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Liquidity Creation and Economic Growth: Are They Monotonically Related? Evidence from MENA Countries

Ali Almeshari [1,2,*], Mohamed Hisham Bin Dato Haji Yahya [3,*], Fakarudin Bin Kamarudin [3] and Sha'ari Abd Hamid [1]

[1] Putra Business School (PBS), University Putra Malaysia, Serdang 43400, Malaysia
[2] Banking Department, College of Economics and Administative Sciences, Imam Muhammad Ibn Saud University, Riyadh 11564, Saudi Arabia
[3] Accounting and Finance Department, School of Business and Economics, University Putra Malaysia, Serdang 43400, Malaysia
* Correspondence: ali.phd16@grad.putrabs.edu.my or aameshari@imamu.edu.sa (A.A.); mohdhisham@upm.edu.my (M.H.B.D.H.Y.)

Abstract: Over the period 2000–2019, we reexamine the connection between finance, as measured by one of the primary banking sector functions—liquidity creation (LC)—and economic growth (EG) in 10 MENA countries panel. In a scenario seen as a dynamic heterogeneous panel, pooled mean group estimates demonstrate that LC and EG may have a favourable long-run connection while also having no influence in the short-run. In addition, results reveal an inverted U-shaped link between LC and EG over the short-term and long-term. This indicates that an excess of financial resources may be counterproductive to development in MENA nations.

Keywords: liquidity creation; economic growth; monotonicity; non-linear; ARDL(*p*,*q*); MENA

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1. Introduction

The finance–growth relationship is considered to be an old and heatedly debated subject; however, a consensus has not been achieved yet. Several research works were conducted on this area. However, the notion that finance can spur growth can be traced back to Schumpeter (1912), who paved the way for scholars to investigate such a claim. Since then, scholars and researchers have taken it upon themselves to investigate this nexus intensively. The vast empirical literature of this nexus can be distilled into three main views. The first view supports Schumpeter's view, which considers finance as an engine for EG. On the other hand, the second school of thought claims that EG leads the financial sector, whereas some of the opponents' scholars opine that the financial sector has no effect on economic growth.

Theoretically, economic theory focuses on external growth variables, including the labor force, capital stock, population, and technological development, to explain economic growth. Schumpeter (1912) and Gurley and Shaw (1955) underlined finance's importance, whereas theoretical economic resurgence of endogenous growth showed that endogenous technology development and externalities might affect growth. Consequently, innovation, human capital, and government spending are considered endogenous growth determinants, and the financing of these by the financial sector results in externalities. The enhancement of resource allocation, the acceleration of total factor productivity development and the decrease of transaction costs all contribute to EG (Beck et al. 2000). King and Levine (1993) and Levine (2005) considered the strength of the finance–growth link as ultimately an empirical issue. Thus, this nexus has prompted researchers to delve into it extensively through the use of numerous econometric methods, including cross-country, time series, panel data, and firm-level studies, as well as through the use of various proxies for the financial sector and the evaluation of various aspects of the financial system, including its

size, depth, and lending, to name a few. Generally, the vast literature of finance–growth has linked the financial system and banking sector specifically to the real economy (such as in Greenwood and Jovanovic 1990; King and Levine 1993; Demirgüç-Kunt and Maksimovic 1998; Bekaert et al. 2005; Arcand et al. 2015). Such a nexus was assessed based on some classic measurements such as liquid liabilities, M2 and credit to private sector, to name but a few among many. It is agreed among researchers interested in this nexus that there is no unique measure that can be employed to assess the role of the banking sector, taking into account that the financial system is considered multi-faceted. Yet, one of the main activities of the banking sector, i.e., liquidity creation (LC), seems to be neglected. Several scholars have reported that LC is one of the fundamental roles that banks play in any financial system in each country, by transferring deposited savings into investments (Diamond and Dybvig 1983; Holmström and Tirole 1998; Berger and Bouwman 2009). The uncertainty of liquidity forces investors to hold liquid assets represented in bank deposits rather than to hold illiquid assets. The subliminal reasons of this situation consist of the uncertainty involved with the unexpected needs for cash, and the unknown cost of dissolving an illiquid asset. As a result, banks play their role for investors, to keep their money until it is needed and provide the required liquidity to needy borrowers (Diamond and Rajan 2001).

When the public is provided with bank loans (illiquid assets), which are taken from deposits (liquid liabilities), such activity is considered as one of the channels through which banks spur economic growth through resources allocation, being representative of on-balance sheet activities (Berger and Bouwman 2009). Whereas, the off-balance sheet activities are the second method that banks use to create liquidity (Berger and Bouwman 2009; Holmström and Tirole 1998; Kashyap et al. 2002). Using derivatives, letters of credit and loan commitments (off-balance sheet activities), helps investors in planning their investments and other expenditures and hedging against risks connected to future changes in interest rates and foreign currency (Committee on the Global Financial System 2014; Berger and Sedunov 2017). Furthermore, banks with a more fragile capital structure are more able to create liquidity compared to those with a less fragile structure (Diamond and Rajan 2001). This is attributed to the incentives of wider monitoring of borrowers to increase loans and extend the existing loans (Berger and Bouwman 2009) which is considered as another channel through which banks spur economic growth by monitoring and boosting corporate governance. Thus, the aforementioned functions highlighted by Levine (2005), that through banks spur EG, are found in LC.

Until Berger and Bouwman (2009) introduced LC measures for liquidity creation, it was thought a theoretical concept. Over the past decade, most research in LC has taken advantage of employing Berger's and Bouwman's measurement to investigate several areas in the economic and finance field such as bank failures (Fungacova et al. 2021; Zheng et al. 2019), LC cyclicality (Davydov et al. 2018; Tang et al. 2021), banks' profitability (Arif and Nauman Anees 2012; Sahyouni and Wang 2019), competition (Jiang et al. 2019; Horvath et al. 2016), etc.

LC measurement has gained the attention of some scholars (Fidrmuc et al. 2015; Berger and Sedunov 2017; Beck et al. 2020; Umar et al. 2021), where the role of LC was investigated in developed countries. Additionally, Beck et al. (2020) utilized panel data. The preceding study used the measurement suggested by Berger and Bouwman (2009) to establish LC; however, they ignored the heterogeneity in financial infrastructure development across their sample nations. Depending on a country's financial system development, securitizing bank assets may be easier or tougher. Thus, banks in developed nations describe some assets as semiliquid, whereas banks in developing countries classify them as illiquid. With this backdrop, the purpose of this research is to contribute to finance and growth literature by using sophisticated econometric techniques to investigate the function of LC in this nexus for MENA countries and to determine whether liquidity creation would have a comparable impact on MENA economic development. Since debt market and non-bank financial institutions of the MENA countries are considered as less developed, the equity market is narrow compared to banks (IMF 2018) and the liquidity creation is mainly used

to measure banks' output, hence, the bank-based financial system becomes the core of discussion in this study. Furthermore, not only do we investigate the linearity of finance and growth, by employing and assessing the role of LC in this nexus, but also the potential non-monotonicity of the connection between LC and EG. Admittedly, a considerable number of works in the current literature recommend that once a certain threshold is reached, the impact of finance on growth in the banking sector turns negative (Cecchetti and Kharroubi 2012; Arcand et al. 2015); in recent times this impact might, in probability, have disappeared (Rousseau and Wachtel 2011). Yet, such a notion has been neglected even by studies that have previously examined the role of LC on EG. Thus, we believe it is legitimate to investigate whether or not LC and EG are monotonically related.

We want to add to the empirical literature on the topic of the role of finance in EG as follows:

In the first step, the well-known analysis of dynamic panel heterogeneity was used (Pesaran et al. 1999), and then extended to the finance and growth nexus (Loayza and Ranciere 2005; Samargandi et al. 2015). Using the model of autoregressive distributed lag (ARDL), the short- and long-term consequences of LC on EG were analysed. Because of this model's flexibility, we can account for differences across countries, and this distinguishes our paper from others that use both fixed-effect and generalized methods of moments (GMM).

The second factor is that 10 MENA[1] nations are taken into account. Incongruously, substantially less is known about this nexus in the MENA region, and there is a noteworthy dearth of empirical studies concentrating on LC; this void in the literature is addressed in part by our research, which adds novelty to our work.

Third, we choose LC as an improved measurement for gauging the output of the banking sector since there are different indicators that might represent the banking sector's role. To add uniqueness to our LC calculation, our activity classification will differ from the main (Berger and Bouwman 2009). Our sample includes developing countries; thus, we must characterize asset and liability disposal differently. Finally, not only do we focus on the linearity of this nexus, but also extend our work to assess the potential nonlinearity of the finance–growth relationship. As shown in Arcand et al. (2015) and Easterly et al. (2000), it is common practice to add a quadratic term to the financial variable to analyse finance on growth or growth volatility impact at the second order. A negative value for this quadratic component would suggest that there is a diminishing correlation between the independent and dependent variables over a certain threshold. We adopt this method following Lind and Mehlum (2010) and Samargandi et al. (2015), in order to test for the existence of U- or inverted U-shaped correlations to ensure the validity of our findings.

To do this, we produced an unprecedented LC dataset between 2000 and 2019 and used the autoregressive distributed lag (ARDL) model, validated by robustness tests. That yields a variety of intriguing findings. First, in the long-term, LC improves EG, whereas the effect of LC on EG in the short-run is statistically insignificant. Second, there is also a threshold beyond which LC begins to have an inverse influence, supporting the literature's short-term insignificance effect. These findings may have several implications. First, it implies that excessive LC by banks might be harmful. LC over a given threshold raises the chance of bank failure, ultimately leading to the removal of the important liquidity-creators and a decrease in aggregate liquidity generation in the economy. Thus, regulatory authorities may need to pay greater attention to banks' liquidity-creating operations when spotting financial system risks. Second, both regulatory agencies and risk departments of banks in MENA may seek to include LC into their early warning systems in order to increase scrutiny or avert bank crises.

Our paper has the following structure: In the Section 2, we conduct a review of literature, highlighting the underlying theories as well as empirical works. The data sources, the formulation of our measures of LC, and the control variables are discussed in Section 3. Section 4 comprises the empirical model, the econometric approach, and our empirical results as well as a discussion of the empirical findings. Section 5 concludes the paper with recommendations and study limitations.

2. Literature Review

The literature has reported studies on the relationship between finance and economic growth extensively. Researchers have been able to fully explore the impact of finance on economic growth. Several studies (Greenwood and Jovanovic 1990; Bencivenga and Smith 1991; Roubini and Sala-i-Martin 1992; King and Levine 1993; Deidda 2006) used this framework to explain how the financial sector may affect economic growth. According to these researches, financing promotes growth (Levine 1997). However, others (Robinson 1952; Stern 1989; Stiglitz 1994) opposed the previous opinion. They opine that economic growth encourages finance rather than vice versa.

Relating to empirical works, an enormous amount of work has been carried out to investigate this nexus. Goldsmith (1969) studied 35 nations and found a positive correlation between finance and growth. Well-developed financial markets boost capital allocation and long-term development via multiple mechanisms. Beck and Levine (2004) showed that stock markets and banks affect and boost EG in 40 countries. In their studies, Arestis et al. (2001) reported that stock markets and credit support EG; nevertheless, the banking sector is said to be more influential. King and Levine (1993) used data from 77 nations from 1960–1989 and a positive relationship was established between the financial sector and GDP growth. Similarly, EG was found to hamper banks' growth, whereas stock market development measures boosted growth (Saci et al. 2009). Falahaty and Hook (2013) came to the same conclusion as Saci et al. (2009) for MENA countries.

Furthermore, previous studies focusing on the MENA region have revealed a positive impact of finance on EG (Al-Malkawi and Abdullah 2011; Hamadi and Bassil 2015; Boukhatem and Ben Moussa 2018). On the contrary, some previous studies (e.g., Al-Zubi et al. 2006; Goaied and Sassi 2011; Gazdar and Cherif 2015) showed either a negative effect or insignificant relationship between finance and EG. However, the inconsistent outcomes are attributable to discrepancies across research, including differences in financial indicators, country samples, time periods, econometric technique, and the list of variables employed.

A new strand in the literature is centered on the concept of LC as a means of overcoming the inherent gap in assessing the role of LC on EG as a main function that banks preform. For instance, the effect of LC on EG for Russia using Berger and Bouwman's (2009) technique on a large panel dataset of Russian banks spanning the period 1999–2009 was assessed by Fidrmuc et al. (2015). They uncovered evidence of the positive effect of LC on EG, and established that the greatest LC in Russia came from state-controlled banks and Russia's largest banks. In the same vein, Berger and Sedunov (2017) evaluated the LC role for US banks and reported a significant positive relationship between LC and EG. Beck et al. (2020) assessed the role of LC and investment as a channel through which LC affected EG, using panel data for 100 countries. They found that LC is linked to EG at the national and sector levels. LC stimulates tangible investment, while intangible investment is not stimulated and does not help development in intangible asset-heavy economies. Whereas the effect of LC on China's economic output, using data from 377 banks encompassing the years 2006 to 2017, was examined by Umar et al. (2021), who concluded there was a negative relationship between LC and Chinese economic output.

Nonlinearity of the Nexus

The severity of several financial crises has forced scholars interested in the finance–growth nexus to reconsider the link between finance and growth. Financial instability is accused of destabilizing production and investment, leading to a drop in EG. For instance, the wake of global financial crises aroused the curiosity of researchers to re-examine this relationship and reveal the repercussions of this crisis that led to the emergence of the "vanishing effect" of finance and a non-monotonic relationship. Previous studies demonstrated and cast light on what later became known as a hump-shaped relationship, such as Arcand et al. (2015), Beck et al. (2014a, 2014b), Law and Singh (2014), Rousseau and Wachtel (2011), and Samargandi et al. (2015).

It seems that the topic of the linking of finance to economic growth has not achieved a firm footing among scholars, particularly when it comes to LC, the function that is regarded a significant tool of the banking financial system. Previous research can only be considered a first step towards a more profound understanding of the effect of LC on EG. Furthermore, despite the confirmation of a number of empirical investigations, previous studies that took the initiative to examine the impact of LC on EG have almost exclusively focused on the linearity of the nexus, neglecting the potential of a nonlinear relationship. Therefore, to our knowledge, no prior studies have examined the linearity of LC and EG.

3. Data Description

3.1. Sample

From 2000 to 2019, the sample included all banks trading in stock markets of the following countries: Bahrain, Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia and the United Arab Emirates. In order to be included in the sample, criteria such as publicly traded share prices and the absence of mergers or decodes throughout the research period were used. Since commercial banks are the primary sources of liquidity to the economy, they are the only institutions taken into consideration. After ensuring that no banks appear twice in the dataset, this research makes use of unconsolidated statements, measured by the US dollar, culled from Bloomberg Terminal. The Bloomberg Terminal offers a number of substantial advantages: (i) the availability of the samples for the whole period's financial statements; (ii) the financial statements are in accordance with international reporting and accounting norms. The macroeconomic variable (GDP) per capita and other control variables data are obtained from the World Bank (World Development Indicators database).

3.2. The Dependent and Independent Variables

GDP per capita (GDPPC) as a measure of EG is regarded as one of the best measures used in the finance–growth nexus, being a reflection of the annual gross value added by all resident producers (GDP) divided by the midyear population in an economy, and will be used as the main dependent variable.

To measure the LC (CATFAT) we took multiple steps, as suggested by Berger and Bouwman (2009). Firstly, all on-balance and off-balance sheet activities were classified as liquid, semi-liquid and illiquid.

Secondly, weights were assigned to the activities as demonstrated in Table 1.

Finally, activities combined as classified and weighted in step 1 and 2 and off-balance sheets activities were either included or excluded.

It is worth mentioning here that our approach is different from the main (Berger and Bouwman 2009), relating to the classification of the activities. This is due to the fact that our sample includes developing countries, which forces us to take the classification of the ease and cost of disposing assets or liabilities in a different way. Thus, our study followed Ali et al. (2022), Berger et al. (2019), Sahyouni and Wang (2019, 2022) in terms of classification for developing countries. Such calculation makes our study more relevant to assess the role of LC in the context of the MENA region and it distinguishes our study from others.

We utilized over 3680 annual bank observations for 184 listed banks to calculate liquidity creation measures in the region of the study. For each country, this information was used to calculate the liquidity created by individual banks. The CATFAT, the preferred measurement for LC that includes all the on- and off-balance sheet activities, according to Berger and Bouwman (2009), for each bank at various moments in time was provided by computation, as mentioned above. We computed an aggregate LC for each country to blend this data with the aggregate variable dataset. Then, we totaled the aggregate of liquidity created by all listed banks in each country for the same year to obtain the CATFAT for each year. Finally, in accordance with Berger and Sedunov (2017) and Beck et al. (2020), we standardized LC by dividing annual LC by the midyear population to obtain LC per capita (LCPC) for regression analysis in order to obtain meaningful coefficients.

Table 1. The classification and assigning of bank activities[2].

Assets		
Illiquid Assets (Weight = −1/2)	Semiliquid Assets (Weight = 0)	Liquid Assets (Weight = 1/2)
Residential mortgage loans (developing countries) Other consumer/retail loans (developing countries) Other mortgage loans Corporate and commercial loans, other loans, investment in property, insurance assets foreclosed real estate, fixed assets Goodwill, other intangibles Current tax assets, deferred tax assets, Discontinued operations, other assets	Residential mortgage loans (developed countries) Other consumer/retail loans (developed countries) Loans and advances to banks	Reserve repos and cash collateral Trading securities and at FV through income Derivatives Available for sale securities Held to maturity securities At-equity investment in associates Other securities Cash and due from bank
Liabilities Plus Equity		
Liquid liabilities (weight = 1/2)	Semiliquid liabilities (weight = 0)	Illiquid liability plus equity (weight = −1/2)
Customer deposits—current Customer deposits—savings Deposits from banks Repos and cash collateral Derivatives Trading liabilities	Customer deposits—term Other deposits and short-term borrowing	Senior debt maturing after 1 year Subordinated borrowing Other funding Fair value portion of debt Credit impairment reserves Reserves for pensions and other Current tax liabilities Deferred tax liabilities Other deferred liabilities Discontinued operations Insurance liabilities Other liabilities Common equity Non-controlling interest Securities revaluation reserves Foreign exchange revaluation reserves Fixed assets revaluation and other accumulated OCI
Off-Balance Sheet		
Illiquid guarantees (weight = 1/2)	Semiliquid guarantees (weight = 0)	Liquid guarantees (weight = −1/2)
Guarantees Acceptances and documentary credits Reported off-balance sheet Committed credit lines Other contingent liabilities	Other off-balance sheet exposure to securitizations	Managed securitized assets reported Off-balance sheet

Our estimates utilize typical finance–growth control factors. Despite several theoretical frameworks seeking to explain economic development, an agreement on regression control variables has not been reached. Levine and Renelt (1992) stated that there are more than 50 control variables correlated with EG. Thus, the model incorporated many control variables to compensate for any substantial influence of these factors to the economic development of MENA nations throughout the research period. We emphasized characteristics that various academics have identified as major predictors of EG in this region of the world and highly used in assessing this nexus, such as Makdisi et al. (2006) and Malik and Masood (2022). The set of control variables include: trade openness (TO), in order to represent the relevance of foreign influences in affecting economic activity; similarly, labor force (LF), measured by total labor force; while inflation (INF) is introduced as a business and economic stability proxy. Finally, given the significant endowment of MENA members in natural resources,

particularly oil, some empirical papers have employed oil as a control variable. We follow Samargandi et al. (2014) and include the yearly price of crude oil.

4. Methodology and Model Specification

Dynamic Panel Estimations

This research aims to investigate the effect of LC on EG using a balanced panel sample of 10 countries (N = 10) over a 20-year period (T = 20), taking into consideration the possibility of heterogenous dynamic issues across countries. Thus, an autoregressive distributed lag (ARDL) (*p*,*q*) model in the error correction form was an appropriate technique employed to investigate the dynamic panels, where p represents the lag of outcome variable and q represents the lag of explanatory variable, and can be stated, following Loayza and Ranciere (2005), and Samargandi et al. (2015), as:

$$\begin{aligned}\Delta GDPPC_{i,t} = & \sum_{j=1}^{p-1} \gamma_j^i \Delta GDPPC_{i,t-j} + \sum_{j=0}^{q-1} \delta_j^i \Delta X_{i,t-j} \\ & + \varphi^i \left[GDPPC_{i,t-1} - \left\{ \beta_0^i + \beta_1^i \Delta X_{i,t-1} \right\} \right] + \epsilon_{it}\end{aligned} \tag{1}$$

GDPPC stands for GDP per capita, X is a vector of independent variables including our main independent variable, i.e., LCPC. γ, δ stand for the short-run coefficients of outcome variable and predictor variables, respectively. β and φ stand for the long-run coefficients and speed for the adjustment to the long-run equilibrium, respectively. The subscripts i and t represent country and time, respectively. The long-run growth regression is represented in the square brackets of Equation (1). We can estimate Equation (1) by the pool mean group (PMG) of Pesaran et al. (1999), mean group (MG) model of Pesaran and Smith (1995), or the dynamic fixed-effect estimator (DFE).

The first estimator (PMG) allows the short-run coefficients (including the error variances, the speed of adjustment to the long-run equilibrium values and the intercepts) to be different between countries compared to the long-run slop coefficients, which are required to be homogeneous across countries.

The PMG estimator requires certain criteria to be met. Firstly, the efficiency, consistency and validity of this strategy need a long-run relationship among the variables of interest; thus, the error correction term coefficient must be negative and no lower than −2. Secondly, if PMG estimates are to be trusted, the explanatory variables must be exogenous and the residual from the error-correction model must be serially uncorrelated. Thirdly, in order to utilize the dynamic panel approach, then T and N need to be somewhat big to avoid the bias in the average estimators. Managing heterogeneity, according to Eberhardt and Teal (2011), is crucial to grasping the expansion process as a whole.

Using the second approach (MG), we estimate a regression for each cross section independently. Thus, the MG approach permits a short-run and long-run coefficient heterogeneity. Having a large time series dimension is crucial to the reliability of MG estimators.

Lastly, DFE is quite similar to the PMG estimator, with the restriction that the slope coefficient and error variances must be the same for all countries in the long-run. In addition, the DFE model requires parity between the adjustment speed coefficient and the short-run coefficient. The model, however, incorporates intercepts that vary by country. The intra-group correlation and standard error may be estimated using the cluster option of DFE (Blackburne and Frank 2007). On the other hand, in the event of a small sample size, the simultaneous-equation bias is exacerbated by the endogeneity between the lagged dependent variable and the error term (Baltagi et al. 2000).

Since we are just looking at MENA nations, we assume that there will be little variation in terms of GDP growth and the development of the financial system throughout this group. In the near term, however, local rules and regulations will have an impact, leading to differences across countries. Under the hypothesis of long-run homogeneity, the PMG estimator provides more effective estimates than the MG estimator. The research covers a

period of 20 years, and it is possible that the MG estimator may not have enough flexibility to account for it. For this reason, the PMG estimate is preferable. However, the Hausman test is used to determine whether there is a statistically significant difference between the MG, PMG, and DFE approaches. The hypothesis being tested is that there is no statistically significant difference between the MG and PMG or PMG and DFE estimate.

Importantly, the ARDL lag structure should be defined by a reliable information criterion. Yet, the lag structure could be imposed by data constraints. When lags cannot be extended due to the short time dimension, a standard lag structure may be applied to all countries in the sample (Demetriades and Law 2006; Loayza and Ranciere 2005; Pesaran et al. 1999; Samargandi et al. 2015). Thus, we apply the following lag structure (1,1,1,1,1,1) for GDP per capita, LC, government spending, labor force, inflation, and oil price based on the Schwartz Bayesian criteria. Finally, we augment our analysis by estimating separate models for middle-income and high-income economies to see whether the influence of LC on economic development varies with income level.

5. Results and Discussion

5.1. Panel Unit Root Tests

Even though Pesaran et al. (1999) state that pretesting for unit root is needless, since the ARDL methodology can be employed whether the variables under investigation are I(0),I(1) or a mixture of I(0)and I(1), we performed the unit root test to make sure that no series exceeded I(1) order of integration. Four different types of panel unit root tests were employed: (i) Im, Pesaran and Shin (IPS), (ii) Levin, Lin and Chu (LLC), (iii) ADF-Fisher and (iv) PP-Fisher to determine the integration order between all the raw series in this research data set. The researchers include deterministic time trend in all the tests, the order of the optimum lag of the variables under investigation was selected according to the Akaike information criterion (AIC) and the Bartlett kernel approach was employed in estimating the long-run variance in all tests with an automatic maximum lag length determined by the Newey–West bandwidth selection. The results of unit root tests, which suggest that LF, INF and EXP are stationary of order I(0) with constant, while the rest of the variables are integrated of order I(1), are seen in Table 2. As a result, since we have a mixed order of integration, the panel ARDL approach is appropriate.

Table 2. Unit root test.

	Level				**1st Difference**			
	Im, Pesaran and Shin	**Levin, Lin and Chu**	**ADF-Fisher**	**PP-Fisher**	**Im, Pesaran and Shin**	**Levin, Lin and Chu**	**ADF-Fisher**	**PP-Fisher**
GDPPC	−0.2036 [0.4193]	−1.4971 *** [0.0672]	−0.1615 [0.4361]	1.8263 [0.9633]	−6.4541 * [0.0000]	−6.4542 * [0.0000]	−2.9604 * [0.0023]	−7.2283 * [0.0000]
LCPC	−0.5553 [0.2893]	−3.1318 * [0.0009]	2.6429 [0.9946]	−1.7764 ** [0.0409]	−6.9256 * [0.0000]	−8.1256 * [0.0000]	−3.3764 * [0.0007]	−12.5896 * [0.0000]
TO	−1.0311 [0.1512]	−3.0927 * [0.0010]	−1.2358 [0.1109]	0.6079 [0.7271]	−6.9256 * [0.0000]	−8.1901 * [0.0000]	−6.1800 * [0.0000]	−7.9266 * [0.0000]
LF	−3.8791 * [0.0001]	−6.9444 * [0.0000]	−6.1352 * [0.0000]	2.9042 [0.9973]	−0.0784 [0.4688]	−3.1133 * [0.0009]	0.6595 [0.7438]	2.0125 [0.9754]
INF	−3.8791 * [0.0001]	−6.9444 * [0.0000]	−6.1352 * [0.0000]	2.9042 [0.9973]	−0.0784 [0.4688]	−3.1133 * [0.0009]	0.6595 * [0.0000]	2.0125 [0.9754]
EXP	−3.8791 * [0.0001]	−6.9444 * [0.0000]	−6.1352 * [0.0000]	2.9042 [0.9973]	−0.0784 [0.4688]	−3.1133 * [0.0009]	0.6595 [0.7438]	2.0125 [0.9754]
OIL	2.6067 [0.9954]	−0.7150 [0.2373]	1.9942 [0.9974]	2.5883 [0.9938]	−5.7922 * [0.0000]	−8.1931 * [0.0000]	−4.7147 * [0.0000]	−7.12008 * [0.0000]

Notes: *, **, *** denote significance at 1, 5 and 10%, respectively. Values in [ ] are the *p*-values.

5.2. Descriptive and Correlation Analyses

Table 3 presents summary statistics for the data under investigation. The average GDPPC is USD 22,190.3, restating the high-income levels for the countries included in our sample. The standard deviation of this variable reemphasizes the difference between the countries in our sample based on their income level, since some of them are considered as middle-income level countries compared to high level income and oil producers. LCPC averaged at USD 267,616.4 with a high standard deviation equal to USD 1,398,336.2 and it ranges between USD −9118.3 to 17,607,860.0. TO ratio averaged at 97.2% with a standard deviation equal to 31.7%, reflecting the difference between countries among our sample where some of them were considered oil producers. LF, INF, EXP and OIL have mean values of 6,339,298, 83.7, 17.2 and 64.6, respectively (Table 3). The high standard deviation reemphasizes a substantial variability across the sample.

Table 3. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPPC	200	22,190.294	20,820.323	1976.1	69,679.1
LCPC	200	267,616.44	1,398,336.2	−9118.278	17,607,860
TO	200	97.241	31.763	30.246	191.872
LF	200	6,339,298	7,719,647.4	305,448	30,828,413
INF	200	83.741	26.86	19.531	137.968
EXP	200	17.209	4.999	0	30.003
OIL	200	64.56	28.506	24.45	111.63

The correlation matrix can be seen in Table 4, for the main variables that were constructed in the second stage. A correlation coefficient demonstrates a positive rise with a fixed fraction. Our dependent variable GDPPC has a positive relationship with our independent variables LCPC. Overall, we can infer that the liquidity creation of MENA's listed banks has a positive impact on EG. Thus, the tested hypothesis indicated a considerably favorable influence, demonstrating that liquidity creation has a favorable impact on economic progress. With everything taken into account, as we will show in our relapse examination underneath, these connections give an extremely unpleasant image of the bivariate connections because of the way that they just consider a solitary variable at a time.

Table 4. Matrix of correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) GDP_PC	1.000						
(2) LC_PC	0.052	1.000					
(3) TO	0.231	0.016	1.000				
(4) LF	−0.430	−0.096	−0.598	1.000			
(5) INF	0.131	0.122	0.287	−0.133	1.000		
(6) EXP	−0.221	0.222	−0.136	−0.250	−0.018	1.000	
(7) OIL	−0.019	0.016	0.220	0.087	0.601	−0.218	1.000

5.3. Linear Relationship: PMG, MG and DFE

Table 5 displays the results of PMG, MG, and DFE estimates, respectively, and the Hausman *h*-test, to assess their relative consistency as well as efficiency. The results indicate that LCPC has a positive and significant impact on EG in the long-run, while LCPC has a positive yet insignificant impact in the short-run, according to the PMG estimator.

Table 5. Results of pooled mean group, mean group, dynamic fixed-effect estimates and the Hausman *h*-test.

	Pooled Mean Group		**Mean Group**		**Dynamic Fixed-Effect**	
Variable	**Cofe.**	**Std. Error**	**Cofe.**	**Std. Error**	**Cofe.**	**Std. Error**
			long-run coeffecients			
LC_PC in log	0.056099 ***	0.020	−0.050	0.061	0.044 ***	0.025
TO in log	0.852 ***	0.111	0.149	0.367	0.203	0.265
LF in log	0.637 ***	0.044	0.218	1.232	0.095	0.217
INFL	0.007 ***	0.001	−0.012	0.018	0.006 **	0.003
EXP	0.014 **	0.007	0.052 *	0.058	0.038 **	0.018
OIL in log	−0.101 ***	0.024	1.636 *	1.697	0.189	0.117
error correction coefficient	−0.091 **	0.045	−0.666 ***	0.249	−0.088 ***	0.022
			short-run coeffecients			
Δ LCPC in log	0.015	0.010	0.001	0.017	−0.004	0.003
Δ TO in log	0.088	0.060	−0.064	0.149	−0.007	0.033
Δ LF in log	0.266	0.198	−0.403	0.543	0.280 ***	0.087
Δ INF	−0.003 **	0.001	−0.003 **	0.001	−0.000	0.000
Δ EXP	−0.011 ***	0.003	−0.011 **	0.008	−0.002	0.002
Δ OIL in log	0.053	0.039	0.069	0.050	0.027 *	0.016
intercept	1.093 **	0.525	4.728	3.974	1.959 ***	0.445
country	10		10		10	
observation	200		200		200	
hausman test	3.74				2.65	
p value	0.7112				0.8512	

Notes: *, **, and *** denote statistical significance of 10%, 5%, and 1%, respectively. Stata's 17 (xtpmg) procedure is used to make estimates (i.e., PMG, MG and DFE). Controlling for country and time effects. Long-term effects are seen in the first panel (LR), whereas, short-term impacts are reported in the second panel (SR), whereas (EC) represents the speed of adjustment. The Hausman test shows that PMG is more accurate and efficient than both the MG and DFE estimations. There is a lag structure of ARDL (1,1,1,1,1,1) and the order of the variables is: LCPC, TO, LF, GDP deflator, government expenditure and oil average annual price, all in natural logarithm.

Moreover, MG estimators show that in the long-run the effect is negative and insignificant, compared to a positive effect in the short-run but statistically insignificant, whereas the DFE results demonstrated that the effect is positive in the long-run and significant, while in the short-run the effect is negative but it is insignificant.

We can infer from the above that LC has a positive and significant effect on EG according to the results of PMG. A 1% increase in the LCPC, holding other variables constant, would lead to 0.06% increase in EG in the long-run ($p < 0.01$). However, the effect in the short-run is positive yet insignificant. These results revealed that banks' ability to create liquidity is beneficial to the economy in the long-run and lend credence to the idea that the banking sector has an effect on economic development in the Middle East and North Africa. It is consistent with the little research that has been conducted on this topic and it bolsters the findings of other studies (Fidrmuc et al. 2015; Berger and Sedunov 2017; Beck et al. 2020).

Furthermore, the effect is economically and statistically sound in the long-run in comparison with the short-run. This supports the predication of Loayza and Ranciere (2005) that finance will have a negative impact on economic growth in the short-term because of business cycles and financial instability. Additionally, it gives support to several theoretical frameworks that have been introduced in the literature (Gaytan and Ranciere 2001) to distinguish the effect of banking sector output in the short- and long-terms.

Dell'Ariccia and Marquez (2006) build a framework claiming that lending standards have various effects over time. During periods of expansions, and when the number of unidentified initiatives in the economy rises, lending standards are released, leading to higher lending, thus a higher LC and more susceptibility to shocks. On the other hand, during a period of business cycle contraction, the opposite is true.

Rajan (1994) presents a similar model that relies on bankers' incentives to explain financial instability. His model suggests that while most borrowers are solvent ("good" times), bank management would maintain loose lending practices (i.e., more liquidity generation) to disguise non-performing loans. When an economy experiences a shock on the macro level, managers have the motivation to tighten credit policy in order to protect themselves, which may have the unintended consequence of reducing liquidity creation. This procyclical lending strategy has the tendency to fund poor projects during prosperous times (greater LC) and deny funding to deserving businesses or liquidate long-term profitable businesses during recessions (lower LC).

In summary, all of these theoretical frameworks agree that the occurrence of financial instability and the risk of banking crises is the primary reason for the intermediation role of the financial system having either a negative or no impact in the short-run. In addition, the cyclicality of LC, which many countries, including Russia (Davydov et al. 2018) and China (Tang et al. 2021), have shown to be true, in our sample supports the findings of the short-run in our estimation.

Regarding the control variables, and according to the results of PMG for the short-run, the coefficients of EXP and oil are significant. While OIL shows an expected positive effect, EXP affects EG negatively. On the other hand, and according to the results of PMG long-term results, all the control variables show a positive and significant effect on the EG except oil, which showed a negative effect. If the sign of the link between EG and OIL depends on their movements (transitory or permanent), then this might account for the discrepancy between the findings of long- and short-run estimations from OIL; moreover, it gives support to "the curse of abundant natural resources" of Sachs and Warner (2001).

In econometrics, there is no one true method for modelling nonlinearity. Both threshold and polynomials (such as squaring) models are used. In this research (and in the research of Rousseau and Wachtel 2002; Arcand et al. 2015; Samargandi et al. 2015), the polynomials method is used to look at the possibility of non-monotonicity in the connection between LC and EG. We include a square term for LCPC (LCPC SQUERE) in order to test the monotonicity of LC. It worth mentioning that we drop the control variable OIL to keep our regression parsimonious.

According to the results shown in Table 6 of PMG, the effect of LCPC is positive and significant in both the short-run and in the long-run. The LCPC SQUARE is negative and statistically significant in both the short- and long-run, implying that the association between LC and EG is concave. The PMG is a better estimator than MG and DFE according to the Hausman test. These results corroborate Arcand et al. (2015)'s "Too Much Finance" notion. The long-term and short-term marginal effect of LC is beneficial up to a threshold amount and thereafter negative. In several of the countries included in our data set, the proportion of the economy devoted to banking is higher than what would be considered socially optimum. Therefore, an increase in LC may have a somewhat negative influence on EG.

Furthermore, the traditional econometric model has been used to test the composite null hypothesis that the association is decreasing on the left side of the interval and growing on the right side of the interval and vice versa. However, Lind and Mehlum (2010) have warned of employing such a technique. To illustrate, consider the following form given

$$y_{i,t} = \alpha LC_{i,t} + \beta LC_{i,t}^2 + \gamma Z_{i,t} + \varepsilon_{i,t} \tag{2}$$

Testing for an inverted-U connection requires the following joint null hypotheses:

$$H_0 : \ y\_i = (\alpha + 2\beta LC_{min} \leq 0) \cup \ (\alpha + 2\beta LC_{max} \geq 0) \tag{3}$$

where the minimal and highest levels of liquidity creation are denoted by LC_{min} and LC_{max}, respectively. The likelihood ratio method proposed by Sasabuchi (1980) is used by Lind and Mehlum (2010) to provide a test for the joint hypotheses posed by the aforementioned equation. Rejecting the null hypothesis would indicate the presence of a reverse U form.

Table 6. Relationship between LC and EG.

	Pooled Mean Group		Mean Group		Dynamic Fixed-Effect	
Variable	**Cofe.**	**Std. Error**	**Cofe.**	**Std. Error**	**Cofe.**	**Std. Error**
			long-run coeffecients			
LCPC in log	0.842 *	0.286	0.207	0.341	−0.179	0.153
LCPC Sequere	−0.029 ***	0.016	−0.028	0.022	−0.015 *	0.005
TO in log	0.501 *	0.156	0.622	0.402	0.203	0.174
LF in log	0.577 *	0.144	0.948 **	0.421	0.304 **	0.147
INFL	0.007 *	0.002	0.007 *	0.005	0.004 **	0.002
EXP	0.017 **	0.007	0.016	0.038	0.022 ***	0.012
error correction coefficient	−0.075 ***	0.042	−0.691 *	0.236	−0.110 *	0.023
			short-run coeffecients			
Δ LC_PC in log	0.030 *	0.011	0.106	0.255	0.051 *	0.017
Δ LC_PC sequere	−0.002 **	0.001	−0.008	0.014	−0.003 *	0.001
Δ TO in log	0.087	0.062	0.158	0.131	0.023	0.029
Δ LF in log	0.383 **	0.194	0.093	0.697	0.324 *	0.082
Δ INF	−0.001	0.001	−0.002 ***	0.001	0.000	0.000
Δ EXP	−0.011 *	0.003	−0.002 **	0.001	−0.002	0.002
intercept	0.977 **	0.471	2.446	2.000	2.057*	0.423
country	10		10		10	
observation	200		200		200	
hausman test	0.91				−34.96	
p value	0.9889				0.7682	

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

According to the results in Table 7, the LCPC slope is positive (0.648) at the lower bound but negative at the higher bound (−0.369). Thus, the null hypothesis was rejected, indicating that there is no inverted U form. Our findings are consistent with the occurrence of an inverted U-shaped relationship between LC and EG, as shown by the SLM test in the bottom panel of Table 7, where the null hypothesis is rejected.

Table 7. SLM test.

	Lower Bound (LC_{min})	**Upper Bound (LC_{max})**
Slope	0.6479859	−0.3694583
T-Value	12.91403	−7.076625
SLM test presence of an inverse U shape	7.08	
p-value	00.00	

5.4. Robustness Check

Even though our overall estimations assert that bank liquidity creation has a positive effect on economic growth, it is legitimate to investigate the role that LC played during the financial crisis where the subprime crisis was linked to liquidity shocks (e.g., Cornett et al. 2011; Fidrmuc et al. 2015). Furthermore, not only is finance is accused of influencing a banking crisis, but it is already recognized by several empirical studies that, in the cyclicality of banking sectors during business cycles, finance has a role in amplifying such cycles. As a result, we re-estimate our model by adding a dummy variable representing the global financial crisis (GFC), which took place in 2009–2010. Such a check test was performed by several researchers (Berger and Sedunov 2017; Fidrmuc et al. 2015; Arcand et al. 2015).

Thus, we replicate our main previous model by applying the ARDL estimator and including the interaction term between LCPC and crisis (Table 8). Our findings hold true even in normal times, as the coefficients for LCPC remain positive and statistically significant, with economic magnitudes similar to our core findings.

Table 8. Effects of bank liquidity creation on GDP.

Dependent Variable: Economic Growth		
Long-term coefficients:	**(1)**	**(2)**
LCPC in log	0.052 * (0.001)	0.088 * (0.001)
LCPC square		−0.010 *** (0.003)
crisis	−0.016 *** (0.072)	−0.124 *** (0.044)
LCPC*crisis	−0.002 ** (0.002)	−0.005 (0.026)
LCPC square*crisis		−0.026 (0.000)
TO in log	0.193 ** (0.113)	0.628 * (0.008)
LF in log	0.395 * (0.138)	1.722 * (0.016)
GDP deflator	−0.002 (0.002)	−0.024 * (0.000)
EXP in log	−0.008 * (0.006)	−0.074 * (0.001)
error correction coefficient	−0.114 * (0.035)	−0.118 ** (0.007)
short-term coefficients:		
LC_PC in log	0.005 (0.004)	−0.002 (0.010)
LC_PC square		−0.004 (0.003)
crisis	−0.016 *** (0.072)	−0.203 (0.011)
LC_PC_*crisis	−0.003 (0.002)	−0.001 (0.247)
LC_PC_ square*crisis		−0.004 (0.004)
TO in log	0.013 (0.052)	0.037 (0.050)
LF in log	0.421*** (0.216)	0.026 (0.445)
GDP deflator	−0.002 * (0.003)	−0.003 * (0.001)
EXP in log	−0.010 * (0.003)	−0.025 ** (0.011)
constant	2.160 * (0.674)	0.204 (0.237)

Note: The symbols *,**, and *** denote significance at the 1%, 5%, and 10% levels, respectively.

The dummy variable "CRISIS" is negative in both the short- and long-run but statistically significant in the long-run as shown in column 1. The interaction term for the financial crisis quantifies the crisis's deviation from normal times. The coefficient on the crisis interaction term is negative in both the short-term and long-term, re-emphasizing the negative impact on EG, suggesting that the stronger effect of the GFC weakened the positive effect of LC on EG during the last global financial crisis and showed the expected result that GFC are negatively correlated with EG. We also notice that inflation has become significant in both the short-term and long-term. In Column 2, where we added the LCPC SQUARE and LCPC square*CRISIS, we notice that LCPC increased and maintained its positive influence in the long-run. Moreover, LCPC SQUARE and CRISIS maintained their negative sign and significance, re-emphasizing the damaging influence of GFC and excess LC.

We also split our sample into six high-income countries (HIC) and four middle-income countries (MIC) based on World Bank classification and the preceding year's GNI per capita in current USD. We recalculated our estimates by applying ARDL regression based on the income category separately. Table 9 represents the results of our model based on the income as in column 1 and 3, whereas in column 2 and 4 we added the LCPC SQUARE to test the non-monotonicity in the nexus for HIC and MIC, respectively. For both HIC economies and MIC economies, the LCPC has a positive effect on EG and it is statistically significant ($p < 0.05$). A 1% in LCPC would lead to 0.011% and 0.055% change in GDPPC for HIC and MIC, respectively. In the short-term, LCPC is positive but statistically significant for MIC. Relating to the monotonicity of LC, column 2 and 4 show that the LCPC SQUARE has a negative sign, indicating that there is a threshold; beyond it, the positive effect of LC on EG becomes negative. Thus, we demonstrate that our finding of an influence of LC and a non-monotonic connection between LC and EG holds up even after accounting for macroeconomic banking crises and income level for the sample under investigation.

Table 9. The effects of bank liquidity creation on GDP for high and middle-income countries.

Dependent Variable: Economic Growth				
long-term coefficients:				
	HIC		MIC	
	1	2	3	4
LC_PC in log	0.011 **	0.031 *	0.055 **	0.023
	(0.005)	(0.008)	(0.025)	(0.023)
LC_PC square		−0.001 *		−0.010 *
		(0.004)		(0.001)
TO in log	0.285 *	0.231 *	0.881 *	0.395
	(0.033)	(0.042)	(0.120)	(0.064)
LF in log	0.591 *	0.572 *	0.541 **	0.990 *
	(0.042)	(0.051)	(0.265)	(0.186)
INF in log	0.003 *	0.001	0.008 *	−0.004 **
	(0.001)	(0.001)	(0.001)	(0.002)
EXP in log	0.005	0.017 *	0.016	−0.025 *
	(0.004)	(0.003)	(0.011)	(0.008)
OIL in log	−0.087 *		−0.101 *	
	(0.027)		(0.027)	
error correction coefficient	−0.270 ***	−0.277 ***	−0.101 *	−0.112 ***
	(0.204)	(0.078)	(0.027)	(0.076)
short-term coefficients:				
LC_PC in log	0.012	0.018	0.021 **	0.029 *
	(0.014)	(0.015)	(0.012)	(0.007)
LC_PC square		−0.010 ***		−0.029 ***
		(0.003)		(0.001)
TO in log	0.074	0.116	0.038 **	0.001
	(0.077)	(0.087)	(0.018)	(0.027)
LF in log	−0.279	−0.195	0.169	0.392 *
	(0.600)	(0.563)	(0.195)	(0.036)
GDP deflator	0.002	0.030	−0.004 **	−0.003 **
	(0.001)	(0.001)	(0.002)	(0.002)
EXP in log	−0.004 **	−0.004	−0.018 *	−0.021 *
	(0.003)	(0.004)	(0.006)	(0.006)
OIL in log	0.086 **		−0.011	
	(0.045)		(0.013)	
constant	4.452 ***	4.518	1.548 **	1.068
	(3.393)	(2.939)	(0.658)	(0.709)

Note: The symbols *,**, and *** denote significance at the 1%, 5%, and 10% levels, respectively.

Furthermore, it is legitimate to investigate the role of other subsets of the financial system such as the stock market.[3]

Thus, we replicate our main previous model by including a new variable representing market development and we dropped GDP DEFLATOR and EXP to keep our model parsimonious. Several variables have been used in the literature to represent market development such as turnover ratio, ratio of the value of the stocks quoted on the stock market to GDP, value of stock market transactions as a proportion of GDP, the growth rate of the capitalization of the stock market, etc. The available data that were consistent with our data included ratio of the value of the stocks quoted on the stock market to GDP (STOCKS). Results are presented in Table 10, where column 1 shows the results including the log of STOCKS and column 2 shows the results including the log of STOCKS and its square term. Column 1 of Table 10 shows a positive and monotonic relationship between the STOCKS and EG in the long-run. Our main independent, LCPC, is a variable still showing a positive and statistical effect, yet its effect is smaller compared to our main model, whereas the square term of LCPC showed higher effect compared to our main model while keeping both its sign and significance. The results in column 2, our variable of interest LCPCC and LCPC SQUARE, still maintain their signs and significance in the long-run compared to the short-run where they lost their significance. Our control variable STOCKS and STOCKS square lost their significance in both long-term and short-term. All in all, the non-monotonic relationship between LC and EG is robust in terms of controlling for STOCKS.

Table 10. The effects of bank liquidity creation on GDP while controlling for stock market.

Dependent Variable: Economic Growth		
Long-Term Coefficients:	**(1)**	**(2)**
LCPC in log	0.037 * (0.010)	0.020 ** (0.005)
LCPC square	−0.113 *** (0.966)	−0.352 * (0.623)
stocks	0.052 * (0.012)	0.004 (0.006)
stocks square		−0.432 (0.128)
TO in log	0.111 ** (0.049)	0.156 * (0.018)
LF in log	0.866 * (0.033)	0.835 * (0.010)
error correction coefficient	−0.211 ** (0.104)	−0.306 (0.188)
short-term coefficients:		
LC_PC in log	0.006 (0.009)	0.017 (0.012)
LC_PC square	−0.264 (0.180)	−0.004 (0.003)
stocks	−0.005 (0.005)	−0.203 (0.011)
stocks square		0.263 (0.336)
TO in log	−0.017 (0.045)	0.063 (0.077)
LF in log	0.180 *** (0.233)	0.050 (0.274)
constant	2.160 * (0.674)	0.204 (0.237)

Note: The symbols *,**, and *** denote significance at the 1%, 5%, and 10% levels, respectively.

6. Conclusions

The nexus of finance and economic growth literature has been intensely expanding, where most studies conclude that, on the whole, the financial sector plays a significant role in fostering growth. Such literature has employed several indicators representing finance such as size and depth, to name some, which assessed the role of different subsets of the financial sector, such as banks and the stock market. However, LC, as a main activity that banks perform in the economy, seems to be neglected in the context of developing countries. In this paper, we apply advanced econometric techniques to assess the impact of LC on EG. These include the error-correction-based autoregressive distributed lag ARDL(p,q) model, which offers three different tests: namely, mean group (MG), pooled mean group (PMG) and dynamic fixed-effects (DFE) estimators. The results obtained when imposing a linear relationship suggest that LC and EG are positively associated in the long-run in the sample of 10 MENA countries. This finding is in line with Beck et al. (2020), Berger and Sedunov (2017), and Fidrmuc et al. (2015), who found that LC positively influences EG, whereas the short finding is partially in line with Umar et al. (2021), who found that LC negatively influences EG in the Chinese context.

In an attempt to go beyond the aforementioned research, we utilized a quadratic polynomial of LC to investigate the possibility of a non-monotonic effect of LC on EG. Our results, like those of Arcand et al. (2015) and Samargandi et al. (2015), who assessed the financial depth, show that LC and EG are not linearly connected. We find that the data points to an inverted U-shaped connection. As evidence, we rely on the U-test developed by Lind and Mehlum (2010), which allows us to determine whether or not certain requirements are met to guarantee the presence of an inverted U connection. These findings provide evidence against the assumption that more LC is always preferable, at least in the case of the MENA nations.

To that end, policymakers may wish to encourage banks to provide more liquidity, since this may contribute to a more prosperous economy. Liquidity creation may be an ideal position, though individual institutions may face a liquidity risk if they create excessive liquidity. Extreme liquidity generation may also result in asset bubbles that pop and trigger financial crises from a macroprudential standpoint (Acharya and Naqvi 2012; Berger and Sedunov 2017; Fungacova et al. 2021). Consequently, governments must choose between economic development and the soundness of financial institutions.

We recommend that officials in the banking supervision sectors take into consideration Berger and Bouwman's (2009) LC measurement and make an effort to use it to evaluate the performance of banking sectors and determine the level of risks. This measurement may be a helpful tool that can be used to broaden the scope of the investigation and evaluate the risks that surround the banking sector.

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Notes

1 The countries that shaped our sample include: Bahrain, Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia and the United Arab Emirates.

2 Extracted from (Berger et al. 2019) to Calculate LC based on category (CATFAT) for developing countries.

3 We appreciate the referee's discretion in raising this issue.

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