Journal of Islamic Monetary Economics and Finance, Vol. 10, No. 2 (2024), pp. 397 - 426
p-ISSN: 2460-6146, e-ISSN: 2460-6618

IMPACT OF LIQUIDITY CREATION ON REAL ECONOMIC OUTPUT: EVIDENCE FROM FULL-FLEDGED ISLAMIC BANKS AND HYBRID CONVENTIONAL BANKS

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ABSTRACT

We examine the impact of the liquidity creation of Full-fledged Islamic Banks (FIBs) and Hybrid Conventional Banks (HCBs) on real economic output for a sample of 10 countries over the 11-year period from 2012–2022. Using the Feasible Generalized Least Squares (FGLS) framework, we show that both FIBs and HCBs liquidity creation per capita impact real economic output positively. However, HCBs have a greater impact on real economic output than FIBs. These results are statistically and economically significant. We further examine the impact of the liquidity created by both banking systems during the COVID-19 pandemic. Interestingly, for both bank types, liquidity creation has a negative impact on real output during the COVID-19 pandemic. However, in terms of magnitude, the negative impact is more pronounced for the HCBs. We also observe a non-linear impact of liquidity creation on real output, where the non-linearity is more pronounced among the HCBs. As for policy, our results imply that governments should incentivize FIBs to expand their scope and engage more in greenfield financing to have greater impact on real economic output.

Keywords: Liquidity creation, Islamic banks, Hybrid banks, Economic output.
JEL classification: -

Article history:
Received : April 8, 2024
Revised : May 17, 2024
Accepted : May 31, 2024
Available online : June 26, 2024

https://doi.org/10.21098/jimf.v10i2.2147

I. INTRODUCTION

A sound banking system mobilizes and allocates funds to the most efficient users (Hunjra et al., 2022). Hence, their maintenance of credit flows to the private sector is the main objective for policymakers and regulators around the world (Pappas et al., 2017). Banking supervisors and regulators monitor banks to ensure that they intermediate efficiently and foster the real economy, as their failure adversely affects the overall economy (Gupta & Kashiramka, 2024). However, how the banking systems impact the real economy depends on their performance, particularly their stability (Stewart & Chowdhury, 2021) and efficiency (Belke et al., 2016), as well as the banking system structure (Ergungor, 2008). As a result, academic scholars have examined the resilience of the banking systems under the hypotheses of stability-fragility and their contributions to the real economy on the basis of finance-growth nexus theories[1]. Nonetheless, given the severe impact of the conventional banking system on the real economy during the 2007-2009 Global Financial Crisis (GFC), Islamic banking has been thought of as an alternative financial system (Aysan et al., 2018; Hasan & Dridi, 2011; Wong & Eng, 2018). This is due to their resilience during the GFC (Beck et al., 2013; Hasan & Dridi, 2011; Ibrahim, 2016; Ibrahim & Rizvi, 2018; Pappas et al., 2017) and their significant positive impact on the economy (Imam & Kpodar, 2016; Kumru & Sarntisart, 2016).

In the literature, Full-fledged Islamic Banks (FIBs) and their conventional counterparts, i.e. Pure Conventional Banks (PCBs) and Hybrid Conventional Banks (HCBs) have been investigated mainly in the context of stability and efficiency (Abedifar et al., 2013; Doumpos et al., 2017; Mohammad et al., 2020; Trinugroho et al., 2021). Surprisingly, their comparative impacts on the real economy using the comprehensive bank output, i.e., liquidity creation, have not been investigated and overlooked. It is well documented by Ayadi et al. (2021) that when riskier banks with lower profitability change their business model, they become more profitable, stable and cost efficient. However, how the changing of banks business model impacts the real economic output has not been investigated, at least in the context of dual banking system economies.

In this paper, we are motivated to empirically examine whether engaging in Islamic banking businesses using Shariah-compliant instruments improves the contribution of the HCBs in boosting the real economy compared to FIBs or FIBs are the main drivers of the real economic output regardless of the fierce dual competition from the HCBs in countries with tri-banking systems. The findings of this paper may offer some important policy insights in either case and may inspire further empirical research. On the one hand, should FIBs foster the real economy better than HCBs, then policymakers and regulators may need to limit the engagement of the HCBs in Islamic banks' businesses; therefore, countries with a high number of such banking variants may need to revise their financial system blueprints to benefit more from the positive impact of FIBs on the development of their economies. On the other hand, if the HCBs spur real economic output significantly better than FIBs do, then policymakers and regulators may need to relax the regulatory constraints that hinder CBs from adopting the FIBs business model. Meanwhile, countries that only allow dual banking systems and prohibit

1 - We discuss the finance-growth nexus theories in the literature review section.

the operation of the HCBs may need to rethink their regulatory actions to take advantage of the roles of the HCBs to boost their countries' real economic output[2].

Prior to initiating policies and regulations that may lead to the implementation of a dual or tri-banking system, the benefits and consequences of the HCBs must be carefully evaluated from both Shariah compliance and practical implications aspects, particularly in Muslim-majority countries, despite their positive impact on the real economy. Interestingly, a limited number of studies that have assessed the intermediation of FIBs and CBs during the GFC (Beck et al., 2013; Hasan & Dridi, 2011; Ibrahim, 2016; Ibrahim & Rizvi, 2018) and the recent COVID-19 health crisis (Boubakri et al., 2023; Viverita et al., 2023) have shown that FIBs were more stable and did not disintermediate during the crisis time compared to their conventional counterparts. Furthermore, in a dual banking system, it has been reported that FIBs enhance the efficiency of CBs (Abedifar et al., 2016) and the stability of the financial system (Rizvi et al., 2020) and create more liquidity for the real economy compared to their conventional counterparts (Berger et al., 2019; Safiullah et al., 2020; Viverita et al., 2023).

Surprisingly, how FIBs' liquidity creation impacts the real economy compared to that of HCBs has not been investigated. This study is the first attempt, to the best of our knowledge, to fill this void in the literature of the finance–growth nexus, especially in the context of dual banking systems, by examining the impact of FIBs and the HCBs on the real economy using the comprehensive bank output value of liquidity creation rather than using classical financial development indicators such as banks' private credit (loans) and deposits as a percentage of GDP, which only represent two key components of banks' assets and liabilities sides. Other banks' on-and off-balance sheet activities impacts on real economic output have not been examined. For instance, Berger and Sedunov (2017) argue that off-balance sheet guarantees and derivatives allows customers to engage in more economic activities by planning their expenditures and financing and by hedging significant price risks thereby boosting real economic output. Furthermore, despite the significant growth in the number of HCBs, their impact on the real economy has not been examined empirically. Meanwhile, the impact of the liquidity creation of FIBs on the real economy has also not been assessed. Therefore, our contribution is twofold: First, to examine the impact of the liquidity creation of these dual banking systems on the real economy and to evaluate their comparative impacts on the real economic output. These are two novel contributions in the finance-growth nexus literature of the dual banking economies. Second, our paper also contributes by assessing the effect of the COVID-19 health crisis on the impact of the liquidity creation of FIBs and the HCBs on the real economy and the non-linear impact of the liquidity created by these banking systems on real economic output. These are also two new contributions in the finance-growth nexus, at least in the context of dual banking systems.

The remainder of the paper is organized as follows. Section 2 reviews relevant literature. Section 3 presents data and the methodology. Section 4 discusses the empirical results and section 5 concludes the paper with some important policy insights.

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2 - Kuwait, Qatar and Turkey do not have hybrid conventional banks.

II. LITERATURE REVIEW

The literature of the finance-growth nexus has been debated for many years under the four classical finance-growth nexus theories, as documented by Swamy and Dharani (2019) since the foundation of the theoretical underpinnings of finance-growth relationships by McKinnon (1973) and Shaw (1973) and the emergence of the endogenous growth theory by Romer Paul (1986) and Lucas Jr (1988). These theories have been investigated empirically under the supply-side (finance leads economic growth follows) hypothesis (King & Levine, 1993; Patrick, 1966), the demand-side (economic growth leads finance follows) hypothesis (Robinson, 1954), the feedback (bi-directional relationship) hypothesis (Greenwood & Jovanovic, 1990), and the neutral (no relationship) hypothesis (Demetriades & Hook Law, 2006; Demetriades & Hussein, 1996; Rousseau & Wachtel, 2002, 2011). The literature of the finance-growth nexus of the supply side hypothesis has further documented the impact of finance on economic growth under the nonlinearity (nonmonotonic) hypothesis (Arcand et al., 2015; Law & Singh, 2014; Samargandi et al., 2015) and the capital allocation (quality intermediation) hypothesis (Schumpeter, 1934) and capital accumulation (quantity intermediation) hypothesis (Hicks, 1969).

However, a more recent strand of literature has reported that the impact of financial development on economic growth is also dependent on the level of economic development. Hence, for developed economies, quality intermediation fosters economic growth, whereas for developing economies, quantity intermediation spurs economic growth (Fu et al., 2018). Meanwhile, some recent studies have also found contradictory results of the impact of intermediation measured by liquidity creation on economic growth. The impact is positive in the case of the United States (Berger & Sedunov, 2017), Russia (Fidrmuc et al., 2015), Pakistan (Ali & Ahmad, 2023) and globally (Beck et al., 2023); however, the impact is negative in the case of China (Umar et al., 2021) and is nonlinear both in the short and long-run in the case of the 10 countries from the Middle Eastern and North Africa (MENA) (Almeshari et al., 2023). These studies have investigated the impact of liquidity creation on economic growth in the context of economies with monolithic conventional banking systems. In the case of countries with dual banking systems, although the comparative performance of FIBs and CBs' liquidity creation (Berger et al., 2019; Safiullah et al., 2020) and its effects on the financial system stability have been investigated (Berger et al., 2019), their impact on real economic output has not been evaluated.

Our paper is related to the finance-growth nexus of bank quantity intermediation (capital accumulation) impact on real economic output and therefore extends the limited literature of the impact of liquidity creation, the comprehensive bank output, on the real economy by examining the impact of FIBs and the HCBs liquidity creation on real economic output while considering the effect of COVID-19 on the impact of liquidity creation using the interaction term and the nonlinear impact of these banks' liquidity creation on real economic output. The findings illustrate how different FIBs and HCBs' liquidity creation impacts the real economy during both normal and crisis times. Nonetheless, Previous empirical studies have shown that the finance-growth nexus relationship is nonlinear, which has also been reported in the case of the economies with dual banking systems (Alaabed & Masih, 2016; Mensi et al., 2020). Moreover, during

the GFC and the recent COVID-19 health crisis, FIBs are reported to be more stable and do not disintermediate compared to their conventional counterparts (Beck et al., 2013; Boubakri et al., 2023; Hasan & Dridi, 2011; Viverita et al., 2023). However, how significantly the recent COVID-19 health crisis has reduced the impact of FIB and HCBs' liquidity creation on real economic output reflects the stability and disintermediation of these banking variants during the crisis.

It is noteworthy that several studies using a single country and group of countries have documented the positive impact of FIBs on economic growth. For the case of single countries, these include countries such as Malaysia (Kassim, 2016), Bangladesh (Abduh & Omar, 2012) and the United Arab Emirates (Zarrouk et al., 2017), while for the cross-country evidence are Southeast Asia (Lebdaoui & Wild, 2016), 14 OIC member countries (Zarrouk et al., 2017), 13 countries from MENA (Boukhatem & Moussa, 2018), GCC countries (Gazdar et al., 2019) and for 24 countries 19 of which are Muslim-majority (Jawad & Christian, 2019). Moreover, few studies have also documented evidence of nonlinear impact of FIBs (Alaabed & Masih, 2016; Mensi et al., 2020). Nonetheless, these studies have used either bank credit financing or deposits or both, which are the main components of the asset and liability sides of the bank balance sheet.

In this paper, we use the total liquidity creation, which is the comprehensive measure of bank output comprising both asset and liability sides following Berger and Sedunov (2017). Theoretically, the FIBs business model is different from that of their conventional counterparts. FIBs financing must adhere to Shariah rulings and could only finance projects that are productive and linked to the real sector. In contrast, CBs can offer loans to any business regardless of their economic and societal added value as long as the borrowers pay back the periodical interest payments and the principal amount at maturity. Nonetheless, HCBs are a combination of both banking systems. While offering their conventional services, they are at the same time offer Shariah-compliant products through their Islamic windows and branches. However, while the performance of the HCBs compared to that of FIBs and PCBs has been investigated in a few studies (Abedifar et al., 2013; Doumpos et al., 2017; Mohammad et al., 2020; Trinugroho et al., 2021), their impact on the real economy compared to that of FIBs has not been investigated. Therefore, the main objective of this paper is to examine empirically the impact of the liquidity creation of FIBs and HCBs on real economic output.

III. DATA AND METHODOLOGY

3.1. Data Sources and Definition

The dataset we use in this paper is retrieved from two main sources: Fitch Connect and the World Bank. We have collected the banks' data to construct our key independent variable of liquidity creation from Fitch Connect, whereas our dependent and all the control variables are sourced from the World Bank database. We only include countries that have more than three HCBs. We excluded countries with missing data, countries that have been in war and countries with Muslim-minority population. The reason why we do this is to maintain the quality of our dataset, as banks from war-torn countries may destroy more liquidity rather than creating more for the economy due to inherent risks and prevalent uncertainties.

Moreover, for Muslim minority countries, the number of FIBs and HCBs are very small, and their inclusion in our dataset may lead to biased results. However, in constructing our liquidity creation measures we follow Berger et al. (2019) while taking into account the presence and development of the stock markets in the selected sample of countries, as banks liquidity creation could be influenced by the capital market development (Toh & Jia, 2021). Finally, our study is motivated by the high growth of the HCBs in the period after the GFC (Berg & Kim, 2014) and the abolition of Islamic windows operated by CBs in Qatar in 2011[3]. Therefore, our full dataset comprises 10 countries with a total of 182 banks (69 FIBs and 113 HCBs)[4]. Following Berger and Sedunov (2017) all financial variables are calculated in real 2022 dollars. We take the natural logarithms for all the variables and winsorize them to remove the influence of outliers and a one-year lag to further mitigate any potential issues of endogeneity. Table 1 presents the definition of the variables and their expected signs and sources.

Table 1.
Variable Notations, Definitions, Expected Signs and Sources

Variable Notation and Definitions	Expected Sign	Sources
GDPPC: GDP Per Capita (constant 2015 US$) is the gross domestic product divided by midyear population.	…	World Bank National Accounts Data.
TLCPC: Total Liquidity Creation Per Capita is the aggregated total liquidity created by each banking group divided by the total population of respective country.	Positive	Fitch Connect and World Bank (United Nations Population Division)-Calculated by Authors.
COVID-19 is the health crisis dummy variable equal to 1 for the years 2020and 2021, otherwise is 0.	Negative	Viverita et al., (2023)
GovExp: Government Expenditure is the general government final consumption expenditure as a percentage of gross domestic product.	Positive	World Bank National Accounts Data.
TOGDP is the Trade Openness calculated as export plus import as a percentage of Gross Domestic Product.	Positive	World Bank National Accounts Data.
FDIGDP is Foreign Direct Investment inflow as percentage of Gross Domestic Product.	Positive/Negative	World Bank and International Monetary Fund.
MYS is Mean Year of Schooling reflecting level of education of population 25 years and above gauging the quality of human capital within a country.	Positive	UNESCO Institute for Statistics (htpp://uis.unesco.org).
RQE is the Regulatory Quality Estimates used as measure of institutional quality.	Positive	World Bank: The Worldwide Governance Indictors
INFCPI is the inflation rate of the annual percentage change of consumer price index.	Positive/Negative	World Bank National Accounts Data.

Sources: Authors' compilation

3 - Qatar Central Bank issued instructions to conventional banks to close their Islamic operation by the end of 2011. See Qatar Central Bank Financial Stability Reviews of 2011.

4 - We collected HCBs from Central banks websites and reports and each banks' annual report starting from 2019. However, the selected 10 countries of our sample set are: Bahrain, Bangladesh, Egypt, Jordan, Indonesia, Malaysia, Oman, Pakistan, Saudi Arabia and the United Arab Emirates.

The selection of the Country Control Variables (CCVs) is consistent with finance-growth nexus literature. We specifically follow Boukhatem and Moussa (2018), Imam and Kpodar (2016), Mensi et al. (2020) and Fidrmuc et al. (2015). Government expenditure may exert either positive or negative impact on economic growth. According to Boukhatem and Moussa (2018) and Kassim (2016), it enhances (undermines) economic growth when it is channeled to infrastructure investing (crowding-out private investment). Meanwhile, Imam and Kpodar (2016) and Fidrmuc et al. (2015) point out that government expenditure affects growth negatively when the oversized government expenditure leads to a waste of public resources. Trade openness, while exposing countries to external shocks which makes their long-run growth weaker, may impact growth positively in the short-run leading to efficient allocation of resources and faster productivity growth (Boukhatem & Moussa, 2018) as well as offering local entrepreneurs access to foreign markets (Kassim, 2016). Furthermore, Imam and Kpodar (2016) argue that countries that are more open benefit from economies of scale in production and technological transfer.

With regards foreign direct investment, Jawad and Christian (2019) report its negative and significant impact on economic growth, Mensi et al. (2020) find both negative and no effect. The authors cite the crowding out effect and the insufficient flow of foreign direct investment as the reasons. According to Hermes and Lensink (2003) foreign direct investment affects economic growth positively only when domestic financial system is developed. For human capital, it boosts economic growth by enhancing workers' productivity (Boukhatem & Moussa, 2018). Due to the unavailability of some primary and secondary school enrolment rates, we use the mean year of schooling following Law & Singh (2014). Regulatory quality is added into our regression models to control for institutional quality, which is crucial for long-term economic growth as it fosters better policy choices (Imam & Kpodar, 2016). Further, regulatory quality affects financial development and the ability of the government to formulate and enforce sound regulations (Boukhatem & Moussa, 2018). Finally, inflation uncertainly distorts price signal and leads to unsustainable macroeconomic policies which harms economic efficiency and productivity and thereby impacts economic growth negatively (Boukhatem & Moussa, 2018; Imam & Kpodar, 2016) through its impacts on consumers' decisions on consumption, savings and investment (Kassim, 2016).

3.2. Econometric Methodology

To examine the impact of FIBs and HCBs liquidity creation per capita on real output, we follow Al-Malkawi and Pillai (2018) and Islam et al. (2021) and employ the Feasible Generalized Least Square (FGLS) model. The justification of using the FGLS method by Parks (1967) is that it can be used when there are issues of heteroskedasticity and autocorrelation (Ugwuanyi et al., 2022) and when the number of groups (N) are smaller than the number of time periods (T) (Reed & Ye, 2011). Furthermore, according to Bai et al. (2021), it is more efficient than the Ordinary Least Square (OLS) regression and can accommodate heteroskedasticity, endogeneity and the persistency of regressors (Westerlund & Narayan, 2012). Though the generalized methods of moments (GMM) corrects for collinearity,

cross-sectional dependence (Xu et al., 2022), FGLS model is more appropriate than GMM for our data set because N<T (Adalessossi, 2023).

We write our basic panel model as:

$$lnY_{it} = \beta_0 + \beta_p lnBLCPC_{ji,t-1} + \beta_s lnCCV_{i,t-1} + \varepsilon_{it} \quad (1)$$

where lnY_{it} is the GDPPC in natural logarithmic form, and $lnBLCPC_{ji,t-1}$ and $lnCCV_{i,t-1}$ are the bank liquidity creation per capita and the country control variables in logarithmic form with a 1-year lag, respectively. ε_{it} is the error term. Then, we extend our baseline model by adding a COVID-19 dummy to investigate the effect of the health crisis on the real economic output:

$$lnY_{it} = \beta_0 + ln\beta_p BLCPC_{ji,t-1} + \beta_q COVID-19_t + ln\beta_s CCV_{i,t-1} + \varepsilon_{it} \quad (2)$$

We also interact COVID-19 with the 1-year lagged bank liquidity creation per capita to examine whether the relation between liquidity created by both types of banking systems and economic growth is influenced by COVID-19:

$$\begin{aligned} &lnY_{it} \\ &= \beta_0 + ln\beta_p BLCPC_{ji,t-1} + \beta_q COVID-19_t \\ &+ \beta_r\left(lnBLCPC_{ji,t-1} * COVID-19_t\right) + ln\beta_s CCV_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (3)$$

Finally, we assess whether there is a nonlinear impact of the liquidity on the real economic output.

$$lnY_{it} = \beta_0 + ln\beta_p BLCPC_{ji,t-1} + \beta_P\left(lnBLCPC_{ji,t-1}\right)^2 + ln\beta_s CCV_{i,t-1} + \varepsilon_{it} \quad (4)$$

We do these to further affirm the consistency and the robustness of our key findings.

IV. EMPIRICAL RESULTS
4.1. Descriptive Statistics

Table 2.
Descriptive Statistics

Variables	N	Mean	Median	SD	Min	Max
GDPPC	110	12748.102	6816.074	12505.463	1070.595	45320.642
FIBTLCPC	109	16580.768	1018.221	62664.216	9.419	554017.2
HCBTLCPC	110	35979.96	2324.374	94374.46	84.854	563127.01
COVID-19	111	.18	0.000	.386	0	1
GEGDP	110	14.041	12.410	5.865	5.075	27.958
TOGDP	110	85.606	82.856	50.236	25.472	185.885
FDIGDP	110	2.274	1.812	1.665	-1.686	7.054
MYS	110	8.791	9.046	2.097	4.536	12.694
RQE	110	2.572	2.632	.614	1.545	3.586
INFCPI	110	4.035	3.066	4.445	-2.318	29.507

Notes: GDPPC is Gross Domestic Product Per capita, FIBTLPC and HCBTLCPC represent the total liquidity creation per capita of full-fledged Islamic banks and hybrid conventional banks, respectively. COVID-19 is a dummy variable equal to 1 for the years 2020-2021 and 0 otherwise. GEGDP, TOGDP and FDIGDP are Government Expenditure and Trade Openness and Foreign Direct Investment as a percentage of Gross Domestic Product, respectively. MYS and RQE are the Mean Years of Schooling and Regulatory Quality Estimates. Finally, INFCPI is the year-on-year consumer price index inflation rate.

The descriptive statistics in Table 2 above show that HCBs, on average, create more liquidity per capita compared to FIBs[5]. Government expenditures and trade openness as a percentage of GDP are on average 14% and 85.61%, respectively. The mean for foreign direct investment as a percentage of GDP is only 2.27%. The average years of schooling in these countries are 8 years and 8 months. However, while regulatory quality is 2.57 points adjusted following Egbendewe and Oloufade (2020)[6], the mean for inflation rate growth is 4%.

5 - Table 2 descriptive statistics are intended to present the data before log-lag transformation for comparing FIBs and HCBs. The descriptive statistics for calculating the economic significance of the coefficients are reported in the Supplementary Appendix (8).

6 - The authors added 2.5 to each of the range (+2.5 and -2.5). Thus, 0 is weak and 5 strong governances, respectively.

Table 3.
Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) GDPPC	1.000									
(2) FIBTLCPC	0.213**	1.000								
(3) HCBTLCPC	0.434***	0.764***	1.000							
(4) COVID -19	-0.001	-0.094	-0.131	1.000						
(5) GEGDP	0.392***	0.026	0.116	0.030	1.000					
(6) TOGDP	0.775***	0.288***	0.427***	-0.057	0.298***	1.000				
(7) FDIGDP	0.326***	0.123	0.169*	0.024	0.191**	0.572***	1.000			
(8) MYS	0.697***	0.173*	0.210**	0.111	0.432***	0.645***	0.466***	1.000		
(9) RQE	0.770***	0.225**	0.342***	0.061	0.462***	0.882***	0.498***	0.729***	1.000	
(10) INFCPI	-0.458***	-0.157*	-0.200**	-0.167*	-0.456**	-0.506***	-0.218**	-0.431**	-0.645***	1.000

Notes: *, ** and *** indicate significance at 10%, 5% and 1% respectively. See also notes to Table 2.

Table 3 presents the correlation matrices between the dependent variable and the independent variables. Column 1, which presents the association of the independent variables with GDPPC, shows that there is a positive and statistically significant correlation between our dependent variable; the real economic output and all the independent variables except for inflation and COVID-19. Interestingly, HCBs' liquidity creation per capita has a higher correlation with real economic output compared to that of FIBs. Note that most of the correlation coefficients between our independent variables are relatively low and hence multicollinearity is not a major concern.

4.2. Estimation Results

We estimate the basic regression model and present the results in Table 4. Our main results show that both banking systems' total liquidity creation per capita foster real economic output consistent with Berger and Sedunov (2017). However, in comparing columns 2 and 5 in Table 4 below, we observe that liquidity creation per capita by HCBs boosts real economic output better than the liquidity creation per capita by FIBs. From the results, a one percentage point increase in the liquidity created by FIBs and HCBs increases real economic output by 2.87 and 9.65 basis points respectively. Alternatively, a one standard deviation increase in liquidity creation by FIBs and HCBs increases real economic output by 6.41 and 19.85 basis points respectively. This suggests the economic significance of the impact of liquidity creation on real activity.

In examining the impact of COVID-19 on real economic output, real economic output during the COVID-19 period is lower on average by more than 7%[7] as

7 - Since our control variables are all at the country level but are estimated twice with the two regressions of the FIBs and HCBs, we took the average of both coefficients in model 2 and 5 to interpret their impacts on real economic output.

shown in columns 3 and 6 of Table 4. For our control variables, we note that government expenditure, trade openness, education and regulatory quality are all positively associated with real economic output. A one percentage increase in government expenditure on average enhances economic growth by 0.6 percentage points. Meanwhile, the one percentage increase in trade on average spurs real economic output by 0.7 percentage points. With regards to the impact of human capital proxied by the mean years of education, the results show that on average a one-year increase in education boosts real economic output 1.1 parentage points. Meanwhile, an enhancement in the regulatory quality spurs real output on average by 0.76 parentage points. However, the coefficient of FDI as a percentage of GDP is not significant. The non-significance of FDI in our sample is reasonable. As shown in our descriptive statistics in Table 2, FDI as a percentage of GDP is only 2.27%, which is very low. In addition, it has been reported that foreign direct investment affects economic growth positively when it transfers skills and technology; otherwise, it impacts economic growth negatively (Gui-Diby, 2014). Likewise, the coefficient of inflation is not significant. As shown in our descriptive statistics, the inflation rate ranges between -2.32% and 29.51%, respectively. Huang et al. (2010) document that inflation worsens economic growth above a certain threshold because of its distortive effects on resource allocation, delays in investment projects and increases in unemployment. Meanwhile, Khan and Ssnhadji (2001) find that the threshold for developed economies is 1-3% and for developing countries is 11-12%. The insignificance of inflation may be due to the presence of both moderate and high inflation rate in our sample, which average out the positive and negative effects of inflation on real output.

Table 4.
Impact of FIBs and HCBs Total Liquidity Creation Per Capita on Real Economic Output

	Full-fledged Islamic Banks			**Hybrid Conventional Banks**		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TLCPC_{(t-1)}$	0.133***	0.0287***	0.0335***	0.313***	0.0965***	0.114***
	(0.0212)	(0.00788)	(0.00848)	(0.0196)	(0.0149)	(0.0162)
COVID-19			-0.0674**			-0.0803*
			(0.0344)			(0.0442)
Ln $GEGDP_{(t-1)}$		0.667***	0.688***		0.523***	0.508***
		(0.0980)	(0.0944)		(0.0779)	(0.0773)
Ln $TOGDP_{(t-1)}$		0.761***	0.736***		0.632***	0.581***
		(0.0528)	(0.0577)		(0.0508)	(0.0543)
Ln $FDIGDP_{(t-1)}$		-0.0196	-0.0157		-0.0454*	-0.0447*
		(0.0169)	(0.0172)		(0.0263)	(0.0263)
Ln $MYS_{(t-1)}$		0.754***	0.795***		1.146***	1.195***
		(0.142)	(0.139)		(0.128)	(0.128)
Ln $RQE_{(t-1)}$		0.910***	0.827***		0.617***	0.507***
		(0.183)	(0.186)		(0.151)	(0.140)
Ln $INFCPI_{(t-1)}$		-0.0163	-0.0326		0.00954	-0.0157
		(0.0298)	(0.0324)		(0.0473)	(0.0496)

Table 4.
Impact of FIBs and HCBs Total Liquidity Creation Per Capita on Real Economic Output (Continued)

	Full-fledged Islamic Banks			Hybrid Conventional Banks		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Constant	8.450***	1.371***	1.433***	6.501***	1.121***	1.296***
	(0.188)	(0.297)	(0.305)	(0.183)	(0.305)	(0.315)
Observations	108	106	106	110	108	108
Countries	10	10	10	10	10	10
Chi^2	39.18***	2071***	2025***	255.4***	3255***	4049***

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

We also assess whether COVID-19 influences the output effect of liquidity creation as well as the non-linearity impact of total liquidity creation per capita on real economic output. The results for the former are reported in Table 5. The coefficient of Covid-19 dummy for the subsample of FIBs is positive but not statistically significant but for the HCBs, it positive and statistically significant. However, the interaction term results reveal that the liquidity created during the COVID-19 pandemic by both banks has reduced real economic output. The negative impact is more pronounced, almost twice, for the case of HCBs than for their FIBs peers (Rizwan et al., 2022). This implies that the liquidity created by FIBs during the COVID-19 crisis has been less detrimental to the real economy than that created by the HCBs[8].

Table 5.
Impact of FIBs and HCBs Liquidity Creation Per Capita During COVID-19 on Real Output

	Full-fledged Islamic Banks			Hybrid Conventional Banks		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TLCPC_{(t-1)}$	0.0496***			0.120***		
	(0.0104)			(0.0152)		
COVID-19	0.108	0.0945	0.0489	0.350**	0.321**	0.241**
	(0.0793)	(0.0780)	(0.0598)	(0.136)	(0.131)	(0.115)
Ln $TLCPC_{(t-1)}$*COVID-19	-0.0234**			-0.0577***		
	(0.0102)			(0.0179)		
Ln $ONBLCPC_{(t-1)}$		0.0473***			0.120***	
		(0.0103)			(0.0157)	
Ln $ONBLCPC_{(t-1)}$*COVID-19		-0.0217**			-0.0558***	
		(0.0100)			(0.0178)	

8 - These findings are consistent when using both total liquidity creation per capita and its on-balance and off-balance sheet components when we exclude Malaysia, Egypt and Pakistan, and three of them as well as Saudi Arabia and Oman. The results are reported in the Supplementary Appendices 1-4, respectively in Table 1.

Table 5.
Impact of FIBs and HCBs Liquidity Creation Per Capita During COVID-19 on Real Output (Continued)

	Full-fledged Islamic Banks			Hybrid Conventional Banks		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $OFFBLCPC_{(t-1)}$			0.0439***			0.101***
			(0.00902)			(0.0132)
Ln $OFFBLCPC_{(t-1)}$*COVID-19			-0.0205**			-0.0531***
			(0.00972)			(0.0179)
Ln $GEGDP_{(t-1)}$	0.658***	0.662***	0.598***	0.485***	0.511***	0.459***
	(0.0886)	(0.0896)	(0.0900)	(0.0729)	(0.0755)	(0.0710)
Ln $TOGDP_{(t-1)}$	0.705***	0.712***	0.727***	0.574***	0.569***	0.623***
	(0.0560)	(0.0560)	(0.0559)	(0.0502)	(0.0511)	(0.0517)
Ln $FDIGDP_{(t-1)}$	-0.0128	-0.0132	-0.0141	-0.0264	-0.0274	-0.0221
	(0.0195)	(0.0190)	(0.0201)	(0.0250)	(0.0253)	(0.0251)
Ln $MYS_{(t-1)}$	0.846***	0.829***	0.870***	1.217***	1.191***	1.280***
	(0.132)	(0.132)	(0.136)	(0.117)	(0.120)	(0.116)
Ln $RQE_{(t-1)}$	0.917***	0.906***	0.968***	0.478***	0.429***	0.634***
	(0.186)	(0.186)	(0.186)	(0.133)	(0.136)	(0.142)
Ln $INFCPI_{(t-1)}$	-0.0403	-0.0390	-0.0430	-0.0730	-0.0774	-0.0473
	(0.0350)	(0.0345)	(0.0349)	(0.0489)	(0.0493)	(0.0487)
Constant	1.334***	1.362***	1.439***	1.419***	1.507***	1.305***
	(0.296)	(0.297)	(0.307)	(0.292)	(0.301)	(0.302)
Observations	106	106	106	108	108	108
Countries	10	10	10	10	10	10
Chi^2	2364***	2412***	1889***	4207***	4020***	4273***

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

Table 6.
Impact of FIBs and HCBs Liquidity Creation Per Capita Non-linearity on Real Output

	Full-fledged Islamic Banks			Hybrid Conventional Banks		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TLCPC_{(t-1)}$	0.138***			0.460***		
	(0.0386)			(0.0606)		
Ln $TLCPC_{(t-1)}$^2	-0.00592***			-0.0199***		
	(0.00201)			(0.00300)		
Ln $ONBLCPC_{(t-1)}$		0.122***			0.449***	
		(0.0383)			(0.0612)	
Ln $ONBLCPC_{(t-1)}$^2		-0.00519**			-0.0197***	
		(0.00202)			(0.00308)	
Ln $OFFBLCPC_{(t-1)}$			0.0792***			0.274***
			(0.0205)			(0.0473)
Ln $OFFBLCPC_{(t-1)}$^2			-0.00400***			-0.0132***
			(0.00148)			(0.00296)

Table 6.
Impact of FIBs and HCBs Liquidity Creation Per Capita Non-linearity on Real Output (Continued)

	Full-fledged Islamic Banks			Hybrid Conventional Banks		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $GEGDP_{(t-1)}$	0.675***	0.694***	0.602***	0.397***	0.430***	0.380***
	(0.0983)	(0.101)	(0.0947)	(0.0710)	(0.0732)	(0.0762)
Ln $TOGDP_{(t-1)}$	0.742***	0.743***	0.764***	0.696***	0.703***	0.676***
	(0.0531)	(0.0539)	(0.0531)	(0.0449)	(0.0448)	(0.0545)
Ln $FDIGDP_{(t-1)}$	-0.00829	-0.00904	-0.00993	-0.00980	-0.0128	-0.00817
	(0.0161)	(0.0161)	(0.0178)	(0.0161)	(0.0165)	(0.0201)
Ln $MYS_{(t-1)}$	0.644***	0.638***	0.778***	0.917***	0.878***	1.053***
	(0.141)	(0.143)	(0.141)	(0.0968)	(0.103)	(0.106)
Ln $RQE_{(t-1)}$	0.796***	0.788***	0.874***	0.543***	0.445***	0.877***
	(0.182)	(0.184)	(0.184)	(0.136)	(0.137)	(0.165)
Ln $INFCPI_{(t-1)}$	0.00814	0.00605	-0.00502	0.0715**	0.0612*	0.0773**
	(0.0292)	(0.0292)	(0.0300)	(0.0321)	(0.0327)	(0.0377)
Constant	1.293***	1.344***	1.427***	0.0718	0.247	0.788***
	(0.293)	(0.297)	(0.299)	(0.288)	(0.290)	(0.290)
Observations	106	106	106	108	108	108
Countries	10	10	10	10	10	10
Chi2	2187***	2144***	1878***	5797***	5467***	4225***

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

Many recent empirical studies have shown that the finance-growth nexus is non-linear and has an inverted U-shaped relationship (Law & Singh, 2014; Mensi et al., 2020). The nonlinearity of liquidity creation has not yet been investigated. In this paper, as reported in Table 6, we find evidence of non-linearity for both types of banking systems. This means that, similar to the financial development measurements such as credit as a percentage of GDP, the comprehensive bank output also spurs economic growth up to a certain threshold, after which it starts to affect economic growth negatively supporting the hypothesis that too much financing is harmful to economic growth (Chu & Chu, 2020). Nonetheless, the non-linearity impact of the liquidity creation per capita of the HCBs on real economic output is greater than that of FIBs.

4.3. Robustness Checks

To confirm our main findings, we conduct several robustness checks. First, we use on-and-off-balance sheets per capita and gross total assets per capita (GTAPC), the main component of the asset side. Beck et al. (2023) report that banks create a large portion of their liquidity off-balance sheet, which may have a significant impact on economic growth. Meanwhile, Berger and Sedunov (2017) document that off-balance sheet liquidity creation matters more than on-balance sheet liquidity creation for real economic output. However, Safiullah et al. (2020) find that in dual banking system better Shariah supervisory board in IBs increases (decreases) the

on-balance (off-balance) sheet liquidity creation. Meanwhile, Sahyouni and Wang (2019) report that while CBs create more liquidity compared to IBs, IBs create more liquidity per asset relative to IBs. The authors' findings is consistent with Berger et al. (2019). Therefore, given these arguments we conduct robustness tests to find out whether FIBs and CBs' on-balance and off-balance sheet liquidity creation and gross total asset per capita impact on real output are positively statistically and economically significant.

Second, we exclude banks with a multi-country presence (MCP) and re-estimate our main models. The main reason for this robustness test is to check whether our main results remain unchanged after the exclusion of the multi-country operating banks. Banks that operate across borders can create more liquidity due to their geographically diversified loans portfolios and mitigated liquidity risk. They can still create liquidity irrespective of their performance by relying on their main partners. The exclusion of such banks at the state level is applied in the U.S. dataset by Berger and Sedunov (2017). Meanwhile, the exclusion of these multi-county operating banks allows us to compare relatively the impact of the liquidity creation of FIBs and HCBs on real economic output as most of the FIBs do not have many overseas operations.

Third, we assess the robustness of our main findings in terms of bank size, namely large versus small banks[9]. As documented in Chatterjee (2018), bank size is a key factor in economic development (Berger & Black, 2011; Carter & McNulty, 2005). Large and small banks create liquidity for the economy differently because of they employ different lending techniques and extending credit to different borrowers on the basis of firms' transparency using hard and soft information (Berger & Black, 2011; Berger et al., 2005). Large banks creates more liquidity compared to small banks due to economies of scale, higher capital and application of advanced technology (Berger & Bouwman, 2009; Toh & Jia, 2021). Safiullah et al. (2020) find that large banks create more liquidity compared to small banks because of their greater liability side and off-balance sheet liquidity creation. However, the authors report that IBs create more liquidity per unit of assets compared to CBs but in terms of total liquidity creation they find no difference between the two types of banking systems. In the case of Indonesia, Viverita et al. (2023) document that IBs create more liquidity than CBs on-balance sheet during normal and pandemic crisis. They also find that small banks create more liquidity than large banks. Following Berger and Sedunov (2017) we examine whether our main results remain robust for FIBs and HCBs regardless of banks size. Moreover, we also assess whether small and large FIBs and HCBs liquidity creation have similar or different impacts on real economic output. Most importantly, assessing the impact of the liquidity creation of FIBs on real economic output compared to that of HCBs using large and small bank size supports the benefit of having bigger IBs for more stable Islamic banking (Ibrahim & Rizvi, 2017).

Finally, we have used Two-Stage Least Squares (2SLS) using bank equity per capita as an instrumental variable following Berger and Sedunov (2017) to account

9 - Large banks are banks with total assets greater than 3 million US$ and small banks are banks with total asset less than or equal 3 million US$. We decide upon this because most of the countries have relatively bigger banks.

for an endogeneity[10]. However, we check the relevance of the instrumental variable using the First Stage Least Squares (1SLS). We find a statistically significant positive impact of bank capital on bank liquidity creation in all of our regressions. Finally, we compare the impact of FIBs and HCBs liquidity creation per capita on the real economic output with those of the overall CBs and PCBs after excluding Saudi Arabia and Oman, which do not have PCBs. The results of these robustness tests are reported in Tables 7-11.

Both FIBs and HCBs' on- and off-balance sheet liquidity creation and GTAPC impacts real economic output positively confirming robust positive relationship as shown in Table 7 below. Moreover, the greater impact of the HCBs liquidity creation is also confirmed[11]. That is, the HCBs' on-and-off-balance sheets and GTAPC have a greater impact on real output almost twice that of the FIBs' on-and-off-balance sheets and GTAPC. These results are economically significant as well. A one standard deviation increases in FIBs on-and-off-balance sheet and GTAPC increases real economic output by 6.41, 6.81 and 7.76 basis points respectively. Whereas for the case of HCBs, the one standard deviation increases lead to 19.58, 17.61 and 17.72 increase in real output respectively. These economic significant impacts are consistent with the statistical significance and confirms further that HCBs liquidity creation have higher impact on real economic output.

Table 7.
Impact of FIBs and HCBs Liquidity Creation Per Capita Components on Real Output

	Full-fledged Islamic Banks			**Hybrid Conventional Banks**		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $ONBLCPC_{(t-1)}$	0.0277***			0.0955***		
	(0.00779)			(0.0151)		
Ln $OFFBLCPC_{(t-1)}$		0.0290***			0.0831***	
		(0.00737)			(0.0131)	
Ln $GTAPC_{(t-1)}$			0.0343***			0.0869***
			(0.00851)			(0.0144)
Ln $GEGDP_{(t-1)}$	0.684***	0.599***	0.659***	0.552***	0.480***	0.514***
	(0.0996)	(0.0956)	(0.0941)	(0.0803)	(0.0751)	(0.0858)
Ln $TOGDP_{(t-1)}$	0.762***	0.760***	0.749***	0.630***	0.663***	0.659***
	(0.0532)	(0.0522)	(0.0508)	(0.0513)	(0.0529)	(0.0515)
Ln $FDIGDP_{(t-1)}$	-0.0188	-0.0213	-0.0252	-0.0476*	-0.0368	-0.0427
	(0.0167)	(0.0179)	(0.0180)	(0.0264)	(0.0261)	(0.0262)
Ln $MYS_{(t-1)}$	0.731***	0.817***	0.822***	1.116***	1.213***	1.125***
	(0.143)	(0.141)	(0.138)	(0.133)	(0.122)	(0.134)
Ln $RQE_{(t-1)}$	0.890***	0.997***	0.866***	0.570***	0.763***	0.647***
	(0.183)	(0.183)	(0.179)	(0.153)	(0.156)	(0.163)

10- The authors discussed the different empirical relationship of capital with liquidity creation and applied it using both large and small banks.

11- These results are as well robustly consistent after the exclusion of the stated countries as reported in SA 1-4 Table 3.

Table 7.
Impact of FIBs and HCBs Liquidity Creation Per Capita Components on Real Output (Continued)

	Full-fledged Islamic Banks			Hybrid Conventional Banks		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $INFCPI_{(t-1)}$	-0.0150	-0.0215	-0.0171	0.00206	0.0312	0.00676
	(0.0294)	(0.0307)	(0.0317)	(0.0473)	(0.0469)	(0.0473)
Constant	1.402***	1.394***	1.279***	1.207***	1.050***	1.057***
	(0.298)	(0.303)	(0.293)	(0.313)	(0.308)	(0.313)
Observations	106	106	106	108	108	108
Countries	10	10	10	10	10	10
Chi^2	2072***	1831***	2449***	3096***	3518***	2847***

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

Table 8.
Impact of FIBs and HCBs Liquidity Creation Per Capita on Output Without Multi-Country Banks

	Full-fledged Islamic Banks (Without MC FIBs)			Hybrid Conventional Banks (Without. MC HCBs)		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TLCPC_{(1-t)}$	0.0243***			0.0508***		
	(0.00773)			(0.0112)		
Ln $ONBLCPC_{(1-t)}$		0.0238***			0.0487***	
		(0.00772)			(0.0114)	
Ln $OFFBLCPC_{(1-t)}$			0.0251***			0.0431***
			(0.00676)			(0.00856)
Ln $GEGDP_{(1-t)}$	0.700***	0.709***	0.708***	0.623***	0.649***	0.579***
	(0.102)	(0.103)	(0.102)	(0.0825)	(0.0832)	(0.0862)
Ln $TOGDP_{(1-t)}$	0.774***	0.774***	0.772***	0.841***	0.845***	0.803***
	(0.0546)	(0.0548)	(0.0523)	(0.0578)	(0.0576)	(0.0604)
Ln $FDIGDP_{(1-t)}$	-0.0173	-0.0172	-0.0143	-0.0530**	-0.0531**	-0.0359*
	(0.0168)	(0.0167)	(0.0159)	(0.0231)	(0.0234)	(0.0196)
Ln $MYS_{(1-t)}$	0.723***	0.715***	0.770***	1.012***	1.005***	0.987***
	(0.145)	(0.145)	(0.142)	(0.160)	(0.162)	(0.153)
Ln $RQE_{(1-t)}$	0.875***	0.864***	0.862***	0.776***	0.724***	0.982***
	(0.187)	(0.187)	(0.183)	(0.186)	(0.186)	(0.188)
Ln $INFCPI_{(1-t)}$	-0.0109	-0.00997	0.00418	-0.0323	-0.0326	-0.0283
	(0.0291)	(0.0290)	(0.0294)	(0.0393)	(0.0398)	(0.0340)
Constant	1.370***	1.380***	1.297***	0.681**	0.694**	0.921***
	(0.300)	(0.300)	(0.295)	(0.325)	(0.330)	(0.313)
Observations	106	106	105	108	108	108
Countries	10	10	10	10	10	10
Chi^2	2011***	2042***	2251***	1839***	1903***	1483***

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

The inclusion of multi-country operating banks in our sample may influence the relative impact of FIBs and HCBs liquidity creation per capita on real economic output, as many of the CBs are banks with muti-country presence. Therefore, following Berger and Sedunov (2017), we exclude these banks and re-estimate the liquidity creation per capita impact of FIBs and HCBs on real economic output[12]. As shown in Table 8, while both types of bank liquidity creation impact real economic output positively, the impact of the liquidity created by the HCBs is double that of FIBs. The greater impact of the HCBs[13] on real economic output is attributable to their larger footprint across a wider span of industries and greenfield infrastructure financing using their hybrid mode of financing. FIBs tend to concentrate more on personal and consumption financing[14]. Interestingly, the liquidity creation impact of HCBs on real economic output is higher than the liquidity created by FIBs when banks with muti-country presence are excluded. These findings are also economically meaningful. A one standard deviation increase in the liquidity creation of FIBs and HCBs increases real economic output by 5.47 and 8.66 basis points respectively.

Several empirical studies document that bank size affects banks' ability to create liquidity for the economy. For instance, Viverita et al. (2023) find that small banks create more liquidity than large banks in the case of Indonesian dual banking systems. However, Berger and Sedunov (2017) and Tran and Nguyen (2023) document that large banks create more liquidity than small banks for the economy. Nonetheless, the liquidity created by these banks may impact real economic output differently in the case of dual banking systems. As shown in Tables 9 and 10, both large and small FIBs and HCBs have positive and statistically significant impacts on real economic output[15]. From the estimated coefficients, a one standard deviation increase in liquidity creation by FIBs and HCBs increases real economic output by 7.13 and 14.50 basis points respectively. This confirms the larger impact of the liquidity created by HCBs on real output than that created by FIBs. In comparing the liquidity creation per capita impacts of small FIBs and HCBs on real economic output, as shown in Table 10, we again find that the liquidity created by small FIBs is statistically significant and fosters real economic output better than the liquidity created by small HCBs[16]. A one standard deviation increase in the liquidity created by FIBs and HCBs increases real economic output by 7.46 and 2.31 basis points respectively. Some of the reasons why large and small FIBs foster real economic output better is because both banks offer more financing

12- The total number of FIBs and HCBs without multi-country presence are 55 and 69 banks, respectively.

13- These findings are consistent for the subsamples, when excluding Malaysia, Egypt and Pakistan and all of them. However, when we exclude Saudi Arabia and Oman, we find that the impact of the liquidity created by FIBs is higher and statistically significant as reported in the supplementary appendices 1-4 in Table 4. The reason for such change is because most of the HCBs of these banks operate on multi-countries.

14- Islamic Financial Services Industry Stability (IFIS) Report 2023, Page 34.

15- The total number of large and small FIBs are 45 and 24, respectively whereas for HCBs are 82 and 31, respectively.

16- These findings are as well consistent with the main findings regardless of the exclusion of Malaysia, Egypt and Pakistan, all of the three countries and Saudi Arabia and Oman.

to firms with feasible projects and to Small and Medium-Sized Enterprises (SMEs), which are the driving engines of the real economy (Aysan et al., 2016; Disli et al., 2023). Interestingly, while the coefficient of total liquidity creation per capita of the HCBs is positive and statistically significant at the 10% level, the coefficient of on-balance sheet liquidity creation is positive but not statistically significant. This means that small HCBs spur real economic output mainly through their off-balance sheet liquidity creation.

Table 9.
Impact of Large FIBs and HCBs Liquidity Creation Per Capita on Real Economic Output

	Full-fledged Islamic Banks (Large FIBs)			Hybrid Conventional Banks (Large HCBs)		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TLCPC_{(t-1)}$	0.0313***			0.0255***		
	(0.00830)			(0.00480)		
Ln $ONBLCPC_{(t-1)}$		0.0299***			0.0252***	
		(0.00815)			(0.00479)	
Ln $OFFBLCPC_{(t-1)}$			0.0322***			0.0258***
			(0.00798)			(0.00473)
Ln $GEGDP_{(t-1)}$	0.675***	0.698***	0.599***	0.609***	0.611***	0.606***
	(0.0943)	(0.0963)	(0.0929)	(0.116)	(0.116)	(0.116)
Ln $TOGDP_{(t-1)}$	0.753***	0.754***	0.751***	0.653***	0.658***	0.637***
	(0.0529)	(0.0534)	(0.0528)	(0.0719)	(0.0718)	(0.0718)
Ln $FDIGDP_{(t-1)}$	-0.0219	-0.0208	-0.0237	-0.00415	-0.00436	-0.00335
	(0.0176)	(0.0173)	(0.0186)	(0.0162)	(0.0161)	(0.0163)
Ln $MYS_{(t-1)}$	0.783***	0.751***	0.837***	0.530***	0.530***	0.536***
	(0.142)	(0.143)	(0.141)	(0.159)	(0.159)	(0.160)
Ln $RQE_{(t-1)}$	0.893***	0.867***	1.007***	1.005***	0.999***	1.022***
	(0.183)	(0.183)	(0.184)	(0.200)	(0.201)	(0.197)
Ln $INFCPI_{(t-1)}$	-0.0155	-0.0140	-0.0230	0.000436	5.75e-05	0.00171
	(0.0307)	(0.0302)	(0.0315)	(0.0257)	(0.0256)	(0.0257)
Constant	1.330***	1.374***	1.376***	2.306***	2.300***	2.371***
	(0.299)	(0.300)	(0.305)	(0.367)	(0.368)	(0.363)
Observations	106	106	106	108	108	108
Countries	10	10	10	10	10	10
Chi^2	2062***	2062***	1780***	873.3***	867.8***	918.4***

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

Table 10.
Impact of Small FIBs and HCBs Liquidity Creation Per Capita on Real Economic Output

	Full-fledged Islamic Banks (Small FIBs)			Hybrid Conventional Banks (Small HCBs)		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TLCPC_{(t-1)}$	0.0370***			0.0162*		
	(0.0102)			(0.00970)		
Ln $ONBLCPC_{(t-1)}$		0.0381***			0.0146	
		(0.0103)			(0.00946)	
Ln $OFFBLCPC_{(t-1)}$			0.0259***			0.0194**
			(0.00965)			(0.00944)
Ln $GEGDP_{(t-1)}$	0.453***	0.454***	0.473***	0.326**	0.320**	0.344**
	(0.176)	(0.175)	(0.180)	(0.160)	(0.159)	(0.163)
Ln $TOGDP_{(t-1)}$	0.680***	0.682***	0.689***	0.443***	0.440***	0.463***
	(0.0732)	(0.0726)	(0.0791)	(0.0759)	(0.0765)	(0.0737)
Ln $FDIGDP_{(t-1)}$	-0.0154	-0.0168	-0.00285	-0.00934	-0.00852	-0.0129
	(0.0238)	(0.0241)	(0.0228)	(0.0218)	(0.0218)	(0.0222)
Ln $MYS_{(t-1)}$	-0.0171	-0.00995	0.00497	0.560***	0.559***	0.580***
	(0.0956)	(0.0963)	(0.0945)	(0.168)	(0.167)	(0.176)
Ln $RQE_{(t-1)}$	1.650***	1.673***	1.536***	1.256***	1.258***	1.283***
	(0.220)	(0.218)	(0.230)	(0.207)	(0.207)	(0.209)
Ln $INFCPI_{(t-1)}$	-0.0592	-0.0593	-0.0474	0.00724	0.00562	0.00389
	(0.0390)	(0.0394)	(0.0392)	(0.0347)	(0.0347)	(0.0358)
Constant	3.137***	3.090***	3.183***	3.419***	3.452***	3.296***
	(0.349)	(0.347)	(0.388)	(0.401)	(0.402)	(0.404)
Observations	74	74	73	78	78	78
Countries	7	7	7	8	8	8
Chi^2	794.5***	864.8***	602.3***	321.7***	313.5***	356.8***

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

Table 11.
Impact of FIBs Liquidity Creation Per Capita on Real Economic Output Using 2SLS

	First-Stage Least Square (1SLS)			Two-Stage Least Square (2SLS)		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TEPC_{(t-1)}$	0.654***	0.658***	0.646***			
	(0.0595)	(0.0607)	(0.0727)			
Ln $GEGDP_{(t-1)}$	-0.164	-0.162	-0.345	0.413***	0.413***	0.441***
	(0.256)	(0.261)	(0.313)	(0.138)	(0.139)	(0.136)
Ln $TOGDP_{(t-1)}$	0.650**	0.632*	0.773*	0.308	0.312	0.289
	(0.323)	(0.329)	(0.394)	(0.187)	(0.188)	(0.187)
Ln $FDIGDP_{(t-1)}$	-0.142	-0.123	-0.263	-0.155*	-0.158*	-0.137*
	(0.143)	(0.146)	(0.175)	(0.0795)	(0.0797)	(0.0806)
Ln $MYS_{(t-1)}$	0.692	0.858*	-0.0141	1.425***	1.401***	1.530***
	(0.487)	(0.496)	(0.595)	(0.268)	(0.273)	(0.256)
Ln $RQE_{(t-1)}$	0.239	0.0246	1.193	0.956*	0.989**	0.808
	(0.895)	(0.913)	(1.095)	(0.487)	(0.488)	(0.492)
Ln $INFCPI_{(t-1)}$	-0.508**	-0.513**	-0.515*	0.162	0.163	0.163
	(0.215)	(0.219)	(0.262)	(0.123)	(0.124)	(0.121)
Ln $TLCPC_{(t-1)}$				0.151***		
				(0.0488)		
Ln $ONBLCPC_{(t-1)}$					0.150***	
					(0.0489)	
Ln $OFFBLCPC_{(t-1)}$						0.153***
						(0.0483)
Constant	0.371	0.124	-1.158	1.322*	1.359*	1.560**
	(1.422)	(1.450)	(1.739)	(0.764)	(0.774)	(0.772)
Observations	106	106	106	105	105	105
Adj. R-squared	0.887	0.883	0.846	0.839	0.837	0.846

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

Finally, to further assess the robustness of our main findings to endogeneity, we run Two-Stage Least Squares (2SLS) for both FIBs and the HCBs employing Total Equity Per Capita (TEPC) as an instrumental variable following Berger and Sedunov (2017). The results are presented in Table 12. First, the one-year lagged coefficients of FIBs and the HCBs TEPC are positively related to the TLCPC and are statistically significant at the 1% level. This confirms that our instrumental variable is valid. Hence, using this instrumental variable in the 2SLS regression, we find that both FIBs and HCBs liquidity creation per capita impact real economic output positively. Meanwhile, the impact of HCBs' liquidity creation per capita is again slightly greater than the impact of the liquidity created by FIBs. These results are robust and consistent with our main findings that liquidity created by the HCBs fosters real output better than that created by the FIBs[17].

17- These findings are consistent with the main findings regardless of excluding Malaysia, Egypt and Pakistan, all three countries, and Saudi Arabia and Oman as shown in the supplementary appendices 1- 4 in Table 7 and Table 8, respectively.

Table 12.
Impact of HCBs Liquidity Creation Per Capita on Real Economic Output Using 2SLS

	First-Stage Least Square			Two- Stage Least Square		
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Ln $TEPC_{(t-1)}$	0.759***	0.765***	0.746***			
	(0.0502)	(0.0495)	(0.0573)			
Ln $GEGDP_{(t-1)}$	0.255	0.266	0.312	0.225**	0.224**	0.210**
	(0.241)	(0.238)	(0.276)	(0.0950)	(0.0956)	(0.0963)
Ln $TOGDP_{(t-1)}$	0.544*	0.457	0.919***	0.313***	0.334***	0.225*
	(0.285)	(0.281)	(0.325)	(0.114)	(0.114)	(0.119)
Ln $FDIGDP_{(t-1)}$	-0.179	-0.159	-0.246	-0.0969*	-0.102*	-0.0806
	(0.130)	(0.128)	(0.148)	(0.0520)	(0.0522)	(0.0533)
Ln $MYS_{(t-1)}$	0.910**	0.846*	1.128**	1.249***	1.265***	1.198***
	(0.451)	(0.445)	(0.515)	(0.179)	(0.180)	(0.182)
Ln $RQE_{(t-1)}$	-0.398	-0.249	-1.216	0.876***	0.840**	1.070***
	(0.830)	(0.819)	(0.948)	(0.321)	(0.324)	(0.320)
Ln $INFCPI_{(t-1)}$	-0.144	-0.136	-0.185	0.159**	0.156*	0.172**
	(0.198)	(0.196)	(0.227)	(0.0788)	(0.0792)	(0.0798)
Ln $TLCPC_{(t-1)}$				0.224***		
				(0.0257)		
Ln $ONBLCPC_{(t-1)}$					0.222***	
					(0.0257)	
Ln $OFFBLCPC_{(t-1)}$						0.228***
						(0.0264)
Constant	-1.121	-1.110	-3.908***	1.434***	1.432***	2.064***
	(1.281)	(1.264)	(1.464)	(0.506)	(0.509)	(0.529)
Observations	108	108	108	107	107	107
Adjusted R-squared	0.885	0.887	0.859	0.926	0.925	0.924

Notes: *, ** and *** denote significance at 10%, 5% and 1% respectively.

4.4. Additional Robustness Checks[18]

To further confirm the robustness of our main findings, we do additional robustness checks by re-estimating our baseline regressions after excluding Malaysia, Egypt and Pakistan each at a time and all three of them altogether at once. We exclude these countries for the following reasons: First, Malaysia has the highest number of FIBs, and HCBs are mainly subsidiaries of foreign banks; Second, Egypt and Pakistan have the highest number of HCBs compared to FIBs. Therefore, excluding these countries and re-evaluating the comparative impact of FIBs and the HCBs liquidity creation per capita on real economic output is more informative and less biased. Our results, confirm the robustness of our main findings that while both FIBs and the HCBs liquidity creation impacts real economic output positively, the impact of the liquidity created by the HCBs on real output is greater than the impact of liquidity created by FIBs.

18The results for this sub-section are not reported. They are available from the authors upon request.

We also comparing the impact of the liquidity created by the HCBs on real economic output to that of the overall CBs and PCBs by excluding Saudi Arabia and Oman. From the results, we observe that the impact of the liquidity created by HCBs on real economic output is much greater[19]. This strong evidence suggests the greater impact of the liquidity created by HCBs on real economic output compared to that of their FIBs counterparts. For instance, a one percentage point increase in liquidity creation per capita by PCBs fosters real output by 2.14 basis points, whereas for the case of the HCBs, a one percentage point increase in the liquidity created by the HCBs spurs real economic output by 9.16 basis points.

V. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Since the 2007-2009 GFC, Islamic finance has attracted the attention of policymakers and academics as an alternative financial system, particularly in Muslim-majority countries given its stability during the crisis (Aysan et al., 2018; Beck et al., 2013; Hasan & Dridi, 2011). Several studies have shown that FIBs enhances the stability of the financial system (Rizvi et al., 2020) and efficiency of CBs (Abedifar et al., 2016) while creating more liquidity for the real economy compared to their conventional counterparts (Berger et al., 2019; Safiullah et al., 2020; Viverita et al., 2023) and promoting financial system development (Gheeraert, 2014) and economic growth (Boukhatem & Moussa, 2018; Imam & Kpodar, 2016; Kumru & Sarntisart, 2016). Meanwhile, to weather the effect of the GFC and to maintain their clients and businesses, conventional banks have also started engaging in Islamic banking businesses by operating Islamic windows and branches. This has shifted the banking system in most Muslim-majority countries from a dual banking system to a tri-banking banking system. Most of the studies have investigated mainly the performance of FIBs in comparison to their conventional counterparts, except for a handful of studies that have compared them with that of HCBs and PCBs (Abedifar et al., 2013; Doumpos et al., 2017; Mohammad et al., 2020; Trinugroho et al., 2021). However, the impact of liquidity creation per capita of FIBs on real economic output compared to HCBs has been overlooked despite the statistically significant positive impact of FIBs on economic growth. In this study, we examine the comparative impacts of the liquidity created by FIBs and HCBs on real economic output using a dataset of 182 banks (69 FIBs and 113 HCBs) from 10 countries for the period of 2012 to 2022 employing the FGLS framework.

Our findings show that both FIBs and HCBs liquidity creation impacts real economic output positively. These findings are statistically significant and economically meaningful. However, the impact of liquidity created by HCBs on real output is greater than that of FIBs. In terms of bank size, liquidity created by

19- These findings are robustly confirmed when exclude Malaysia, Egypt and Pakistan, all three of them and Saudi Arabia and Oman. Both the results of the overall CBs and PCBs is lower than that of FIBs and HCBs. Interestingly, the impact of small CBs and PCBs generally positive but not statistically significant. Meanwhile, the results of the 2SLS of the overall CBs and PCBs when excluding Saudi Arabia and Oman is only statistically significant at 10% and is positively and negatively related to real economic output for overall CBs and PCBs, respectively.

both large and small FIBs and HCBs are positively related to real economic output. In terms of economic significance small FIBs have greater impact whereas for large banks, HCBs have greater economic significance impact on real economic output compared to FIBs.

Nevertheless, during the COVID-19 pandemic, liquidity created by HCBs has a greater negative impact on real economic output than that created by FIBs. Furthermore, both FIBs and HCBs liquidity creation have non-linear impact on real economic output. Finally, in comparing the impact of FIBs liquidity creation on real economic output to that of purely conventional banks (PCBs), we find that liquidity created by FIBs to have a greater impact on real economic output compared to the liquidity created by PCBs. This supports the argument that the superior impact of the HCBs on real economic out relative to that of FIBs mainly arises from their larger footprint, which covers a wider span of industries and greenfield infrastructure financing through both conventional and Islamic modes. These findings are robust to on-and-off-balance sheet liquidity creation per capita and to the exclusion of multi-country operating banks. Finally, these findings are statistically and economically significant and are also robust to a number of sub-sample tests and endogeneity using 2SLS.

5.2. Recommendations

Given the findings of this study, we suggest three key recommendations for policy makers. First, we find a statistically and economically significant positive impact of the liquidity created by both FIBs and HCBs. However, the impact of the liquidity creation per capita by HCBs on real economic output is found to be greater compared to that of FIBs. This implies that liquidity created by HCBs fosters real economic output better than the liquidity created by FIBs. Therefore, policy makers in Muslim-majority countries with lower economic growth should encourage more HCBs to enhance the economic growth.

Second, the results of this study reveal that liquidity created by both FIBs and HCBs during COVID-19 impacts real output negatively, however, the impact is more pronounced for the case HCBs than that of FIBs. Meanwhile, there is evidence of nonlinearity of the liquidity creation impact on real economic output by both types of banks but more pronounced again for the case of HCBs. This implies that liquidity created by FIBs has less detrimental and lower nonlinear effects on real economic output compared to that of HCBs. Therefore, HCBs liquidity creation should be monitored more during crisis and normal times as too much liquidity creation impacts real economic output negatively.

Finally, with regards to banks' size, the results of this study report that liquidity created by both large and small FIBs and HCBs spurs real economic output. However, both large and small FIBs' impact on real output is greater than that of both large and small HCBs respectively. Therefore, based on these findings we suggest that policy makers and governments, especially those that intend to build their Islamic banking sector, should incentivize FIBs to merge to be bigger and to expand their scope, diversify across industries and engage in greenfield financing. This should enable FIBs to not only have greater impact on real output

but also be more competitive, enhancing the nation's financial sector stability and efficiency.

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