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Liquidity Creation, Oil Term of Trade Shocks, and Growth Volatility in Middle Eastern and North African Countries (MENA)

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Abstract: Both real and monetary shocks have been extensively researched, with conflicting findings on the involvement of the banking sector following the occurrence of these shocks. Nonetheless, liquidity creation (LC) appears to be one of the most underappreciated banking operations. This research analyses the impact of LC on economic volatility and the mechanisms through which LC influences volatility in 10 MENA countries from 2000 to 2019. Using a recently published panel cointegration estimating approach, we show that LC does influence growth volatility over the long term and short term—in other words, LC, as a primary activity of banks, helps to reduce volatility. According to PMG's findings, both real and monetary shocks significantly increase volatility in the short term compared to their influence in the long term. The channels of expression show that LC mitigates the influence of real shocks (amplifies the effect of monetary shocks) on growth volatility, and there is a greater magnitude of this effect in the short term. Strengthening the banking industry through LC, which is their primary business, could be a critical strategy in avoiding economic swings.

Keywords: liquidity creation; growth volatility; ARDL(p,q); MENA

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1. Introduction

The importance of the role that the financial system both directly and indirectly plays in promoting economic growth (EG) has been widely recognised in the literature on finance and growth. A tiny strand of this literature has focused on explaining such linkages through the role of the financial sector in facing real or monetary shocks. The notion of this strand is centred around the idea that the financial sector may play a role in curbing and smoothing the repercussions of real shocks, leading to a reduction in macroeconomic volatility. Thus, the financial sector can indirectly spur EG by smoothing and mitigating real shocks (e.g., as is discussed in Denizer et al. 2002; Easterly et al. 2000; Ibrahim and Alagidede 2017; Moradbeigi and Law 2016; and Kpodar et al. 2018). Yet, it is remarkable that so little empirical and theoretical work has been conducted on the influence of the financial industry on stability.

Scientific interest in the connection between EG and growth fluctuations began in the middle of the twentieth century (Bartak et al. 2021), and the finance-volatility nexus has been a continuation of this conversation. Additionally, the real business cycle approach (Long and Plosser 1987; and Nelson and Plosser 1982) has provided the theoretical groundwork for viewing business cycle volatility as a normal part of a growing economy. Researchers have since investigated the correlation between volatility and EG from a variety of angles, yielding mixed and occasionally conflicting findings; thus, it is difficult to draw firm conclusions from the results of this body of work. Several researchers have shown a positive correlation between volatility and growth, such as in Beck et al. (2006); however, others, such as Ramey and Ramey (1994), Aghion et al. (2009), and Brueckner and Carneiro (2017), have found the opposite to be true. Long-term economic growth may be favourably or adversely affected by macroeconomic instability through savings, investment, and risk. Risk, as measured by the volatility of the macroeconomy, may be positively connected with the returns on investments, which can stimulate EG. More volatility will encourage people to save more for safety reasons, thus boosting savings. Contrarily, a lower rate of return on investments is one reason why more volatility is harmful to EG.

As a consequence of extensive study, a body of literature has developed that analyses the function of the financial sector in response to real and monetary shocks. This line of inquiry has grown to include a wide range of topics related to the financial system, including, but not limited to financial depth (Dabla-Norris and Srivisal 2013; Jarrett et al. 2019); financial inclusion and integration (Abdelmageed 2021); financial structure (Wei and Kong 2016); financial openness and innovation (Jarrett et al. 2019; and Dynan et al. 2006); and Islamic financial development (Gazdar et al. 2019); etc. Whereas others have examined the impact of various macroeconomic activities, such as openness in regional trade treaties (Kpodar and Imam 2016) as a tool to mitigate real shocks.

While some research has shown that strengthening the financial sector may reduce macroeconomic volatility, this finding appears to be very sensitive to the specific measures of finance that are used, such as the sets of controls, aggregation periods, nation samples, and estimation procedures. Certain studies have shown that financial factors may cushion the blow of a genuine shock (Easterly et al. 2000; Denizer et al. 2002; Ferreira da Silva 2002; Raddatz 2006; Larrain 2006; Dabla-Norris and Srivisal 2013; and Wei and Kong 2016). In fact, the vast majority of prior research has only used and exploited one activity of the financial sector: financial depth.

Furthermore, several writers have claimed that banks, rather than markets, would be best suited to address informational asymmetries, since they are in a position to collect extra data about projects, which would allow for a more accurate assessment of each project's likelihood of success (Devinney 1986; and Singh 1997). Banks are important in facilitating more efficient resource allocation, according to Diamond (1984); Boot and Thakor (1997); Boyd and Prescott (1986); and Ramakrishnan and Thakor (1984). The capability of banks to absorb shocks is the result of a variety of characteristics, a summary of which will be presented below. Firstly, banks usually form deep, long-term relationships with businesses, easing cash flow limitations for current company development, which has beneficial effects on EG (Hoshi et al. 1991) when compared to markets that do not possess the same benefits (Bhide 1993; and Stiglitz 1985). For this reason, banks would be better prepared to mitigate the damage to borrowers' ability in terms of obtaining external financing in the event of a real shock that reduces their net value.

Secondly, banks might better distribute risks if they understood that not all borrowers were impacted in the same manner by a real shock. When it comes to providing liquidity, banks may have an edge, especially in the startup phase. Constraints on resources may be exacerbated if enterprises' export production falls as a result of negative real stocks. By providing short-term loans, banks help businesses mitigate the impact of seasonality on their production by limiting the decline to a lesser extent than would occur if the businesses were to only rely on their own cash flow. Thirdly, banks are more crucial than competitive markets for supplying liquidity (through credit lines, for example), as stated by Raddatz (2006)—particularly in less economically developed countries. Finally, banks' ability to pool resources, and enabling risk-sharing with other sectors that are not subject to the same economic cycle, is reflected in their supply of counter-cyclical lending.

Furthermore, banks allow customers to pool their liquidity risk (Bryant 1980; Diamond and Dybvig 1983; and Holmström and Tirole 1998). In addition, banks aid in resolving adverse selection issues (Gorton and Pennacchi 1990; and Vi Dang et al. 2017) to generate secure claims that meet the requirement for security (Stein 2012). Deposit insurance

(Hanson et al. 2015), borrower monitoring (Diamond 1984; and Holmström and Tirole 1997), and wealth storage (Holmström and Tirole 1997) may all play supporting roles in enabling banks to perform their core duties (Donaldson et al. 2018). The banking industry as a whole has been shown to have a buffering function during actual shocks (Dabla-Norris and Srivisal 2013; Denizer et al. 2000; Easterly et al. 2000; Ferreira da Silva 2002; Ibrahim and Alagidede 2017; Larrain 2006; Moradbeigi and Law 2016; Raddatz 2006; and Wei and Kong 2016).

Banks play a crucial role in each economy through LC. By matching illiquid assets with liquid obligations, banks create liquidity (Diamond and Dybvig 1983; Holmström and Tirole 1998). Bank deposits are the backbone of the contemporary economy's payment system; meanwhile, bank loans finance long-term investments. Although banks play an important role in the economy, little is known about whether or not their ability to create liquidity helps to buffer or amplify the effects of monetary or real-world shocks. Additionally, no previous research has investigated the relationship between LC, as a primary banking function, and volatility.

Thus, this research focuses on bank-based systems in order to assess the role of the financial sector as an amplifier or mitigator during real and monetary shocks for numerous reasons. Previous studies have shown that developing countries rely on a bank-based financial system for efficient and successful development, and have also shown that the depth of their respective financial systems is still shallow (Abdelmageed 2021; Almeshari et al. 2023; and IMF 2018). The strong link between the private sector and a well-established financial system encourages the private sector to consistently pay its obligations and on schedule (Rajan and Zingales 2004). Unrestricted banks can boost industrial progress by gathering data at scale (Levine 1997; Levine et al. 2000). Moreover, it would be interesting to investigate whether LC moderates the impact of real and monetary shocks on growth volatility. This is especially important for developing countries that heavily rely on primary products and have low levels of financial development, such as those in North Africa and the Middle East (MENA).

In light of the aforementioned discussion, this research is designed to examine the association between real shock, represented here by the volatility of oil terms of trade growth (OTOT), monetary shock, and growth volatility conditioning on the major activity in the banking sector, LC. This research contributes to the literature on the finance-volatility nexus by analysing the role that LC plays in the correlation between growth volatility, OTOT, and monetary shocks. Using a core panel of data for 10 MENA[1] countries with observations between 2000 and 2019, we analyse the effect of OTOT as the actual shock on growth volatility.

This research addresses that need by showing how banks' liquidity creation reduces the impact of real shocks while amplifying the impact of monetary ones. Altogether, our research presents a cohesive framework that highlights banks' LC as a fundamental process for understanding the many significant results in the finance and volatility literature. We corroborate the belief that the banking sector is responsible for the spread of monetary shocks and demonstrate that the creation of liquidity aids economies in absorbing real shocks. In contrast to previous studies, which have relied on a size-based indicator of the banking sector, our emphasis is on an empirical gauge of one of the core functions of banking LC, which accounts for both on- and off-balance-sheet banking activities. To designate all things on a bank's balance sheet as either liquidity producing or liquidity destroying, as proposed by Berger and Bouwman (2009), is a significant step forward. However, we are unaware of any research that has used this metric for analysing the banks' sensitivity to real and monetary shocks. In this study, we measure the amount of liquidity generated by listed banks in 10 MENA countries, providing the first data on the influence of real and monetary shocks at the national level, thereby expanding on the work of earlier researchers. In addition, dynamic panel heterogeneity analysis (Pesaran et al. 1999; and Ibrahim and Alagidede 2017) is used to study the finance and volatility nexus. The short- and long-term effects of LC on growth volatility are examined using autoregressive distributed lag (ARDL). Our article differs from others that employ both fixed-effect and generalised method of moments (GMM) because this model can account for country heterogeneity. Finally, using oil shocks, measured according to the oil terms of trade index from Spatafora and Tytell (2009) and calculated using generalised autoregressive conditional heteroskedasticity (GARCH, 1, 1), distinguishes our paper from others who used the change in the term of trade as a proxy for real shock.

Our analysis yields several interesting results. First, real shock, as measured by oil terms of trade volatility, and monetary shock are positively related to growth volatility. Second, LC as a main function of the banking sector, is negatively related to growth volatility. Finally, in terms of the channels by which effects are manifested, our findings indicate that the creation of liquidity reduces the impact of OTOT and is higher in the short term compared to long term, while simultaneously magnifying the impact of monetary shocks. We demonstrate that the role of LC, as a buffer against real shocks, holds. This is even after accounting for the level of economic development (which is often an omitted control variable in an econometric approach) and other stakeholders in the financial system, such as in the stock market.

The outline of our paper is as follows. We perform a literature review in the next section. In Section 3, we address the data sources, the formulation of our LC measures, and the control variables. In Section 4, we provide our empirical model, econometric strategy, and outcomes and explain the results. Limitations and suggestions for further research are then presented in Section 5.

2. Finance and Volatility: A Review of Empirical Studies

The impact of finance on volatility is not substantial, yet it is still growing in the literature of finance and volatility. One of the main strands of this literature focuses on the link between finance and its effect on the aggregate output volatility. The main notion of such a strand is that the role played by finance is found in reducing the aggregate output volatility.

Bacchetta and Caminal (2000) offer a tractable dynamic general equilibrium model with asymmetric credit market information, which is theoretically delivered. Information asymmetry affects agency costs. Asymmetric information only matters when internal finances and collateralizable assets are minimal in their model. In an equilibrium, lenders limit loans to enterprises that can internally finance a small percentage of planned investment. They propose two types of companies: rich businesses with plenty of cash flow, and poor enterprises with less cash flow, which are credit rationed. Given the declining returns of scale in production, credit-constrained enterprises have a greater falling marginal productivity. According to their theoretical model, information asymmetry impacts resource allocation between credit-constrained and unconstrained companies, thereby causing a composition effect on relative production. When credit-constrained enterprises have more internal funds than total funds, this composition effect amplifies positive shocks. Thus, whether asymmetric knowledge amplifies or dampens production swings relies on whether funds are redistributed in favour of or against credit-constrained enterprises.

Additionally, diversification risk reduction also links financial growth and volatility, according to Acemoglu and Zilibotti (1997). They demonstrated that early stage diversification is difficult with indivisible investment initiatives. However, diversity encourages investment and reduces risk and volatility as wealth grows. On this topic, Aghion et al. (1999) developed a micro-founded macroeconomic model that combined financial market imperfections with unequal investment opportunities. They believe countries with underdeveloped financial systems are more uncertain and flourish slower. Macroeconomic oscillations that originate from the lack of financial development and the partitioning of savers and investors eventually converge on a steady-state growth cycle. However, countries with a well-developed financial sector converge to a steady development path with just external shocks. Thus, this model predicts cyclical loan supply and demand in undeveloped financial sectors. A negative economic shock makes investors more likely to be credit limited. However, good economic shocks are the opposite.

For monetary policy to have a bank lending channel, several conditions must be met, as is laid out by Beck et al. (2006) expanding on the model of Bacchetta and Caminal (2000): (a) Organisations do not have access to viable alternatives to bank loans, and (b) the availability of credit is subject to control by the monetary authorities. Beck et al. (2006) argue that financial intermediaries have no impact on productivity or monetary shocks. This is because they do not include agency costs when evaluating shocks and instead only focus on the impact of unanticipated shocks on output volatility. Asymmetric information has a greater influence than perfect capital markets on the relative output effect of a disruption that shifts the income and wealth effect ratio of both low and high innovators. The premise is that a developed financial sector reduces the influence of monetary shocks on the production function while simultaneously improving the situation for low-capital entrepreneurs (or credit-constrained enterprises). Under asymmetric knowledge and in a sophisticated financial system, the influence of real (monetary) volatility on production and growth volatility is bigger (lower) than under a shock.

Despite the theoretical basis of such a strand of the literature, the empirical studies of this offer mixed findings. For instance, Denizer et al. (2000) utilised the data for 70 countries, spanning the period 1956–1998, to assess whether the financial sector may reduce macroeconomic volatility. They used four variables to stand as a proxy for the financial sector's liquid liabilities, a ratio of claims on the nonfinancial private sector to GDP, the ratio of domestic money banks assets to domestic money banks assets plus the central bank assets, and the ratio of claims on the nonfinancial private sector to total domestic credit. Furthermore, they used a fixed effect method and showed that the financial system plays the role of lessening the oscillation of consumption, real per capita output and investment. Ferreira da Silva (2002) assessed the effect of the financial sector—specifically its size—the importance of the banking sector, and the depth of the financial sector for 40 countries in terms of the output, consumption, and investment volatility; this was achieved using the generalized method of moments (GMM) technique. The results revealed that economic variations are less volatile as a country's financial system grows. Furthermore, the private sector receives more credit compared to the public sector, and deposit money institutions also become more prominent. In addition, all the finance indictors negatively used affected consumption, investment, and output volatility through reduction in information asymmetry. Instead, Larrain (2006), in 59 countries, assessed the role of bank credits in either reducing or increasing the output volatility of industries. He showed that banks mitigate the real shocks through short-term debt.

Beck et al. (2006) assessed the role of financial intermediaries during real and monetary shocks using a panel of 63 countries spanning the period 1960–1997. The real shocks were proxied by the standard deviation of terms of trade; in addition, monetary shock was proxied by the standard deviation of inflation. They found minimal evidence that financial intermediaries lessen real shocks and moderate evidence that they amplify monetary shock in countries where enterprises lack access to external capital markets.

Dabla-Norris and Srivisal (2013) showed that financial depth has an essential role in reducing output volatility, consumption volatility, and investment growth volatility up to a certain point. Moreover, they also demonstrated that a deeper financial system is a shock absorber in terms of mitigating real external shocks on macroeconomic volatility. In the same vein, Beck's (Beck et al. 2014) findings, obtained via OLS regressions, showed that unlike the size of the financial system, intermediation activities decrease output volatility in the long term. However, medium-term volatility in high-income nations is positively correlated with the financial system size; this is notably the case in non-intermediation services. Shorter time horizons show income-dependent volatility effects. Size and intermediation affect volatility in different ways. While intermediation stabilises the economy of low-income nations, the size of the financial system with respect to high-income nations increases growth volatility. However, such an effect is weakening as time passes. Majeed and Noreen (2018) investigated the impact of financial development on the output volatility represented in the panel data of 79 countries. Using four measures for financial development (i.e., efficiency, size, quality, and stability), with the term of trade volatility as a real sector shock and inflation volatility as a monetary shock, their results showed that there is weak evidence of the role of finance in the dampening of the real sector of volatility. Furthermore, financial stability was the prominent indicator among the examined indicators in reducing output volatility.

Moradbeigi and Law (2016) investigated the role of financial intermediaries' development, as measured by (1) the domestic credit to private sector and (2) the liquid liabilities in the oil term of trade volatility and growth volatility using a sample of 63 oil-producing countries over the period of 2000 to 2010. They showed that there is a positive relationship between the oil terms of trade volatility and growth volatility. In addition, financial development dampens the negative effect of the oil terms of trade volatility.

Ibrahim and Alagidede (2017) decomposed the aggregate volatility into its components using a spectral approach for 23 Sub-Saharan African countries. They proxied finance by credit to the private sector as a percentage of GDP and used the panel configuration estimator ARDL(p,q) method. They showed that although financial growth non-linearly influences business cycle volatility, its effect on long-term fluctuation is fictitious. Strong financial sectors reduce volatility. Further research shows that although monetary shocks amplify volatility, their short-term impact is minimal. Real shocks, however, are different. The financial sector dampens (magnifies) the influence of real shocks (monetary shocks) on volatility components in the short term. On the other hand, Kpodar et al. (2018) investigated whether financial intermediation is conducted via banks or markets. Moreover, the structure of the financial system affects the macroeconomic volatility that is being used for the fixed effect, system GMM, and local projection estimations. A total of 38 lower income countries were sampled over the period of 1978–2012 and their findings demonstrated that banking sector expansion serves as a shock absorber in poor nations, thereby moderating growth volatility. Expanding the sample to 121 underdeveloped nations has not changed the previous findings, although the shock-absorbing capacity disappears as economies become wealthier. Stock market development does not seem to absorb or amplify shocks in most economies.

Furthermore, Jarrett et al. (2019) investigated the role of financial depth and financial openness in the relationship of oil price volatility and economic growth. They used the Fraser chain index measure as a proxy for financial institutions' quality. They showed that financial depth reduces the negative effect of oil volatility on growth, whereas financial openness has no effect in such a relationship. However, the proxy used in this study focuses more on the quality of financial institutions, while neglecting the main and crucial activities that banks play in an economy. In the same vein, Gazdar et al. (2019) investigated the effect of the oil terms of trade growth volatility and economic growth in the GCC countries for the period of 1996 to 2016. Specifically, they examined the effect of Islamic financial development, which was measured by (1) what is the Islamic financial depth (the financial intermediary credit to the private sector to GDP ratio) and (2) what is the Islamic financial concentration (Islamic banking assets to total banking assets ratio) in this context. Their results showed that there is a positive relationship between the oil terms of trade growth volatility and economic growth. In addition, the Islamic financial system reinforces the effect of the oil terms of trade growth's volatility on growth. However, this study neglects the test of whether Islamic financial development reduces growth volatility or not.

Manganelli and Popov (2015) investigated, in 28 OECD countries, how financial development affects growth volatility through the channel of resources reallocation to sectors. They showed that financial development plays a role in reducing the growth volatility by reallocating resources across sectors. On the other hand, Fernández et al. (2016) examined the banking stability and its effect on the volatility of industrial value that is added. They examined 23 industrial sectors in 110 countries over the period of 1989–2008, and they showed that banking stability plays a role in reducing the volatility of industrial value that is added and to growth volatility more generally. In addition, nations with less bank market competitiveness benefit more from financial stability in dampening the effects of economic volatility.

Smolo et al. (2021) assessed the impact of bank concentration and financial development, both individually and jointly, on growth volatility for the Organization of Islamic Cooperation (OIC) countries. They show that bank concentration has no significant impact on growth volatility, whereas financial development lowers the growth volatility. In addition, they show that "volatility-increasing effects of bank concentration or market power, which is moderated or even reversed in a more developed financial market".

As this debate has shown, researchers have probed the link between finance and volatility using a wide range of proxies and empirical methods. In realizing that the concept of "financial" is not a single-dimensional notion, several indicators are necessary. Despite the fact that certain nations in the samples of the earlier research do not yet have a deeper financial depth and are regarded to be bank-base countries when compared to developed countries, most of the prior studies primarily focused on financial depth. Not only that, but many components of the financial system have been studied, including the size of the banking industry (Kpodar et al. 2018), bank concentration (Smolo et al. 2021), financial openness (Jarrett et al. 2019), efficiency and quality (Majeed and Noreen 2018), bank stability (Fernández et al. 2016), and financial depth (Beck et al. 2014). We are not aware of any research that has used LC as its primary method to investigate whether banks attenuate or amplify actual and monetary shock.

3. Data and Methodology

In order to verify our hypothesis, we assembled a panel dataset covering ten MENA nations from 2000–2019. The selection of these countries was only based on the availability of data for a sufficiently long enough time period. Our sample was composed of the following countries: Bahrain, Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates. The criteria used to determine which banks would be included in the sample were publicly traded share prices and the lack of mergers or decodes throughout the study's time frame. Solely considering commercial banks made sense, since they are the most important providers of liquidity for the economy. This study used the Bloomberg Terminal to extract the banks' unconsolidated statements, measured in U.S. dollars, after confirming that no banks appeared twice in the dataset. The Bloomberg Terminal's main benefits are (i) the availability of samples for the whole period's financial statements and (ii) the financial statements' compliance with international reporting and accounting standards. The World Bank's world development indicators (WDI) served as the source for the annual data used in this analysis, except with respect to our main independent variable, LC.

To calculate the LC for each bank year included in our sample, we followed Berger and Bouwman's (2009) "CATFAT" calculation procedure. The procedure has three steps: Firstly, all on-balance-sheet and off-balance-sheet activities are classified into three categories—liquid, semiliquid, or illiquid. Such classification is based on ease, cost, and time for the bank to satisfy its commitments and to supply liquidity in order to meet borrowers' requests. This is likewise repeated for the ease, cost, and time for depositors to withdraw their money from the bank (Berger and Bouwman 2009). Secondly, assigning weights on each of the first step's categories of bank activities[2]. The LC theory provides a foundation for the selection of weights. According to this theory, banks generate liquidity on the balance sheet by converting illiquid assets into liquid liabilities. To account for the fact that it is impossible to attribute more than half of the total amount of liquidity that is created with respect to the source or use of funds, the authors assign 0.5 (−0.5) weights to illiquid assets and liquid liabilities (liquid assets and illiquid liabilities and equity), respectively. Semi-liquid assets and liabilities are given the same value of 0. Off-balance-sheet items are given the same weights as on-balance-sheet activities. Thus, liquid assets, liquid off-balance-sheet items, illiquid liabilities, and equity currently have a weight of −0.5 as they destroy liquidity, while all semiliquid items have a weight of 0 as they do not create any liquidity. Illiquid assets, illiquid off-balance-sheet items, and liquid liabilities have a weight of 0.5 as they create liquidity. Thirdly, Berger and Bouwman's (2009) preferred LC (CATFAT) measure is built by combining the activities identified in 1 as liquid illiquid, or semi-liquid, and weighted it as in 2 0.5, −0.5, or 0, respectively. Ultimately, a bank's liquidity creation over the time is the total of all possible permutations. To integrate these data with the dataset of the country's variables, we must compute the liquidity that is produced in each country by every bank in our sample. Liquidity creation is then the sum of all liquidity that is created by all banks in each country for each year. This gives us a proxy for the banks' annual liquidity creation in a country. Finally, we standardized the LC by dividing the annual LC by the mid-year population to obtain the LC per capita (LCPC) for the purposes of regression analysis in order to obtain meaningful coefficients.

It is worth mentioning here that there are several subtle differences between our method and that of Berger and Bouwman (2009). We factor in the fact that the ease with which bank assets may be securitized varies from country to country due to the varying degrees of development of their capital markets. Certain assets are considered semiliquid by banks in developed countries, but illiquid by banks in developing countries. As a result, we follow Berger et al.'s (2017) procedure to calculate the LC in developing countries.

With regard to the growth volatility, shock variables, and the real and monetary shocks, they are, respectively, proxied by the annual growth rate of real GDP per capita, inflation, and the oil terms of trade volatilities that are estimated by means of a generalized autoregressive conditional heteroskedasticity (GARCH, 1, 1)—which was developed by Bollerslev (1986). The capacity to collect data on the series' historical values and patterns of behaviour convinced us to go with this method rather than with the more conventional ones. Additionally, where most of the previous studies used the term of trade volatility as a proxy for real shock, we employ the oil term of trade instead. Since World War II, industrialised and rising economies have relied on oil for transportation and production. Crude oil dominates the commodities market and provides 40% of global energy use (Schiffer 2016). Oil is the main energy carrier in many nations; therefore, price variations may affect other forms of energy as well as economies. Several studies support this (Liu et al. 2022). In oil-dependent countries, oil price volatility and uncertainty undermine economic growth. Thus, crude price fluctuation boosts manufacturing costs and lowers productivity, threatening economic and social development (UNCTAD 2012). Additionally, oil price changes might still hurt MENA nations that do not export oil. First, energy intensity is impacted by the fluctuating price of oil (i.e., the cost of converting energy into GDP) (Maghyereh et al. 2019). Second, oil price variations might affect regional inflation rates in non-oil-producing nations. Oil prices may raise production and transportation costs, which can raise consumer prices. Furthermore, oil prices affect petrochemical input costs. This may affect the cost of production and the competitiveness of these businesses, affecting economic activity in non-oil-producing nations in the area.

The real shock is measured by the increase in the oil terms of trade during the same time frame. Spatafora and Tytell (2009) define the oil terms of trade (*OTOT*) index as

$$OTOT_{it} = \{\frac{POIL_t}{MUV_t}\}^{X_i - M_i} \quad (1)$$

where $POIL_t$ is the average annual price of oil between 2000 and 2019, MUV_t is the manufacturing unit value index, and X_i and M_i are the average percentages of oil exports and imports to GDP in country i between 2000 and 2019. Instead of being fixed, similar to the "All Primary Commodities Index" that is used by the International Monetary Fund (IMF), this index allows the country's exposure to oil price fluctuations to fluctuate with the composition of its oil export and import basket. The index for the growth of oil's trading terms was determined using Equation (1) as follows:

$$gOTOT_{,it} = OTOT_{it} - OTOT_{it-1} \quad (2)$$

In Equation (2), we see a reflection of the actual oil price variations in the countries, scaled by the weight that oil has in the country's total net exports ($X_i - M_i$).

Furthermore, we settle on the following few variables as our controls. Exports and imports expressed as a percentage of gross domestic product make up what is known as trade openness (TO). It is hypothesised that nations with greater trade openness are more susceptible to external shocks, since they engage with more countries (Easterly et al. 2000). Expenditure (EXP) by the government was understood as a percentage of gross domestic product; furthermore, it is a standard measure of government size.

Dynamic panel estimations

Using a balanced panel sample of 10 MENA countries (N = 10) over a 20-year period (T = 20), this research aims to investigate the impact of LC and shocks on growth volatility and how LC plays out in dampening or propagating monetary and real shocks in the growth volatility process. Moreover, for samples where N is less than T, like ours, Roodman (2009) says that the GMM estimators are more likely to give wrong results because the autocorrelation test is not reliable and the number of instruments goes up as the data lasts longer. As a result, the Sargan test of over-identification limitation may be invalidated and the null hypothesis of instrument exogeneity may be rejected. Thus, we dispute the GMM results' reliability and consistency.

On the other hand, the authors (Pesaran et al. 1999) suggested the autoregressive distributed lag ARDL(*p*,*q*) technique that can be used to incorporate dynamic heterogeneous panel regression into the error-correction model, where p is the response variable's lag and q is the predictor variable's lag. Furthermore, one of the main characteristics of ARDL, especially PMG and MG estimators, is their ability to alleviate the problem of endogeneity with the inclusion of sufficient lags of all variables (Pesaran et al. 1999).

Pesaran et al. (1999) suggest two methods for estimating a dynamic model: the mean group (MG) method, which averages estimates across countries, and the pooled mean group method (PMG), which averages the long-term parameters across countries. We choose the PMG method because it solves the inconsistency issue that is introduced by pooling diverse dynamic connections, while still providing the efficiency of the pooled estimate. To adjust for errors, we use the autoregressive distributed lag (*p*,*q*) method, which we define as

$$
\begin{aligned}
\Delta VY_{it} = \quad & \varnothing \Delta VY_{it-1} + \beta_1 LNLCPC_{i,t-1} + \beta_2 LNOPENNESS_{i,t-1} \\
& + \beta_3 V(OTOT)_{i,t-1} + \beta_4 LNExp_{i,t-1} \\
& + \beta_5 INFLATION_{i,t-1} \\
& + \beta_6 \left(LNLCPC_{i,t} * V(OTOT)_{i,t} \right) \\
& + \beta_7 (LNLCPC_{i,t-1} * V(OTOT)_{i,t-1}) \\
& + \sum_{j=0}^{p-1} \gamma_1 \Delta VY_{i,t-j} + \sum_{j=0}^{q-1} \gamma_2 \Delta LNLCPC_{i,t-j} \\
& + \sum_{j=0}^{q-1} \gamma_3 \Delta LNOPENNESS_{1,t-j} \\
& + \sum_{j=0}^{q-1} \gamma_4 \Delta v(OTOT)_{1,t-1} + \sum_{j=0}^{q-1} \gamma_5 \Delta LNExp_{1,t-j} \\
& + \sum_{j=0}^{q-1} \gamma_6 \Delta V(INFLATION)_{1,t-j} \\
& + \sum_{j=0}^{q-1} \gamma_7 (LNLCPC_{i,t} * V(OTOT)_{i,t}) \\
& + \sum_{j=0}^{q-1} \gamma_8 (LNLCPC_{i,t-1} * V(INFLATION)_{i,t-1}) + \mu_{it}
\end{aligned}
\tag{3}
$$

where VY is the volatility of economic growth, $LNLCPC$ is the natural logarithm of liquidity creation per capita, measured according to the Berger and Bouwman's classification of liquidity creation, which is based on the category and the inclusion of on- and off-balance-sheet activities (CATFAT) and divided by the mid-year population. *LNOPENNESS* stands for the natural logarithm for trade openness, *V(OTOT)* stands for the volatility of oil term of trade that represents real shock, LNEXP refers to the natural logarithm of government expenditures (% GDP), and *V(INFLATION)* stands for the volatility of inflation, which represents monetary shock. The notations of β_1, β_2, β_3, β_4, and β_5 refer to the long-term coefficients for control variables. Additionally, $\gamma_1, \gamma_2 \ldots, \gamma_8$ are the short-term coefficients of the lagged dependent regressors. Furthermore, the $\varnothing_0 = -(1-\delta_i)$ group, which was specified as the speed adjustment coefficient and is expected that $\varnothing_0$ is less than zero ($\varnothing_0 < 0$). Finally, the subscript i and t represent country and time, respectively, and μ_{it} is the error term.

The mean group (MG) model of Pesaran and Smith (1995) and the pooled mean group (PMG) estimator of Pesaran et al. (1999) can estimate Equation (3). The autoregressive distributed lag (ARDL) model in error correction form is a novel cointegration test (Pesaran et al. 1999; and Pesaran and Smith 1995). Here, the focus is on reliable and efficient long-term parameter estimations. Long-term associations can only exist among variables with the same order of integration, as per Johansen (1995) and Phillips and Hansen (1990). Pesaran and Shin (1999) demonstrate that panel ARDL may be employed with I(0), I(1), and mixed variables. ARDL eliminates the need to test for unit roots.[3] Both short-term and long-term impacts may be calculated given a large cross-section and a temporal data collection.

Our baseline regression model is potentially subjected to the endogeneity problem since we can have reverse causality between growth volatility and LC. To solve such a problem, the dynamic panel data method can be used to address endogeneity by using lags of both the dependent and independent variables as instruments. Panel ARDL (Autoregressive Distributed Lag) can address the endogeneity problem in panel data analysis by using the lagged values of the dependent and independent variables as instruments to address the potential correlation between the independent variable and the error term in the regression model. The ARDL model, notably PMG and MG, provides consistent coefficients despite endogeneity, since it integrates the lag of both the dependent and the independent variables (Pesaran et al. 1999).

Most importantly, the ARDL lag structure has to be determined; however, data limitation may impose the lag structure. In other words, in cases where the time dimension of a series is not long enough to overextend the lag structure, just as in our data series, a unified lag structure across countries can be imposed (Demetriades and Law 2006; Loayza and Ranciere 2005; and Pesaran et al. 1999). Furthermore, by enhancing the lag structure of ARDL, we reduce the possibility of endogeneity. Thus, we impose the following lag structure (1,1,1,1,1,1) for all the variables under the estimations.

4. Empirical Results

The study's actual results are discussed here. Our dynamic panel technique and a proxy for the banking sector's LC are used to provide the findings of our analysis, beginning with descriptive statistics and correlation, then using the dynamic relationship between the variables, and ending it with the robustness check that makes use of the two-step GMM estimator, splitting our sample and introducing new control variables, which is detailed in the following subsection.

4.1. Descriptive and Correlation Analyses

Table 1 reports the descriptive statistics for our data, in their natural logarithm, used in the base model for the period span of 2000–2019. The GDPPC volatility has a mean equal to 8.174% with a standard deviation that is equal to a 1.42 LCPC, averaged at 9.841%. We infer that both transmissions, i.e., LC*REAL_SHOCK and LC*MONETARY SHOCK, have a standard deviation that is higher than their mean, thus indicating higher variations. We also calculate the coefficient of variety (CV) as the proportion of the standard deviation to mean that the overall scattering of the regressors is to be quantified. Given the large CV values, REAL SHOCK is the most volatile regressor, whereas TO is the least volatile regressor.

Table 1. Descriptive Statistics.

Variable	Mean	Std. Dev.	Coefficient of Variation (CV)	Min	Max
GDPPC Volatility	8.174	1.42	0.17372	−5.832	13.438
LCPC in log	9.841	2.562	0.260339	5.594	18.12
REAL SHOCK	0.286	3.336	11.66434	−7.131	5.801
Monetary SHOCK	1.014	1.607	1.584813	−5.915	4.979
LC*REAL_SHOCK	167.17	336.735	2.014315	0.007	2446.179
LC*MONETARY SHOCK	70.554	151.593	2.14861	0	1426.879
TO in log	4.523	0.339	0.07495	3.409	5.257
EXP in log	2.808	0.301	0.107194	1.907	3.401

Table 2 introduces the correlation matrix for the main variables that is constructed in the second stage. A correlation coefficient demonstrates a positive rise with a fixed fraction. Our dependent variable, growth volatility, has a positive relationship with our independent variables LC, real shock, and monetary shock, thereby indicating a positive impact on growth volatility. Thus, the tested hypothesis indicated a considerably positive influence, demonstrating that liquidity creation has a positive impact on GDPPC volatility. Real shock has the highest correlation with growth volatility re-emphasising the impact of real shock on growth volatility. Furthermore, the transmissions, i.e., LC*REAL SHOCK and LC*MONETARY SHOCK, have a 0.554% correlation with real shock and 0.618% with monetary shock, thereby indicating the intertwisted relationship between the banking sector and both real shock and monetary shock, and reiterating that the banking sector might amplify shocks. The single-variable focus of these links, however, paints a rather unflattering picture of bivariate relationships.

Table 2. Matrix of correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) GDP_PC Volatility	1.000							
(2) LCPC in log	0.339 *	1.000						
(3) REAL SHOCK	0.709 *	−0.387 *	1.000					
(4) MONETARY SHOCK	0.113 *	−0.079 *	−0.163 *	1.000				
(5) LC*REAL_SHOCK	−0.148	−0.162	0.554	−0.150	1.000			
(6) LC*MONETARY SHOCK	0.123 *	−0.050	−0.139	0.618	−0.101	1.000		
(7) TO in log	−0.071 *	0.136 *	0.197	−0.149	0.294	−0.097	1.000	
(8) EXP in log	0.272 *	0.154	−0.140	−0.367	−0.001	−0.267	−0.128	1.000

Notes: * denote significance at 5%.

4.2. Panel Cointegration

Cointegration tests are performed in order to avoid obtaining spurious regression. Additionally, cointegration tests are used to test if a long-term equilibrium relationship exists among a series. We preformed both Pedroni's (1999, 2004) and Kao's (1999) cointegration tests to check whether our series shows long-term equilibrium relationships. Both tests, Perdroni and Kao, select the appropriate lag length for the estimation by applying the Bayesian information criterion. Precisely, a lag of 2 was selected as a maximum lag length. Furthermore, the bandwidth that was chosen was the Newey–West automatic, whereas the spectral estimation was steered by counting on the Bartlett kernel. Additionally, an individual intercept was chosen in the Padroin's test. Finally, the null hypothesis for both tests is that there is no cointegration.

As Table 3 shows, the results of the within—i.e., assuming common autoregressive coefficients—and the between—i.e., assuming individual autoregressive coefficients dimensions—for the PP and ADF, we can reject the null at a 5% of significance, thereby meaning that there is a cointegration relationship between the variables. Moreover, the Kao's value reveals a long-term relationship, as the *p*-value is less than 5% of the significance level.

Table 3. Panel cointegration tests results.

Approach	Panel Cointegration Tests	Statistics	*p*-Values
Pedroni: Common AR coefficients (within dimension)	Panel-v	−2.575556	0.9950
	Panel-rho	3.493393	0.9998
	Panel-PP	−3.617759	0.0002 *
	Panel-ADF	−12.80074	0.0000 *
Pedroni: Individual AR coefficients (between dimension)	Group-rho	3.878982	0.9999
	Group-PP	−6.251401	0.0000 *
	Group-ADF	−5.865543	0.0000 *
Kao		2.50695	0.0061 *

Notes: * denote significance at 1.

4.3. Main Empirical Analyses and Discussion

Both the short term and the long term are considered when analysing growth volatility and regressors. PMG and MG are both used for this purpose, with MG functioning as an alternative. Estimates of PMGs are derived from the panel extension of the single equation in the ARDL framework, but MGs make it possible to have heterogeneity among long-term components. Information describing the immediate effects of a shock, as well as the rate at which the economy readjusts to its new long-term equilibrium, is provided by the ARDL. Furthermore, in the short term, the coefficients are expected to be country specific and heterogeneous; however, in the long term, the parameters are expected to be homogenous and consistent across the board. For the estimates of PMG and MG, the findings are shown in Table 4. The coefficients are interpreted as elasticities since the variables under investigation are all in their natural logarithms.

First, when it comes to the impact of shocks on the volatility of economic growth, our results show that both monetary and real shocks are significant sources of volatility in the long term, according to both PMG and MG estimates. The results show the static and positive effect of real shock, which is represented by the volatility of oil term of trade on growth volatility. The positive signs of the coefficients in both the long and short term and the PMG and MG highlight the amplifying effect of real shock on growth volatility. According to the PMG- and MG-long-term coefficients, when OTOT volatility increases by one percent growth volatility, they surge by 0.424 and 12.944, respectively. However, in the short term, the real shock still maintains its positive and significant effect. In statistical terms, an increase in OTOT volatility in the short term by 1% will lead to 3.198%, as in the PMG when compared to 0.247% according to the MG estimation. We infer that the real shock effect in the short term is higher under the PMG estimation when compared to its long-term effect, whereas the reverse is true according to the MG results. Our results are consistent with previous studies, which highlight the robust effect of the commodity term of trade in general and specifically oil term of trade volatility on growth volatility. These results reconfirm the previous studies in the literature, which highlight the negative impact of a high dependence on oil and other natural commodities in general. Our results on the true shock–volatility nexus are expected and consistent with the fact that the majority of the countries examined are oil-dependent. In addition, our results are also in tandem with other studies in the literature (e.g., Ibrahim and Alagidede 2017; Kpodar et al. 2018; and Moradbeigi and Law 2016).

Furthermore, the monetary shock displays a similar positive effect as the real shock's effect on growth volatility. Our findings show that a percentage rise in inflation oscillations raises growth fluctuation according to the PMG and MG estimations by 0.6% and 2.90% in the long term, respectively. However, in the short term, the effect is statistically insignificant. The theory assures us that the origin of the monetary shock that the economy encounters has a considerable consequence on whether or not changes in inflation affect growth volatility. When monetary shocks come from wage setting, growth volatility is expected to reduce, but when monetary shock originates from aggregate demand, growth volatility is expected to rise (De Long and Summers 1986; and Driskill and Sheffrin 1986). In reality, if a rise in aggregate demand is not matched by an increase in output and productivity, it may lead to an increase in inflation (Beck et al. 2006; and Karras and Song 1996). Thus, an increase in inflation volatility leads to a rise in the macroeconomy's volatility, according to the authors.

Table 4. Liquidity creation, shocks, and volatility.

Dependent Variable: Growth Volatility		
Estimators	**PMG**	**MG**
	Long term coefficients:	
Variables		
Real Shock	0.424 (3.690) *	12.944 (1.020) **
Monetary shock	0.060 (0.660) **	2.902 (01.150) ***
Liquidity Creation (LC)	−0.175 (−5.680) *	−0.354 (−0.950) ***
*(LC*real Shock)*	−0.003 (−4.830) *	−0.391 (−0850) ***
*(LC*Monetary Shock)*	0.002 (2.990) *	0.002 (2.990) ***
Trade Openness (TO)	0.939 (2.010) **	10.335 (0.870)
Expenditure (EXP)	2.888 (5.030) *	1.307 (1.020)
Error correction term	−0.474 (−2.270) **	−0.270 (−5.300) *
	Short term coefficients:	
Δ Real Shock	3.198 (1.110) **	0.247 (0.090) ***
Δ Monetary Shock	0.437 (0.830) ***	3.224 (0.900)
Δ Liquidity Creation (LC)	−0.336 (−1.280)	−0.446 (−0.580)
*Δ (LC*real Shock)*	−7.142 (−1.020) **	−5.992 (−1.040)
*Δ (LC*Monetary Shock)*	0.042 (0.930) ***	0.256 (1.100)
Δ Trade Openness (TO)	0.535 (0.330)	0.693 (0.180)
Δ Expenditure (EXP)	3.329 (2.390) **	0.711 (0.170)
Intercept	−4.662 (−2.080) **	−10.433 (−0.670) **
Diagnostics:		
Hausman test (χ^2)	0.172	
p-value	0.973	
Number of countries	10	10
Number of observations	167	167

Notes: *, **, and *** denote significance at 1, 5, and 10%, respectively. Values in () represent the standard errors. Estimations are conducted using the Stata command xtpmg.

With positive coefficients, estimates under the PMG show that both real and monetary shocks exacerbate variations. These results demonstrate that the oil terms of trade shock and inflation fluctuation are both harmful to domestic stability, even though the influence of oil terms on trade shock looks to be critical. Finally, when comparing the shock factors, it is important to note that oil terms of trade shocks have a bigger effect on growth volatility than inflation volatility, as the PMG results show. This is in line with the findings of (Easterly and Kraay 2000; Vegh et al. 2018), who both point to real shocks as a major cause of economic volatility, particularly in countries that heavily rely on their natural resource endowments. Considering how reliant some of these nations in our sample are on oil and how much of their budget is supported by commodity earnings, this finding is not surprising.

Consistent with our hypothesis, while the coefficients of banking sector output measured by LCPC are negative in all of the estimations, only their impact on volatility is significant in the long term, as both PMG and MG estimations reveal. The results of PMG and MG in the long term are statistically significant and show that a one percent increase in LCPC reduces growth volatility by 0.175 and 0.354, respectively. Meanwhile, in the short term, LC keeps its sign while it loses its significance.

The implication is that banking sectors in countries under investigation play a role in lowering growth volatility, specifically in the long term. LC has been proven to have several advantages in the theoretical banking literature. There is a mutual sharing of liquidity risk between economic agents (Bryant 1980; Diamond and Dybvig 1983; and Holmström and Tirole 1998). Moreover, banks aid in avoiding adverse selection issues (Gorton and Pennacchi 1990; and Vi Dang et al. 2017) in order to generate secure claims that meet the requirement for security (Stein 2012). Deposit insurance (Hanson et al. 2015), borrower monitoring (Diamond 1984; and Holmström and Tirole 1998), and wealth storage may all play a part in facilitating these roles for banks (Donaldson et al. 2018).

Furthermore, according to Fidrmuc et al. (2015), liquidity creation (LC) improves financing conditions and facilitates the transactions among all economic agents. In addition, banks also perform their roles as financial intermediaries and help to ameliorate the frictions in the financial market. In other words, the banking sector facilitates a closer match between savers and investors, helps absorb exogenous shocks in the real sector, promotes diversification, and potentially reduces risks and cyclical fluctuations. Thus, volatility will, by far, be dampened by the banking sector. Due to credit constraints, entrepreneurs and firms may entirely rely on retained earnings for investment, thereby leading to an exacerbation of volatility. However, through LC, banks transform liquid liabilities into illiquid assets (i.e., capital allocation and soothing borrowing constraints). Thus, such mechanisms make funds available to distressed entrepreneurs and firms, thus leading to an increase in investment.

The results given so far imply that the MENA banking sector greatly decreases macroeconomic volatility via liquidity creation, but the transmission channels remain ambiguous. This study empirically investigates the banking sector's role in mitigating or amplifying the consequences of volatility by adding an interaction term between liquidity creation and both real and monetary shocks.

The coefficient of the interaction term between LC and OTOT shock enters with a negative sign, implying a dampening influence on macroeconomic volatility, which is in line with our hypothesis. Although the long-term effect of liquidity creation on growth volatility is statistically significant, the effect is too miniscule to be considered statistically significant (−0.003%). The interaction term's short-term coefficient is negative and substantially greater under PMG than in MG estimates, but only under PMG is it statistically significant. Even after accounting for monetary and real shocks, these findings suggest that the banking sector contributes to the reduction in macroeconomic volatility by providing liquidity and spreading risk across the different sectors of the economy. Each of these studies support one another (Beck et al. 2006; Dabla-Norris and Srivisal 2013; Denizer et al. 2000; Ibrahim and Alagidede 2017; Larrain 2006; and Moradbeigi and Law 2016; and Kpodar et al. 2018).

On the other hand, when it comes to how LC and monetary shock interact, our data show that the effect of growth volatility caused by monetary shock is amplified by the banking sector's ability to create liquidity. For both PMG and MG estimations, the results show that the effect of magnifying is greater in the short term than in the long term. Furthermore, according to the results of the PMG and MG estimations, even though the magnitude of the coefficients of the interaction term is positive in both the long and short terms, it is only statistically significant under the PMG estimation in the long term. For instance, according to the PMG estimates, a 1% increase in the monetary shock in the long term adds to the growth volatility by 0.06%, whereas the interaction term amplifies such a shock by increasing the growth volatility by 0.001%. In other words, our findings show that the banking sector exacerbates the impact of a monetary shock on the volatility of the economy. As a result, our findings support Beck et al.'s (2006) theoretical hypothesis and empirical findings, as well as Ibrahim and Alagidede's (2017) and Xue's (2020).

In terms of the effect of trade openness on growth volatility, our findings show that the PMG and MG have significantly different effects of trade openness on growth volatility. While the coefficients are statistically significant and positive under the PMG approach, the MG approach shows the opposite. Increased trade openness decreases volatility, as PMG shows. Furthermore, short-term results show a negative but statistically insignificant effect, whereas long-term findings are also negative but significant. In addition, the results show that long-term elasticities are smaller than short-term ones. According to the PMG, an increase in trade openness of 1% causes growth volatility to increase by 0.938 percent over the long term, compared to a decrease of 0.53% that is reported in the short term. The implication is that a reduction in barriers to trade perhaps decreases countries' susceptibility to external shocks, thus mitigating growth vagaries. The theory highlights that trade openness is a double-edged sword. On the one hand, while trade openness might, in principle, provide a mechanism for smoothing consumption and production in the face of shocks. On the other hand, trade openness could expose a country to greater volatility as exogenous shifts in trade lead to disruptions in economic activity. Overall, this finding is consistent and confirms the findings of Cavallo (2007).

Furthermore, government spending with positive coefficients influences volatility. Fiscal policy measured by government expenditure is positive in all the estimations, thus also suggesting some degree of a magnifying effect in both the long term and short term. Furthermore, the PMG estimation shows that the coefficients are significant at conventional significance levels, whereas the MG shows no such significance. According to the results of PMG, an increase of 1 percent in government expenditures would result in an increase of 3.33 percent in the short term and 2.89 percent in the long term. This destabilising effect is evident from our results. This evidence could be attributed to pro-cyclical fiscal policies. According to our data, governments' use of fiscal policy as a tool to control long-term economic oscillations may not be successful. However, it is worth mentioning that our results are similar to Moradbeigi and Law (2016).

Finally, both PMG and MG treat their long-term coefficients in different ways. For instance, PMG assumes a homogeneity of the effect across the cross-sections under investigation, whereas MG assumes that its long-term coefficients are heterogenous. Thus, the assumption of homogeneity needs to be validated by applying the Hausman test. Given low- or high-test statistics, Hausman tests of model difference accept homogeneity restrictions on regressors in the long term. Thus, as the table shows, the *p*-value for Hausman is 0.973, thus failing to reject the null hypothesis for this test and indicating that the PMG is more efficient than the MG. Two estimators that predict convergence show that the error correction term, which quantifies the pace of adjustment to long-term equilibrium, is accurate and strongly significant. Following a sudden change in the system's trajectory, the coefficients show that the system immediately returns to its long-term equilibrium. As the table shows, the adjustment coefficient is negative and statistically significant. In other words, there is cointegration among tested variables, and any deviation from the equilibrium of the panel is corrected at an adjustment speed of 0.47%, according to the PMG.

4.4. Robustness Check

Using lags of both the independent and dependent variables as instruments is a possible approach for addressing endogeneity in panel data analysis. This method is known as the "dynamic panel data" approach or the "Arellano-Bond" estimator. The basic idea is to use the lagged values of the endogenous variable as instruments for the current endogenous variable in order to address the problem of endogeneity and adjusts for period and country-specific effects. The intuition behind this approach is that the lagged values of the endogenous variable are likely to be correlated with the current value of the endogenous variable, but are uncorrelated with the error term. In addition to using the lagged values of the endogenous variable as instruments, the lagged values of the exogenous variables can also be used as instruments to address the problem of endogeneity. However, it is important to ensure that the instruments used in the analysis satisfy the relevant statistical properties, such as relevance and exogeneity.

The Blundell and Bond (1998) dynamic system of Generalised Method of Moments (GMM) estimation technique is used to look at liquidity creation, real and monetary shocks, and growth volatility. One potential issue with the dynamic panel data approach is that it requires a large number of cross-sectional units relative to the number time periods in order to obtain consistent estimates. Thus, the study bank-levelizes the LC variable instead of calculating it as an aggregate variable. In other words, we used the liquidity created by each bank included in our sample instead of using LC at aggregate level. The system GMM estimator takes into account both moment conditions for first-differences and levels models. The estimation uses exogenous variable lags and volatility lags to reduce endogeneity. In addition, the method assumes that the errors are serially uncorrelated and have constant variance over time. Overall, using lags of both the independent and dependent variables as instruments is a possible approach for addressing endogeneity in panel data analysis.

Serial correlation and Sargan's over-identifying restriction tests verify instrument validity, which affects GMM estimations. Unlike our tests, since we did not reject the null hypothesis of over-identifying restrictions, Sargan's tests support the validity of the instruments. This suggests that the instruments are valid. At standard levels, the tests for second order–correlation [AR (2)] also failed to reject the no serial correlation of order two. Addedly, the total number of instruments, which should be less than the total number of cross sections. These results are based on valid instruments and give estimates that make sense and are consistent.

In addition to being resistant to heteroskedasticity and non-normality of disturbances, the main benefit of this method is that it uses instrumental variables to deal with biases caused by reverse causality. Using a panel dataset from 2000 to 2019, Table 5 shows how liquidity creation, shocks, and volatility relate to each other.

Table 5. Liquidity creation, real and monetary shocks, and volatility.

Dependent Variable Volatility	
Variables	
lagged. volatility	0.237 * (0.066)
Real Shock	0. 936 * (0.260)
Monetary Shock	0.014 ** (0.005)
Liquidity Creation (LC)	−0.135 ** (0.058)
*(LC*real Shock)*	−0.007 * (0.002)
*(LC*Monetary Shock)*	0.021 * (0.008)
Trade Openness (TO)	0.750 * (0.444)
Expenditure (EXP)	2.690 * (0.351)
Constant	−2.463 (0.494)
Diagnostics:	
Number of cross groups	93
Number of instruments	27
AR(2) p-value	0.753
Sargan tests p-value	0.381
Countrys-pecific effects	*YES*
Time-period effect	*YES*

Notes: *, and ** denote significance at 1, 5, and 10%, respectively. Values in () represent the standard error. Estimations are conducted using Stata command xtabond2.

Table 5 shows the results of our main model for the growth volatility equation using the two-step system GMM estimator. The lagged dependent variable is included as an independent variable, and its coefficient is positive and significant, indicating that two-step system GMM is an appropriate estimator and that statistical estimations of interested hypotheses performed using this method can be trusted.

Both real and monetary shocks suggest a positive and statistically positive significant effect. We notice that the effect of real and monetary shocks now are lower 0.936 and 0.014 compared to our main results of PMG in the short term, 3.198 and 0.437, respectively. It also shows that the effect of LC on growth volatility is negative and statistically significant and qualitatively similar to the findings from the PMG estimation. The interaction term between LC and real shocks is negative and statistically significant. Thus, LC plays the role in mitigating the adverse effect of real shock. On the other hand, the interaction term between LC and monetary shock enters with a positive and significant term. The positive interaction term between monetary shock and LC indicates the amplifying effect of monetary shock by the banking sector on growth volatility. Lastly, the signs of other control variables remain as the results of our main model using PMG in the short-term.

The World Bank classifies national economies into four categories based on per capita income: low, lower medium, upper middle, and high. The gross national income (GNI) per capita in current U.S. dollars from the previous year is used to determine the categories annually.[4] As a result, we subdivided our sample into high-income and middle-income nations and independently recalculated our results using ARDL for each income group. The estimations of PMGs are shown for six high-income countries (HIC) and four middle-income countries (MIC) in Table 6.

Table 6. LC, shocks, and volatility for HIC and MIC.

Dependent Variable: Growth Volatility		
Countries Based on Income	**HIC**	**MIC**
Estimators	**PMG**	**PMG**
	Long term coefficients:	
Variables		
Real Shock	0.349 (0.063) *	0.173 (0.158)
Monetary Shock	0.038 (0.092)	0.169 (0.123)
Liquidity Creation (LC)	−0.269 (0.063) *	−0.013 (0.142) **
*(LC*real Shock)*	−0.004 (0.001) *	−0.007 (0.003) ***
*(LC*Monetary Shock)*	0.002 (0.001) *	0.009 (0.006)
Trade Openness (TO)	−3.501(1.292) ***	−1.983 (1.094) ***
Expenditure (EXP)	3.370 (1.222) *	5.133(1.365) *
Error correction term	−0.548 (0.196) *	−0.264 (0.502) *
	Short term coefficients:	
Δ *Real Shock*	0.430 (0.528) **	6.581 (7.264) ***
Δ *Monetary Shock*	0.113 (0.201) ***	1.278 (1.380)
Δ *Liquidity Creation (LC)*	−0.273 (0.208) **	−0.153 (0.147) **
Δ *(LC*real Shock)*	−11.773 (11.663) **	−0.795 (0.447)
Δ *(LC*Monetary Shock)*	0.010 (0.015) **	0.074 (0.068)
Δ *Trade Openness (TO)*	−1.011 (2.348)	−1.141 (3.119)
Δ *Expenditure (EXP)*	3.454 (2.423)	5.294 (3.827)
Intercept	1.341 (0.646) **	−4.039 (7.928) **
Number of countries	6	4
Number of observations	101	66

Notes: *, **, and *** denote significance at 1, 5, and 10%, respectively. Values in () represent the standard error. Estimations are conducted using Stata command xtpmg.

Table 6 shows that the error correction term and other main and control variables in our model are still significant (i.e., LC and the interaction term), except for trade openness. Regarding the real shock, the short-term coefficients for both groups are positive and significant, i.e., higher for middle income countries when compared to high income countries. This finding can also be attributed to the fact that some of the countries in our sample rely on remittances and government aid from countries with higher incomes in our sample. However, for the long term, the coefficients show that HIC's volatility will increase by 0.349%, for a 1% increase in the real shock, compared to a 0.173% increase for countries in the MIC. For the financial shock, the variable maintains its sign; however, it is only significant in the short term for HIC. Furthermore, the LC, which is one of the core variables in our model, also maintains its sign and significance, thereby indicating that the LC negatively affects growth volatility. The coefficient of the interaction term between liquidity creation and OTOT shocks also maintains its negative sign, thus indicating a dampening influence on macroeconomic volatility, which is in line with our hypothesis. On the other hand, the interaction term between LC and financial shock upholds its sign; however, it also loses its significance for the MIC. Finally, the speed of the adjustment maintains its negative sign and statistical significance. In other words, there is a cointegration among the tested variables for both groups, and any deviation from the equilibrium of the panel is corrected at an adjustment speed of 0.54% and 0.26% for the HICs and MICs, respectively.

Secondly, some of the studies that examined the determinants of growth volatility employed the population, or another proxy that represents the population, as a determinant of growth volatility, as was the case in Haddad et al. (2013) and Lin and Kim (2014). Population is a reflection of the size of a country's market, and a bigger market provides better risk diversification and leads to more stability. Thus, a bigger population base is expected to dampen growth volatility. Moreover, certain studies employed labour force (LF) as a variable that determines growth volatility. The notion is that higher technology requires a higher level of expertise from the workforce. In principle, higher-quality products tend to have more stable pricing and less growth volatility. Thus, we augment our model by adding labour force as an explanatory variable. This variable includes 15-year-olds. People in the workforce, those who are unemployed, and those looking for work for the first time are all represented.

Table 7 indicates that the error correction term and other main variables and control variables in our model are still significant in the long term (i.e., the LC and the interaction term), except for monetary shock. On the other hand, even though in the short term our variables maintain their signs, they lose their significance (except for government expenditure), thereby emphasising the amplifying effect of government expenditure cyclicality. Generally, after adding the LF, we notice that, controlling for other variables, when the LF increases by 1%, volatility will decrease by 6.97% in the short term, whereas in the long term, volatility will increase by 0.719% for a 1% increase in the LF. Furthermore, LC shows a higher mitigating effect when an oil shock erupts. The moderating effect of LC and real shocks is higher in the short term (8.587%) when compared to −7.142% in our main model.

Thirdly, the analytical model and the data restrictions are a main driver in certain cases with respect to imposing a common lag among cross sections, as was highlighted in several empirical papers, such as Pesaran et al. (1999); Demetriades and Law (2006); and Samargandi et al. (2015). Thus, we re-estimate the model by applying the lag structure (1, 0, 0, . . . , 0, 0). Table 8 shows the results of this test. The results show that, in the long term, our main variables (other than the error correction) maintain their signs and significance, except for the monetary shock variable. In the short term, however, even though our variables retain their expected signs, they lose their significance, with the exception of LC. The possible explanation for the difference in effect between the long term and short term is that the short-term coefficients are not assumed to be homogenous in the short term, which makes pooling the estimate of the short-term estimate impossible. As a result, when long-term and short-term estimates are compared, one basic conclusion is that the sign of the link between LC and growth volatility depends on whether the shifts are transient or permanent. Overall, in the long term, our estimates show the mitigating role that the banking sector plays when an oil shock erupts.

Table 7. LC, shocks, and volatility.

Long Term Coefficients:	
variables	
Real Shock	0.791 (0.038) *
Monetary Shock	−0.082 (0.066)
Liquidity Creation (LC)	−0.355 (0.038) *
*(LC*real Shock)*	−0.005 (0.001) *
*(LC*Monetary Shock)*	0.002 (0.000) *
Trade Openness (TO)	−1.127 (09782) *
Expenditure (EXP)	4.068 (0.518) *
Labour Force (LF)	−0.719 (0.173) *
Error correction term	−0.389 (0.228) *
Short Term Coefficients:	
Δ *Real Shock*	3.147 (2.974)
Δ *Monetary Shock*	0.729 (0.614)
Δ *Liquidity Creation (LC)*	−0.300 (0.326)
Δ *(LC*real Shock)*	−8.587 (8.266)
Δ *(LC*Monetary Shock)*	0.034 (0.044)
Δ *Trade Openness (TO)*	−1.312 (1.666)
Δ *Expenditure (EXP)*	4.750 (1.666)
Labour Force (LF)	−6.977 (10.289)
Intercept	−7.501 (5.119)
Number of countries	10
Number of observations	167

Notes: * denote significance at 1, 5, and 10%, respectively. Values in () represent the standard error. Estimations are conducted using Stata command xtpmg.

It must be noted that, regarding the effect of other financial organisations on volatility, banks have been the main emphasis. By helping corporations manage risk, stock markets may reduce volatility. Business cycle volatility does not matter when financing comes from banks or the market, as illustrated by Ferreira da Silva (2002). In addition, there is evidence to show that the growth of banks and stock markets occurs at about the same time, and that certain nations are making slow but steady progress toward an intermediate system that combines aspects of market-based financial and bank-based systems. Thus, it is legitimate to question whether our results will hold if we control for the capital market.

Market growth has been measured using a variety of indicators in the literature, including turnover ratio, stock market value relative to GDP, stock market transaction value relative to GDP, stock market capitalization growth rate, etc. The ratio of stock market value to gross domestic product is one example of publicly available data that is in line with our own (STOCKS). The results are presented in Table 9, which indicate that STOCK has a positive but insignificant coefficient in the long term, and almost all of the coefficients have the exact sign. In the short term, the STOCK has a negative and statistically insignificant effect, and the rest of the variables keep their signs, except for TO. We notice that the impact of LC on growth volatility is higher after controlling for STOCK. Overall, we infer that our main results are robust even after controlling for other players in the financial system, such as the capital market.

Table 8. LC, shocks, and volatility, while imposing a common lag among cross sections.

Dependent Variable: Growth Volatility	
Long term coefficients:	
Variables	
Real Shock	0.424 (0.031) *
Monetary Shock	0.060 (0.090)
Liquidity Creation (LC)	−0.175 (0.031) *
*(LC*real Shock)*	−0.003 (0.001) *
*(LC*Monetary Shock)*	0.002 (0.001) *
Trade Openness (TO)	−0.939 (0.467) **
Expenditure (EXP)	2.888 (0.575) *
Error correction term	−0.474 (0.209) **
Short term coefficients:	
Δ *Real Shock*	2.998 (2.916)
Δ *Monetary Shock*	−0.465 (0.522)
Δ *Liquidity Creation (LC)*	0.419 (0.246) ***
Δ *(LC*real Shock)*	−7.141 (6.979)
Δ *(LC*Monetary Shock)*	0.041 (0.045)
Δ *Trade Openness (TO)*	−0.090 (1.520)
Δ *Expenditure (EXP)*	1.960 (1.371)
Intercept	−4.662 (2.245) **
Number of countries	10
Number of observations	167

Notes: *, **, and *** denote significance at 1, 5, and 10%, respectively. Values in () represent the standard error. Estimations are conducted using Stata command xtpmg. Lag structure is (1,0,0,0,0,0,0,0).

Table 9. LC, shocks, and volatility while controlling for the capital market.

Long Term Coefficients:	
Variables	
Real Shock	0.276 (0.075) *
Monetary Shock	0.070 (0.017) ***
Liquidity Creation (LC)	−0.261 (0.025) *
*(LC*real Shock)*	−0.002 (0.000) **
*(LC*Monetary Shock)*	0.002 (0.000) *
Trade Openness (TO)	−3.893 (0.406) *
Expenditure (EXP)	3.328 (0.638) *
STOCK	0.005 (0.008)
Error correction term	−0.422 (0.167) **
Short Term Coefficients:	
Δ *Real Shock*	2.931 (2.775) ***
Δ *Monetary Shock*	0.181 (0.388)
Δ *Liquidity Creation (LC)*	−0.534 (0.312) ***
Δ *(LC*real Shock)*	−7.259 (7.232)
Δ *(LC*Monetary Shock)*	0.034 (0.044)
Δ *Trade Openness (TO)*	−0.527 (1.551)
Δ *Expenditure (EXP)*	3.598 (1.411) ***
Δ *STOCK*	−0.011 (0.015)
Intercept	1.413 (0.712) **
Number of countries	10
Number of observations	167

Notes: *, **, and *** denote significance at 1, 5, and 10%, respectively. Values in () represent the standard error. Estimations are conducted using Stata command xtpmg.

Furthermore, it can be claimed that inflation may be induced by monetary and fiscal shocks, as well as other variables that are not explicitly tied to central bank action. Thus, the volatility of inflation as a proxy for monetary shocks is not a suitable proxy. The shift in the policy rate set by the central bank would be a proper proxy for a monetary shock. Consequently, we replace the volatility of inflation as a proxy for monetary shock with the change in the monetary policy rate.[5]

Table 10 indicates that the error correction term and other main variables and control variables in our model are still significant in the long term (i.e., the LC and the interaction term), but with a higher magnitude than our main model. For instance, the interaction LC*real Shock became (−0.334) compared to (−0.003) in our main model, whereas the interaction (LC*Monetary Shock) became (0.074) compared to (0.002) in our main model. Furthermore, we found that the coefficient of real shock is lower and keeps its sign compared to our main model, while the coefficient of monetary shock is higher than the coefficient of the main model. We also noticed that EXP changed its sign and lost its significance. On the other hand, in the short term, both real and monetary shocks have higher coefficients compared to the results of our main model. Furthermore, LC shows a lower negative and significant effect compared to the results of our main model. Our previous result that liquidity creation is correlated with lower volatility is supported by the fact that the liquidity creation coefficient is negative. Furthermore, we discovered that while liquidity creation decreases volatility by mitigating the positive effect of OTOT, it amplifies the pass-through effect of monetary shock on growth fluctuations.

Table 10. Liquidity creation, shocks, and volatility using the shift in the policy rate set by the central bank as a proxy for monetary shock.

Dependent Variable: Growth Volatility	
Estimator	PMG
Long term coefficients:	
variables	
Real Shock	0.132 (0.102) *
MonetaryShock	4.286 (1.995) **
Liquidity Creation (LC)	−1.445 (0.852) ***
*(LC*real Shock)*	−0.334 (0.000) **
*(LC*MonetaryShock)*	0.074 (0.032) **
Trade Openness (TO)	1.024 (0.396) **
Expenditure (EXP)	−0.170 (0.177)
Error correction term	−0.652 (0.286) **
Short term coefficients:	
Δ *Real Shock*	6.790 (2.234 *
Δ *MonetaryShock*	0.536 (0.229) **
Δ *Liquidity Creation (LC)*	−0.268 (0.123) **
Δ *(LC*real Shock)*	−0.455 (0.218) **
Δ *(LC*MonetaryShock)*	0.059 (0.583)
Δ *Trade Openness (TO)*	−0.002 (0.070) *
Δ *Expenditure (EXP)*	0.795 (1.611)
Intercept	−4.430 (1.991) **
Number of countries	10
Number of observations	167

Notes: *, **, and *** denote significance at 1, 5, and 10%, respectively. Values in () represent the standard error. Estimations are conducted using Stata command xtpmg.

Finally, we remeasured our main variables, i.e., growth volatility, real shock, and monetary shock.[6] We recalculated the dependent variable as the standard deviation of real GDP per capita growth. The real and monetary shocks were captured by the standard deviation of oil terms of trade growth and inflation over the same period.

Table 11 indicates that the error correction term and other main variables and control variables in our model are still significant in the long term (i.e., the LC and the interaction term). We find that the main coefficients of our main variables are higher and maintain their signs. On the other hand, in the short term, our variables maintain their signs but lose their significance, except for interaction terms and government expenditure. Largely, after re-measuring growth volatility, real shock, and monetary shock as the standard deviation, we notice that after controlling for other variables in the long term—LC continues to show a negative effect on growth volatility. For instance, when the LC increases by 1%, volatility decreases by −1.17%. On the other hand, in the short term, LC keeps its sign but loses its significance. Furthermore, LC shows a lower mitigating effect when an oil shock erupts. The moderating effect of LC and real shocks is weaker in the short term (−2.110%) when compared to −7.142% in our main model.

Table 11. Liquidity creation, shocks, and volatility.

Dependent Variable: Growth Volatility	
Estimator	PMG
Long term coefficients:	
variables	
Real Shock	0.663 (0.102) *
Monetary Shock	0.478 (0.104) *
Liquidity Creation (LC)	−1.171 (0.195) *
*(LC*real Shock)*	−0.011 (0.002) *
*(LC*Monetary Shock)*	0.194 (0.003) *
Trade Openness (TO)	−1.491 (0.323) **
Expenditure (EXP)	−1.486 (0.308) *
Error correction term	−0.598 (0.141) **
Short term coefficients:	
Δ *Real Shock*	14.450 (13.367)
Δ *Monetary Shock*	0.127 (0.244)
Δ *Liquidity Creation (LC)*	−0.486 (1.527)
Δ *(LC*real Shock)*	−2.110 (1.020) *
Δ *(LC*Monetary Shock)*	0.225 (0.119) ***
Δ *Trade Openness (TO)*	−0.549 (1.226)
Δ *Expenditure (EXP)*	0.392 (0.165) **
Intercept	−4.662 (−2.080) **
Number of countries	10
Number of observations	167

Notes: *, **, and *** denote significance at 1, 5, and 10%, respectively. Values in () represent the standard error. Estimations are conducted using Stata command xtpmg.

5. Conclusions

There is a school of thought that states that the banking sector helps the economy expand by dampening the negative effects of growth volatility. However, studies that have tried to evaluate the link between the two have shown mixed results. Furthermore, despite the fact that liquidity creation is widely acknowledged as the primary function of the banking sector, its role during real and monetary shocks has not yet been studied. Therefore, our research investigates the finer points of this relationship in an effort to unearth new, never-before-seen information.

The impact of LC on growth volatility, through its interaction with a broad range of shocks, was also measured, as was the relative size of monetary and real shocks in this body of study. The effect of LC on growth volatility was also assessed, and MENA commercial banks listed on the stock markets were studied. Our findings, albeit preliminary, provide credence to the idea that finance (LC) might help moderate MENA economies' proneness to economic volatility. Empirical data supports LC's moderating influence on oil terms of trade and growth volatility. Furthermore, LC can counteract some of oil's negative impact on growth volatility.

The short-term effect of the volatility of OTOT is higher than its long-term effect, which indicates the intensity of genuine shocks. Our findings suggest that these monetary shocks significantly exacerbate volatility, but their impact is much less noticeable in the near term. Despite this, our findings demonstrate that the banking sector dampens (intensifies) the impact of real shocks (monetary shocks) on growth volatility, regardless of the time horizon.

Finally, the findings imply that a robust financial sector may mitigate the impact of actual shocks on growth volatility. One major conclusion for policymakers is that a stronger banking sector performance may help central banks better implement macroeconomic policies. Further, reducing consumer and business uncertainty may be facilitated by promoting additional actors in the financial system and by evaluating their impact. This research concludes by recommending that central banks use an inflation targeting strategy for dealing with monetary shocks in order to dampen volatility.

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Notes

1. Our sample was based on information from the following countries: Bahrain, Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates.
2. To classify activities and weights, see Almeshari et al. (2023).
3. We performed a three-panel unit root test—as per Im et al. (2003); Levin et al. (2002); and Pesaran's second generation of IPS test (CIPS) (Pesaran 2007) the results revealed that all variables are integrated of I(1). The findings are available upon request; we have not included them here due to their length.
4. Further explanation can be found at: https://datahelpdesk.worldbank.org/knowledgebase/articles/378834-how-does-the-world-bank-classify-countries (accessed on 3 April 2023).
5. We appreciate an anonymous referee proposing this check.
6. We appreciate an anonymous referee who proposed this check.

References

Abdelmageed, Samar. 2021. Financial Integration, Inclusion and Stability During Crises: Insights from the MENA Region. Working Papers 1518. *Economic Research Forum*. Available online: https://ideas.repec.org/p/erg/wpaper/1518.html (accessed on 18 August 2022).

Acemoglu, Daron, and Fabrizio Zilibotti. 1997. Was Prometheus Unbound by Chance? Risk, Diversification, and Growth. *Journal of Political Economy* 105: 709–51. [CrossRef]

Aghion, Philippe, Abhijit Banerjee, and Piketty Tomas. 1999. Dualism and Macroeconomic Volatility. *The Quarterly Journal of Economics* 114: 1359–97. [CrossRef]

Aghion, Philippe, Phillipe Bacchetta, Romain Rancière, and Kenneth Rogoff. 2009. Exchange rate volatility and productivity growth: The role of financial development. *Journal of Monetary Economics* 56: 494–513. [CrossRef]

Almeshari, Ali, Mohamed Hisham Bin Dato Haji Yahya, Fakarudin Bin Kamarudin, and Sha'ari Abd Hamid. 2023. Liquidity Creation and Economic Growth: Are They Monotonically Related? Evidence from MENA Countries. *Economies* 11: 24. [CrossRef]

Bacchetta, Philippe, and Ramon Caminal. 2000. Do capital market imperfections exacerbate output fluctuations? *European Economic Review* 44: 449–68. [CrossRef]

Bartak, Jakub, Łukasz Jabłoński, and Agnieszka Jastrzębska. 2021. Examining GDP Growth and Its Volatility: An Episodic Approach. *Entropy* 23: 890. [CrossRef]

Beck, Thorsten, Hans Degryse, and Christiane Kneer. 2014. Is more finance better? Disentangling intermediation and size effects of financial systems. *Journal of Financial Stability* 10: 50–64. [CrossRef]

Beck, Thorsten, Mattias Lundberg, and Giovanni Majnoni. 2006. Financial intermediary development and growth volatility: Do intermediaries dampen or magnify shocks? *Journal of International Money and Finance* 25: 1146–67. [CrossRef]

Berger, Allen N., and Christa H. S. Bouwman. 2009. Bank Liquidity Creation. *The Review of Financial Studies* 22: 3779–837. [CrossRef]

Berger, Allen N., Narjess Boubakri, Omrane Guedhami, and X. Li. 2017. Liquidity Creation and Financial Stability Implications of Islamic Banking: Evidence from a Multinational Study. Paper presented at the KFUPM Islamic Banking and Finance Research Conference, Dhahran, Saudi Arabia, November 19–20.

Bhide, Amar. 1993. The hidden costs of stock market liquidity. *Journal of Financial Economics* 34: 31–51. [CrossRef]

Blundell, Richard, and Stephen Bond. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87: 115–43. Available online: https://www.ssc.wisc.edu/~walker/wp/wp-content/uploads/2013/09/bundell_bond98.pdf (accessed on 3 April 2023). [CrossRef]

Bollerslev, Tim. 1986. Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics* 31: 307–27. [CrossRef]

Boot, Arnoud W. A., and Anjan V. Thakor. 1997. Financial System Architecture. *Review of Financial Studies* 10: 693–733. [CrossRef]

Boyd, John H., and Edward C. Prescott. 1986. Financial intermediary-coalitions. *Journal of Economic Theory* 38: 211–32. [CrossRef]

Brueckner, Markus, and Francisco Galaro Carneiro. 2017. Terms of trade volatility, government spending cyclicality, and economic growth. *Review of International Economics* 25: 975–89. [CrossRef]

Bryant, John. 1980. A model of reserves, bank runs, and deposit insurance. *Journal of Banking and Finance* 4: 335–44. [CrossRef]

Cavallo, Eduardo A. 2007. Output Volatility and Openness to Trade: A Reassessment. *Research Department Publications*. Available online: https://ideas.repec.org/p/idb/wpaper/4518.html (accessed on 3 April 2023).

Dabla-Norris, Era, and Narapong Srivisal. 2013. Revisiting the Link Between Finance and Macroeconomic Volatility. In *IMF Working Papers*. Washington, DC: International Monetary Fund, vol. 13. [CrossRef]

De Long, James Bradford, and Lawrence H. Summers. 1986. Is Increased Price Flexibility Stabilizing? *The American Economic Review* 76: 1031–44.

Demetriades, Pianco, and Siong Hook Law. 2006. Finance, institutions and economic development. *International Journal of Finance and Economics* 11: 245–60. [CrossRef]

Denizer, Cevdet A., Murat F. Iyigun, and Ann L. Owen. 2000. Finance and Macroeconomic Volatility. *International Finance Discussion Paper* 2000: 1–29. [CrossRef]

Denizer, Cevdet A., Murat F. Iyigun, and Ann L. Owen. 2002. Finance and Macroeconomic Volatility. *Contributions in Macroeconomics* 2: 1–32. [CrossRef]

Devinney, Timothy M. 1986. *Background and Literature Review*. Berlin and Heidelberg: Springer, pp. 3–9. [CrossRef]

Diamond, Douglas W. 1984. Financial Intermediation and Delegated Monitoring. *The Review of Economic Studies* 51: 393–414. [CrossRef]

Diamond, Douglas W., and Philip H. Dybvig. 1983. Bank Runs, Deposit Insurance, and Liquidity. *Journal of Political Economy* 91: 401–19. [CrossRef]

Donaldson, Jason Roderick, Giorgia Piacentino, and Anjan Thakor. 2018. Warehouse banking. *Journal of Financial Economics* 129: 250–67. [CrossRef]

Driskill, Robert A., and Sheffrin M. Sheffrin. 1986. Is Price Flexibility Destabilizing? *The American Economic Review* 76: 802–7.

Dynan, Karen E., Douglas W. Elmendorf, and Daniel E. Sichel. 2006. Can financial innovation help to explain the reduced volatility of economic activity? *Journal of Monetary Economics* 53: 123–50. [CrossRef]

Easterly, William, and Aart Kraay. 2000. Small states, small problems? Income, growth, and volatility in small states. *World Development* 28: 2013–27. [CrossRef]

Easterly, William, Islam Roumeen, and Joseph E. Stiglitz. 2000. *Explaining Growth Volatility*. Bretton Woods: World Bank, pp. 1–24.

Fernández, Ana I., Francisco González, and Nuria Suárez. 2016. Banking stability, competition, and economic volatility. *Journal of Financial Stability* 22: 101–20. [CrossRef]

Ferreira da Silva, Gisele. 2002. The impact of financial system development on business cycles volatility: Cross-country evidence. *Journal of Macroeconomics* 24: 233–53. [CrossRef]

Fidrmuc, Jarko, Zuzana Fungáčová, and Laurent Weill. 2015. Does Bank Liquidity Creation Contribute to Economic Growth? Evidence from Russia. *Open Economies Review* 26: 479–96. [CrossRef]

Gazdar, Kouthar, M. Kabir Hassan, M. Faisal Safa, and Rihab Grassa. 2019. Oil price volatility, Islamic financial development and economic growth in Gulf Cooperation Council (GCC) countries. *Borsa Istanbul Review* 19: 197–206. [CrossRef]

Gorton, Gary, and George Pennacchi. 1990. Financial Intermediaries and Liquidity Creation. *The Journal of Finance* 45: 49–71. [CrossRef]

Haddad, Mona, Lim Jamus Jerome, Pancaro Cosimo, and Christian Saborowski. 2013. Trade openness reduces growth volatility when countries are well diversified. *Canadian Journal of Economics/Revue Canadienne d'économique* 46: 765–90. [CrossRef]

Hanson, Samuel G., Andrei Shleifer, Jeremy C. Stein, and Robert W. Vishny. 2015. Banks as patient fixed-income investors. *Journal of Financial Economics* 117: 449–69. [CrossRef]

Holmström, Benget, and Jean Tirole. 1997. Financial Intermediation, Loanable Funds, and The Real Sector. *The Quarterly Journal of Economics* 112: 663–91. [CrossRef]

Holmström, Bengt, and Jean Tirole. 1998. Private and Public Supply of Liquidity. *Journal of Political Economy* 106: 1–40. [CrossRef]

Hoshi, Takeo, Anil Kashyap, and David Scharfstein. 1991. Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups. *The Quarterly Journal of Economics* 106: 33–60. [CrossRef]

Ibrahim, Muazu, and Paul Alagidede. 2017. Financial sector development, economic volatility and shocks in sub-SaharaSub-Saharan Africa. *Physica A: Statistical Mechanics and Its Applications* 484: 66–81. [CrossRef]

IMF. 2018. Gulf Cooperation Council Countries (GCC): How Developed and Inclusive are Financial Systems in the GCC? *Policy Papers* 18: 1–40. [CrossRef]

Im, Keo So, Mohammad H. Pesaran, and Yongcheol Shin. 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics* 115: 53–74. [CrossRef]

Jarrett, Uchechukwu, Kamiar Mohaddes, and Hamid Mohtadi. 2019. Oil price volatility, financial institutions and economic growth. *Energy Policy* 126: 131–44. [CrossRef]

Johansen, Soren. 1995. Likelihood-Based Inference in Cointegrated Vector Autoregressive Models. In *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models*. Oxford: Oxford University Press. [CrossRef]

Kao, Chihwa. 1999. Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics* 90: 1–44. [CrossRef]

Karras, Georgios, and Frank Song. 1996. Sources of business-cycle volatility: An exploratory study on a sample of OECD countries. *Journal of Macroeconomics* 18: 621–37. [CrossRef]

Kpodar, Kangni, and Patrick Imam. 2016. Does a Regional Trade Agreement Lessen or Worsen Growth Volatility? An Empirical Investigation. *Review of International Economics* 24: 949–79. [CrossRef]

Kpodar, Kangni, Maelan Le Goff, and Raju J. Singh. 2018. Financial deepening, terms of trade shocks, and growth volatility in low-income countries. *Revue d'Economie Du Developpement* 26: 27–68. [CrossRef]

Larrain, Borja. 2006. Do Banks Affect the Level and Composition of Industrial Volatility? *The Journal of Finance* 61: 1897–925. [CrossRef]

Levin, Andrew, Chien-fu Lin, and Chia Shang James Chu. 2002. Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics* 108: 1–24. [CrossRef]

Levine, Ross. 1997. Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature* 35: 688–726.

Levine, Ross, Norman Loayza, and Thorsten Beck. 2000. Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics* 46: 31–77. [CrossRef]

Lin, Shu-Chin, and Dong-Hyeon Kim. 2014. The link between economic growth and growth volatility. *Empirical Economics* 46: 43–63. [CrossRef]

Liu, Haiying, Muhammad Mansour Saleem, Mamdouh Abdulaziz Saleh Al-Faryan, Irfan Khan, and Muhammad Wasif Zafar. 2022. Impact of governance and globalization on natural resources volatility: The role of financial development in the Middle East North Africa countries. *Resources Policy* 78: 102881. [CrossRef]

Loayza, Norman, and Romain Ranciere. 2005. Financial Development, Financial Fragility, and Growth. *IMF Working Papers* 5: 1–32. [CrossRef]

Long, John B., and Charles I. Plosser. 1987. Sectoral vs. Aggregate Shocks In The Business Cycle. *American Economic Association* 77: 333–36.

Maghyereh, Aktham I., Basil Awartani, and Osama D. Sweidan. 2019. Oil price uncertainty and real output growth: New evidence from selected oil-importing countries in the Middle East. *Empirical Economics* 56: 1601–21. [CrossRef]

Majeed, Muhammad Tariq, and Ayesha Noreen. 2018. Financial Development and Output Volatility: A Cross-Sectional Panel Data Analysis. *The Lahore Journal of Economics* 23: 97–141. [CrossRef]

Manganelli, Simone, and Alexander Popov. 2015. Financial development, sectoral reallocation, and volatility: International evidence. *Journal of International Economics* 96: 323–37. [CrossRef]

Moradbeigi, Maryam, and Siong Hook Law. 2016. Growth volatility and resource curse: Does financial development dampen the oil shocks? *Resources Policy* 48: 97–103. [CrossRef]

Nelson, Charles R., and Charles R. Plosser. 1982. Trends and random walks in macroeconmic time series: Some evidence and implications. *Journal of Monetary Economics* 10: 139–62. [CrossRef]

Pedroni, Peter. 1999. Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics* 61: 653–70. [CrossRef]

Pedroni, Peter. 2004. Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the ppp hypothesis. *Econometric Theory* 20: 597–625. [CrossRef]

Pesaran, M. Hashem. 2007. A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics* 22: 265–312. [CrossRef]

Pesaran, M. Hashem, and Ron Smith. 1995. Estimating long-run relationships from dynamic heterogeneous panels. *Journal of Econometrics* 68: 79–113. [CrossRef]

Pesaran, M. Hashem, and Yongcheol Shin. 1999. An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In *Econometrics and Economic Theory in the 20th Century*. Edited by G. Balint, B. Antala, C. Carty, J.-M. A. Mabieme, I. B. Amar and A. Kaplanova. Cambridge: Cambridge University Press, vol. 7, pp. 371–413. [CrossRef]

Pesaran, M. Hashem, Yongcheol Shin, and Ron P. Smith. 1999. Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association* 94: 621. [CrossRef]

Phillips, Peter C. B., and Bruce E. Hansen. 1990. Statistical Inference in Instrumental Variables Regression with I(1) Processes. *The Review of Economic Studies* 57: 99. [CrossRef]

Raddatz, Claudio. 2006. Liquidity needs and vulnerability to financial underdevelopment. *Journal of Financial Economics* 80: 677–722. [CrossRef]

Rajan, Raghuram, and Luigi Zingales. 2004. *Saving Capitalism from the Capitalists: Unleashing the Power of Financial Markets to Create Wealth and Spread Opportunity*. Princeton: Princeton University Press, p. 369. Available online: https://press.princeton.edu/books/paperback/9780691121284/saving-capitalism-from-the-capitalists (accessed on 3 April 2023).

Ramakrishnan, Ram T. S., and Anjan V. Thakor. 1984. Information Reliability and a Theory of Financial Intermediation. *The Review of Economic Studies* 51: 415. [CrossRef]

Ramey, Garey, and Valerie Ramey. 1994. *Cross-Country Evidence on the Link Between Volatility and Growth*. Cambridge: National Bureau of Economic Research. [CrossRef]

Roodman, David. 2009. How to Do xtabond2. *Stata Journal* 103: 1–48.

Samargandi, Nahla, Jan Fidrmuc, and Sugata Ghosh. 2015. Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries. *World Development* 68: 66–81. [CrossRef]

Schiffer, Hans-Wilhelm. 2016. *World Energy Resources 2016*. London: World Energy Council, pp. 6–46.

Singh, Ajit. 1997. Financial Liberalisation, Stockmarkets and Economic Development. *The Economic Journal* 107: 771–82. [CrossRef]

Smolo, Edib, Mansor H. Ibrahim, and Ginanjar Dewandaru. 2021. Impact of Bank Concentration and Financial Development on Growth Volatility: The Case of Selected OIC Countries. *Emerging Markets Finance and Trade* 57: 2094–106. [CrossRef]

Spatafora, Nikola, and Irina Tytell. 2009. Commodity Terms of Trade: The History of Booms and Busts. *IMF Working Paper No. 09/205*. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1486523 (accessed on 27 April 2023).

Stein, Jeremy C. 2012. Monetary Policy as Financial Stability Regulation. *The Quarterly Journal of Economics* 127: 57–95. [CrossRef]

Stiglitz, Jeremy E. 1985. Credit Markets and the Control of Capital. *Journal of Money, Credit and Banking* 17: 133. [CrossRef]

UNCTAD. 2012. *Excessive Commodity Price Volatility: Macroeconomic Effects on Growth and Policy Options*. New York: United Nations Conference on Trade and Development. 51p.

Vegh, Carlos A., Guillermo Vuletin, Daniel Riera-Crichton, Juan Pablo Medina, Diego Friedheim, Luis Morano, and Lucila Venturi. 2018. From Known Unknowns to Black Swans: How to Manage Risk in Latin America and theCaribbean. In *From Known Unknowns to Black Swans: How to Manage Risk in Latin America and the Caribbean*. Washington, DC: World Bank. [CrossRef]

Vi Dang, Tri, Gray Gorton, Benget Holmström, and Guillermo Ordoñez. 2017. Banks as secret keepers. In *American Economic Review*. Nashville: American Economic Association, vol. 107, pp. 1005–29. [CrossRef]

Wei, Feng, and Yu Kong. 2016. Financial Development, Financial Structure, and Macroeconomic Volatility: Evidence from China. *Sustainability* 8: 1116. [CrossRef]

Xue, Wen-Jun. 2020. Financial sector development and growth volatility: An international study. *International Review of Economics & Finance* 70: 67–88. [CrossRef]