2 SIZE + \beta_3 LDTA + \beta_4 NII\ ratio + \beta_5 Operating\ efficiency + \beta_6 CAP + \beta_7 Credit\ risk + Year\ Dummies + Country\ Dummies + \varepsilon_{it}$$

Where,

ROA and *ROE* are measures of bank profitability;

Leverage Ratio is the measure of debt ratio as a proxy of capital structure;

SIZE measures the bank size or ln(TA);

LDTA measure long-term debt as a proxy of capital structure;

NII ratio measure non-interest income to total assets;

Operating efficiency is measured as the ratio of non-interest expense to total assets;

CAP is the capital ratio measured as equity to total assets;

Credit risk is measured as the ratio of loans to total assets;

ε_{it} is included as error term for the equation.

4. Data analysis

The study aims to investigate the influence of capital structure, operational efficiency and non-interest income ratio on the profitability of Asian banking sector. In this study, we employed panel data estimations. The panel data model is constructed by utilizing both the cross sectional and time series observations. Nevertheless, the format of our data model is strongly balanced, suggesting that the time points are equal for every panel and non-existence of gaps in between the time series. Hence, the study avoids the use of pooled OLS regression model. We used Hausman specification test also termed as Durbin–Wu–Hausman (DWH) to verify which regression model is appropriate for the study. Numerous empirical research have been attempted in the past to ascertain whether the FE or RE model should be assessed using the Hausman test, specifically when evaluating performance of the bank. The Hausman specification test demonstrates a consistent difference in coefficients, indicating that the fixed effect regression model is appropriate for both the dependent variables in this investigation. In addition, we use a modified Wald test for group-wise heteroscedasticity to see if there is any unequal dispersion. Furthermore, we use the Wooldridge auto-correlation test to see if our regression model has any first-order auto correlation.

Table 3 summarizes the explanatory and control variables along with the dependent variable utilized in the study. The dependent variable ROA and ROE averages on 0.010 and 0.101 where the mean value of ROA is greater than the mean of Rana-Al-Mosharrafa and Islam (2021) and having a standard deviation of 0.009. Considering the prime explanatory variables, leverage ratio and LDTA as a measure of capital structure depicts a mean of 7.2% and 3.6% and deviates 0.08 and 0.05 from their respective mean values. However, keeping a close look at other variables, the non-interest expense ratio or the average of operational efficiency reaches to −0.023 where it deviates 1.6% from their mean value. In terms of credit risk, we observe that the mean value is near to 57% which is much greater than (Ali and Puah, 2019), while the value is less in compared to the findings of Rana-Al-Mosharrafa and Islam (2021). Lastly, observing the mean value of CAP, we examine that the adequacy ratio averages on −62.13 which is much less than the findings observed in Rana-Al-Mosharrafa and Islam (2021). On an average, the non-interest income (NII ratio) remains 1.4% during the time span of 15 years from 2004 to 2018.

Variable	Observations	Mean	Std. Dev.	Min	Max
ROA	6,346	0.010	0.009	−0.029	0.049
ROE	6,351	0.101	0.082	−0.372	0.321
Leverage Ratio	6,429	0.072	0.084	0.000	0.617
LDTA	6,425	0.036	0.051	0.000	0.323
NII ratio	6,345	0.014	0.011	−0.047	0.092
Operating Efficiency	6,367	−0.023	0.016	−0.099	0.708
CAP	6,429	−62.130	4988.487	−399982.000	0.412
Credit Risk	6,295	0.573	0.136	−0.069	1.000
SIZE	6,494	22.855	1.951	−2.795	28.887

Note(s): This table represents summary statistics of the two measures of bank profitability *ROA* and *ROE*, leverage ratio, long-term debt ratio (*LDTA*), non-interest income ratio (*NII ratio*), operating efficiency, capital ratio (*CAP*), credit risk and size of bank (*SIZE*). The *ROA* is estimated for 6,346 observations; the *ROE* is estimated for 6,351 observations; the leverage ratio is estimated for 6,429 observations; the long-term debt ratio (*LDTA*) is estimated for 6,425 observations; the non-interest income ratio (*NII ratio*) is estimated for 6,345 observations; the Operating Efficiency is estimated for 6,367 observations; the capital ratio (*CAP*) is estimated for 6,429 observations; the credit risk is estimated for 6,295 observations; the bank size (SIZE) is estimated for 6,494 observations

Table 3.
Descriptive statistics

The pairwise correlation test is performed to determine how closely dependent and independent variables are related. Figure 1 portrays the degree of correlation between the dependent and explanatory variables. Considering the prime explanatory variables in the study, leverage ratio has a positive significant association with both the dependent variables. Similarly, LDTA exerts a positive significant correlation with the dependent variables. This signifies that an expansion in debt position is accompanied by an increase in profit; the larger the overall debt, the more profitable the firm is. However, taking a close look at other variables for instance, operational efficiency, which seems to exhibit a negative association with the

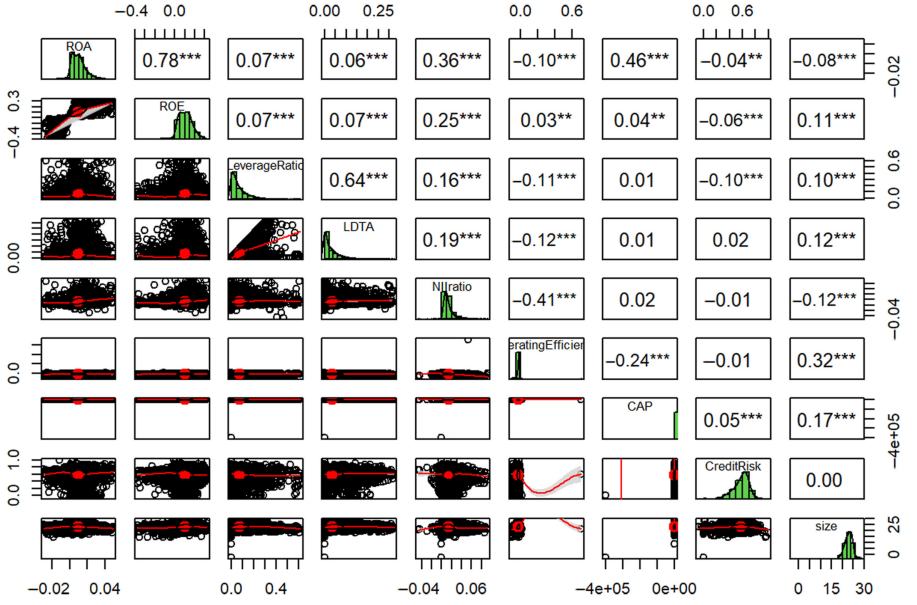

Figure 1.
Pairwise correlation

dependent variable ROA. This correlation contradicts with the statement, that an efficient management of costs can boost the profitability of banking industry. In addition, Figure 1 highlights the positive and significant correlation between CAP and the dependent variables, implying that the more buffer capital a firm acquires, the more profitability of the banking industry can be advanced. Since having an adequate capital safeguard a firm from monetary distress, hence buffer capital can help a firm achieve profitable position. However, credit risk is found to have a negative correlation with the dependent variables. The variable credit risk can be utilized to measure and quantify the likelihood of financial catastrophe by diminishing the asset quality and improving the loss of loan, lessening the profitability of the banking industry in countries of Asia.

Overall, we did not find any high correlation in between the variables as predicted. High correlation coefficients highlight significant linear connections among variables, implying the presence of greater multicollinearity.

Table 4 highlights the influence of explanatory variables and the control variables on the profitability of banking industry of 28 countries from Asia. The prime explanatory variables in the study are the two measures of capital structure which are proxied as leverage ratio and LDTA. Considering the leverage ratio, it is observed that a negative significant influence exists on bank profitability in model 2, while proceeding toward model 5 and model 6 we observe a positive significant relationship at 10% level of significance.

The findings of the study is consistent with Ayalew (2021), signifying that an expansion in debt position is accompanied by an increase in profit; the larger the overall debt, the more profitable the firm is. Hence, the regression results accept the hypothesis (H1), suggesting that the total debt ratio or simply the leverage ratio increases the profitability of the banking sector of Asian countries. Moreover, utilizing debt financing to finance the assets and operations of a firm eventually increases the profit of any financial institution. Furthermore, the analysis reveals the relationship of LDTA with the profitability of bank and portrays that a positive significant relation with ROA in model 2 at 1% level of significance. However, no statistical significant relationship is observed between the two variables in other models except for model 2. Hence, the findings of the study contradict with the hypothesis (H2) that long term debt increases the profitability. Nevertheless, the total debt ratio is found to influence the profitability in a positive manner. In fact, the findings imply that the financial institutions which are profitable tends to rely much more on adopting debt financing as their major source of funding rather than equity financing to meet any of their financial targets. Hence, the results of the regression analysis reveals that the findings contradict the pecking order theory by prioritizing debt financing to finance the operations in the Asian banking industry.

Taking a close look at other variables, Table 4 reveals that the non-interest income ratio (NII ratio) exerts a positive significant influence on the profitability of bank. They exhibit level of significance at 1% level from model 3 to model 6, respectively. The findings of the study complies with Hossain and Ahamed (2021), suggesting the significance of non-interest income. Non-interest income is vital when the rate of interest is lower in a bank. Since, it is hardly possible for bank to gain profit from such lower rate of interest, so most of the time banks need to depend on non-interest income to earn profit. Furthermore, non-interest income is a potential means of generating revenue for banks and that careful distribution of resources in this sector might boost both the income and the profitability of the banking arena of Asian countries (Hossain and Ahamed, 2021). Hence, the regression results accept the hypothesis (H3), signifying that the profitability of the banks are strengthened from non-traditional business activities.

However, taking into consideration another control variable, for instance, operational efficiency which exerts a statistical positive significant influence on the bank profitability where the impact is seen to rise from model 4 to model 6 substantially at 1% level of significance. Operational efficiency illustrates a bank's effective management in trying to keep the expense level at a lower rate while yielding greater profits. Apart from that, hiring of

	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
Leverage Ratio	−0.001 (0.001)	−0.003*** (0.001)	0 (0.001)	−0.001 (0.001)	0.002* (0.001)	0.002* (0.001)
SIZE	0*** (0)	0*** (0)	0 (0)	−0.001*** (0)	0 (0)	0 (0)
LDTA		0.007*** (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)	0.002 (0.002)
NII Ratio			0.317*** (0.009)	0.484*** (0.011)	0.443*** (0.01)	0.445*** (0.01)
Operating Efficiency				0.316*** (0.011)	0.325*** (0.01)	0.329*** (0.01)
CAP					0.086*** (0.002)	0.086*** (0.002)
Credit Risk						0 (0.001)
_cons	0.016*** (0.001)	0.015*** (0.001)	0.004*** (0.001)	0.023*** (0.001)	0.003*** (0.001)	0.004*** (0.001)
Observations	6,284	6,244	6,132	6,111	6,081	5,943
Year Dummies	YES	YES	YES	YES	YES	YES
Country Dummies	YES	YES	YES	YES	YES	YES

Note(s): This table represents the fixed effect regression analysis by considering 5,943 observations for dependent variable return on assets (*ROA*), and the independent variable consists of leverage ratio and long term debt ratio (*LDTA*) as measures of capital structure; size of the bank (*SIZE*); non-interest income ratio (*NII Ratio*); non-interest expense ratio denoted as Operating Efficiency; the capital ratio (CAP); the net loans to total assets ratio denoted as Credit Risk. The sign ***, ** and * denotes the statistical significance level at 1%, 5% and 10%, respectively. The *p* values are shown in the parenthesis

Table 4.
Estimations with panel data: Regression with fixed effect

new staff members and extending the branches might boost operating costs but it generates more revenues simultaneously. Hence, the regression results accept the hypothesis (H4), indicating that the operational efficiency increases the profitability of bank. Moreover, the findings of the study are consistent with the investigation of Ayalew (2021) and Hossain and Ahamed (2021).

As per our predicted expectations, CAP is found to influence the profitability of the bank in a statistically positive significant way at 1% level of significance as observed in model 5 and model 6, respectively. Greater capital safeguards banks against the danger of losing money on hazardous ventures. In fact, greater capital acts as a shield against any poor financial catastrophes. Additionally, a banking institution having sufficient buffer capital gets opportunity to make investment and earn a profit margin. Since borrowing funds from external sources create an adverse effect on the performance of bank that's why holding buffer capital help a bank gain financial strength and remain in a stable position. However, the findings of the study contradict with Rana-Al-Mosharrafa and Islam (2021), that a bank holding over capital waste potential investment opportunities. Finally, the credit risk is found to have no statistical significant impact on the profitability of the banking sector in 28 countries of Asia as analyzed in the study.

4.1 Robustness check

To check robustness, following Ayalew (2021), we include ROE as an alternative measure of bank profitability. The study contains analysis of 492 banks from 28 Asian countries. However, for robustness analysis, we divide them into two segments namely – Middle East countries and Non-middle east countries. By considering 12 Middle East countries from our data set, we re-run the regression model using fixed effect. Table 5 depicts the regression results for Middle East countries. We observe consistent results for almost all variables except for bank size, credit risk and capital ratio. In verifying the relationship between bank size and ROE, we observe a statistical positive association at 1% level. As per the theory of size-profitability, major banks are coupled with larger scale economies in operations, leading to increased profit margin Ali and Puah (2019). Hence, the findings in Table 5 imply that the banking industries of countries in Middle East are efficient enough to gain economies of scale which would further lead to increased profitability. However, Table 4 did not show any significance of bank size on profitability. Concerning the influence of capital ratio on bank performance, Table 5 demonstrates a statistical negative influence at 1% level. The reason is, over capitalization and adequate funds of a bank implies underutilized investment potentials as argued by Angbazo (1997) and Goddard *et al.* (2008). Hence, the findings are not consistent with the regression analysis in Table 4 since the influence of capital ratio on the profitability measure ROA has been positively significant as observed in model 5 and model 6, respectively. Hence, when we consider only the Middle East region, the findings does not conforms to the previous regression results (Table 4). In addition, Table 5 indicates the positive significant relationship between credit risk and bank profitability at 5% level. This implies that due to having a better loan criteria, bank credit risk can impose a positive influence on the stability of the banking industry, eventually rising the profit margin in Middle East banking sector. Nevertheless, no significant relationship has been found between these two variables when analyzing the regression with dependent variable ROA in Table 4. Furthermore, taking a close look at other variables, for instance operational efficiency which exhibits greater coefficient with ROE in compared to the regression findings of Table 4. The similar case is observed in non-interest income ratio where the coefficients are larger than the previous results (Table 4).

To examine the credibility of the study, the robustness analysis has been conducted precisely into two segments. Table 6 portrays the regression analysis using fixed effect model by considering the countries which are not located in the Middle East region from our data set. Considering the two measures of capital structure, we observe that the findings are robust

	(1) ROE	(2) ROE	(3) ROE	(4) ROE	(5) ROE	(6) ROE
Leverage Ratio	−0.027* (0.015)	−0.044** (0.02)	−0.041** (0.02)	−0.03 (0.018)	−0.026* (0.015)	−0.032** (0.016)
SIZE	0.018*** (0.001)	0.019*** (0.001)	0.016*** (0.001)	0.012*** (0.001)	0.009*** (0.001)	0.009*** (0.001)
LDTA		0.063** (0.03)	0.063** (0.029)	0.056** (0.028)	0.027 (0.027)	0.026 (0.027)
NII Ratio			1.691*** (0.146)	3.032*** (0.159)	3.125*** (0.159)	3.129*** (0.159)
Operating Efficiency				2.64*** (0.152)	2.503*** (0.157)	2.49*** (0.159)
CAP					−0.144*** (0.018)	−0.144*** (0.019)
Credit Risk						0.02** (0.009)
_cons	−0.258*** (0.027)	−0.267*** (0.027)	−0.233*** (0.026)	−0.115*** (0.026)	−0.038 (0.027)	−0.048* (0.027)
Observations	1,648	1,641	1,596	1,593	1,583	1,573
Year Dummy	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES

Note(s): This table represents fixed effect analysis for dependent and independent variables by estimating 1,573 observations. The robustness of the findings is checked by considering alternative measure of bank profitability (*ROE*) as a dependent variable. The independent variable consists of leverage ratio and long term debt ratio (*LDTA*) as measures of capital structure; size of the bank (*SIZE*); non-interest income ratio (*NII Ratio*); non-interest expense ratio denoted as Operating Efficiency; the capital ratio (*CAP*); the net loans to total assets ratio denoted as Credit Risk. The sign ***, ** and * denotes the statistical significance level at 1%, 5% and 10%, respectively. The *p* values are shown in the parenthesis

Table 5.
Regression with fixed effects: Middle east countries

Table 6.
Regression with fixed effects: Non-middle east countries

	(1) ROE	(2) ROE	(3) ROE	(4) ROE	(5) ROE	(6) ROE
Leverage Ratio	0.095*** (0.014)	0.073*** (0.017)	0.083*** (0.018)	0.093*** (0.018)	0.11*** (0.018)	0.102*** (0.018)
SIZE	0.003*** (0.001)	0.003*** (0.001)	0.005*** (0.001)	−0.003*** (0.001)	−0.003*** (0.001)	−0.002** (0.001)
LDTA		0.061*** (0.023)	−0.004 (0.025)	−0.012 (0.024)	−0.01 (0.024)	0.001 (0.025)
NII Ratio			2.361*** (0.1)	3.677*** (0.12)	3.85*** (0.123)	3.727*** (0.127)
Operating Efficiency				2.55*** (0.122)	2.854*** (0.122)	2.683*** (0.126)
CAP					0.072** (0.03)	0.086*** (0.03)
Credit Risk						−0.022** (0.009)
_cons	0.031** (0.016)	0.03* (0.015)	−0.037** (0.015)	0.166*** (0.017)	0.166*** (0.019)	0.155*** (0.021)
Observations	4643	4616	4541	4515	4484	4357
Year Dummy	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES

Note(s): This table represents fixed effect analysis for dependent and independent variables by estimating 4357 observations. The robustness of the findings is checked by considering alternative measure of bank profitability (*ROE*) as a dependent variable. The independent variable consists of leverage ratio and long term debt ratio (*LDTA*) as measures of capital structure, size of the bank (*SIZE*); non-interest income ratio (*NII Ratio*); non-interest expense ratio denoted as Operating Efficiency; the capital ratio (*CAP*); the net loans to total assets ratio denoted as Credit Risk. The sign ***, ** and * denotes the statistical significance level at 1%, 5% and 10% respectively. The *p* values are shown in the parenthesis

with the previous regression analysis (Table 4). Indeed the leverage ratio has greater coefficients with ROE as opposed to ROA. Moreover, the results in Table 6 depict that bank size and profitability has statistical positive relationship at 1% level in all models. Hence, the findings conform to the size-profitability arguments suggested by Ali and Puah (2019). In addition, it can also be observed that this results does not differ with that of Table 5. Therefore, the banking industry of both Middle East and non-Middle East countries are efficient in gaining economies of scale and improve their profit margin. Concerning the association between credit risk and bank performance, a statistical negative influence has been depicted (Table 6). The reason is, due to having a poor loan criteria in the banking industry of non-Middle East countries, credit risk may impose a detrimental influence on the stability of the banking industry, diminishing the profit margin. This finding contradicts the regression results for Middle East countries (Table 5), as a favorable influence of credit risk has been observed on driving the bank profit. Nevertheless, the relationship between capital ratio and bank profitability has been positive as per Table 6. Therefore, the findings resemble the previous regression results as observed in Table 4, and thus assure the robustness of our findings. Taking a close look at other explanatory variables, for instance, both the operational efficiency and the non-interest income ratio of non-Middle Eastern banking sector follow similar pattern like that of Middle East countries and therefore exhibits greater coefficient with ROE in compared to previous regression analysis (Table 4).

5. Conclusions and implications

The objective of this study is to investigate to what extent the capital structure, non-interest income and operational efficiency influence the profitability of the banking industry in 28 countries of Asia by consisting a total of 492 banks Although a number of studies have been made regarding the bank profitability, there has been a narrow research made by constituting the capital structure and the operating efficiency along with the control variable non-interest income (NII ratio) to examine their impact on the profit of the banking arena. However, to analyze the influence of the prime explanatory variables and the control variables on the profitability, the study employs fixed effect regression model after conducting the Hausman specification test. The study considers two main measures of capital structure, i.e. leverage ratio and LDTA as the prime explanatory variable. The study further considers other control variables which includes the influence of the operational efficiency, non-interest income ratio (NII ratio), CAP and the credit risk. The statistical findings of the study reveal that the leverage ratio has a positive significant influence on the profitability of the banking sector. The results confirm that an expansion in debt position is accompanied by an increase in profit; the larger the overall debt, the more profitable the bank can be in countries of Asia. In fact, the findings are in line with the agency cost theory and contradict the pecking order theory that suggests prioritizing retained earnings to finance the company assets. However, the LDTA does not seem to have any influence on the profitability hence reject the hypothesis. Furthermore, we look into the influence of the operational efficiency on the profitability and reveals that the impact is positive and significant. The findings imply that bank profitability substantially enhances when a bank adopts limited operational cost. Considering the non-interest income (NII ratio), it is highlighted that they exert a positive significant influence on the profitability of banking sector, indicating that a careful distribution of resources in this sector might boost the both the income and the profitability of the banking arena of Asian countries. Additionally, it is found that the CAP influences the profit margin in a statistically positive significant way, while the credit risk is found to have no influence on the profitability.

Overall, this study adds knowledge to the literature concerning the profitability of the firm in Asian countries by providing some new yet valuable insights. Our findings are relevant for

numerous reasons. Firstly, we combine the influence of capital structure along with the operating efficiency and the non-interest income to analyze the extent of their influence on the bank profit margin. Furthermore, the study implemented total debt to total asset as a leverage ratio to measure the capital structure rather than considering capital ratio as a substitute of capital structure like most prior studies (Rao and Lakew, 2012) utilized and trickled the leverage ratio to the long term debt ratio to gain a complete knowledge of the subject. Secondly, rather than centering our attention on a specific country, we consider 492 banks from both public and private sectors located in 28 countries of Asia. This study also conducts an additional analysis by making two segments of the sample and interprets the robustness of the findings. Finally, we consider the time span of 2004–2018, which covers some major changes in financial markets due to the global recession in 2007/2008.

The results used by the Asian banking industry for the research study have relevance of long-term controversy on the structure of capital and the profitability of the bank. The research is intended to assist the regulators, financiers and corporate managements to investigate relevant aspects of profitability and suggest remedial measures as needed. The findings of the study reveal a positive significant influence of leverage ratio, operational efficiency, non-interest income (NII ratio) and capital ratio (CAP). Hence the competent authority should formulate regulatory criteria on total debt and focus on maintaining a buffer capital to generate a greater profit margin and further ensuring financial stability in general and bank industry specifically. In addition, the competent authority should take a considerable look in an effort to maintain the expense level at a lower rate and hence generate greater revenue and profit. Lastly, the regulatory authority should make a careful distribution of resources in non-interest income sources since this sector might boost both the income and the profitability in the banking arena of Asian countries.

Although the research has a long-lasting relevance to the banking industry of Asia, the study incorporates three major drawbacks that should be addressed in future research initiatives. Firstly, the research did not consider the macroeconomic factors such as GDP, inflation rate, competition into account. Secondly, the study concentrated its attention on measured variables and ignored non-measured variables such as government regulation, political stability and social conditions. Moreover, the study can be extended further by including some more control variables such as bank insolvency risk, bank concentration, liquidity ratio. The study can also be extended in the near future by including the concept of financial inclusion and micro finance to improve bank profit margin since many nations of Asia are substantially growing from developing economies to developed economies. Lastly, the study considered the time span from 2004 to 2018 and did not consider current few years into account. So, the research can be further extended for analyzing the bank profitability by taking into account the time period after 2018.

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