



## Effects of Macroeconomic Volatility on the Financial Sector Performance in the Selected MENA Countries

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### ABSTRACT

In recent times, there has been growing concern in the enquiry into the effects of macroeconomic volatility on financial sector performance in the MENA economies. This concern grew especially in this recent time due to great efforts devoted to financially integrating MENA economies with the rest of the world and the emergence of this region as a potential substitute to East Asia, in the wake of the East Asian financial crisis of the mid 1990s Empirically, the study assessed the effects of macroeconomic volatility on the financial sector performance in the MENA economies from 1996 to 2016. It also assessed the direction of the causality between macroeconomic volatility and financial sector performance using secondary data sourced from the World Bank development indicator for the analysis. The regression results were obtained using the Panel Autoregressive Distributed Lag Model (PARDL) method which shows that measures of macroeconomic performance have a statistically significant effect on financial sector performance and a conclusion was drawn that macroeconomic volatility has negative effects on financial sector performance in the MENA economies. The result was analyzed in line with the possible policy implications and valid recommendations were made based on the policy implications of the findings.

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### 1. INTRODUCTION

The financial sector plays an indispensable role in fostering sustainable economic growth by efficiently allocating resources, facilitating investment, and promoting macroeconomic stability—functions that are particularly vital in developing and transitioning economies. In the Middle East and North Africa (MENA) region, this role has gained prominence amid intensified efforts to diversify economies, reduce dependency on oil revenues, and deepen integration with global financial markets (Manasseh et al., 2024a; World Bank, 2020; Manasseh et al., 2024b). Since the 1990s, a combination of external shocks, most notably the East Asian financial crisis and internal policy shifts have spurred MENA countries to liberalize capital markets, improve regulatory environments, and promote financial inclusion (IMF, 2019). Yet, despite such reforms, financial sector performance across the region remains inconsistent and susceptible to macroeconomic volatility. This volatility, expressed through erratic movements in inflation, interest

rates, exchange rates, and output, poses significant threats to financial institutions by distorting credit allocation, undermining asset quality, and heightening systemic risk (Schumpeter, 1939; Bernanke et al., 1999).

Empirical evidence underscores these concerns: Ajayi and Atanda (2012) identified a long-term negative association between macroeconomic instability and credit growth in Nigeria, while Lin and Kim (2014), using global panel data, confirmed strong feedback loops between volatility and weakened financial sector outcomes. Additional studies corroborate these findings across different contexts. For example, Enyioko (2012) highlighted how policy inconsistency eroded banking performance in Nigeria, and Posch and Walde (2011) demonstrated that economies with higher output volatility and distortionary tax regimes tend to experience suppressed financial development. Similarly, Schuh (1974) linked commodity price shocks and exchange rate swings to financial instability in industrialized nations, while Claudia et al. (2010) and Otuori (2013) revealed how

macro shocks influence bank risk and profitability in the U.S. and Kenya, respectively. However, the relationship is not uniformly negative. Some scholars suggest that moderate volatility may foster adaptive responses within financial institutions. For instance, Mohammed (2012) found a positive correlation between moderate macroeconomic fluctuations and bank profitability in Nigeria. Likewise, Fidelis, Ogwumike, and Salisu (2010) reported that long-run variability was positively associated with financial development indicators, and Mansor (2006) emphasized the indirect effects of exchange rate movements on bank lending via output and stock price channels. These findings imply that institutional quality, regulatory strength, and financial depth may condition how volatility affects financial outcomes (Demirgüç-Kunt & Huizinga, 1999).

Despite this growing body of evidence, a notable research gap persists regarding the MENA region. Most existing studies are concentrated in Sub-Saharan Africa, Asia, or Latin America, with few systematically analyzing how macroeconomic volatility shapes financial sector performance in MENA, a region marked by geopolitical uncertainty, oil price sensitivity, and often weak monetary autonomy (Beck et al., 2019; Elbadawi & Soto, 2017). Furthermore, much of the literature relies on narrow financial performance metrics, such as return on assets or total bank credit limiting our understanding of financial intermediation's multidimensional nature. Addressing these gaps, this study offers a regionally focused, methodologically robust examination of the impact of macroeconomic volatility on financial sector performance across selected MENA countries. Its contributions are fourfold: it centers on a high-risk but under-researched region; it adopts a multidimensional view of financial performance, encompassing credit expansion, capital market development, and intermediation efficiency; it employs advanced panel techniques, including fixed effects and Generalized Method of Moments (GMM), to account for endogeneity and heterogeneity; and it provides actionable insights for policymakers aiming to enhance financial resilience in volatile environments. By bridging regional and methodological gaps in the literature, this study contributes to both scholarly understanding and practical policy design, offering a clearer picture of the complex interplay between macroeconomic instability and financial sector performance in MENA economies. The remaining sections of the study are organized as follows: Section Two reviews MENA macroeconomic volatility and its implications on financial performance; Section three reviews the literature; Section four discusses the methodology; Section Five presents and analyses the findings; and Section six provides the conclusion and policy recommendations.

## 2. MENA MACROECONOMIC VOLATILITY AND ITS IMPLICATIONS ON FINANCIAL PERFORMANCE

Over the past two decades, the Middle East and North Africa (MENA) region has grappled with persistent macroeconomic instability, which has significantly hindered GDP growth and efforts to achieve consumption smoothing. Recurrent episodes of fiscal and monetary imbalance have constrained the development of financial markets and limited the region's ability to integrate into the global economy. On the monetary front, many MENA countries have adopted fixed exchange rate regimes, typically pegging their currencies to the U.S. dollar. While intended to anchor inflation and promote stability, these arrangements have yielded mixed outcomes. Several economies have experienced persistent inflation despite the nominal peg, often due to loose monetary policies and excessive money supply growth. These inflationary pressures have contributed to sustained real exchange rate appreciation, thereby undermining export competitiveness and exacerbating external imbalances. Fiscal policy dynamics have also played a central role in shaping the region's macroeconomic trajectory. The accumulation of substantial public debt across MENA economies has resulted in governments becoming the dominant borrowers in both domestic and international financial markets. This reliance on debt financing, often to fund recurrent expenditures or service external obligations has placed upward pressure on interest rates and inflation while simultaneously crowding out private sector credit and investment. The net effect has been a dampening of long-term private sector development and financial deepening.

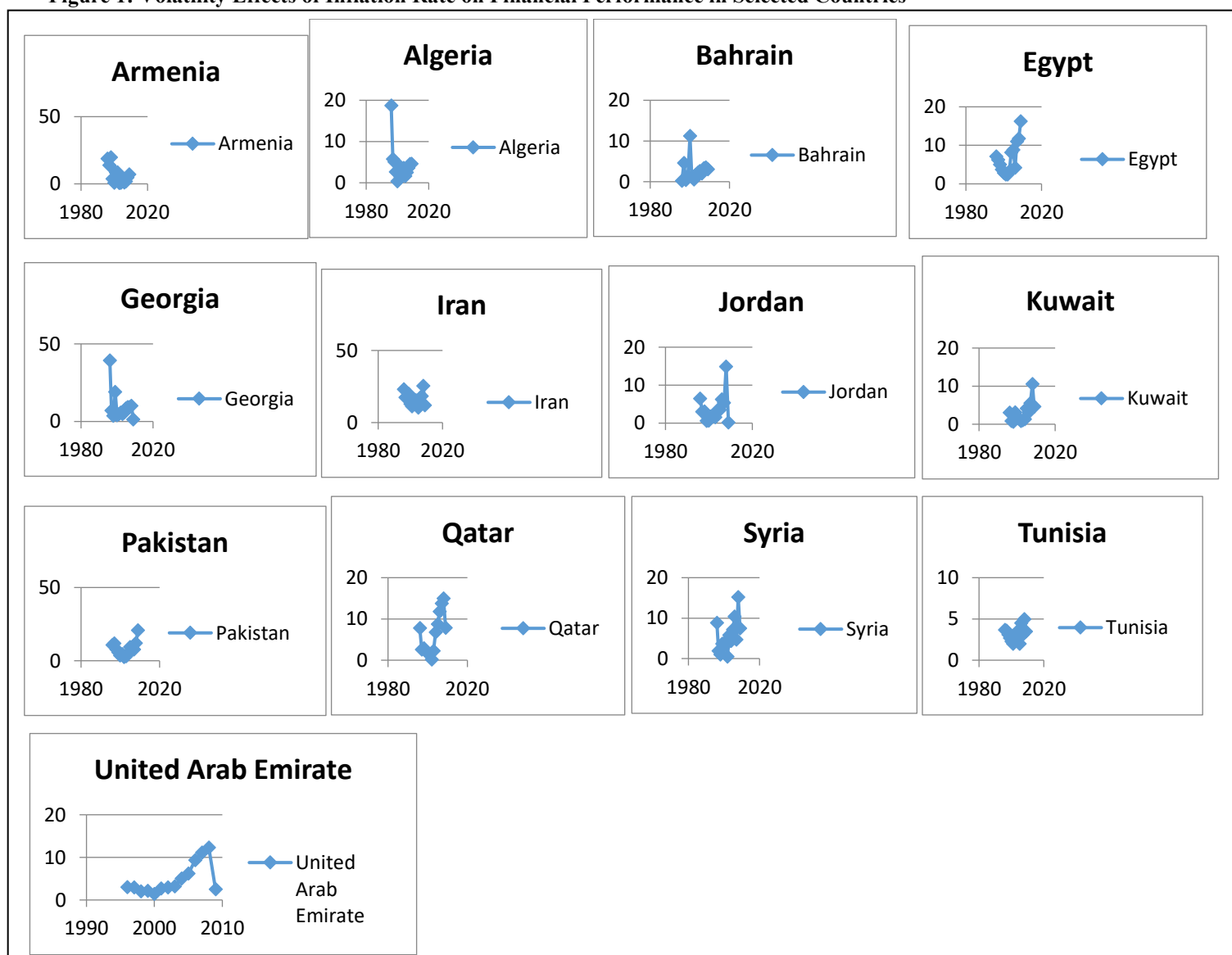
To mitigate inflation, many MENA economies have employed exchange rate anchors, often supported by high interest rate policies. While these measures have occasionally succeeded in reducing inflation, they have also produced adverse side effects, namely, real exchange rate misalignments, reduced foreign investment, and heightened vulnerability to external shocks and currency crises. Countries like Egypt and Turkey, for instance, experienced significant exchange rate overvaluations during the 1990s, followed by sharp devaluations in the early 2000s. The volatility of the U.S. dollar has further complicated monetary management in MENA economies that rely on dollar pegs. Rigid exchange rate regimes have amplified external shocks, leading to frequent currency realignments. In response, some countries, most notably Egypt have transitioned toward more flexible exchange rate systems. This shift has allowed greater room for macroeconomic adjustment and increased access to international capital markets. However, flexibility is not universally feasible. Countries such as Saudi Arabia, Kuwait, and the United Arab Emirates, characterized by limited monetary autonomy and underdeveloped financial systems, continue to depend on fixed exchange arrangements. In such contexts, the success of exchange rate management is closely

tied to fiscal discipline, robust institutional frameworks, and effective management of reserves and public debt.

Institutional constraints, particularly weak monetary governance and underdeveloped financial infrastructures, further limit the effectiveness of discretionary monetary policy across much of the region. For countries with strong trade linkages to Europe, pegging to the euro, rather than the U.S. dollar, may offer a more appropriate nominal anchor. However, even this strategy requires careful coordination with fiscal policy and structural reforms. The trend among emerging markets has increasingly favored flexible exchange rate systems, reflecting a global move away from intermediate regimes. Egypt's transition exemplifies this pattern, signaling greater financial openness and a desire for autonomous monetary policy. While this reform has come at the cost of substantial currency depreciation, Egypt's pound depreciated by nearly 300% between 1988 and 1991, it has also enhanced the country's access to external capital. Inflation remains one of the most significant macroeconomic challenges facing the MENA region. Volatile inflation rates

have eroded real savings, disrupted investment decisions, and distorted credit markets. Across the region, inflation trends have been erratic. For instance, Algeria's inflation dropped from 18.7% in 1996 to 0.3% in 2000 before rising again. Egypt's inflation surged from 2.4% in 2002 to over 16% in 2009. Sudan, meanwhile, experienced hyperinflation of over 130% in 1996, falling to 8% by 2009. Similar fluctuations were observed in Bahrain, Armenia, Georgia, and the UAE. These inflationary episodes have consistently undermined financial sector stability, reduced household purchasing power, and limited credit growth. Macroeconomic volatility, driven by rigid exchange rate regimes, fiscal imbalances, and inflationary pressures continues to constrain financial sector performance across the MENA region. While recent reforms and increased openness have yielded some progress, sustained improvement will depend on adopting more flexible monetary frameworks, strengthening institutional capacity, and reinforcing fiscal and monetary discipline.

Figure 1: Volatility Effects of Inflation Rate on Financial Performance in Selected Countries



Source: Authors' Concept.

Volatility has this negative effect through its links with various forms of uncertainty (economic, political, and policy-related) and with the tightening of binding investment constraints (when volatility reflects large negative fluctuations) Aizenman and Pinto (2005) and Wolf (2005). Therefore this study seeks to address the problems associated with fluctuations of macroeconomic variables and its effects on the financial sector performance.

### 3. LITERATURE REVIEW

This chapter reviews the literature on the effects of macroeconomic volatility on financial sector performance. The chapter, thus, presents relevant theories, literature and an empirical review of this study.

#### 3.1. Theoretical Literature

##### 3.1.1. Business Cycle Theory

Schumpeter's (1939) theory of the business cycle offers a dynamic and non-linear interpretation of economic change, highlighting that economic growth unfolds in recurring waves of “prosperity” and “recession.” Prosperity, in this context, is driven by entrepreneurial innovation that disrupts the existing equilibrium and stimulates expansion. In contrast, recession represents a necessary correction phase, during which the economy adjusts and gravitates toward a new equilibrium. Schumpeter views these cyclical fluctuations not as anomalies, but as fundamental and self-reinforcing features of capitalist systems. Central to his analysis is the role of the financial sector as a critical intermediary between savers and investors. Through the process of credit creation, particularly via bank lending, financial institutions channel funds toward productive investments that spur economic development. However, this mechanism also introduces inherent vulnerabilities. During periods of economic expansion and credit boom, both lenders and borrowers often enjoy rising profits. Yet, these gains are precarious, as excessive optimism can lead to mispricing of risk and eventual systemic imbalances when the cycle turns downward. Expanding on this foundation, Bikker and Hu (2002) observe that key macroeconomic indicators such as GDP growth, inflation, and domestic demand tend to follow identifiable cyclical patterns. Crises frequently emerge at the peak of economic expansion, when overheating leads to inflationary pressures and a deceleration in real output.

During such booms, firms' profits and asset prices typically rise, encouraging banks to extend credit more freely. In doing so, they may underestimate risk, ease lending standards, and reduce loan loss provisions, practices that intensify their exposure to potential defaults. As the economy contracts, profitability erodes, asset values fall, and non-performing loans rise. Borrowers' repayment capacity weakens, and collateral values diminish, triggering higher credit risk for banks. Faced with these pressures, financial institutions often reduce lending precisely when credit is most needed, thereby amplifying the downturn and limiting access to finance for

more vulnerable sectors. While Schumpeter's framework provides valuable insight into the cyclical behavior of credit, including its limited extension to sectors like agriculture, it does not fully capture modern complexities such as information asymmetries and regulatory constraints. These limitations underscore the need to complement his theory with contemporary models of financial intermediation for a more comprehensive understanding of economic fluctuations.

##### 3.1.2. Banks as Intermediaries and the Theory of Loanable Funds

All financial intermediaries operate by borrowing from one party to lend to another, though the sources of their funds differ. For instance, retail banks typically obtain funds from households through deposits, whereas investment banks rely more on funding from other financial institutions. This view of banking as mere intermediation has been influential since Tobin's (1963) foundational work, which challenged the notion that banks can create money “out of thin air.” Tobin downplayed the distinction between money and other financial assets, arguing that banks are not fundamentally different from other intermediaries. The primary difference, in his view, is that banks issue more liquid liabilities, such as demand deposits, which serve as close substitutes for currency. He contended that the allocation of savings depends on the relative returns of deposits versus other assets. When yields on non-deposit assets decline, banks' lending opportunities become less profitable until the marginal return on lending equals the marginal cost of attracting deposits, thus aligning banks with other intermediaries in their behavior.

This conceptualization aligns with the loanable funds theory, which assumes that lending is constrained by prior saving. In a frictionless world, the presence or absence of intermediaries would be analytically irrelevant. However, financial frictions, such as information asymmetries and verification costs make intermediation essential. As Townsend (1979) argues, lenders often incur costs to assess borrowers' returns, making external finance more expensive than internal funds. Critiques of the loanable funds framework date back to Keynes (1937), who rejected the idea that saving automatically leads to investment. More recently, Lindner (2015) emphasized that saving and lending are conceptually distinct: saving does not inherently involve providing funds to a borrower. This critique undermines the assumption that financial intermediaries simply channel pre-existing savings, suggesting instead that the process of credit creation plays a more central role in modern financial systems.

##### 3.1.3. Credit, Finance and Banking Theories

The global financial crisis of 2007–2008 reignited interest in the macroeconomic significance of credit markets and their interplay with the real economy. The crisis exposed major limitations in prevailing macroeconomic models that had often overlooked financial sector dynamics, prompting a shift

toward frameworks that incorporate financial frictions and imperfections more explicitly. While much of this work emerged post-crisis, earlier foundational studies, such as those by Kiyotaki and Moore (1997) and Bernanke et al. (1999) had already begun to analyze the implications of credit constraints on macroeconomic fluctuations. In particular, Bernanke et al. (1999), working within a New Keynesian dynamic stochastic general equilibrium (DSGE) framework, introduced the concept of the external finance premium, the additional cost of external financing relative to internal funds. This premium moves inversely with entrepreneurs' net worth, thereby amplifying economic cycles as declining asset values raise borrowing costs and depress investment. Eggertsson and Krugman (2012) extended this analysis by modeling two types of agents, patient and impatient with borrowing limits. A tightening of these limits forces deleveraging, reduces interest rates, and may lead to a liquidity trap. Their model underscores how borrower-side frictions can disrupt macroeconomic stability. Woodford (2010) focused on lender-side constraints, showing that fluctuations in the net worth of financial intermediaries can restrict credit supply, reinforcing the procyclical nature of lending. Further contributions, such as Boissay et al. (2016), examined how inefficiencies in interbank markets, due to asymmetric information and moral hazard can result in credit misallocation and underutilization of savings. Carlin and Soskice (2015) and subsequent work by Adrian and Shin (2011) and Gertler et al. (2016) highlighted the destabilizing role of shadow banking and financial leverage in driving the financial cycle. Collectively, these insights underscore the structural importance of financial institutions in shaping macroeconomic outcomes.

### 3.2. Empirical Literatures

Ajayi and Atanda (2012) examined the effect of monetary policy instruments on banks performance in Nigeria with the view to determine the existence of negative long-run relationship between macroeconomic volatility and Nigerian banks from 1970 to 2008. The Engle-granger two step co-integration approach was adopted based on the regression model that regress banks total loan and advances on minimum policy rate, cash reserves ratio, liquidity ratio, inflation and exchange rate. The empirical estimates indicated that macroeconomic volatility exerts negative effect on banks total credit. Enyioko (2012) examined the performances of banks and macro-economic performance in Nigeria based on the interest rate policies of the banks. The study analyses published audited accounts of twenty (20) out of twenty-five (25) banks that emerged from the consolidation exercise and data from the Central Banks of Nigeria (CBN). The results indicate that the interest rate policies have not improved the overall performances of banks significantly and also have contributed marginally to the growth of the economy. Levine (1997) suggests that the financial sector could diminish the volatility of economic growth by affecting the macroeconomic variables through diversifying portfolios,

facilitating the production risk management and coping with liquidity shocks, mobilizing the precautionary savings of households and generating information about the risks and returns of alternative investments in order to allocate capital more efficiently. Mohammed (2012) studied the impact of macroeconomic volatility on the performance of banks in Nigeria. The study made use of secondary data obtained from the financial reports of nine (9) banks for a period of ten (10) years (2001- 2010). The data were analyzed using multiple regression analysis. The study supported the hypothesis that macroeconomic volatility positively affects performance of banks.

Chong and Gradstein (2009) in their studies showed that volatility in economic and fiscal policies explains the negative correlation between macroeconomic volatility and banks' performance. Lin and Kim (2014) investigated the relationship between macroeconomic volatility and financial sector performance using a simultaneous equation system with a panel of 158 countries. They found a negative relationship and also significant feedback between macroeconomic volatility and financial sector performance. Posch and Walde (2011) used a model of growth with endogenous innovations and distortionary taxes to show how macroeconomic variables affect the financial sector with different tax levels that differ in their macroeconomic volatility and growth process. Their analysis implies that there should be controls for taxes in the standard volatility–growth regressions because their results show a negative relationship. Fidelis, Ogwumike and Salisu (2010) observed the relationship between bank deposit liability, credit to private sector, real discount rate and stock market capitalization (elements of financial development) and macroeconomic variability of Nigeria expressed by real gross domestic product for the period 1975 to 2008 and the study used the Bound test Autoregressive Distributed Lag (ARDL) approach. The outcomes demonstrated that there is a unique long-run association between financial sector progress and macroeconomic variability. Schuh (1974) studied the impacts of macroeconomic variables on the financial sector in the United States and other industrialized countries. He provided evidence of significant linkages between real supply shocks, commodity prices, exchange rates and international monetary reserves. He found that exchange rates, interest rates, and the level of money supply are key monetary variables that are determined mainly within domestic or international markets. He concluded that macroeconomic variables, including trade policy instruments on imports and exports, affect the level of financial sector performance negatively.

Claudia et al, (2010) studied the interplay between banks and the macroeconomic importance of financial and economic stability in the U.S. for the period 1985 quarter 1 to 2008 quarter 2. They studied more than 1,500 commercial banks and analyzed the data using a factor-augmented vector autoregressive model which extends a standard VAR. The model included GDP growth, inflation, the Federal Funds

rate, house price inflation, and a set of factors. Their main findings were; that average bank lending increases following expansionary shocks, average bank risk declines after most expansionary macroeconomic shocks, house price and monetary policy shocks are particularly important for bank risk and that, there was a substantial degree of heterogeneity across banks both in terms of idiosyncratic shocks and the asymmetric transmission of banking and macroeconomic shocks. Kargbo (2000) examined the implementation of macroeconomic factors that is monetary and exchange rate policies on the financial sector performance in West African countries and found that they had positive impacts on commodity prices, real incomes, the terms of trade between tradable and non-tradable and on financial sector performance. Further, he stated that reforms were a response to significant balance of payments problems experienced during the 1970s and early 1980s. Price reforms that targeted stabilization of food prices for consumers were key components of the macroeconomic adjustment packages. He concluded that macroeconomic factors adversely affect financial sector performance.

Mansor (2006) employed the Vector Autoregressive (VAR) technique to investigate the relationship between bank sector performance and some macroeconomic variables such as real output, stock prices and exchange rate in Malaysia for quarterly data spanning 1978 quarter 1 to 1998 quarter 2. The study demonstrated that bank loans were positively influenced by real output but no influence of bank loans on real economic activity was found negative. He further observed that exchange rate fluctuations affected bank lending activities through their effects on real output and stock prices. Therefore he concludes that macroeconomic variables greatly affect the bank sector performance. Otuori (2013) in his study investigated the determinant factors of exchange rates and their effects on the performance of commercial banks in Kenya. He observed that exports and imports, Interest rates, inflation and exchange rates were all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impacts inflation and currency values. Higher interest rates offer lenders in an economy a higher return relative to other countries, attract foreign capital and cause the exchange rate to rise. The impact of higher interest rates is mitigated, however, if inflation in the country is much higher than in others, or if additional factors serve to drive the currency down and impose a negative effect on the financial sector performance.

Lucas and Anne (2010) examined the effect of macroeconomic developments on the performance, credit quality and lending behaviour of banks in Kenya, by estimating a dynamic panel data model using the Generalized Method of Moments. The study suggested that banks need to continue pursuing risk-sensitive loan pricing policies to ease the extent of cyclical/countercyclical behaviour during economic upswings/downswings respectively, which in turn

reduces the chances of supply-driven credit crunch effects, as a result, brings negative effects on Kenyan financial sector performance. Demircuc and Huizinga (1999) study the effects of banks' performance, macroeconomic conditions, profit taxation, deposit insurance regulation, financial structure, and underlying legal and institutional indicators on bank return on assets as well as on the net interest income (NII). They find a positive association between short-term interest rates and banks profitability. Beckman (2007) assesses the effects of shocks of macroeconomic variables, which include real GDP growth, short and long term interest rates and interest rate volatility, on bank-specific variables, such as the ratio of credit to total assets and leverage, on bank return on assets. He also includes a number of so-called structural variables, namely banking system concentration and financial structure indicators. He discovered a negative impact of GDP growth on bank performance and a negative influence of interest rates. Additionally, the coefficient on the term premium is statistically insignificant which, according to the author, is due to hedging against the interest rate volatility performed by the largest banks in the sample. However, the empirical review above indicates that macroeconomic variability adversely affect the performance of financial institutions in their financial intermediary roles in an economy. Most studies on this subject were done in different regions, on different macroeconomic indicators and sectors with scanty studies done in developing countries and particularly in MENA region. The limited access of abundant literatures necessitates the need of carrying out this research. In addition, studies on financial performance and intermediation reviewed offers a comprehensive and multi-layered understanding of how financial system interfaces with economic performance under conditions of macroeconomic volatility, yielding important implications for the MENA region. Manasseh et al. (2021), using quarterly data from Nigeria (1994–2018), demonstrate that deposit mobilization and bank reserve accumulation significantly enhance per capita GDP, whereas the impact of bank credit, though positive, is statistically insignificant. These findings suggest that financial stability, particularly in volatile environments, can be strengthened through policy mechanisms that prioritize deposit mobilization and prudent reserve management. For MENA economies, many of which are vulnerable to geopolitical tensions and oil price fluctuations such strategies could serve as internal shock absorbers that stabilize financial sector performance amid macroeconomic uncertainty. Building on this, Manasseh et al. (2024a) expand the analysis across multiple African economies and employ fully modified and dynamic ordinary least squares (FMOLS and DOLS) to examine long-run causal links between financial deepening indicators, such as credit-to-GDP ratio, money supply, trade openness, and capital formation and economic growth. Their findings reveal bidirectional causality between financial deepening and growth, with capital formation exerting a one-way influence

on GDP. These results underscore the potential for financial deepening and openness to act as countercyclical tools in volatile settings. For the MENA region, strengthening domestic credit systems and fostering financial openness could mitigate the adverse transmission of external shocks, particularly in economies undergoing financial transition.

However, Manasseh et al. (2024b) highlight critical constraints that may diminish the effectiveness of intermediation. Using dynamic ARDL and cointegration techniques, they show that financial deepening's contribution to growth is negatively conditioned by deteriorating national security and ecological degradation. This finding is highly relevant for MENA countries, many of which are situated in conflict-prone or environmentally fragile zones. It implies that financial policy must be nested within a broader macro-prudential framework that incorporates security and environmental considerations to yield stable growth outcomes. In a related context, Manasseh et al. (2020) analyze how the global financial crisis and oil price volatility affect banking and investment in ECOWAS and G7 countries. Their results reveal that commodity shocks increase production costs and dampen investment, especially in oil-dependent regions. For MENA, where economies are often exposed to global oil and financial cycles, policies that promote economic diversification and establish countercyclical buffers are essential to safeguard financial intermediation and maintain performance under external stressors. In this study, combinations of different macroeconomic factors were used in the analysis. There is therefore a gap in literature regarding the effect of macroeconomic factors on financial sector performance in MENA. The current study sought to bridge this gap.

#### 4. METHODOLOGY

The selection of the sample period and countries is based on the availability of annual data, spanning the period 1996 to 2016 in the selected MENA countries as classified by World

Bank. Thus, this study makes use of a panel autoregressive distributed lag model (PARDL) and data set of 13 MENA countries Algeria, Armenia, Bahrain, U.A.E, Egypt, Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia and Tunisia. The considered panel data series are financial sector performance (FSP), macroeconomic volatility (MEV), bank credit to private sector (BCPS), domestic credit to private sector (DCPS), interest rate (INTR), inflation rate (INFL), real exchange rate (REXR) and foreign direct investment (FDI) which are obtained from the world development indicators (WDI) online database published by the world bank. The measurements of the above variables are as follows:

##### 4.1. Mathematical Formulation

$FSP = f(MEV, BCPS, INTR, INFL, REXR, DCPS, FDI)$   
(1)

Where: FSP denotes Financial Sector Performance, capturing the efficiency, stability, and depth of a country's financial system. It reflects the capacity to mobilize savings, allocate credit efficiently, and manage financial risk, typically measured using indicators such as ROA, ROE, credit-to-GDP, and private sector lending. MEV represents Macroeconomic Volatility, indicating fluctuations in key macroeconomic indicators (GDP growth, inflation, exchange rates), measured by statistical dispersion (e.g., standard deviation). BCPS is Bank Credit to the Private Sector, a proxy for credit access and financial depth. INTR refers to the prevailing nominal Interest Rate, influencing borrowing, saving, and investment. INFL is the Inflation Rate, capturing annual CPI changes, with implications for real returns and credit conditions. REXR denotes the Real Exchange Rate, indicating international competitiveness. DCPS reflects total Domestic Credit to the Private Sector, while FDI captures Foreign Direct Investment inflows, signaling investor confidence and financial openness.

##### 4.2 Definition of Variables used in the Model for the Study

| Acronym | Definition                            | Source                                                   |
|---------|---------------------------------------|----------------------------------------------------------|
| FSP     | Financial Sector Performance          | World Bank's World Development Indicators                |
| MEV     | Macroeconomic Volatility              | Generated from the standard deviation of GDP growth rate |
| BCPS    | Bank Credit to the Private Sector     | World Bank's World Development Indicators                |
| INTR    | Interest Rate                         | World Bank's World Development Indicators                |
| INFL    | Inflation Rate                        | World Bank's World Development Indicators                |
| REXR    | Real Exchange Rate                    | World Bank's World Development Indicators                |
| DCPS    | Domestic Credit to the Private Sector | World Bank's World Development Indicators                |
| FDI     | Foreign Direct Investment             | World Bank's World Development Indicators                |

Source: Authors' Concept

##### 4.3 Model Specification

###### Generalized Method of Moments (GMM):

In this study, we employed the panel ARDL model according to Pesera et al. (2001) to investigate the effects of

macroeconomic volatility on the financial sector performance in the 13 selected MENA Countries. However, for an in-depth understanding of the ARDL model's assumptions, of order (p, q) we, therefore, define the model as follows;

$$Z_t = \emptyset_0 + \emptyset_1 g_1 + \dots + \emptyset_p g_{t-p} + \beta_0 f_t + \beta_1 f_{t-1} + \dots + \beta_q f_{t-q} + \varepsilon_t \quad (2)$$

Where  $\varepsilon_t$  is an error term,  $g_t$  is an auto-regressive because it is explained partly by the lagged values of the variables.  $f_t$  indicates the distributed lagged component of successive lags of the explanatory variables. The model assumes rational and asymptotically normal characteristics of the estimates of long-run coefficients, irrespective of whether the regressors are I(1) or I(0) or jointly co-integrated (Pesaran and Shin, 1999). In addition, it creates the chance to explore the correct dynamic structures and allows for inferences on impact estimates. In accord with, Shin et al. (2011), Al-Malkawi et al (2012) and Ahmed et al (2014), this model is consistent in estimating the cointegration relationship compared to Engle and Granger (1987), Johansen (1988) and Gregory and Hansen (1996). More so, the study establishes the effect of macroeconomic variability on financial sector performance and the relationship between macroeconomic variability and financial sector performance of the selected MENA countries considering the linear structure of the model as presented below.

$$\ln KOP_{i,t} = \emptyset_t + \beta_t \ln L_{i,t} + \alpha_t \ln J_{i,t} + \varepsilon_t \quad i = 1, \dots, N, \quad t = 1, \dots, T \quad (3)$$

While  $N$  and  $T$  are defined as in equation (1) above,  $\ln$  is the log.  $KOP_{i,t}$ ; represent the dependent variables proxied with financial sector performance (FSP) and macroeconomic variability (MEV). In addition,  $L_{i,t}$ ; is the vector explanatory variables and  $J_{i,t}$ ; is the vector of control variables. Hence,  $\emptyset_t$  and  $\varepsilon_t$  are the intercept and the stochastic term while  $\beta_t$  and  $\alpha_t$  are coefficients of explanatory variables and vector of control variables in the model respectively. Transforming equation (3) into linear ARDL (1, 1), we have;

$$\Delta \ln FSP_{i,t} = \emptyset_3 + \sum_{i=1}^n J_3 \Delta \ln FSP_{t-1} + \sum_{i=0}^n \beta_t \Delta \ln L_{t-1} + \sum_{i=0}^n J_t \Delta \ln J_{i,t-1} + \rho_3 \ln FSP_{t-1} + \gamma_t \ln L_{i,t-1} + \xi_t \ln J_{i,t-1} + \vartheta_t \quad (4)$$

$$\Delta \ln MEV_{i,t} = \emptyset_3 + \sum_{i=1}^n J_3 \Delta \ln FSP_{t-1} + \sum_{i=0}^n \beta_t \Delta \ln L_{t-1} + \sum_{i=0}^n J_t \Delta \ln J_{i,t-1} + \rho_3 \ln FSP_{t-1} + \gamma_t \ln L_{i,t-1} + \xi_t \ln J_{i,t-1} + v_t \quad (5)$$

Where  $FSP_{i,t}$  is partly explained by the lagged values of the variables, and  $L_{i,t}$ , indicates the distributed lagged component of successive lags of the explanatory variables (macroeconomic variability, bank credit to private sector, interest rate, inflation rate, real exchange rate, domestic credit to private sector and foreign direct investment) while the vector of control variables in equation (4) includes; macroeconomic volatility, bank credit to private sector, domestic credit to private sector, foreign direct investment and inflation rate, while equation (5) include interest rate and real exchange rate. The combined significance ( $\rho_3 = \gamma_t = \xi_t = 0$ ) is conducted on equations (4) and (5) to establish the long-run relationship (Pesera et al. 2001). Also, F-test will be carried out on the lagged levels of the variables and the lower

and upper bound critical values would be generated. Following Pesera et al. (2001) proposal, variables at I(0) serves as a standard measures for lower bounds critical values, while variables at I(1) measures the upper bound critical values. If the computed F-stat is greater than the upper critical value, cointegration exists but if otherwise, the null hypothesis of no co-integration cannot be rejected. But if it lies between lower and upper bound values, it becomes inconclusive. As a consequence, the ARDL specification of the short-run dynamics is derived by creating an error correction mechanism to correct the existence of long-run relationship among the variables as shown in equation (6) and (7) respectively.

$$\Delta \ln FSP_{i,t} = \emptyset_3 + \sum_{i=1}^n J_3 \Delta \ln FSP_{t-1} + \sum_{i=0}^n \beta_t \Delta \ln L_{t-1} + \sum_{i=0}^n \alpha_t \Delta \ln J_{i,t-1} + \Gamma Ecm_{t-1} + U_t \quad (6)$$

$$\Delta \ln MEV_{i,t} = \emptyset_3 + \sum_{i=1}^n J_3 \Delta \ln FSP_{t-1} + \sum_{i=0}^n \beta_t \Delta \ln L_{t-1} + \sum_{i=0}^n \alpha_t \Delta \ln J_{i,t-1} + \eta Ecm_{t-1} + V_t \quad (7)$$

From equations (6) and (7),  $\Delta$  is the first difference operator of the variables while  $\vartheta_t$  and  $v_t$  in equation (4) and (5) are the error terms respectively. The  $\rho_3$ ,  $\gamma_t$  and  $\xi_t$  in equation (4) and (5) represent the long-run association in the models while  $J_3$ ,  $\beta_t$  and  $\alpha_t$  in equation (6) and (7) represent the short-run dynamics of the models.  $\emptyset_3$ ,  $(U_t, V_t)$  and  $(\Gamma, \eta)$  in (6) and (7) are constant, error term and coefficients in disequilibrium respectively. The error correction model ( $Ecm_{t-1}$ ) explains how much the short-run disequilibrium is corrected in the long run – that is the speed of adjustment.

#### Panel Data Analysis – Hausman Specification Tests:

Hausman specification test on the panel data would be carried out to determine whether the analysis will be based on random or fixed effects. Considering linear unobserved effects model for  $N$  observation and  $T$  time periods, we represent panel model as;

$$y_{i,t} = \beta_0 + X_{i,t} \beta + \alpha_i + u_{i,t} \quad \text{for } t = 1, \dots, T \text{ and } i = 1, \dots, N \quad (8)$$

$y_{i,t}$ ; is the dependent variable observed for individual  $i$  at time  $t$ .  $X_{i,t}$ ; is the time-invariant  $1 \times k$  regressor matrix.  $\alpha_i$ ; is the unobserved time-invariant individual effect and  $u_{i,t}$  is the error term. Unlike the random effects (RE) model where the unobserved  $\alpha_i$  is independent of  $X_{i,t}$  for all  $t = 1$ , the fixed effects (FE) model allows  $\alpha_i$  to be correlated with the regressor matrix  $X_{i,t}$ .

In addition,  $\alpha_i$  is not observable and cannot be controlled directly. Hence, the fixed effect (FE) model eliminates  $\alpha_i$  by belittling the variables using the within transformation.

$$y_{i,t} - \bar{y}_i = (X_{i,t} - \bar{X}_i) + (\alpha_i - \bar{\alpha}_i) + (u_{i,t} - \bar{u}_i) \Rightarrow \check{y}_{i,t} = \check{X}_{i,t} \beta + \check{u}_{i,t}$$

$$\bar{X}_i = \frac{1}{T} \sum_{t=1}^T X_{i,t} \quad \text{and} \quad \bar{u}_i = \frac{1}{T} \sum_{t=1}^T u_{i,t}$$

Since  $\alpha_i$  is constant,  $\bar{\alpha}_i = \alpha_i$  and hence the effect is eliminated. The  $\hat{\beta}_{FE}$  is then obtain by an OLS regression of  $\check{y}$  and  $\check{X}$ . From eqn. (20),  $u_{i,t}$  is the error term. Therefore, the random effects model assumes that;

$$u_{i,t} = \mu_i + \epsilon_{i,t}$$

$$\mu_i \sim \text{i.i.d. } N(0, \sigma_\mu^2) \text{ and } \epsilon_{i,t} \sim \text{i.i.d. } N(0, \sigma_\epsilon^2)$$

**Note:** The two error components are independent of each other.

#### Testing fixed effects (FE) versus random effects (RE):

Given the above discussion and using Durbin-Wu-Hausman test, we intend to carry out fixed effect and random effects to determine the method most suitable for the analysis taken into consideration the null hypothesis which state that, if there is no correlation between regressors and effects, then FE and RE are both consistent, but FE is inefficient. In other words, the alternative hypothesis implies that if there is correlation, FE is consistent while RE is not. Under this hypothesis of no

correlation, there should be no differences between the estimators.

$$H_0 : \alpha_i \Rightarrow X_{i,t}, Z_i \text{ and } H_a : \alpha_i \not\Rightarrow X_{i,t}, Z_i$$

If  $H_0$  is true, both  $\hat{\beta}_{RE}$  and  $\hat{\beta}_{FE}$  are consistent, but only  $\hat{\beta}_{RE}$  is efficient. If  $H_a$  is true,  $\hat{\beta}_{FE}$  is consistent while  $\hat{\beta}_{RE}$  is not. To carry out the Hausman test, we calculate;

$$\hat{Q} = \hat{\beta}_{RE} - \hat{\beta}_{FE} \text{ and its covariance.}$$

The covariance of an efficient estimator with its difference from an inefficient estimator should be zero. Under the null hypothesis we test;

$$W = (\hat{\beta}_{RE} - \hat{\beta}_{FE})' \hat{\Sigma}^{-1} (\hat{\beta}_{RE} - \hat{\beta}_{FE}) \sim \chi^2(k);$$

If W is significant, we use fixed effects estimator.

## 5. EMPIRICAL RESULTS AND DISCUSSION OF FINDINGS

### 5.1. Descriptive Statistics

**Table 1: Summary Statistics of Variables**

| Variables | Mean | Min   | Max  | Std. Dev. |
|-----------|------|-------|------|-----------|
| FSP       | 2.51 | 0.17  | 7.88 | 1.93      |
| MEV       | 0.91 | -0.01 | 6.28 | 3.98      |
| BCPS      | 1.83 | -5.03 | 5.41 | 2.87      |
| INTR      | 1.62 | -4.03 | 5.16 | 2.84      |
| REXR      | 1.59 | -3.95 | 5.99 | 2.77      |
| DCPS      | 3.05 | 0.17  | 8.85 | 2.48      |
| FDI       | 0.02 | -0.13 | 2.24 | 0.11      |

**Source:** Authors' Concept

Descriptive statistics are used to describe the basic features of the data in the study. They provide simple summaries about the sample and the measures as well as quantitative descriptions of the variables of the model used in the study. Table 1 shows the summary statistics of the variables used in the study. There is significant variation in Financial Sector Performance (FSP) ranging from 0.17 to 7.88. In the same vein, Macroeconomic Volatility (MEV) has lot of variations ranging from -0.01 to 6.28. Similarly, Bank Credits to the Private Sector (BCPS) has variations ranging from -5.03 to

5.41. Interest Rate (INTR) has variations ranging from -4.03 to 5.16. The Real exchange rate (REXR) has variations ranging from -3.95 to 5.99. The Domestic Credits to the Private Sector (DCPS) has significant variation ranging from 0.17 to 8.85. And Foreign Direct Investment (FDI) has variation ranging from -0.13 to 2.24. However, the behavior of the variables in the descriptive analysis, clearly depict that there is no presence of serial correlation in the variables and they are good fit for the model of the study which panel autoregressive distributed lag model (PARDL).

### 5.2. Cross-sectional Dependency

**Table 2: Cross-Sectional Dependency Tests**

| Variables | Breusch-Pagan LM    | Pesaran Scaled LM   | Bias-Correlated Scaled LM | Pesaran CD          |
|-----------|---------------------|---------------------|---------------------------|---------------------|
| InFSP     | 2331.<br>[0.000]*** | 180.4<br>[0.000]*** | 180.3<br>[0.000]***       | 30.13<br>[0.000]**  |
| InMEV     | 1619.<br>[0.000]*** | 123.4<br>[0.000]*** | 123.3<br>[0.000]***       | 18.11<br>[0.000]*** |
| InBCPS    | 1325.<br>[0.000]*** | 99.91<br>[0.000]*** | 99.83<br>[0.000]***       | 0.855<br>[0.392]*   |
| InINTR    | 1683.<br>[0.000]*** | 128.5<br>[0.000]*** | 128.4<br>[0.000]***       | 1.849<br>[0.000]*** |
| InREXR    | 1337.<br>[0.000]*** | 100.8<br>[0.000]*** | 100.7<br>[0.000]***       | -0.614<br>[0.539]*  |
| InDCPS    | 2076.<br>[0.000]*** | 160.0<br>[0.000]*** | 159.9<br>[0.000]***       | 26.23<br>[0.000]*** |

|       | [0.000]*** | [0.000]*** | [0.000]*** | [0.000]*** |
|-------|------------|------------|------------|------------|
| InFDI | 577.9      | 40.03      | 39.95      | 6.123      |
|       | [0.000]*** | [0.000]*** | [0.000]*** | [0.000]*** |

**Source:** Authors' Concept. P-values of test statistics are presented in parentheses

Cross-sectional correlation may occur due to unknown common shocks, spatial effects or interactions within the variables used in the study. Ignoring cross-sectional correlation in panels can have serious consequences, because, the existence of cross-sectional correlation leads to efficiency loss for least squares, panels and invalidates inference in a study. Therefore, we conducted cross-sectional dependency test in Table 2. The null hypothesis  $H_0$ : there is no cross-sectional dependence and the alternative  $H_1$ : there is cross-sectional dependence. As we can see clearly from table 2

above that all the four different tests (BREUSCH-PAGAN LM, PESARAN SCALED LM, BIAS-CORRELATED SCALED LM and PESARAN CD) turned out to be significant at 1% percent level, (apart from InBCPS and InREXR of Pesaran CD test which were significance at 10% level) implying that the null hypothesis of “no cross correlation dependence among the different variables is rejected and we conclude that there exist cross-sectional dependency among different variables.

### 5.3. Unit Root Tests

**Table 3: Summarize Results of Stationarity Tests**

| Variables | LLC                  | IPS                  | LLC                  | IPS                  |
|-----------|----------------------|----------------------|----------------------|----------------------|
| InFSP     | -2.977***<br>(0.002) | -2.934***<br>(0.001) | -15.52***<br>(0.000) | -11.15***<br>(0.000) |
| InMEV     | -2.454***<br>(0.007) | -2.942***<br>(0.001) | -14.60***<br>(0.000) | -8.569***<br>(0.000) |
| InBCPS    | -1.752<br>(0.039)    | -1.374<br>(0.084)    | -12.61***<br>(0.000) | -8.501***<br>(0.000) |
| InINTR    | -4.364***<br>(0.000) | -2.990***<br>(0.004) | -11.45***<br>(0.000) | -3.545***<br>(0.002) |
| InREXR    | -3.043***<br>(0.001) | -4.286***<br>(0.000) | -9.726***<br>(0.000) | -6.086***<br>(0.000) |
| InDCPS    | -2.593***<br>(0.004) | -2.489***<br>(0.006) | -7.410***<br>(0.000) | -17.48***<br>(0.000) |
| InFDI     | -10.02***<br>(0.000) | -5.569***<br>(0.000) | -18.81***<br>(0.000) | -19.77***<br>(0.000) |

**Note:** Levin, Lin & Chun (LLC) assume common unit root process; while Im, Pesaran and Shin (IPS) assume individual unit root process. \*\*\*, \*\* and \* represent 1%, 5% and 10% percent level of significance respectively.

The results of panel unit root LLC (Levin, Lin and Chun) test complemented with the IPS (Im, Pesaran and Shin) tests are presented in Table 3. The null hypothesis is  $H_0=\beta=0$  (i.e.  $\beta$  has a unit root) and the alternative hypothesis is  $H_1:\beta<0$  (i.e.  $\beta$  does not have a unit root). The Panel unit root test is based on the assumption that the variables are integrated of order I(0) and I(1). The objective is that all variables should not be I(2) so as to avoid spurious results; because, in the presence of variables integrated of order I(2) we cannot interpret the values of F statistics provided by Pesaran et al. (2001) or it will go boasted. The LLC and IPS tests for each variable show that the null hypothesis (there is unit root) could be rejected in 1% level of significance apart from BCPS of LLC and IPS order I(0) for financial sector performance (FSP), macroeconomic volatility (MEV), bank credit to the private sector (BCPS), interest rate (INTR), real exchange rate (REXR), domestic credit to the private sector (DCPS) and foreign direct investment (FDI) data series in level I(0) and I(1). The IPS first difference results shows that the tested

variables is stationary at 1% significance level (integrated of order one 1(1). The results of the panel unit root tests confirm that most of the variables are non-stationary at level. The different order of integration of the variables makes ARDL the preferred approach to this empirical study.

### 5.4. Results of Panel Cointegration Test

Table 4 shows the result of Pedroni panel cointegration test which the dependent variable is FSP (Financial Sector Performance) and the independent variables include Macroeconomic Volatility (MEV), Bank Credit to the Private Sector (BCPS), Interest Rate (INTR), Real Exchange Rate (REXR), Domestic Credit to the Private Sector (DCPS) and Foreign Direct Investment (FDI). There are two parts, the first four test statistics (panel-v statistic, panel rho-statistic, panel PP-statistic and panel ADF-statistic) are computed by the “within-dimension”. While the second part shows the last three test statistics (group rho-statistic, group PP-statistic and group ADF-statistic) are computed by “Between-

Dimension”. The columns labeled within-dimension contain the computed value of the statistics based on estimators that

pool the autoregressive coefficients across different models for the unit root tests on the estimated residuals.

**Table 4: Pedroni Cointegration Results**

| Within-Dimension    |                      |                      | Between-Dimension   |                      |
|---------------------|----------------------|----------------------|---------------------|----------------------|
| Tests               | Statistic            | w-statistic          | Tests               | Statistic            |
| Panel-v statistic   | -3.266<br>(0.999)    | -1.948<br>(0.974)    | Group rho-statistic | -9.263***<br>(0.000) |
| Panel rho-statistic | -9.329***<br>(0.000) | -9.907***<br>(0.000) | Group PP-statistic  | -11.39***<br>(0.000) |
| Panel PP-statistic  | -10.48***<br>(0.000) | -11.24***<br>(0.000) | Group ADF-statistic | 2.453<br>(0.992)     |
| Panel ADF-statistic | -2.853<br>(0.999)    | 1.865<br>(0.968)     |                     |                      |
| Group ADF-statistic | 2.453<br>(0.992)     | 0.992                |                     |                      |

**Source:** Conceived by the Author. \*\*\*, \*\* and \* represent 1%, 5% and 10% percent level of significance respectively. The null hypothesis ( $H_0$ ) assumed no cointegration, while the alternative hypothesis ( $H_1$ ) assumed that there is cointegration. The decision rule employed in the t-test is to reject the null hypothesis ( $H_0$ ) if the calculated p-value is less than tabuled p-value ( $\alpha=0.05$ ) using the rule of thumb at 5% level of significance.

Observing from table 4 above, most of the estimate results of the Pedroni (2004) heterogeneous panel co-integration test’s p-values are less than 0.05 critical level indicating that the null of “no co-integration” can be rejected at the 5% significant level. Therefore, the result suggests that there is presence of co-integration between all the variables (financial sector performance, macroeconomic volatility, bank credit to the private sector, interest rate, real exchange rate, domestic credit to the private sector and foreign direct investment). This shows that macroeconomic volatility in these 13 countries (Algeria, Bahrain, Armenia, Egypt, U.A.E, Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia, and Tunisia) is connected with other macroeconomic variables in the study. However, the results in Table 4 are in consistent; some statistics are significant, and there are some exceptional results, such as the panel v-statistic and the Group rho-statistic. Because the data applied in this study are panel data, the varied results can be caused by the different relationships between variables (financial sector performance, macroeconomic volatility, bank credit to the private sector,

interest rate, real exchange rate, domestic credit to the private sector and foreign direct investment) and macroeconomic variables in the 13 selected MENA countries. This empirical finding proves evidence for the presence of a long-term relationship between financial sector performance, macroeconomic volatility, bank credit to the private sector, interest rate, real exchange rate, domestic credit to the private sector and foreign direct investment.

Also viewing from the co-integration graph above, it shows that there exist cointegration among all the variables. The panel of the model is economically meaningful in that it suggests that there exist negative impact of macroeconomic volatility on financial sector performance in the MENA countries under study. Having found that there exists a co-integrating link between the variables (FSP, MEV, BCPS, INTR, REXR, DCPS and FDI), it is convenient to say that the coefficients be estimated using a panel co-integrating estimator. In this study therefore, we choose to employ panel co-integrating estimators: the panel ARDL

## 5.5 Hausman Test

**Table 5 Hausman Result**

| Test Summary  | Chi-Sq. Statistic | Chi-Sq. D.f. | Prob  |
|---------------|-------------------|--------------|-------|
| Period Random | 42.74             | 6            | 0.000 |

**Source:** Authors’ Concept

Following the conclusions from the Pedroni cointegration test above, in determining which model is the more appropriate to use, or a statistical test to be implemented, the Hausman test is employed to compare the fixed effects and random effects ‘within’ the estimator. If the null is rejected, this favour the ‘within’ estimator’s treatment of the omitted effects (i.e., it favour the fixed effects but only relative to the random

effects) and if the null hypothesis is not rejected, it favour random effects. The use of the test in this case is to discriminate between a model where the omitted heterogeneity is treated as fixed and correlated with the explanatory variables, and a model where the omitted heterogeneity is treated as random and independent of the explanatory variables.

### Hypothesis:

H<sub>0</sub>: the coefficient estimated by the random effects RE estimator is the same with FE

H<sub>1</sub>: the coefficient estimated by the random effects RE estimator is not the same with FE.

Decision Rule: If P-Value > 5%, we use RE, if P-Value < 5% we use FE.

In conclusion, since P-value < 5% level of significance, we do not reject the null hypothesis since the p-value is statistically significant at 1% critical level. Therefore we conclude that fixed effects are independent of the explanatory variables. The fixed effects are found to be independent of the covariates, therefore, from the empirical result, the fixed effects model is the most appropriate for this study because it

provides a more efficient estimator than the random effects estimator.

### 5.6. ARDL Bounds Test for Co Integration

The computed F-statistics; InFSP for all sampled MENA countries as shown in Table below is 2.833629. This value is above the upper bounds of the critical value at 5% level of significance. This implies that there exists a long run relationship between financial sector performance, macroeconomic volatility, bank credit to the private sector, interest rate, real exchange rate, domestic credit to the private sector and foreign direct investment and therefore, the null hypothesis of no co integration between the variables is rejected and the alternative hypothesis is accepted which implies that there exist co-integration among the variables.

**Table: 6 ARDL Bound Test For Cointegration**

| Critical Value                                                                                | Lower Bound Value I(0) | Upper Bound Value I(1) |
|-----------------------------------------------------------------------------------------------|------------------------|------------------------|
| 1%                                                                                            | 3.173                  | 4.485                  |
| 5%                                                                                            | 2.431                  | 3.518                  |
| 10%                                                                                           | 2.088                  | 3.103                  |
| Computed F-Statistic: $\ln FSP F(\ln MEV, \ln BCPS, \ln INTR, \ln REXR, \ln DCPS, \ln FDI)$ . |                        |                        |
| F-statistic= 2.833629                                                                         |                        |                        |

Source: Authors' Concept

### 5.7. Long Run Analysis

**Table 7A: Results of Panel ARDL Estimation**

| ARDL (2,5,5,5,5,5) Long Run Elasticity |             |            |             |          |
|----------------------------------------|-------------|------------|-------------|----------|
| Dependent Variable: InFSP              |             |            |             |          |
| Variable                               | Coefficient | Std. Error | T-Statistic | Prob*    |
| InMEV                                  | -0.043      | 0.006      | -6.931      | 0.000*** |
| InBCPS                                 | -0.161      | 0.041      | -3.894      | 0.000*** |
| InINTR                                 | 0.341       | 0.062      | 5.462       | 0.000*** |
| InREXR                                 | 0.106       | 0.027      | 3.827       | 0.000*** |
| InDCPS                                 | 0.276       | 0.019      | 14.35       | 0.000*** |
| InFDI                                  | -0.734      | 0.055      | -4.965      | 0.000*** |

**Notes:** The maximum number of lags for each variable is set at one, and optimal lag lengths are selected by the AIC. The ARDL estimators are computed by a 'back-substitution' logarithm, \*\*\*\*1% significance level, \*\* 5% level of significance and \*10% level of significance.

#### 5.7.1. Long-Run Result Interpretations

This study estimates the effects of macroeconomic volatility on financial sector performance evidence from selected MENA countries using the panel ARDL estimator. This is informed with a strong evidence from the Hausman test which indicates a Prob> chi<sup>2</sup> of 0.0000, which is less than 5% level of significance; indicating that ARDL is the most preferred estimator for the study (see table 5). Also, building on the existing literature, ARDL estimator allows for heterogeneous slope coefficients across group members and accounts for cross-sectional dependence (Pesaran and Shin, 1999). The result of the estimated coefficients of the long run relationships in Table 6 indicates that macroeconomic volatility (MEV) has a negative and significant influence on Financial Sector Performance (FSP) at 1% critical level.

The estimated coefficient of macroeconomic volatility (-0.043) implies that a unit increase in macroeconomic volatility will increase the FSP approximately by 43.72%, all things being equal. Bank Credit to the Private Sector BCPS was found to be negatively related to FSP at significant level 1% with an estimated coefficient of (-0.161) and this implies that a unit increase in bank credit to the private sector will lead to increase in financial sector performance by a magnitude of 0.16% all other things being equal. The interest rate positively influenced the FSP at 1% level of significance. The estimated coefficient of interest rate (0.341) implies that a unit increase in interest rate would lead about 0.341 decreases on the financial sector performance all other things being equal. The real exchange rate (REXR) is positively related to the FSP at 1% level of significance. The estimated

coefficient of real exchange rate (0.106) implying that a unit increase in the real exchange rate would lead to about 0.106 decreases on the financial sector performance all other things being equal. The Domestic credits to the Private Sector (DCPS) is positively related to Financial Sector Performance (FPS) at 1% level of significance with the estimated coefficient of (0.276) and this implies that a unit increase in the Domestic credit to private sector would lead to about 0.276489 decreases in the Financial sector performance all other things being equal. Foreign Direct Investment (FDI) has a negative and significance influence on Financial Sector Performance (FSP) at 1% level of significance with an estimated coefficient of (-0.734) and it implies that a unit in foreign direct investment would lead to a increase in the

financial sector performance (FSP) by a magnitude of 0.27% all other things being equal.

The coefficients were interpreted as long-run elasticity estimates due to the fact that all variables are expressed in natural logarithms and the behaviors of the variables are in line with the apriori economic expectations. The positive relationship that existed between MEV, BCPS, INTR, REXR, DCPS and FDI are similar to the findings of a number of existing studies in the literature including Ajayi and Atanda (2012), Enyioko (2012), Lin and Kim (2014), Posch and Walde (2011), Schuh (1974), Claudia et al (2010), Kargbo (2000), Otuori (2013), Lucas and Anne (2010) and Beckham (2007).

### Short-Run Analysis

**Table 7: Panel Estimated Short Run Dynamic Results**

| Short Run elasticity     | $\Delta \ln \text{FSP ARDL (2,5,5,5,5,5)}$ |          |
|--------------------------|--------------------------------------------|----------|
| Variables                | T-Statistic                                | Prob*    |
| ECM(-1)                  | -0.105                                     | 0.162*   |
| $\Delta \ln \text{MEV}$  | -9.401                                     | 0.000*** |
| $\Delta \ln \text{BCPS}$ | -1.791                                     | 0.073**  |
| $\Delta \ln \text{INTR}$ | -2.315                                     | 0.020**  |
| $\Delta \ln \text{REXR}$ | -1.564                                     | 0.118*   |
| $\Delta \ln \text{DCPS}$ | -9.639                                     | 0.000*** |
| $\Delta \ln \text{FDI}$  | -1.980                                     | 0.048**  |

ECM denotes the estimated coefficient on the error correction model. The vector error correction model is estimated using panel regression techniques with fixed effects for cross section. , \*\*\*\*1% significance level, \*\* 5% level of significance and \*10% level of significance.

Table 7 presents the short run results for the panel ARDL model of the study. The coefficient of the ECM variable is found to be negative and statistically significant at 10% level confirming the existence of long run relationship among the variables. The coefficient of ECM for the co integrating equation with  $\Delta \ln \text{FSP}$  as the dependant variable show a low speed adjustment back to equilibrium position, with about 10.56%. The short run coefficient suggests that Macroeconomic Volatility has negative and significant impact on the Financial Sector Performance (FSP) at 1% level in the short run (See Mohammed (2012), Levine (1997), Fidelis Ogwumike and Salisu (2010), Mansor (2006), and Demirguc and Huizinga (1999) among others). Astonishingly, bank credit to the private sector, interest rate and foreign direct investment are negative and significant at

5% levels respectively. In addition, real exchange rate (REXR) was negative and significant at 10% level. And domestic credit to the private sector (DCPS) was found to be negative and significant at 1% level.

### 5.8. Diagnostic Tests

The outcome of the Lagrange multiplier test of residual serial correlation, Ramsey's RESET test, Jarque Bera normality test and Heteroskedasticity test for countries under study (Algeria, Bahrain, Armenia, Egypt, U.A.E., Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia and Tunisia) as presented in Table 4.6 indicates the model passed all the tests and this implies that it has a correct functional form, its residuals are serially uncorrelated, normally distributed and homoscedastic

**Table 4.6: ARDL Model Diagnostic Tests**

| LM TEST STATISTIC                           | PROB.* |
|---------------------------------------------|--------|
| (A): NORMALITY: $X^2(I) = 76.95097$         | 0.000  |
| (B): FUNTIONAL FORM: $X^2(I) = 0.759573$    | 0.447  |
| (C) SERIAL CORRELATION: $X^2(I) = 114.8057$ | 0.000  |
| (D) HETEROSCEDASTICITY: $X^2(I) = 19.09050$ | 0.000  |

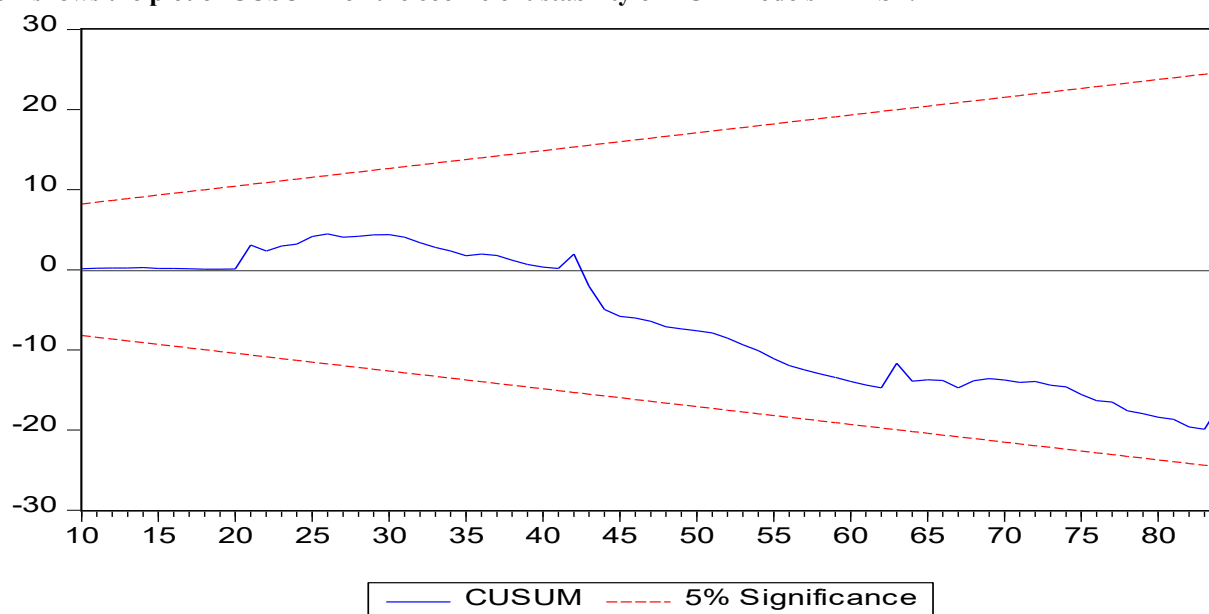
Source: Authors' Concept

## 5.9. Stability Test

From the diagnostic test results (see table 4.4), there is no evidence of serial correlation, heteroscedasticity and the model is well specified in the ARDL models. The stability of the long-run coefficient is tested by the short-run dynamics. Once the ECM model given in table 4.6 has been estimated, the cumulative sums of recursive residuals (CUSUM) tests

are applied to assess parameter stability (Pesaran and Pesaran, 1997). Figures 1 plot the results for CUSUM test. The results indicate the absence of any instability of the coefficients because the plot of the CUSUM statistic falls inside the critical bands of the 5% confidence interval of parameter stability.

Figure 1 shows the plot of CUSUM for the coefficient stability of ECM models  $\Delta \ln FSP$ .



## 6. CONCLUSION AND RECOMMENDATIONS

This paper investigates the effects of macroeconomic volatility on financial sector performance in the selected countries in the MENA region. The autoregressive distributed lag (ARDL) model was employed. From the regression analysis, there is existence of long-run relationship between macroeconomic volatility and financial sector performance in Algeria, Bahrain, Armenia, Egypt, United Arab Emirate, Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia, and Tunisia. It further revealed that long-run relationship between financial sector performance (FSP), macroeconomic volatility (MEV), bank credits to the private sector (BCPS), interest rate (INTR), real exchange rate (REXR), domestic credits to the private sector (DCPS) and foreign direct investment (FDI) in the selected MENA countries.

Empirical findings showed that the macroeconomic volatility had negative and significant impact on financial sector performance (FSP) in the selected MENA countries. It was also found that inflation rate, foreign direct investment, interest rate and real exchange rate had direct impact on macroeconomic volatility and financial sector performance in Algeria, Bahrain, Armenia, Egypt, United Arab Emirate, Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia, and Tunisia, because they have the ability to directly and indirectly affect the labour pricing, cost of mining, cost of export and import, general price of commodities, consumption levels of households, household level of savings, bank credits, amount

of credits made available for businesses as well as entire cost of production. The empirical results revealed that macroeconomic volatility has a negative and significant influence on financial sector performance in the sampled countries of the MENA economies. These hypotheses can be evaluated from the results of our model. These variables that were found to be statistically significant include (MEV, BCPS, INTR, REXR, DCPS and FDI) using the t-test at 5% level of significance and can be said to be the major variables that affect financial sector performance in the sampled countries (Algeria, Bahrain, Armenia, Egypt, United Arab Emirate, Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia, and Tunisia) of MENA region.

Also, the F-statistics from the Bound test indicates that the overall regression result is significant in explaining variations of macroeconomic volatility on financial sector performance in MENA region economies (Algeria, Bahrain, Armenia, Egypt, United Arab Emirate, Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia, and Tunisia). The F-statistic 2.833629 which implies that about 28% of the systemic variations in the sampled countries for the reference period of this study is explained or accounted for by the explanatory variables. The co-integration test carried out shows that there is a sustainable relationship between macroeconomic volatility and financial sector performance in the selected countries.

Therefore study concluded that macroeconomic volatility contributes significantly and negatively affects the financial

sector performance of the Algeria, Bahrain, Armenia, Egypt, United Arab Emirate, Iran, Jordan, Kuwait, Pakistan, Qatar, Syria, Georgia, and Tunisia economies. And therefore study recommends that: Government of the nation should opt for stabilization policies of both monetary and fiscal policies. Government should as well seek for favourable balance of trade between their economies and nations that involve in trade with them so as to add credits to their economies. Exchange rates, import duties, export duties, and interest rates should be checked regularly by the authorities so as to achieve stable exchange rates and interest rate for the economies. Inflation rates should be checked always to avoid fluctuations (volatility) in general prices of goods and services. Authorities of banks and financial institutions and their regulatory bodies should sort for diversification policies. Government of MENA countries should also adhere to economic diversification policies and engage their countries in international trade with other parts of the world. Viewed in this manner as aforementioned, the menace of macroeconomic volatility in MENA economies will be minimal.

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