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Role of bank competition in determining liquidity creation: evidence from GCC countries

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ABSTRACT

This study aims to investigate the impact of banking-sector concentration on the banks' liquidity creation in GCC countries over the period from 2012 to 2018 by using a dynamic GMM panel procedure. The results suggest that increased bank competition reduces banks' liquidity creation across the GCC countries. The study's findings are in line with the 'financial fragility hypothesis' according to which banks to reduce their lending activities when competition is high in the market. The evidence suggests that the banking industry is different from others, and pro-competitive policies in the banking industry can reduce liquidity provision by banks. In the context of policy implications, a concentrated banking system discourages capital provision to firms; hence, regulators have to take appropriate measures to resolve the problem of a reduced supply of capital. Government must regulate the banking sector by keeping in view their long-run goal as competition is a double-edged sword in banking.

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Concentration; Liquidity creation; GCC; Financial Fragility hypothesis

1. Introduction

Financial institutions, especially commercial banks, play a significant role in economic growth and stability by extending loans to firms (Laeven, Levine, & Michalopoulos, 2015). This role of a bank's liquidity creation and risk-taking is jointly referred to as the Qualitative Assets Transformation Function (QATF). Traditionally banks create liquidity by playing the role of financial intermediary between borrowers and lenders of the funds. Banks use their liquid liabilities (demand deposits) to finance their illiquid assets (consumer loans) to create liquidity in an economy (Bryant, 1980; Gorton & Winton, 2017). In line with the empirical literature, financial institutions also create liquidity by using off-balance-sheet activities by providing the standby letter of credit, loan commitments and guarantees to firms to achieve their long-term goals (Berger & Bouwman, 2009; Holmström & Tirole, 1998; Horvath, Seidler, & Weill, 2016).

It is argued that the recent global financial crisis of 2007 was triggered due to the lack of liquidity in the financial sector. Since then, a significant structural and operational transformation has taken place in the financial institutions' to create liquidity in the

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market. Nowadays, in addition to traditional liquidity creation, banks create liquidity through off-balance sheet items. Banks' liquidity creation and restrictions by regulators simultaneously influence the structure of banks' financial position. Due to these reasons, financial institutions actively manage their assets and liabilities to align their financial position as per the regulators' requirements. Indeed, the following mechanism of banks to adjustment their balance sheet influences bank liquidity creation. Consequently, liquidity shocks have a more significant impact on market and funding liquidity, which is expected to have potential implications on the level of bank competition among market participants. Correspondingly competition in the banking industry affects the ease of access to finance, accessibility of credit, and economic growth (Claessens & Laeven, 2005). So, understanding how competition affects the availability and accessibility of funds helps in designing a regulatory policy in an economy.

This article aims to empirically test the impact of banks' competition on banks' liquidity creation. Banks assuming the role of financial intermediary creates liquidity and foster economic growth. Given its unique importance, empirical work in the domain of banks' liquidity creation is scratching the surface. Recently, Berger and Bouwman (2009) constructed a comprehensive measure of liquidity creation. Since then, empirical work was just focused on understanding and exploring the mechanism based on liquidity measures given by Berger and Bouwman (2009). However, our focus is to examine whether competition affects the banking industry and its financial intermediation ability.

The liquidity creation mechanism in the banking industry is relatively a new phenomenon, and literature on its determinant and implication is scarce. Most recent studies in the field of banks' liquidity creation investigate its relationship with regulatory capital (Casu, Di Pietro, & Trujillo-Ponce, 2019; Davydov, Fungáčová, & Weill, 2018; Le, 2019; Toh, 2019; Zheng & Cronje, 2019), financial crisis (Berger & Bouwman, 2017; Berger & Sedunov, 2017), Corporate governance (Bo, Li, Shi, & Wang, 2020; Díaz & Huang, 2017; Safiullah, Hassan, & Kabir, 2020). The most empirical studies conducted in the domain of banks competition have mainly focused on bank interest margin (Amidu & Wolfe, 2013), the stability of financial institution (Amidu & Wolfe, 2013; Berger & Bouwman, 2009), access to credit (Beck, Demirgüç-Kunt, & Maksimovic, 2004), economic growth (Claessens & Laeven, 2005) and recent work on how it affects the liquidity creation in Czech banking industry (Horvath et al., 2016).

The banking sector is of particular importance in the Arab Gulf Cooperation Council (GCC) countries, including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE, in relation to GCC aspirations to become knowledge-based economies and to reduce their high reliance on oil and gas exports for external revenue. All banks in the GCC, except for those in Bahrain and Oman, have historically been protected from foreign competition by regulations imposing barriers to entry (Chowdhury & Rasid, 2016). GCC countries have shown a general commitment to the process of transitioning from rent-seeking economies to knowledge-based economies since the mid-1990s, and the banking sector is considered to be one of the most economically viable diversification options (Al-Obaidan, 2008). In most GCC countries, the banking sector is the second-largest contributor to the country's GDP after the oil and gas sector and continues to be the cornerstone of non-oil and gas GDP growth in the economy. According to the Islamic Financial Services Industry Stability 2015 report the GCC region accounts for the largest proportion of Islamic financial assets accounting for 37.6% of the total global Islamic

financial assets. In terms of banking-sector assets, GCC alone contributes 38% which is second only to the Middle East and North Africa (MENA) region (excluding GCC) which accounts for 43% of the total Islamic banking assets. In addition, the region's banking system has undergone enormous changes due to significant economic and financial deregulation, financial innovation, and automation (Ariss, 2010), which have had a major effect on the bank's stability and efficiency.

In recent years, intensified competition, the proliferation of deregulatory forces, financial market developments, declining margins from conventional financial intermediation functions, and rapid growth of new technologies have led Gulf Cooperation Council (GCC) banks to step into new Off-balance sheet activities (OBS). The OBS activities to total assets of GCC banks ranged from 15% to 37% (average 20%) during 2000–2017. Consequently, GCC banks' income streams have changed dramatically. The relative share of income from conventional banking operations has decreased and that of non-interest income from OBS activities such as loan commitments, securitization, future and forward contracts, standby credit letters has increased substantially. Non-interest income ranged from 35 to 81% of the gross income of GCC banks with an average of 52%, compared to 14.18% for Chinese banks; 27.91% for banks in South Asia; 29.45% for banks in East Asia and Pacific (excluding GCC countries); 30.69% for Indian banks; 31.96% for banks in the MENA region (excluding GCC countries); 38.31% for the Euro area; and 35.83% for the world over the period 2000–2017 (Saif-Alyousfi, 2020). It's worth noting that banks generate a significant income from the off-balance sheet items, and competition can have a detrimental effect on the banks' stability and performance. However, no studies have been done in this area, in GCC.

Our study expanded the literature on the relationship between bank competition and liquidity creation. First, this is the first study to the best of our knowledge that provides an in-depth and detailed analysis of how banks' competition affects the banks' liquidity creation in the context of the GCC region. There is not a single study till now, which has studied the relationship between bank competition and liquidity creation in the GCC region; the present study bridge this significant gap in the literature. Secondly, banks' competition is mostly measured through the Lerner index, which measures the competition at the bank-level and over time, which is advantageous over the traditional HHI index.

This study uses the banking data of 61 banks from 6 GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates) countries from 2012 to 2018. This study attempts to contribute to the existing empirical literature in the domain of competition and liquidity creation due to conflicting results on how competition affects the banks' liquidity creation (Bewazir et al., 2018; Horvath et al., 2016; Ali, Shah, & Chughtai, 2019; Jiang, Levine, & Lin, 2019; Toh, Gan, & Li, 2020). we apply a more recent measure of market power that allows for the possibility that firms do not choose the prices and input levels in a profit-maximizing way (Koetter *et al.*, 2012). The finding of the study shows that banks' competition is significant and negatively associated with liquidity creation, showing that banks with more market power enjoy monopolistic rent and create more liquidity. The finding of the study is consistent with using different measures of liquidity creation given by Berger and Bouwman (2009).

Several robustness checks have been performed to validates the result. First, the narrow measure of liquidity creation is used along with a preferred broad measure of liquidity creation to check the results' consistency. Second, different lag length of

liquidity creation and the Lerner index is used. Third, we estimate the effects for small banks to check the relationship between bank competition and liquidity creation and find similar results. Fourth, we have tested the potential effect of macroeconomics variables on the baseline findings of the study. In case of all simulations, the findings of the study remain robust and consistent with baseline results.

The remainder of the paper is organized as follows: Section two reviews the past literature on bank competition and liquidity creation and builds hypotheses based on existing literature. Section three explains the variables construction and methodology employed in this paper. Section four discusses the study results and findings, while section five makes concluding remarks about the study.

2. Literature review

The relationship between bank competition and banks' liquidity creation is of great concern to the economic policymakers because of its far-reaching implication on the economy. Regulators may want to increase the consumer's welfare by increasing the competition, limiting the banks' incentive to create liquidity in the market. Thus any result suggesting a liquidity-destroying role of bank competition would indicate the existence of a policy trade-off. Thus, we try to enhance our understanding of the consequences of bank competition and liquidity creation.

2.1. Banks competition

The financial liberalization and deregulation, specifically in the banking sector, have drawn the attention of many policymakers and researchers on the role of competition in the banking sector. Previous studies focus on the impact of competition on access to credit, risk-taking behavior, financial stability, and bank failure. However, little attention has been paid to the role of competition on liquidity creation by the banks.

There are two different schools of thought on banks' competition. "Competition-stability" and "Competition-Fragility". According to the competition fragility view, enhances competition in banking sectors erodes banks' profitability, thus reduces their charter value (character value hypothesis), ultimately reduce liquidity creation by banks. On the other hand, Repullo (2004) said that banks profit margin to act as a safeguard in the wake of financial distress; banks try to recover the profit margin by taking the additional risk and grant funds to the project which is too risky. In a highly concentrated market, banks try to protect their franchise value by taking less risk as high franchise value implies high opportunity costs of bank failure (Hellmann, Murdock, & Stiglitz, 2000).

Another school of thought in the literature is the competition-stability view given by (Boyd & De Nicolo, 2005). This suggests a direct and positive relationship between bank competition and liquidity creation, and competition in the banking sector makes the system more stable and innovative. In a less competitive market, banks enjoy the monopolistic competition and enjoy monopolistic rent like a lower interest rate on deposits and a higher rate on lending, which could lead to risk shifting and adverse selection (Stiglitz & Weiss, 1981). Few of the advocates of competition stability view are (Boyd & De Nicolo, 2005; Schaeck, Cihak & Wolfe, 2009) according to them, competition in the market make the financial system more stable. Boyd and De Nicolo (2005)

empirical model consider competition in both loan and deposit markets is neglected in the literature, and they find an inverse relationship between bank stability and competition. Less bank competition means more concentrated market power, leading to higher loan rates and lower deposit rates because banks with higher market power have incentives to pursue monopolistic rents. Low competition in the banking sector could lead to either a more stable credit market, which is an intended result of government policy, or a highly dominated and limited credit market, which is an unexpected incident. Using 45 countries' data, Scaheck, Cihak, and Wolfe (2009) also support this view. They found a positive impact of banks' competition on banks' stability rather than suffering from systemic risk, as suggested by financial fragility theory. Whereas, Berger, Klapper, and Turk-Ariss (2009) have a moderate view of the relationship as they have mixed evidence. While studying a sample of 23 countries (Berger et al., 2009) found that market power increases credit risk, but banks with high market power have less overall risk. Thus, the paper suggests limited support to both the competition-fragility and the competition-stability views. These mixed results indicate that the effects of bank competition on bank activities could also be mixed under different circumstances.

2.2. Liquidity creation

Numerous studies in the past literature suggest that the primary reason for banks' existence is to create liquidity between lenders and borrowers (Diamond and Dybvig, 1983; Kashyap, Rajan, & Stein, 2002; Gatev & Strahan, 2006). Banks create liquidity by issuing long term loans or illiquid loans by using relatively liquid deposits or short-term deposits. Banks can create liquidity in two ways either on-balance sheet by using liquid liabilities and illiquid assets Bryant (1980) and Diamond and Dybvig (1983) or in the form of off-balance sheet activities like loan commitments. At the same time these commitments allow the borrower to draw funds during the contract period, and these withdrawals are uncertain. These commitments by the banks provide liquidity to the customer whenever they need liquidity unexpectedly.

Empirical studies regarding liquidity creation and its implications are scratching the surface because of the absence of a comprehensive measure of liquidity creation. Deep and Schaefer (2004) develop a measure for liquidity creation known as liquidity transmission gap, which is not a comprehensive one. Berger and Bouwman (2009) developed four different comprehensive measures of liquidity creation and argued cat-fat is best of all, including the liquidity transformation gap, which has close resemblance with the matnot-fat measure of Berger and Bouwman (2009). A significant difference between liquidity transformation Gap and Catfat measure of liquidity creation in the classification of the loan, former classifies loan based on maturity. While later categorizes based on category. Catfat measure classifies residential mortgages and loans as semi-liquid assets because they can be sold or securitized to meet the liquidity demand of the bank. Business loans, irrespective of their maturity, are treated as illiquid assets as banks cannot dispose of them to settle their liquidity demands. Catfat includes both on and off-balance sheet items, making it a more advanced and comprehensive measure of liquidity creation.

The literature on the relationship is just scratching the surface as only few studies are available on this topic (Ali et al., 2019; Horvath et al., 2016; Jiang et al., 2019). None of the studies investigate this relationship for the GCC countries. Horvath et al. (2016)

investigated this relationship using the sample of Czech Republic banks. Using a sample period of 2002–10, they find support for the competition fragility hypothesis and suggest a pro-competitive banking framework can limit banks' liquidity creation. A significant flaw in their study is that they did not use Catfat measure for liquidity, which is a superior measure of liquidity creation (Berger & Bouwman, 2009). Joh and Kim (2008) used international data covering 25 OECD countries. They use a catfat measure following Berger and Bouwman (2009), but they control for size and market shares even though the key explanatory variable is the Lerner Index, which is strongly related to those variables.

2.3. Hypothesis development

The first testable hypothesis of the present study is that the bank's competition is negatively related to banks' liquidity creation. The rationale behind this hypothesis is that banks will face several risks, like (Default risk, liquidity risk, and bankruptcy risk) while operating in a competitive environment. Thus, banks operating in a competitive environment keep excessive cash holdings which acts as a buffer against bank run and default risk. Therefore, banks in a competitive environment create less liquidity to avoid such risks. From the bank's market power perspective, banks with more power have enough sources to respond to adverse market conditions. Banks are reluctant to provide funds when their market power is low (Petersen & Rajan, 1995). "They argue it is difficult for banks to internalize the benefits of assisting the firms, so banks are less likely to grant credit to firms that do not have a long-term relationship with the banks. In other words, banks have much worse accessibility to information on borrowers in the competitive market than in the concentrated market. Thus, banks have no incentive to create liquidity for new customers without reliable information about them".

Hypothesis 1: Banks' competition has a significant and negative impact on banks' liquidity creation.

Banks' competition is directly related to banks' loan and deposit rates. Banks in a competitive environment increase their rates on deposits and reduce their lending rate to increase the demands of both deposits and loans (Love & Martinez Peria, 2012). In contrast, banks have increased lending rates and low rates on deposits while operating in a less competitive environment. Besides, Beck et al. (2004) suggest that keen competition increases the demand for loans by alleviating financing obstacles, such as collateral, to dominate the market. That leads to higher liquidity creation. That holds only for large banks, as they have ample capital to contest with other banks in a competitive environment. Thus, large banks tend to dominate when competition in the market is high. From the market power view, "the large banks with substantial market power would tend not to create liquidity with favorable terms because they have less default risk and bank run risk by possessing sufficient funds in several different markets. This mechanism would allow them to pursue monopolistic gains, such as higher loan rates and lower deposit rates. Thus, the effects of bank competition on bank liquidity creation would not inverse but direct."

Hypothesis 2: Banks' competition has a significant and positive impact on banks' liquidity creation for large banks.

3. Methodology

3.1. Data sources

The study sample consisted of all banks listed on GCC stock exchanges in the period from 2012–2018. The sample was chosen under the following conditions: all relevant data was available; the bank had not undergone a merger or decoded during the study period; and the bank's shares were traded publicly. Only commercial banks are considered for this because they are major liquidity providers to the economy.

To constitute the authenticity and reliability of the data, it is crucial to explain the source and approach used in the process of data collection, following the work of Naceur and Omran (2011), and Agoraki et al. (2011), data related to banks' specific variable are taken from Orbis bankfocus. Following Naceur and Omran (2011) work, this study uses the unconsolidated statements and consolidated financial statement in the absence of an unconsolidated financial statement after confirming that no banks exist twice in the dataset.

There are three major benefits of using the data from Orbis bankfocus: (i) Its globally recognized as used in research by researchers and credit rating agencies like Fitch (Naceur and Omran, 2011) (ii) it contains about 90% of banks assets in an economy. (iii) It provides information as per the global reporting and accounting standards. Moreover, following Dinger and Hagen (2009), Ali et al. (2019) data related to macro-economic variables are obtained from the world economic outlook and international monetary fund (IMF) database.

3.2. Measure of competition (Lerner index)

There are two different schools of thought in the literature regarding the measure of the competition. The traditional industrial organization (IO) approach measures the degree of competition in the market using well known structural conduct performance (SCP) model. According to this, increased market power originates from non-competitive behavior among banks and earns high profitability. SCP model measures the competition in markets by using different concentration indices like the Herfindahl index (HHI) or concentration by large banks. However, these measures are inadequate in measuring competition in the banking sector (Bikker, Shaffer, & Spierdijk, 2012). New industrial organizational (NEIO) approach purposes non-structural tests to fix the problems associated with the traditional industrial-organization (IO) approach. They directly measure the banks' competitive behavior rather than rely on the analysis of the market structure.

Following the new industrial organizational (NEIO) approach, this study uses the Lerner index as a bank competition measure, the most commonly used proxy for bank competition in recent studies (Beck, De Jonghe, & Schepens, 2013; Fungacova & Weill, 2013; Horvath et al., 2016). A major advantage of using the Lerner index is that it can be measured both at the bank level and over time, so it can identify different behavior patterns in the same market and/or between time and cross-sections. Moreover, as Beck et al. (2013)

note, it does not require a clear definition of the bank's geographic market, unlike market share or market concentration measures (HHI). Shaffer (2004) argues that the Lerner index is frequently compared to other new empirical industrial organization (NEIO) competitiveness metrics formally derived from profit-maximizing equilibrium conditions. Additionally, Beck et al. (2013) show that their country-averaged Lerner indices positively and statistically related to other measures of competition. Similarly, Delis (2012) finds a high correlation between the Lerner index and the multi-country banking industry Boone Indicator, concluding that the Lerner index is a valuable market power indicator. Lerner index measures banks' ability to set the price above marginal cost. A high value of the Lerner index suggests more market power as the Lerner index is the ratio of the difference between price and marginal cost to the price. Where the price (revenue to total assets) is bank output (Carbo, Humphrey, Maudos, & Molyneux, 2009). The translog function is used to measure the marginal cost having one output (measured by total assets) and three inputs (the price of the borrowed fund, the price of labor, and physical capital).

$$TC = \partial_0 + \partial_1 \ln y + \frac{1}{2} \partial_2 (\ln y)^2 + \sum_{j=1}^3 \beta_j \ln w_j + \sum_{j=1}^3 \sum_{k=1}^3 \beta_{jk} \ln w_j \ln w_k + \sum_{j=1}^3 \gamma_j \ln y \ln w_j + \varepsilon \quad (1)$$

Where the TC represents total cost, x is total assets, w_1 is the price of labor (the ratio of staff expenses to the number of employees), w_2 is the price of physical capital (the ratio of general and administrative expenses, other operating expenses, and depreciation divided by fixed assets), and w_3 is the price of borrowed funds (the ratio of the cost of borrowed funds to borrowed funds). X represents the total asset of the respective banks. Therefore, the total cost is the summation of general and administrative expenses, staff expenses, depreciation, operating expenses, and costs of borrowed funds. The estimated coefficients of the cost function are used to calculate the marginal cost:

$$MC = \frac{TC}{y} (\partial_1 \Lambda + \partial_2 \Lambda \ln y + \sum_{j=1}^3 \gamma_j \Lambda \ln w_j) \quad (2)$$

After calculating the marginal cost, the Lerner index for each bank and time is calculated by using the following equation.

$$Lerner_{it} = \frac{Price_{i,t} - MC_{i,t}}{Price_{i,t}} \quad (3)$$

Table 1 shows the Lerner indices for each year. Two significant findings emerge from the analysis of reported measures. First, values are higher than other studies in different countries, suggesting low competition in GCC countries. The only exception is (Horvath et al., 2016) while studying the banking industry of Czech Republic banks, they find average values of Lerner index ranging from 44 to 56%, which shows a low level of the competitive market. While studying a sample of EU (Carbo et al., 2009), it finds the mean of the Lerner index value ranging from 10% to 21%. Whereas the mean value of the Lerner index in the Chinese market is 37.8% (Fungacova, Pessarossi, & Weill, 2013).

Table 1. Lerner indices.

		All		Large 5		
Year	Obs.	Mean	Std.	Obs.	Mean	Std.
2012	310	0.334	0.075	5	0.449	0.047
2013	325	0.422	0.103	5	0.497	0.025
2014	340	0.402	0.097	5	0.511	0.065
2015	340	0.370	0.112	5	0.532	0.073
2016	360	0.412	0.097	5	0.555	0.047
2017	395	0.421	0.107	5	0.578	0.034
2018	420	0.419	0.080	5	0.581	0.052

Second, the level of competition in the GGC region (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates) over the study period remains stable, ranging from 33% to 42 %. This suggests that no significant changes have occurred in the market structure of these banks.

4. Measures of banks' liquidity creation

Following Berger and Bouwman (2009), all balance sheet items were classified as liquid, illiquid, or semi-liquid. After classifying items weights are assigned to them as per Berger and Bouwman (2009). Only two proxies are used out of four that were suggested by them because of data limitation. So, catfat and a catnotfat measure of liquidity creation are used for analysis purposes. We label them as broad measure (catfat) and narrow measure (catnotfat). As the name suggests, the broad measure is preferred as it includes both on and off-balance sheet items, while the narrow measure only accounts for on-balance sheet items. The narrow measure is used as a mean to test the robustness of the results. Table 2 shows the description and detail of all accounts used in calculating the broad and narrow measure of liquidity creation.

Table 3 shows the mean liquidity created by banks over the sample period. This shows a strong positive trend over the period, suggesting that banks increase their liquidity creation over time. The mean value of the liquidity creation-to-asset ratio has grown between 2012 and 2018 from 29% to 52% when measured through the broad measure and from 16% to 32% using the narrow measure of liquidity.

5. The relation between competition and liquidity creation

To test our stated hypothesis, we estimate the following equation.

$$\text{LiquidityCreation}_{it} = f(\text{Lerner}_{i,t-1}, \text{LiquidityCreation}_{i,t-1}, Z_{it}) + e_{it}$$

Where i denote banks and t donates time, and Z denotes control variables(see Table 4) used in the study, e_{it} represents error term. The broad and narrow measure of liquidity creation is used for the analysis and robustness of results. Whereas Lerner is a measure of competition. In the presence of lagged dependent variable the use of simple panel OLS is not a good choice. Because the OLS does not control the problem of endogeneity, autocorrelations, and heteroscedasticity. Therefore, the above-mentioned equation is estimated by using a dynamic GMM estimator. It accounts for the missing variables and possible endogeneity problems in the data, as argued by (Arellano & Bover, 1995).

Table 2. Descriptive detail of calculating the broad and narrow measure of liquidity creation.

Illiquid Assets (Weight = ½)	Semi Liquid Assets (weight = 0)	Liquid Assets (Weight = - 1/2)
(Cat) Commercial real estate loans (CRE) Loans to finance agricultural Production Commercial and industrial loans (C&I) Other loans and lease financing receivables Other real estate owned (OREO) Customers' liability on bankers' acceptances Investment in unconsolidated subsidiaries Intangible Assets Premises Other assets	(Cat) Residential real estate loans (RRE) Consumer loans Loans depository institutions Loans to state and local Governments Loans to foreign Governments	Cash and due from other institutions All securities (regardless of maturity) Trading assets Fed funds sold
Liquid Liabilities	Semi liquid liabilities	Illiquid liabilities plus
Transactions deposits	Time deposits	Bank's liability on bankers' acceptances
Savings deposits	Other borrowed money	Subordinated debt
Overnight federal funds		Other liabilities
Purchased		Equity
Trading liabilities		

Table 3. Descriptive statistics of liquidity creation.

Year	Liquidity Creation-Broad measure		Liquidity Creation-Narrow measure	
	Mean	Std. Dev.	Mean	Std. Dev.
2012	0.29	0.26	0.16	0.17
2013	0.32	0.26	0.18	0.17
2014	0.37	0.27	0.22	0.18
2015	0.36	0.27	0.26	0.19
2016	0.42	0.26	0.31	0.20
2017	0.45	0.27	0.32	0.20
2018	0.52	0.26	0.32	0.18

Table 4. Variables measurement.

Variables Names	Measurements
Liquidity Creation	Catfat and Catnotfat (Berger & Bouwman, 2009; Tran, 2020)
Competition	Lerner Index (Spierdijka & Zaourasa, 2018; Ali et al., 2019)
Credit Risk	The ratio of Risk-weighted assets and off-balance-sheet activities to total assets (Horvath et al., 2016)
Z-Score	Return on assets plus the ratio of equity to total assets divided by Earnings Volatility (Horvath et al., 2016)
Capital Size	Total Equity divided by Total Assets (Yousaf, Ali, & Hassan, 2019a; Abbas & Ali, 2020) Log of total assets (Ali, Yousaf, & Naveed, 2020)
Profitability	Net income/total assets (Abbas, Ali, & Rubbaniy, 2021; Yousaf, Ali & Hassan, 2019b)
NPL	Ratio of non-performing loans to total loans (Abbas et al., 2020; Abbas, Ali, Moudud-UI-Huq, & Naveed, 2021)
Inflation	Consumer Price Index (Abbas & Ali, 2021)
Unemployment	Unemployment rate (Abbas & Masood,)

Table 5. Descriptive statistics.

Variables	Mean	Std.Dev.	Min	Max	p1	p99	Skew.	Kurt.
Broad Measure	0.39	0.34	−0.17	0.75	−0.09	0.70	1.69	9.50
Narrow Measure	0.27	0.12	−0.41	0.31	−0.37	0.30	0.17	3.56
Lerner	0.35	0.11	0.00	0.67	0.07	0.67	−0.60	2.85
NPL	3.43	5.23	−0.25	17.87	−0.15	15.67	1.05	7.78
Z-Score	18.78	10.41	−3.07	48.68	−1.07	44.20	2.02	6.37
Capital	0.11	0.08	0.03	0.73	0.03	0.66	0.63	4.54
Credit Risk	31.30	42.42	15.67	75.32	16.54	74.23	0.52	3.41
Profitability	0.17	0.83	−0.13	0.39	−0.05	0.33	1.30	5.16
Size	0.01	0.01	−0.05	0.26	−0.04	0.26	−0.19	4.07

Table 6. Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Broad Measure	1								
(2) Narrow Measure	0.66a	1							
(3) Lerner	0.02a	0.05a	1						
(4) NPL	−0.13a	−0.04a	−0.23a	1					
(5) Z-Score	−0.11a	0.08a	−0.24a	0.32a	1				
(6) Capital	0.10a	0.35a	0.02a	−0.07a	−0.03a	1			
(7) Credit Risk	0.02a	0.03a	−0.06a	0.00	0.01	−0.03a	1		
(8) Profitability	0.06a	0.19a	−0.32a	0.50a	0.46a	−0.24a	0.03a	1	
(9) Size	0.02	−0.08a	0.73a	0.03	−0.00	0.27	−0.10	0.02	1

arepresent significance at 5%

Horvath et al. (2016) proceed with the analysis similarly while studying the relationship between competition and liquidity. The same approach is adopted by Fiordelisi, Marques-Ibanez, and Molyneux (2011), while exploring the risk in Europe's banking industry. The selection of control variables is based on recent studies conducted in banks' liquidity creation domain (Berger & Bouwman, 2009; Horvath et al., 2016; Zheng et al., 2019; Casu et al., 2019; Abbas, Masood, Ali, & Rizwan, 2021).

Table 5 contains the information of proxies used to investigate the impact of competition on the banks' liquidity creation. The statistics indicate that the average value of the broad measure of liquidity creation is 42%, with a standard deviation of 24%. The average value of the narrow measure of liquidity creation is 27%, with a standard deviation of 12%. The average of the Lerner index is 0.35, with a standard deviation of 11%. No abnormality is found in descriptive statistics, and values are in line with the previous studies of a similar context.

Table 6 reports the results for the correlation among proxies used in the analysis. The findings confirm that there is no problem with the high correlation between explanatory variables other than size and competition. Therefore, We do not use size or market share as control variables, as they are strongly related to our proxy variable for competition. Moreover, it is also found that the relationship is as per the economic theory among variables.

6. Results

Table 7 shows the results of a narrow and broad measure of liquidity creation. As mentioned above, the broad measure of liquidity creation is a preferred and comprehensive one. However, the narrow measure is used for the robustness test of the regression analysis. Furthermore, two separate models are evaluated with and without macroeconomic variables to examine their possible impact on results.

Table 7. Main results. Two-step GMM is used and The Sargan/Hansen test of the overidentifying restrictions for the GMM. The Arellano–Bond (AB) test for serial correlation concerns the first differenced residuals. The null hypothesis is that errors in the first difference regression do not exhibit second-order serial correlation.

Explained Variables	LC-Broad measure		LC-Narrow measure		off-balance-sheet Item	
	(1)	(2)	(3)	(4)	(5)	(6)
LC _{t-1}	0.18* (0.100)	0.070 (0.140)	0.30*** (0.110)	0.24* (0.130)	0.53*** (0.020)	0.42*** (0.030)
Lerner _{t-1}	0.24*** (0.090)	0.18** (0.080)	0.040 (0.040)	0.030 (0.040)	0.010 (0.010)	0.03** (0.020)
Lerner total	1.09*** (0.000)	0.85*** (0.010)	0.29*** (0.010)	0.25* (0.070)	0.02** (0.050)	0.04* (0.080)
Capital	1.36*** (0.520)	−0.08 (0.660)	−0.17 (0.550)	0.160 (0.570)	0.04* (0.020)	0.040 (0.060)
NPL	−0.002 (0.001)	−0.001 (0.001)	−0.01*** (0.002)	−0.01*** (0.001)	−0.01*** (0.001)	−0.01*** (0.003)
Credit	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Z-score	−0.0003*** (0.000)	−0.0003** (0.000)	−0.0001 (0.000)	−0.0001 (0.000)	−0.0001 (0.000)	0.000 (0.000)
Profitability	0.020 (0.010)	0.010 (0.010)	0.020** (0.010)	0.020* (0.010)	0.010** (0.003)	0.001 (0.003)
Unemployment		0.003 (0.004)		−0.003* (0.002)		0.002 (0.001)
Inflation		0.004** (0.002)		0.001 (0.001)		0.002*** (0.001)
Observations	427	427	427	427	427	427
Hansen value	0.132	0.990	0.220	0.235	0.175	0.144
AB Test AR (1)	0.000	0.000	0.00	0.000	0.00	0.000
AB Test AR (2)	0.420	0.480	0.320	0.530	0.330	0.520

Robust standard errors are mentioned in brackets. While *, **, and *** shows significance at 10%, 5% and 1% respectively.

Results show that the Lerner index has a significant positive relationship with liquidity creation in the presence of both sets of control variables. This study finds that bank competition has a negative relationship with liquidity creation. The finding of the study validates the competition-fragility hypothesis in GCC countries. The result of the study is in line with the view that competition erodes liquidity creation by enhancing banks' fragility (Ali et al., 2019; Horvath et al., 2016; Jiang et al., 2019). In general, competition in the market erodes the banks' profitability and makes it vulnerable to adverse shocks. Low profitability in the banking sector is associated with low liquidity creation as a higher volume of loans increases potential loan losses, and a higher volume of deposits increases sensitivity to bank runs. Therefore, the study's finding suggests that high competition in the banking sector can have a significant economic impact through reduced liquidity creation. The findings of the present study are in line with (Beck et al., 2013; Berger et al., 2009; Horvath et al., 2016). Outcomes reveal that competition is harmful to the financial stability of the bank. However, we can compare the findings of this study with Berger and Bouwman (2009). They used the Herfindahl – Hirschman index as a measure of competition while studying the impact of capital on banks' liquidity creation; the findings of the study show an insignificant relationship between competition and liquidity creation. Both studies are different in context, but they can be related to the fact that HHI results are not similar to findings of the Lerner index of competition.

Table 8. Robustness checks.

	LC-Broad measure		LC-Narrow measure	
	(1)	(2)	(3)	(4)
Lerner total	0.59** (0.026)	−1.27*** (0.008)	0.19** (0.040)	−0.08*** 0.000
Bank Controls	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	No	Yes
Observations	280	280	280	280
Hansen value	0.175	0.771	0.176	0.653
Bond test for AR (1)	−2.74**	−2.28**	−2.11***	−2.50***
Bond test for AR (2)	0.09	0.79	−0.64	0.55

Small Banks only	(5)	(6)	(7)	(8)
Lerner total	0.37* (0.080)	2.01* (0.070)	0.57** (0.020)	1.15** (0.010)
Bank Controls	Yes	Yes	Yes	Yes
Macro Controls	No	Yes	No	Yes
Observations	147	147	147	147
Hansen value	0.617	0.827	0.901	0.183
Bond test for AR (1)	−0.00**	−0.00**	−0.00	−0.00*
Bond test for AR (2)	−0.73	0.569	1.04	2.31**

Robust standard errors are mentioned in brackets. While *, **, and *** shows significance at 10%, 5% and 1% respectively. The variable *Lernertotal* is the estimated coefficient for the test that the sum of lagged terms is not different from zero (p-values are reported in brackets). Other coefficients are not reported for the sake of brevity. Columns (1)–(4) present the results with 3 lags of the Lerner index, columns (5)–(8) the results for small banks only.

Moreover, we are interested in finding the impact of bank competition on liquidity creation come only from on balance sheet items, or it can affect the off-balance sheet liquidity creation as well, although the negative effect of bank competition is observed with both on and off-balance sheet measure of liquidity creation. To study this phenomenon, we estimate the model only for off-balance sheet liquidity creation; results are shown in the last two columns of Table 7. The findings show that bank competition significantly contributes to destroying the off-balance sheet liquidity creation by banks. Hence the liquidity destruction impact of bank competition is driven by on and off-balance-sheet items. Out of four control variables, only two control variables are significantly affecting the banks' liquidity creation in both the estimations, which are Z-score and credit risk, with positive and negative coefficients, respectively. Finding suggests that increased competition adversely affects banks' liquidity creation in the short-run, keeping other factors held constant.

Table 7 also reports the result of using the narrow version of liquidity creation along with the broad one. Lerner index has a significant and positive relationship with the narrow version of liquidity creation, both in the presence and absence of macroeconomic control variables. A significant finding of the study is that; competition has a significant negative impact on liquidity creation, and the results remain consistent by the inclusion or exclusion of off-balance sheet items in the liquidity creation measure. The negative relationship between bank competition and liquidity creation is in line with hypothesis 1 of this study.

6.1. Robustness check

We checked the robustness of the results in two different ways, reported in [Table 8](#). First, Lag length can influence the results, so three lags of the Lerner index are used instead of 2. Again, we have a significant positive relationship between the Lerner index and liquidity creation using the alternative specification. There, these results validate the finding of the main estimation.

Secondly, we examine whether the impact of banks' competition on liquidity creation is similar for small and large banks. The size of the banks might influence our results. We can notably assume that the argument of Petersen and Rajan (1995) in favor of a positive impact should be mainly observed for small banks because these banks are more likely to resort to relationship lending. In line with Toh et al. (2020), We use the median of the assets to classify the banks into small or large banks; banks having more assets than the median are treated as large banks and small otherwise. Again, our results are in line with our baseline findings: we find a positive and significant effect of the Lerner index on liquidity creation. The results reveal that the banks the impact of competition is different for small and large banks, which supports the second hypothesis of this study. Thus, our main findings confirmed by different robustness tests show banks destroy liquidity in the presence of high competition in the market.

7. Conclusion

This paper investigates the association between banks' liquidity creation and bank competition using a large sample of GCC countries from 2012 to 2018. The findings of the study show that competition negatively affects liquidity creation. This means that competition increases the bank's fragility, which decreases the incentives for banks to create liquidity.

The present study results shed light on the ongoing debate of bank competition and its possible effect on the liquidity creation in GCC economies over the study period. Banks' competition can have a far-reaching impact on the economy through liquidity creation. There is an essential message for the think tanks and policymaker: bank competition can have significant economic effects through its effect on liquidity creation. We can say there is a policy trade-off between the positive impact of competition on consumer welfare, stemming from lower margins, and the adverse effects of competition on liquidity creation.

Other than this trade-off, bank competition can have a critical impact on the bank's stability (Berger & Bouwman, 2009; Fungacova & Weill, 2013), which needs to be considered. As stability in the banking industry matters the most in comparison with other sectors in an economy. However, the results show the nonlinear relationship between banks' competition and bank stability. Therefore, we cannot give a general conclusion regarding limiting or fostering competition in the banking industry. However, in the presence of these results, we cannot ignore the importance of competition and bank liquidity creation for economic growth and prosperity.

The findings of the study have several policy implications. First, bank market power matters for macroprudential policies. We find evidence that banks take on more liquidity risk as they achieve higher market power. Market power can have a significant effect on economic growth through its impact on liquidity creation. However, in light of the new

liquidity rules, banks are required to hold more liquid assets. Thus, policymakers facing conflicting objectives between sustainable economic growth through liquidity creation and the effectiveness of the Basel III policy.

Our study remains restricted to analyze the banks which are listed in bankscope database. We remain unable to collect data for those banks that are not listed at bankscope. In addition, Further, scholars may explore the relationship between competition and bank liquidity creation for the other region of the globe to reach solid conclusions.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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