

## COMPETITION, RISK, AND PROFITABILITY IN BANKING: A STUDY OF OIL EXPORTING VS. NON-EXPORTING COUNTRIES

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### **Abstract**

*This study investigates the association of competition, risk, and financial performance in the banking industry of Oil Exporting Countries (OEC) and Non-Exporting Oil countries (NEOC) from 2011-2019 using the balanced panel data from 2011 to 2019. The two-step system generalized method of moment (GMM) is used to estimate the results in this paper. The primary focus of this study is to assess competition among banks with the Lerner Index and Herfindahl-Hirschman Index along with credit risk, liquidity risk, and insolvency risk which are the main measures of risk in the banking sector. Competition, credit risk, and liquidity risk negatively influence the profitability of banks in OECs whereas they have a significant positive relation with profitability in NEOCs' banks. Z-score and profitability show a significant positive relation in the banking sectors of OECs and NEOCs. The study's conclusion offers a thorough framework that the central bank and other regulatory bodies can use to implement macroprudential and macroprudential measures that support the stability of the financial system.*

**Keywords:** Competition, Risk, Profitability, Oil Exporting Countries (OEC), Non-Exporting Oil Countries (NEOC).

JEL: D22, G32, L22, L25

### **Introduction**

In any country, whether developed or developing, financial institutions function as a strong pillar for the growth of economic activities because of their participation and input to the overall GDP. The banking sector has a defined character in the financial system that has a major role in building up an economy. Banks are considered as significant support for the economy of any country. They are owing to their pivotal character in encouraging monetary action and the smooth running of the payment structure. Hence, if the banks are performing well then, they can enhance the financial stability and a boost in terms of the economic growth of a country. Banks' performance can better be indicated by profitability which is extensively narrated in previous literature (Athanasoglou et al., 2008; Fidanoski & Sergi, 2017; Fungáčová et al., 2017; Sufian, 2009; Prasanto, 2020; Al-husainy et al., 2021). On the other hand, dealing with profitability is a bit sophisticated concern as more profitability might boost interest regarding the possible misuse of market power and risk-taking behaviors of banks (Sarpong-kumankoma et al., 2018).

Bank competition being highlighted in the literature for two decades. Many researchers kept an eye on this area of the banking sector in developed economies and those in the development process (Chortareas et al., 2011; Tan, 2016; Moudud-ul-huq, 2020; Lapteacru, 2014; Shair et al., 2019 ). These scholars came up with two contradictory outcomes. The first one is that the market power of banks and profit margins are gone low while facing competition which encourage banks to take more risks to get profitability back on track. In such conditions, banks usually reduce borrowers screening to earn more interest through lending, leading to loan defaults. Keeley (1990), said that the intense situation regarding the banking sector's competition causes banks to lose market share and profit margins, pushing them to take on excessive risks that lead to instability and failure.

Similarly Berger et al., (2009), exclusively stated that the competition of banks, returns, and franchise value condensed with the boost competition. This paradigm is famous as the Structure Conduct Performance (SCP) Hypothesis. Researchers supporting SCP with their studies are (Mirzaei et al., 2013; Tregenna, 2009; Jeon & Miller, 2002, Batten et al., 2019).

The other paradigm namely in literature as the Efficient Structure (ES) Hypothesis explains that its efficiency is the reason behind the increase or decrease in profitability. Market power is not the reason behind this (Chortareas et al., 2011; Seelanatha, 2010). Some scholars like Boyd & De Nicoló (2005) and John Boyd & Gianni De Nicolò (2006) argued that banks generally reduce costs due to increased competition, which might aid in reducing issues with moral hazard and adverse selection. It further decreases loan defaults and increases the financial stability of banks.

Current study highlights few main facets of banking industry of Oil exporting and non-exporting oil countries namely as competition, Risk and profitability. [Tan \(2016\)](#); [Tan, Floros, and Anchor \(2017\)](#), and [Tan \(2018\)](#) examined the impacts of competition and risk-taking on bank profitability using a sample of the banking sector of China. Rakshit & Bardhan (2021), worked on Indian banking industry. Previous studies are designed by investigating the banking sectors of advanced and developed countries where as less work has been done on Islamic countries. Still, there is a lot more to explore from different perspectives.

The association between bank rivalry and risk-taking and the banking industry's profitability in Islamic nations categorized on the basis of oil exporting and non-exporting oil countries (Malaysia, Turkey, Bahrain, Saudi Arabia, Kuwait, Lebanon, Pakistan, and Bangladesh) demonstrated the significance of this study. Banks' competitiveness might be bolstered by higher earnings. Oil-producing nations are largely dependent on the oil sector, as seen when looking at the chosen countries in the sample. As a result of their financial systems' increased globalization and increased sensitivity to oil price changes. Additionally, as the majority of investments are tied to oil, the extremely fluctuating nature of oil revenues causes uncertainty in investors' expectations. In addition, the majority of government spending comes from the sale of oil (International Monetary Fund, 2016). The majority of banks are owned domestically, with 0-49 percent foreign ownership limitations and entry hurdles. Additionally, they are well-capitalized and have a substantial amount of governmental ownership. On the other hand, economies in non-oil exporting nations are more diversified. Their primary sources of income are agriculture, foreign direct investment, and tourism. This investigates an area that hasn't been looked previously in comparison perspective, this study provides extra importance in that regard. Because of this, our findings add to the ongoing discussion on how risk and competition affect profitability in these nations.

The study includes the set of those countries which have so far received less focus in research. Most of the previous literature is available regarding linkages of competition, risk and profitability in developed nations. This study uses two different samples in data analysis to accomplish its objectives. The first sample consists of three countries as oil exporting countries (Saudi Arabia, Kuwait and Bahrain) and the second sample consists of five countries as non-exporting oil countries (Pakistan, Bangladesh, Lebanon, Malaysia and Turkey).

The current study showing its contribution as follows (i) focused to find the association of bank competition, risk and profitability of banks in which various types of risks are planned and by structural and non-structural ways to generate results of bank competition's measurement. (ii) spotlighted the link between competition, risk and profitability in banking sector of Oil Exporting countries and Non-exporting Oil Countries from 2011-2019. (iii) In order to estimate the bank competition study targeted two methods; first one is Lerner Index and the other is HH index to add into the empirical literature, (iv) gives limelight to robust results of having alternative measures of competition, risk and profitability be checked by most recent proxy via applying the econometrics technique GMM on a most recent data set 2011-2019.

### **Literature Review**

Bank competition is the factor that is extensively measured and discussed in terms of concepts in banking sector. It is a concerning issue among banks' behavior and has its impact on the working of the whole financial system. The results of research published in literature typically established a connection between bank competition and banks' propensity for taking risks, as well as highlighting the diversity of insights gleaned from various bank competition theories. Two main streams are here while dividing the literature related to competition of banks. First one is a structural approach which is based on different economic theories in which Industrial Organization (IO) is being under observation and the second one is related to a non-structural approach having foundation on the New Empirical Industrial Organization Theory (NEIO).

There are two hypotheses, first one is structural conduct performance (SCP) and the other one is efficient structure (ES) hypothesis on which first structural approach is designed. Pioneer of First hypothesis that is Structure conduct performance was Bain (1951), whereas the Efficient structure hypothesis was developed by Demsetz (1973). Concentration ratios are used to measure the former approach, and it states that in highly concentrated markets, banks' competition is significantly affected by market structure. To gain more profits, fewer big banks can be designed at higher prices to gain performance from the market structure. On the other side, the efficient structure hypothesis explains that efficient performance is the reason behind the increased market share of banks. The expansion in market share and size better supports banks to boost their profitability.

In developing countries, Structural ways which usually used by them are concentration ratios and the HHI (Herfindahl–Hirschman index) to calculate the competition between banks because these methods are simple to estimate and data requirement is minimum. C3 and C5 ratios are mostly used in the concentration ratio procedure whereas H-index calculations are summing the squares of market share percentages of all banks running in their relevant market. Market structure and market share can be used as proxies of competition in the methods mentioned above, which is considered its weakness. The nonstructural methods for measuring competition are Boone indicator, Panzar-Rosse, H-statistics and Lerner index. The nonstructural approach is associated with the belief that the measures of competition go with the economic justification of bank behaviour, specifically when measures of concentration are unable to evaluate competition

(Baumol et al., 1982). The nonstructural competition measures which are widely used are the H-statistic of Panzar and Rosse (1982, 1987), the Lerner index (1934) and the Boone indicator (2008). H-statistic calculated banks' competition by the reaction of their revenue to the evolution of their input prices.

Above mentioned methods, which are frequently used in the literature related to banks to calculate their competition, are different in terms of their understandings and base. Lapteacru (2014), used three methods: HHI, Lerner index and H-statistics. Central and Eastern Europe banks were taken as a sample to empirically investigate how these methods are different and came up with different findings. Frontier analysis was taken by Bolt & Humphrey (2015), displayed the fact that we cannot use these methods reciprocally. More concentrated banking sectors might have less competition Khan et al., (2018), despite the fact that there is an easy approach towards bank deposits and bank loans provided by low competition (Owen & Pereira, 2018). Researchers have to be careful while dealing with the idea of bank competition as it has an important impact on financial results.

Spierdijka & Zaourasa (2018) investigated the analysis of bank competition in the banking sector of United States. They estimated competition by corrected as well as uncorrected Lerner Index Results revealed that there is significant competition in the banks of US while using scale adjusted Lerner Index. Mirzaei (2018) studied the relationship of bank competition and global financial crisis using the sample of UAE banking sector. Bank competition measured by Lerner Index. Results interprets the loss of competition during that time period. Lerner Index is the most persistent method used to calculate bank competition in empirical literature. This method is used by researchers to measure competition at bank level (Cipollini & Fiordelisi, 2012; Shair et al., 2019; Tan, 2016; Moudud-ul-huq, 2020, D. T. Nguyen et al., 2024). Researchers prefer Lerner index over H-statistics, and the reason is very obvious that it recorded the values of competition for every bank in every year.

A study conducted by researchers Davis et al., (2020), took data from 112 countries for the period 1999-2015. They also used Lerner Index to calculate competition in banks with other bank factors were bank capital and bank risks. In order to check the relation of Bank competition and financial stability on economic growth by Ijaz et al., (2020), used the data of both Asian emerging economies and European economies including 38 countries focused on Lerner Index to estimate competition of banks. Another study by Moudud-ul-huq (2020), investigated the BRICS region using the unbalanced set of panel data, took 1137 banks which were under observation for the period 2000–2015. Risk, competition, performance found a nonlinear relation. This study used GMM two-step system estimator and 3SLS approach. Lerner index is used by Nguyen (2019) in the Vietnamese banking sector and the data period is from 2006-2016 using GMM system estimator. The results of this study found a non-linearity exists while finding association of profits and competition in banks of Vietnam. Other more recent studies used Lerner index relation with profitability of banks are (Owen & Pereira, 2018; Nyangu et al., 2022; Shair et al., 2019).

Based on the above literature, it can be hypothesized that:

H1: There is a significant impact of bank competition on profitability.

It is a general concept that higher risk is involved when there is banking actions or activities and often associated with insolvency. Researchers conclude that the industries working globally, the most regulatory one is the banking sector (Chortareas et al., 2012). Many types of banking-related



risk arise or manifest themselves as a result of conducting banking operations. Risk was taken by researchers in accordance with their study aims, which are grouped into several types of risk. Insolvency of banks is mostly likely to happen if banks face liquidity risk, which is not good for reputation (Jenkinson, 2008). It is extensively used in literature where this risk is calculated by dividing liquid assets to total assets.

Mixed results have been found while studying the impact of liquidity risk to banks' profitability. Few researchers found positive impact in their studies (Molyneux & Thornton, 1992; Barth & Nolle, 2003; Islam & Nishiyama, 2016) and few found negative impact (Kosmidou et al., 2017; Pasiouras & Kosmidou, 2007; Demirgüç-Kunt & Huizinga, 1999; Pac et al., 2018). In addition to that past studies concluded that there is less net interest margin when liquidity is high (Demirgüç-Kunt & Huizinga, 1999; Demirgüç-kunt et al., 2003) There is less liquidity risk when the values of calculated ratios are high (Abbas et al., 2019; Moudud-ul-huq, 2019). While going through the literature limited researches highlighted the negative impact of liquidity risk on bank's profitability due to the fact that grabbing more liquid assets in hand could result less return (Barth & Nolle, 2002).

Researchers used insolvency risk calculating it by z-score (Doumpos et al., 2015). This study utilized z-scoring in order to get the results of insolvency risk (Berger et al., 2009; Tan, 2016; Noman et al., 2017). Literature spotlighted that the credit risk is estimated by dividing the loan loss provision to total loans by many researchers while checking its impact on profitability. Therefore, researchers came up with variations in results for example (Staikouras & Wood, 2004; Menicucci et al., 2016; Yao et al., 2018; Ekinçi & Poyraz, 2019; Saleh & Afifa, 2020) estimated a negative relation of insolvency risk with profitability while investigation done by ( Tan & Floros, 2014; Tan, 2016) on Chinese banking sector found no relation with profitability. There are studies in literature which show positive relationship of credit risk and banks' profitability (Hymore et al., 2012; Bucks & Mathisen, 2005; Flamini et al., 2009, Olszak, M., & Kowalska, I. 2023).

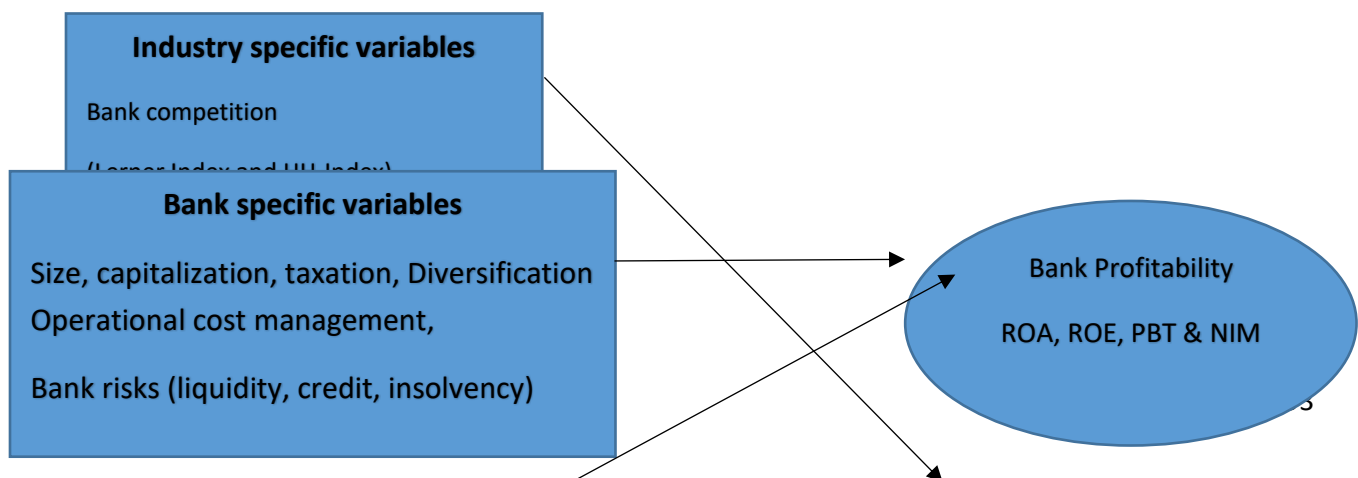
Based on the above literature, it can be hypothesized that:

H2: There is a significant relationship between risk and profitability.

From this discussion of above mentioned literature, we can summarized that, in recent years, the relationship between the profitability, bank competition and risk has been strengthened.

In the near future, this research will likely to help policymakers, central banks, and the whole banking sector in Islamic countries, as well as those who use the data collection. In addition, the findings of this study might be useful to policymakers who want to alter the regulatory framework in order to spur competition in the banking sector and increase bank profitability.

### Theoretical Framework



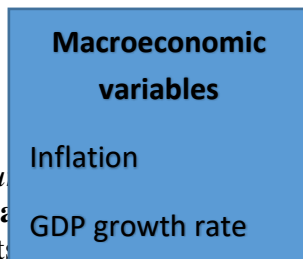


Figure 3. Data work

### 3. Data

As it is well known in the literature that researchers shed light over the past two decades in doing research on bank competition along with bank related factors with profitability. This paper highlighted the association between bank competition, bank risks and profitability in banking sector Oil exporting and non-exporting oil countries.

#### Population and sample

Oil exporting and non-exporting oil countries' banking Sector is comprised of different types of banks. Data included in this study for the estimation of results is from 2011-2019. In order to achieve its objectives, this study uses the data of 156 banks from eight countries. The first sample consists of three countries as oil exporting countries (Saudi Arabia, Kuwait and Bahrain) and the second sample consists of five countries as non-exporting oil countries (Pakistan, Bangladesh, Lebanon, Malaysia and Turkey). Like many other banking studies, we relied on the annual financial statements of the banks, World Bank reports, Bankscope as our primary source of bank-level data.

#### Model

Athanasoglou et al., (2008) and Tan (2016) deliberated a model in order to investigate the association between profitability, competition and risk categorized by bank specific variables, industry specific variables and macroeconomic variables.

$$Profit_{it} = C + Profit_{i,t-1} + \sum_{j=1}^j \beta_j X_{it}^j + \sum_{l=1}^l \beta_l X_{it}^l + \sum_{m=1}^m \beta_m X_{it}^m + e_{it} \quad (1)$$

In above equation  $i$  indicates the single bank,  $t$  shows the time period that would be in years and  $Profit_{it}$  that is dependent variable showing the indicators for profitability of a specific bank in specific year  $t$  which are going to measure with ROA, ROE, NIM and PBT.  $Profit_{i,t-1}$  is one period lagged profitability,  $C$  is the constant.  $X_{it}$  refers to the determinants related with profitability of banks which is divided into three categories, bank specific determinants  $X_{it}^j$  representing bank specific variables,  $X_{it}^l$  representing industry specific variables  $X_{it}^m$  representing macroeconomic variables.

In many studies in literature, researchers estimated the results by using different methods in order to find determinants of banks' profitability. Generalized Method of Moments (GMM) is practiced by different researchers in their studies like (Dietrich & Wanzenried, 2014; Goddard et al., 2010; Wilson, 2013; Tan, 2016; Noman et al., 2017). This study used two step system GMM for estimation purpose because of three main reasons. First, the dynamic nature of the data can be modeled by the GMM estimator without bias and inconsistency. Second, the GMM estimator enables the use of an increased number of regressors without worrying about endogeneity problems. Third, the accuracy of the coefficients is improved due to removing the bias caused by weak instruments in difference Gmm by putting level values back in the equation. Therefore this study has used system GMM to find results by estimating dynamic panel equations.

### Dependent variables

**Return on Assets (ROA)** represents how much profit is earned by total assets hooked in the business (Hassan & Bashir, 2003). This ratio is considered the widely used ratio to measure the profitability of banks and the most frequent measure of the profitability of banks in literature (Golin, 2001; Athanasoglou et al., 2008; García-herrero et al., 2009).

$$ROA = \frac{\text{net profit after taxes}}{\text{total assets}}$$

**Return on Equity ROE** shows the ability to how much profit being earned by a bank through shareholders' equity. Despite the fact that it's frequently applicable in literature, it is not considered a good indicator because the leverage risk is not in the spotlight (Dietrich & Wanzenried, 2011). Still, this indicator is used by researchers because it is essential to know how good a banks' management is in using shareholders' funds.

$$ROE = \frac{\text{net profit after taxes}}{\text{total shareholder's equity}}$$

**Net Interest Margin (NIM)** is extensively used in literature while measuring the profitability of banks ((Dietrich & Wanzenried, 2011; Athanasoglou et al., 2008; Tan & Floros, 2012). This ratio depicts that how well the banks are in taking the right investment decisions corresponds to the interest expense of banks. Net interest margin has a variation from return on assets as it represents the profit gained from interest related functions, whereas the focal point of ROA is to earn profit from total assets.

$$NIM = \frac{\text{total interest income} - \text{total interest expenses}}{\text{total assets}}$$

**Profitability before tax (PBT).** In this ratio profitability of a bank is measured by the profitability margin. This ratio varied from return on assets as it shows the profit before the taxes being paid. The addition of this profitability indicator is essential to check the impact of taxes on the profitability of South Asian banks.

$$PBT = \frac{\text{bank's profitability before tax}}{\text{total assets}}$$

### Independent variables

**Bank size:** To find bank size, a natural log of total assets will be used to find out the estimates for this variable. Researchers have frequently used the indicated variable for many years (Molyneux, 2004; Athanasoglou et al., 2008; Shair et al., 2019). There is a difference in findings between researchers in terms of size and bank profitability. Some argue that the larger banks can get an advantage by economies of scale and scope to minimize their funding cost, which sooner or later increased profitability (Philip Molyneux & Thornton, 1992; Iannotta et al., 2007; Mercieca et al., 2007). Another side of the argument is that (Barros et al., 2007) stated that the difficulties raised from asymmetric information be minimized with size; hence this problem is less in banks that have a small size, which ultimately has a negative impact on profitability. Athanasoglou et al., (2008) backed this argument that profit within banks can move with size up to a stated level further enhancing the size could result in diseconomies of scale.

**Capitalization:** the ratio used as a proxy to this variable is the shareholders' equity to total assets (Dietrich & Wanzenried, 2011; Garcia et al., 2009). Explanation of the performance of financial institutions has been shown by this variable. Studies found a negative relation between this variable and profitability backing the argument by stating that when the level of capital is high, banks are in less risk taking position, which results in low profits (Berger & Deyoung, 1997). On the other hand, banks holding the higher level of capital could easily consume risk; hence they are hooked

up in more lending activities which results from more profitability in the form of interest income. One more reason to support this argument is that banks with decent capital levels have the advantage of creditworthiness, which gives benefit in the form of low funding cost.

**Diversification:** This variable will be calculated using this formula as non-interest income divided by gross revenue. As stated by Tan & Floros (2014), when banks are hooked up with different activities, it produces better income. In extending this statement as to when banks have diversified activities, they can mitigate cost with the help of economies of scale and has a positive impact on profitability. Diversification positively relates to profitability in the Hong Kong banking industry (Jiang et al., 2003). Conversely, few researchers found a negative relation like Gischer & Jüttner (2001), because there is less profitability compared to the traditional interest income activity where there is vigorous competition in the field of fee-income generating business.

**Taxation.** To calculate this variable, we will use this ratio that is tax to operating profit before tax at the end of each year. Bank costs is increased when they have to pay more and more taxes, which decreases the profitability (Tan & Floros, 2012).

**Inflation:** Annual inflation rate will be used to calculate it. Inflation is one of the main determinants of bank profitability. Researcher Revell (1979), investigated the relation between inflation and bank profitability for the first time, later examined by Perry (1992). The effect of inflation depends on the type, even if it is anticipated or unanticipated. In the case of fully anticipated, banks can regulate the interest rates and reduce costs by carefully managing the operating expenses to get more revenue, which results in profitability. In case of unanticipated, the loan losses will be assembled, which results lower profitability.

**GDP growth rate:** In the time of cyclical upswings, lending demand is on top, so GDP has a positive relation with bank profitability ((Demirgüç-Kunt & Huizinga, 1999; Bikker & Hu, 2002). At the same time, it might have a negative relation with bank profitability as Tan & Floros (2012), examined in the Chinese banking sector. Their study explained that the business environment could be better by higher economic growth, and then it reduces the bank entry barriers therefore enhanced competition consequently increased competition shadowed the profitability.

#### Risk measurements

**Credit risk:** This variable will be calculated using the ratio of loan loss provision to total loans. When the banks have great exposure in the direction of high-risk loans, then there is an increased number of non-performing loans, which have a negative impact on profitability (Miller & Noulas, 2010).

$$\text{Credit risk} = \frac{\text{loan loss provisions}}{\text{total loans}}$$

**Insolvency risk:** Z-score will be used to calculate this risk; empirical literature shows that it has been widely used ( Berger et al., 2009; Noman et al., 2017; Tan, 2016). It is calculated as the sum of return on assets of banks and equity to the ratio of total assets over the standard deviation of banks' return on assets. This index is considered as the inverse proxy of the insolvency risk of banks.

$$Z - score_{it} = \frac{ROA_{it} + \frac{E_{it}}{TA_{it}}}{\delta ROA_{it}} \quad (2)$$



**Liquidity risk:** This risk will be calculated as the ratio of liquid assets to total assets, and it is previously used by (Demirguc-Kunt & Levine, 1996; Yago G 2003; Huizinga H 2004; Girardone 2012). More liquidity risk is there when this ratio shows lower values.

$$\text{Liquidity risk} = \frac{\text{liquid assets}}{\text{total assets}}$$

### Competition measures

**Lerner index:** This non-structural measure of bank competition was designed by (Lerner, 1934). For example, this measure has been fluently used by researchers (Berger et al., 2009; Soedarmono et al., 2013; Tan, 2016; Noman et al., 2017). The formula for calculating it is by subtracting the bank's price and marginal cost divided by price. Its maximum value is 1 and minimum is 0. 1 value shows the monopoly, and 0 shows the perfect competition.

$$\text{Lerner Index}_{it} = \frac{PTA_{it} - MCTA_{it}}{PTA_{it}} \quad (3)$$

In the above equation,  $PTA_{it}$  shows the price of total assets. These total assets are calculated by dividing total revenue (sum of total interest and non-interest income) to total assets for each bank  $i$  and for time period  $t$ . The marginal cost of total assets for each bank  $i$  in period  $t$  is represented by  $MC_{it}$ , which is calculated by translog cost function, following the methodology of (Demirgüç-Kunt & Huizinga, 2010; Demirguc-Kunt, & Zhu, 2014; Noman et al., 2017).

$$\ln TC_{it} = \delta + \gamma_1(\ln y_{it}) + \omega_1(\ln w_{1it}) + \omega_2(\ln w_{2it}) + \omega_3(\ln w_{3it}) + \gamma_2(\ln y_{it})^2 + \gamma_3(\ln y_{it})(\ln w_{1it}) + \gamma_4(\ln y_{it})(\ln w_{2it}) + \gamma_5(\ln y_{it})(\ln w_{3it}) + \omega_4(\ln w_{1it})^2 + \omega_5(\ln w_{2it})^2 + \omega_6(\ln w_{3it})^2 + \omega_7(\ln w_{1it})(\ln w_{2it}) + \omega_8(\ln w_{2it})(\ln w_{3it}) + \omega_9(\ln w_{1it})(\ln w_{3it}) + e_{it} \quad (4)$$

The above equation shows that  $i$  is depicting the specific bank and  $t$  is the specific time period.  $\ln TC$  showing the natural log of the total cost. Total cost is comprised of three elements first one is total interest, second is non-interest expenses and administrating and other operating expenses. Total assets showing the output quality explained by  $Y_{it}$ .  $w_{1it}$ ,  $w_{2it}$ ,  $w_{3it}$  representing three input prices: price of funds, price of labor, and price of fixed capital, respectively. There are the following conditions regarding input prices.

$$\begin{aligned} \omega_1 + \omega_2 + \omega_3 &= 1 \\ \gamma_3 + \gamma_4 + \gamma_5 &= 0 \\ \omega_4 + \omega_7 + \omega_8 &= 0 \\ \omega_5 + \omega_7 + \omega_9 &= 0 \\ \omega_6 + \omega_8 + \omega_9 &= 0 \end{aligned}$$

$$MCTA_{it} = \frac{TC_{it}}{Y_{it}} (\gamma_1 + \gamma_2 \ln(Y_{it}) + \gamma_3 \ln(\omega_{1it}) + \gamma_4 \ln(\omega_{2it}) + \gamma_5 \ln(\omega_{3it})) \quad (5)$$

When we are able to find the output price and marginal cost of total assets, we can easily calculate the Lerner index of each bank for each year. Variables that are used to measure the calculation of the Lerner index are given below.

Three input prices are:

$$\omega_1 \text{ Price of funds} = \frac{\text{interest expense}}{\text{total deposits}}$$

$$\omega_2 \text{ Price of labor} = \frac{\text{personnel expense}}{\text{total assets}}$$

$$\omega_3 \text{ Price of fixed capital} = \frac{\text{administrating and other operating expenses}}{\text{fixed assets}}$$

Output price  $Y_{it}$  Total Assets

Total cost  $TC_{it}$  Addition of interest and non-interest expenses

**Herfindahl Hirschman Index (HHI):** As one of the objectives of this study is to measure the bank competition by the structural way, we used HHI which is a structural measure, as a proxy to calculate competition. This measure is used by researchers like (Anginer et al., 2014; Noman et al., 2017; Tan, 2016). It is estimated as the sum of the square of the market share of all firms working in the relevant markets.

$$HHI = \sum_{i=1}^n (MSB_i)^2 \quad (6)$$

In the above equation, MSB shows the market share of banks and n depicts the number of banks working in the market.

#### 4. Result and discussion

Table 1. highlights the results of descriptive stats, indicating the values of mean, standard deviation, minimum and maximum values for the whole set of variables including in the data of current study for the banking industry of OEC oil export countries (Saudi Arabia, Bahrain and Kuwait) and non-oil export countries NEOC (Malaysia, Turkey, Lebanon, Pakistan and Bangladesh).

Variables	OECs				NEOCs			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
ROA	.015	.024	-0.357	.073	.011	.01	-0.113	.107
ROE	.089	.099	-0.517	1.51	.121	.078	-0.284	1.51
NIM	.02	.022	-0.298	.068	.037	.026	-0.022	.234
PBT	.015	.024	-0.357	.076	.015	.012	-0.111	.065
Size	15.658	2.26	11.165	20.045	19.242	2.278	13.447	24.988
Capitalization	.22	.157	-0.026	.779	.104	.089	0.024	.986
Diversification	.207	.232	0.000	1	.316	.932	-1.218	15.775
Taxation	.091	.191	-1.035	1.469	.252	.262	-5.511	1.757
Operational management cost	.029	.042	0.006	.314	.022	.019	0.004	.226
Credit risk	.07	.215	-0.004	1.963	.021	.156	0.000	4.647
Liquidity risk	.332	.201	0.005	.942	.303	.193	0.018	2.959
Z-score	52.293	40.193	1.134	235.798	48.579	41.162	2.105	262.968
Lerner Index	.317	.208	0.002	.991	.172	.187	0.000	.994
GDP growth rate	2.961	2.671	-4.712	9.997	4.328	2.924	-6.700	11.2
Inflation	2.113	1.528	-2.093	5.826		4.112	-3.749	16.332
HH Index	1839.38	330.561	1247.485	2208.12	5.601 977.754	158.928	781.408	1442.815

It seems that profitability measures (ROA, ROE, NIM, PBT) are demonstrating an expanded variations (-0.357 to 0.073), (-0.517 to 1.51), (-0.298 to .068), (-0.357 to .076) respectively for banks in OEC. Thus, profitability of banks in OEC seems more volatile during the study period.

While discussing the rest of the variables used in this study, size shows the strength in OECs' banking sector according to its mean value. Operational cost management values show that banks of OEC are efficient in handling operational cost. Taxation's mean value exhibits lower to higher tax rates paid by banks of OEC. Non-performing loans showing less values suggest there is more credit risk in OECs, banking industry. Z-score showing high to moderate values depicting less insolvency risk in banking sector of OEC. Values of liquidity risk showing that the banks in OEC try to hold liquid assets in hands when they have to pay immediate cash in order to avoid paying extra borrowing cost. This reveals that OEC's banks has conservative behavior which then limit their profits. Lerner Index used to estimate the competition of bank which is a non-structural measure. HH-index that is structural measure to measure competition of banks is also used in current study.

Now moving towards the descriptive statistics of NEOCs, it seems that profitability measures (ROA, ROE, NIM, PBT) are demonstrating an expanded variation (-0.113 to .107), (-0.284 to 1.51), (-0.022 to .234), (-0.111 to .065) respectively for banks in NEOC. Thus, profitability of banks in NEOC seems more volatile during the study period.

While discussing about the variables used in this study, size show the strength in NEOCs' banking sector according to its mean value. Operational cost management values showing that banks of NEOC are efficient in handling operational cost. Having a look over the mean value of Taxation we can say that banks of NOEC showing lower as well as higher tax rates. Non-performing loans showing less values suggest there is more credit risk in NOECs, banking industry. Z-score showing high to moderate values depicting less insolvency risk in banking sector of NOEC. Values of liquidity risk showing that the banks in NOEC try to hold liquid assets in hands when they have to pay immediate cash in order to avoid paying extra borrowing cost. This reveals that NOEC's banks has conservative behavior which then limit their profits. Lerner Index used to estimate the competition of bank which is a non-structural measure. HH-index that is structural measure to measure competition of banks is also used in current study.

Table 2. exhibiting correlation analysis. All the explanatory variables' correlation coefficient being checked. This has done to check whether multicollinearity exist or not with in variables. Multicollinearity issue is not being faced by clearly monitoring all the correlation values so that we can further go for regression analysis.



**Table 2. Correlations**

Variables	1	2	3	4	5	6	7	8	9	10	11	12
(1) Size	1.000											
(2) Capitalization	-	1.000										
	0.543											
	*											
(3) Diversification	-	0.265	1.000									
	0.140	*										
	*											
(4) Taxation	0.387	-	-0.025	1.000								
	*	0.142										
		*										
(5) Operational cost mgt	-	0.296	0.158	-	1.000							
	0.412	*	*	0.149								
	*			*								
(6) Credit risk	-	0.068	0.172	-0.064	0.108	1.000						
	0.183		*		*							
	*											
(7) Liquidity risk	-	0.325	0.433	-	-	0.108	1.000					
	0.358	*	*	0.102	0.155	*						
	*			*	*							
(8) Z-score	0.253	0.019	-	0.096	-0.085	-0.090	-	1.000				
	*		0.139				0.124					
			*				*					
(9) Lerner Index	-	0.167	-0.042	-0.033	0.131	0.123	-	-0.088	1.000			

	0.099	*			*	*	0.116					
	*						*					
(10) HH Index	-	0.191	0.085	-	0.228	0.181	0.266	-	0.007	1.000		
	0.340	*		0.445	*	*	*	0.305				
	*			*				*				
(11) GDP growth rate	-0.001	0.024	0.054	0.095	0.001	0.002	0.016	0.008	0.051	0.057	1.000	
(12) Inflation	-0.069	-0.071	0.047	0.099	0.004	-0.042	0.027	-0.031	0.034	0.078	0.591	1.000
				*							*	

Regression results are presented in table 3, showing findings of the relation of bank competition, risk and profitability in OECs, when competition is measured by Lerner Index using two-step system GMM technique. From the estimates of table 3 it is clearly understood that there is Dynamic Panel model used in this study not static one because all the lagged dependent variables (ROA, ROE NIM & PBT) showing significant values.

F-statistics showcasing the joint significance. Hansen J-test exhibiting the validity . Consistency is the quality of this test that is why this study preferred it even if heteroscedasticity and autocorrelation is present.

	(1)		(2)		(3)		(4)	
	ROA		ROE		NIM		PBTA	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
L.	0.139** *	8.030	0.32***	32.18	0.05** *	13.2	0.152** *	8.77
Size	0.008	1.050	-0.068**	-2.12	-0.006* *	-2.68	-0.02***	2.73
Capitalization	-0.418** *	-10.02 0	-1.674** *	-6.88	-0.156* **	-6.63	-0.413** *	-11.53
Diversification	0.119** *	6.710	0.2	1.67	0.076* **	-4.26	0.088** *	5.92
Taxation	-0.008	-1.490	0.064	1.14	-0.003	-1.19	-0.017** *	-3.11
Operational management cost	-1.224** *	-16.70 0	-1.67***	-2.87	0.211	3.77	-1.162** *	-14.22
Liquidity risk	-0.108** *	-10.49 0	-0.293	-1.32	0.005	0.22	-0.056** *	-3.52
Z-score	0.003** *	42.67 0	0.003** *	4.04	0.000* **	3.49	0.003** *	54.1
Credit risk	-0.051** *	-6.290	-0.413** *	-4.38	0.005	1.19	-0.032** *	-4.51
Lerner Index	0.048** *	9.470	0.126** *	2.96	-0.001	-0.33	0.06***	12.16
GDP growth rate	-0.001**	-2.130	0.002	1.16	0.000	-0.12	-0.002** *	-4.37

Inflation	0.006** *	8.490	-0.003	-1.17	0.000	-0.13	0.008** *	13.34
Constant	-0.163	- 1.180	1.41***	2.78	0.13** *	3.35	- 0.376** *	-2.92
No of observations	352		352		352		352	
F-test	77070.4 54		1653.79 7		193.83 7		7772.78 5	
AR2	0.850		0.177		0.947		0.944	
Hansen Test	0.330		0.478		0.663		0.249	

**Table 3. Empirical results of OECs using Lerner Index**

*\*Stands for 10%, \*\* stands for 5% and \*\*\* stand for 1% level of significance*

Lerner Index showing positive value with profitability measures (ROA, ROE & PBT) depicts that the banks' profitability in OECs is negatively influenced by bank competition aligned with the results of Yuanita (2019). Results are in accordance with Structure Conduct Performance (SCP) Hypothesis that are also similar to the results presented by (Batten et al., 2019; Tan, 2016; Shair et al., 2019). It shows that when Lerner index and profitability showing positive association then it means that bank profit margins get a boost with increasing market power.

As far as the findings of risk variables are concerned coefficient of Z-score is positive with all four profitability measures (ROA, ROE NIM & PBT) exhibits that the profitability of banks get hiked when there is less or no insolvency risk the results are similar to previous studies (Fang et al., 2019; Tan & Floros 2014). Credit risk showing significant and negative relation as expected with profitability (ROA, ROE & PBT), in line with the findings of (Abbas et al., 2019; Ongore, 2013; Islam & Nishiyama, 2016). There is a negative significant coefficient values of liquidity risk interpreting that this risk is in negative relation with profitability (ROA, NIM & PBT). This negative association of liquidity risk and profitability shows that banks of OECs are unable to hold a decrease in liabilities. This is so by holding more liquid assets resulted in low profits. Findings are in relation with (Chen et al., 2018; Arif & Nauman Anees, 2012) who found negative association between these variables.

Moving towards other explanatory variables bank size showing significant and negative relation with profitability (ROE, NIM & PBT). Results indicates that the smaller banks are proficiently managed by the bank managers as compared to larger ones. Operational cost management has significant negative relationship with profitability (ROA, ROE and PBT) showing banks tend to increase operational cost to entertain the hardworking and efficient employees who then helped to increase profits. Taxation is negatively related as expected. Diversification has positive relation with profitability measures (ROA, NIM & PBT) determines that the banks of OECs engaged in diversified business activities led to an increase in profitability, as they can reduce their cost from economies of scope. Profitability measures (ROA, ROE, NIM & PBT) have a negative relation with capitalization. This is so because when banks have maximum capitalization levels it lowers the risk taking positions of banks (Berger, 1995).

Finally, moving towards the macroeconomic variables, significant and positive values of inflation



with profitability (ROA & PBT). This result reveals that Turkish banks full anticipate inflation during the examined period; thus, bank managers and regulatory authorities adjust the interest rates accordingly. GDP growth rate has a significant negative relation with profitability (ROA & PBT). Entry barriers be reduced when there is better business opportunities because of better economic growth which in turn hitting badly the profitability by increasing competition.

Tables 4 identifies the empirical results that when the HH-Index measures competition showing it has a positive association with profitability measures (ROA, ROE & PBT). This result demonstrating that when there is more competition in the OECs banking industry then it results a decrease in profitability.

Liquidity risk represents that profitability (ROA, ROE, NIM & PBT) is negatively significant. Z-score is positively significant with all four measures of profitability (ROA, ROE, NIM & PBT). Credit risk has a negative relation with profitability (ROA, ROE & PBT).

(1) OECs' banks showing less profitability who are bigger in size according to the benchmark of total assets (ROA & ROE). (2) There is a negative and significant relationship of taxation with profitability (ROE). (3) There is a significant negative relation between operation cost management and profitability (ROA, ROE, NIM & PBT).

	(1)		(2)		(3)		(4)	
	ROA		ROE		NIM		PBTA	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
L.	0.354***	5.02	0.238***	26.58	0.04***	24.49	0.288***	14.73
Size	0.041**	2.31	-0.066***	-2.78	-0.006***	-3.98	0.034***	3.21
Capitalization	-0.438***	-3.37	-1.66***	-21.11	-0.029***	-3.97	-0.277***	-4.93
Diversification	0.117*	1.99	0.006	0.14	-0.043***	-12.43	0.140***	7.36
Taxation	0.024	0.5	-0.044**	2.24	0.007	5.74	-0.029**	-2.27
Operational cost management	-0.43	-0.8	-1.613***	-10.12	-0.118***	-4.81	-0.179**	-2.11
Liquidity risk	-0.419***	-3.61	-0.371***	-4.31	-0.048***	-6.14	-0.227***	-8.55
Z-score	0.003***	10.46	0.006***	25.11	0.000***	2.89	0.004***	41.49
Credit risk	-0.141*	-1.77	-0.152***	-4.16	0.003	2.29	-0.054***	-6.02
HH Index	0.000***	2.84	0.000***	7.46	0.000	-1.28	0.000**	2.04

GDP growth rate	-0.002	-0.8	-0.005***	-4.21	0.000	1.91	0.000	-0.16
Inflation	0.007**	2.42	0.004	1.65	0.000*	1.93	0.007***	4.82
Constant	-0.764**	-2.52	0.913**	2.34	0.147***	6.03	-0.714***	-3.59
No of observations	352		352		352		352	
F-test	883.17		8939.404		4978.938		63279.24	
AR2	0.108		0.191		0.594		0.580	
Hansen Test	0.821		0.280		0.308		0.730	

**Table 4. Empirical results of OECs using HH-Index**

*\*Stands for 10%, \*\* stands for 5% and \*\*\* stand for 1% level of significance*

(4) Diversification showing positive impact with profitability (ROA, ROE & PBT). (5) Capitalization has negative impact on profitability (ROA, ROE, NIM & PBT). (6) Inflation has significant and negative relation with profitability (ROA, ROE & PBT). (7) GDP has positive relation with all four profitability indicators. (8) Diversification has negative relation with all four profitability measures.

Table 5. exhibiting correlation analysis of variables having data from NEOCs. All the explanatory variables' correlation coefficient being checked. This has done to check whether multicollinearity exist or not with in variables. Multicollinearity issue is not being faced by clearly monitoring all the correlation values so that we can further go for regression analysis.

**Table 5. Correlations**

Variables	1	2	3	4	5	6	7	8	9	10	11	12
(1) size	1.000											
(2) capitalization	-	1.000										
	0.275											
	*											
(3) diversification	-	-0.030	1.000									
	0.185											
	*											
(4) taxation	-0.030	-	-0.009	1.000								
		0.069										
		*										
(5) oprationcostma~t	-	0.388	-	-0.054	1.000							
	0.252	*	0.068									
	*		*									
(6) creditrisk	-0.057	0.084	-0.016	-0.002	0.030	1.000						
		*										
(7) liquidityrisk	0.105	0.142	0.045	-0.026	0.195	0.177	1.000					
	*	*			*	*						
(8) zscore	0.115	-0.002	0.140	-	-	-0.047	-0.057	1.000				
	*		*	0.065	0.249							
				*	*							
(9) lerner	-	0.262	0.041	-	0.180	0.134	0.170	0.006	1.000			
	0.317	*		0.075	*	*	*					
	*			*								
(10) hindex	0.455	-	-	0.148	0.047	0.060	-0.048	-	-	1.000		
	*	0.078	0.210	*				0.196	0.108			

(11) gdp	-	*	*	0.113	0.060	-0.009	-	*	*	0.103	-	1.000
	0.559	0.039	0.053	*			0.257	0.105	*	0.112		
	*						*	*		*		
(12) inflation	-	0.114	-	0.019	0.230	0.109	-	-	0.020	0.017	0.050	1.000
	0.260	*	0.201		*	*	0.068	0.360				
	*		*				*	*				

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Table 6. is showing the findings of the relation of bank competition, risk and profitability in NEOCs, when competition is measured by Lerner Index using two-step system GMM technique.

**Table 6. Empirical results of NEOCs using Lerner Index**

	(1)		(2)		(3)		(4)	
	<b>ROA</b>		<b>ROE</b>		<b>NIM</b>		<b>PBT</b>	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
L	0.165** *	6.44	0.167** *	5.84	0.201** *	3.42	0.227* *	4.67
Size	-0.002	-0.87	-0.06***	-4	-0.006**	-2.54	-0.007*	-2.12
Capitalization	- 0.179** *	-13.13	-0.461**	-2.57	0.015	0.4	- 0.183* *	-5.08
Diversification	- 0.046** *	-3.67	-0.082	-0.76	0.007	0.93	-0.037	-1.55
Taxation	-0.003	-0.9	-0.032	-1.54	- 0.011** *	-2.19	-0.015	-1.93
Operational cost mgt	- 0.200** *	-4.07	- 1.784** *	-2.84	-0.12	-0.88	- 0.500* *	-2.84
Liquidity risk	-0.017	-1.55	0.126	1.42	0.013	1.01	-0.005	-0.39
Z-score	0.001** *	15.52	0.001** *	1.42	0.000	0.19	0.001* *	4.94
Credit risk	0.005** *	15.26	0.024** *	7.81	0.003** *	9.5	0.005* *	6.91
Lerner Index	- 0.021** *	-6.96	-0.19***	-4.34	- 0.010** *	-2.78	- 0.037* *	-4.91
GDP growth rate	0.000	-3.77	- 0.003** *	-2.75	- 0.002** *	-5.45	- 0.001* *	-4.21
Inflation	0.000	-4.67	-0.003**	-2.39	0.000	1.57	- 0.001* *	-3.94
Constant	0.046	1.26	1.383** *	4.63	0.157** *	3.61	0.167*	2.55
No. of observations	832		832		832		832	
F-test	216.935		26.118		423.974		31.662	
AR2	0.562		0.206		0.318		0.39	
HansenTest	0.462		0.813		0.576		0.282	

*\*Stands for 10%, \*\* stands for 5% and \*\*\* stand for 1% level of significance*

Lerner index showing significant negative value with profitability (ROA, ROE, NIM & PBT) depicting that there is positive impact of the competition on profitability of banks in NEOCs which is in contrast with the SCP Hypothesis. This empirical result is in accordance with the results of Vives (2016), stated that with income diversification, innovation and development of new non-based interest activities of banks are enhanced due to an increased competition, which has a positive impact on the profitability of bank. These findings conclude that in a competitive environment we cannot neglect the importance of revenue diversification. Particularly, it could help to lessen the negative impact of competition on the stability of banking system (Berger & Hannan, 1998).

While checking the results of risk variables, liquidity risk has no impact on profitability in non-exporting oil countries. Coefficient values of Z-score are positive with profitability measures (ROA, ROE & PBT) depicts that bank profits get hiked when less or low insolvency risk be here, the results are similar to previous studies (Fang et al., 2019; Tan & Floros 2014). Credit risk showing positive relation with risk on return on assets (ROA) similar with the investigations of earlier studies (Hymore et al., 2012; Bucks & Mathisen, 2005; Flamini et al., 2009). Findings clarifies that risk averse shareholders targeted the risk adjusted returns and usually try to get the benefits of higher profits in order to compensate the higher credit risk.

Coefficient values of size are showing the negative relation with profitability (ROA, NIM & PBT), explaining that the smaller banks are proficiently managed by the bank managers as compared to larger ones. Operational cost management has significant negative relationship with profitability (ROA, ROE and PBT) showing banks tend to increase operational cost to entertain the hardworking and efficient employees who then helped to increase profits. Taxation is negatively related as expected. Capitalization has negative impact on all four profitability measures (ROA, ROA, ROE & PBT). This is so because when banks have maximum capitalization levels it lowers the risk taking positions of banks, so according to risk-return trade off theory low risk low return (Berger, 1995). GDP growth rate has a significant negative relation with profitability (ROE, NIM & PBT). Entry barriers be reduced when there are better business opportunities because of better economic growth which in turn hitting badly the profitability by increasing competition. Profitability measures (ROE & PBT) showing a significant negative impact on inflation. This shows that in the sample time period there is unanticipated inflation in NEOCs. When there is unanticipated inflation, loan losses would be more which results in a fall of profits.

	ROA		ROE		NIM		PBT	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
L	0.213***	6.13	0.166***	6.86	0.175**	2.17	0.164***	5.25
Size	-0.004*	-1.78	-0.032***	-2.73	-0.007***	-2.85	-0.008***	-4.02
Capitalization	-0.181***	-11.05	-0.562***	-3.43	-0.123***	-5.40	-0.173***	-9.92

Diversification	0.001	0.14	-0.222**	-2.13	0.004	0.28	-0.008	-1.05
Taxation	-0.001	-0.21	-0.063*	-1.81	0.028***	-4.31	-0.006	-1.35
Operational cost management	-0.364***	-5.83	-1.607***	-3.45	-0.045	-0.66	-0.697***	-13.24
Liquidity risk	-0.023	-1.54	0.079	1.26	0.025	4.1	-0.029	-2.64
Z-score	0.001***	13.78	0.002***	2.93	0.001***	2.89	0.001	13.38
Credit risk	-0.002	-0.59	0.027***	6.03	0.004	0.79	-0.001	-0.27
HH Index	0.000***	-3.25	0.000	-1.43	0.000	1.30	0.000**	-2.22
GDP growth rate	0.000	-2	0.003***	-3.08	0.001***	-4.85	0.001***	-4.32
Inflation	0.000	1.12	0.002***	-2.96	0.000	-0.62	0.000	-0.20
Constant	0.160***	3.4	0.964***	3.80	0.112**	2.20	0.214	5.36
No of observations	832		832		832		832	
F-test	32.004		42.431		26.813		91.826	
AR2	0.949		0.491		0.946		0.366	
Hansen Test	0.528		0.672		0.448		0.216	

**Table 7. Empirical Results of NEOCs using HH-Index**

\*Stands for 10%, \*\* stands for 5% and \*\*\* stand for 1% level of significance

Table 7 is showing the estimations of study when competition of banks is calculated by HH Index, showing it has a negative association with profitability measures (ROA & PBT). Liquidity risk showing no relation with profitability. Credit risk and insolvency risk (Z-score) showing significant positive relation.

- (1) Banks of NEOCs have a negative relation of size and profitability (ROA, ROE, NIM & PBT).
- (2) Profitability (ROE & NIM) has a significant and negative relation with taxation.
- (3) There is a significant negative relation between operational cost management and profitability (ROA, ROE & PBT).
- (4) There is significant positive impact of diversification on profitability (ROA, ROE & PBT).
- (5) Capitalization has negative impact on profitability (ROA, ROE, NIM & PBT).
- (6) Inflation has significant and negative relation with profitability (ROE).
- (7) GDP has negative relation with profitability (ROE, NIM & PBT).

## 5. Conclusion

In this paper we empirically examine the impact of bank competition and risk on profitability of Oil exporting countries (OECs) and non-exporting oil countries (NEOCs) over the period 2011-2019. We checked the robustness with structural and non-structural measures of bank competition, specifically named as Herfindahl Hirschman Index and Lerner Index. This study used three risk indicators Credit risk, Liquidity risk and Insolvency risk (z-score). As far as econometric estimation is concerned, two step system GMM is being used in current study.

Results depicts that the competitive environment in banking sector of OECs, that creates a negative impact on profitability. The coefficient values of Lerner Index are significant and positive with profitability measures. The empirical results of OECs are according to the narration of Structure

Conduct Performance (SCP) Hypothesis. Results are in accordance with Structure Conduct Performance (SCP) Hypothesis that are also similar to the results presented by (Batten et al., 2019; Tan, 2016; Shair et al., 2019). Empirical results of NEOCs are different from results of OECs. The coefficient values of Lerner Index are negative which contrasts with Structural Conduct Performance (SCP) Hypothesis. This result is in accordance with the results of Vives (2016), stated that with income diversification, innovation and development of new non-based interest activities of banks are enhanced due to an increased competition, which has a positive impact on the profitability of bank. These findings conclude that in a competitive environment we cannot neglect the importance of revenue diversification.

In OECs, credit risk has a negative impact on profitability, showing the picture of OECs banks with more bad loans that hit adversely the profit margins. They have great exposure in the direction of loans that increase credit risk which results a negative impact on profitability. In NEOCs, credit risk is positively associated with profitability. This finding depicts that risk averse shareholders targeted the risk adjusted returns and try to get the perks of higher profits to compensate for the higher credit risk.

There are negative significant coefficient values of liquidity risk interpreting that this risk is in negative relation with profitability in OECs. This negative association of liquidity risk and profitability shows that banks of OECs are unable to hold a decrease in liabilities. This is so by holding more liquid assets resulted in low profits. The banking sector of NEOCs do not have any impact of liquidity risk on profitability. In OECs and in NEOCs, z-score is positively associated with profitability which shows that high chances of profits be there when there is less risk. Higher values of z-score exhibiting less risk.

## **6. Recommendations and Policy implications**

Results in accordance with current study highlight the fruitful vision for policy makers because the relationship of different risks, competition and profitability is estimated in the banking industry of oil exporting countries and non-exporting oil countries. This study suggest that use distinct regulatory procedures based on the risk profiles of banks whether they are oil exporting or not. Oil exporting countries face higher risk as compared to non-exporting oil countries because of volatility in commodity prices, so they should prefer diversification just to avoid the reliance only in oil related industry.

This study suggests that Oil exporting countries should monitor their loan activities because excess of bad loans decreases the profits. The study's conclusion offers a thorough framework that the central bank and other regulatory bodies can use to implement macroprudential and macroprudential measures that support the stability of the financial system. Countries whether they are oil exporting or not should develop databases just to check the interaction of competition, risk and profitability in their respective banking sector.

Banking sector of Oil exporting countries is likely to show more competition which results the fall of profitability so their governments have to introduce minor entry barriers in order to address this problem.

The study's outcome directs and designed a detailed structure to Central banks of all the countries involved in this study and as well as to the regulatory bodies which helps in order to recommend micro and macroprudential policies which would be fruitful for the financial system's betterment.



### 7. Limitations and future direction

There are a few limitations present in this study; future research could lead to many directions based on these limitations. This study ignored the total productivity only emphasized over the relation of risk, competition, and profitability. However, further research could be done by taking total productivity into account with risk and competition instead of profitability. Future research could introduce different variables like behavioral impacts, exchange rate fluctuations bankers' sentiments, mergers and acquisitions. One prominent issue that can be considered is the merger and acquisition activities for banks. Many acquisitions activities for financial Institutions are politically orientated, which is one of the reasons, to control competition against other big financial institutions. Future studies could also use alternative measurement methods for calculating risk and competition. Future research could also be investigated based on various categories of banks.

### Disclosure of interest

The authors declare no relevant financial or non-financial competing interests to report.

### Data Availability Statement

The data used in this study will be made available upon reasonable written request to the corresponding author.

Authors contribution: All the authors contributed equally to this manuscript.

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