Print ISSN: 2288-4637 / Online ISSN 2288-4645
doi:10.13106/jafeb.2021.vol8.no5.0325

The Effect of Banking Industry Development on Economic Growth: An Empirical Study in Jordan

Hamed Ahmad ALMAHADIN[1], Anwar AL-GASAYMEH[2],

Najed ALRAWASHDEH[3], Yousef ABU SIAM[4]

Received: January 15, 2021 Revised: March 21, 2021 Accepted: April 01, 2021

Abstract

This study aims to investigate whether economic growth is elevated by banking industry development in Jordan. The study adopts time-series econometric methodologies, which comprise the bounds testing approach within the autoregressive distributed lag (ARDL) and the conditional causality analysis. Consistent with the assumptions of the adopted methodology, the study utilized annual time-series data for a relatively long period of thirty-nine years, between 1980 and 2018. The empirical results show that Jordan's economic growth is strongly responsive in respect to any changes in banking industry development. Also, the results reveal the harmful impact of rising lending interest rate; as this rate increases, economic growth will decrease. The findings are in line with the conceptual arguments of the supply-leading hypothesis, which confirmed that banking development is considered as one of the main pillars that have stimulating effects on economic growth. The evidence of the current study may provide important implications for policymakers and bankers. Those professionals should work to maintain a stable regulatory system that enhances the banking system function in activating economic growth. Also, a considerable focus should be placed on designing a steady interest rate policy to avoid the inherently undesirable impacts of high-interest rates on the Jordanian economy.

Keywords: Banking Industry, Economic Growth, ARDL, Conditional Granger Causality, Jordan

JEL Classification Code: M12, G25, R44

1. Introduction

It is confirmed in the economic literature that banking sectors play an intermediation role by facilitating money movements between both fund-suppliers and fund-demanders. This can be through attracting savings and then channeling these savings as loans to finance different economic activities, which eventually encourage economic growth (EG). It is important to assert that banking institutions should direct the funds to the appropriate economic activities that can elevate EG rapidly; this, in turn, reflects how important these institutions in the EG processes. However, bankers should pay considerable attention to maintain a solvent banking sector to ensure its ability in providing the necessary fund needs, which sustain economic development and growth. A developed banking system is a major requirement for an economy to grow hurriedly. Therefore, the banking system should be stable and sound to absorb all of the possible shocks; regardless of internal or external shocks. Therefore, a well-developed banking sector can play an effective role, which, surely, elevates EG.

The linkage between EG and banking industry development has attracted the attention of economists and researchers, especially after the growth of the endogeneity theories. The development of the banking industry can be

[1]First Author and Corresponding Author. Assistant Professor of Finance, Department of Finance and Banking Sciences, Faculty of Business, Applied Science Private University, Jordan [Postal Address: Al Arab St. 21, Amman, 11931, Jordan]
Email: h_almahadin@asu.edu.jo
[2]Assistant Professor of Finance, Department of Finance and Banking Sciences, Faculty of Business, Applied Science Private University, Jordan. Email: a_gasaymeh@asu.edu.jo
[3]Assistant Professor of Finance, Financial and Accounting Sciences Department, Faculty of Business, Middle East University, Jordan. Email: nalrawashdeh@meu.edu.jo
[4]Assistant Professor of Accounting, Department of Accounting, Faculty of Business, Applied Science Private University, Jordan. Email: yousefabusiam@asu.edu.jo

described by the ability of the banking sector to providing broad financial services and products that satisfy the rabid expansions of economic activities. Today, banking development is an important factor causing EG, while the direction of the causal impact between these two variables is one of the debated issues in the literature. Some support the supply-leading hypothesis that argues that banking development is the key supporter of the EG, whereas others confirmed the demand-leading hypothesis that posits the EG is a source of banking development. Historically, Schumpeter (1961) mentioned that the functional role of banking sectors, as financial intermediaries, is one of the most important roles that cause to accelerating EG. This can be through the main functions of this sector that include providing funds, managing risks, evaluating and selecting projects, and facilitating transactions among different parties. In the same manner, Patrick (1966) confirmed the role of the banking sector to be one of the most important elevators to EG, which asserts the importance of the banking sector especially in the early stages of EG. As a consequence, the direction of the causal impact becomes reversed in the advanced stages of EG; economic expansion creates a demand on the financial services and products leading to a developed banking sector. The former view is strongly supported by the evidence from a broad panel of countries (among others, Robinson, 1952; King & Levine, 1993; Levin, 2005).

EG has been considered a crucial objective of countries throughout the world over the past number of decades and up to date. However, the development of this process of growth needs certain prerequisites to satisfy demand. Satisfying this demand may occur by providing sufficient finance for investment and production activities. These requirements appear heavily in developing countries where numerous economic problems, such as high inflation and interest rates, high unemployment rate, very low living and wellbeing standards are prevalent (Pieroni, 2009). According to these problems, developing countries constantly seek to maintain their EG to increase their national income, creating more job opportunities, thus improving living standards. The banking industry is currently playing a vital contribution to accelerating the process of economic development. Moreover, the banking sector leads to enhance rates of EG in both developing and developed economies (Rodrik, 2000). The theory of EG postulates that banking sectors are useful instruments for improving the production capacity of the economies to be more productive; assuming that the banking sector comprises an important internal source for any country, especially the countries where still in the first stages of economic expansion (Schumpeter, 1961; Shokr & Al-Gasaymeh, 2018). The need to stimulate and manage EG is a global issue of significant importance in developed, emerging, and under-developed countries. While this need is not new, given the continued population growth, changing demographics, and widening income disparities in under-developed countries. Tekin (2012) asserted that the most successful economies have been sufficiently sophisticated to develop their financial systems to sustain EG.

In line with the previous discussion, this study aims to explore the role played by the banking industry development in elevating EG of Jordan between 1980 and 2018. Jordan's financial system is characterized as a bank-based system; the banking sector is considered the prime sector in the financial system that plays a dynamic role in the economy (Almahadin et al., 2020). Therefore, the banking sector is deemed the solidest aspect of the financial services industry. The financial services industry is considered the most established and vigorous sectors in Jordan, remaining resilient in the face of significant external shocks and retaining its role as the key stimulator of economic growth. For that the Central Bank of Jordan (CBJ) maintains a pro-growth monetary stance, following on from growth in deposits and profits at commercial banks (CBJ, 2018). Also, this study is motivated by the lack of empirical studies that investigated the role of banking development in elevating EG of Jordan. The empirical outcomes of the present study are presumed to provide interested parties with informative content that will be useful in decision-making processes and policy designing.

The remaining of the study is organized as follows: the literature review is presented in section 2; the model specification is presented in section 3, followed by econometric methodology in section 4; the empirical results are reported in section 5, and section 6 delivers the conclusions and policy implications.

2. Literature Review

In past decades, many researchers and analysts have discussed the debated relationship between finance and EG (among others, Baghehot, 1873; Schumpter, 1961; Robinson, 1952; Hicks, 1969; Miller, 1998). The debate was whether financial development is the source of EG, or the EG is the key factor that enhances financial development. For example, Robinson (1952) suggests that EG creates a demand for financial services and products in which, as a result, accelerates financial development. On the other side, Lucas, (1988) indicates that, when finance is excessive, it is somehow complicated in explaining growth. Moreover, growth may be affected by financial development when combining savings, high diversifications, risk management, and when goods and services are easily exchanged (Levine, 2005; Bong & Premaratne, 2019; Camba & Camba, 2020; Kumar & Paramanik, 2020; Ngoc, 2020).

In the context of developing countries, several studies have discussed the indispensable role of banking sectors in developing and promoting EG in different countries and using different methodologies (Demetriades & Hussein,

1996; Rousseau & Watchel, 1998; Kar & Pentecost, 2000; Christopoulos & Tsionas, 2004; Bolbol et al., 2005; Abu-Bader & Abu-Qarn, 2008; Abusharbeh, 2017). Demetriades and Hussein (1996) suggest a bidirectional causal relation accurses between money supply and Gross Domestic Products for developing countries. Rousseau and Watchel (1998) suggest that in developing countries, finance has a supportive impact on EG; the functional role of banking sectors elevates economic to grow. For Turkey, Kar and Pentecost (2000) point out that the direction of the causality depends heavily on the used indicators especially; the impact causality analysis might be varying across different used gauges of both EG and financial development. While Christopoulos and Tsionas (2004) suggest that in the long run there are high frequently factors influencing the finance, which lead to EG. Recently, Abusharbeh (2017) indicates that banking sectors are playing a momentous role in EG progress by enhancing economic productivity. For Egypt, Bolbol et al. (2005) point out that the country's total factor productivity can be enhanced by diversifying the financial system and by reforming the stock market. For MENA region, Abu-Bader and Abu-Qarn (2008) found a bidirectional causality to suggest finance leads growth and the vice versa is correct as well. They assert that financial sector supports EG through efficient investment allocation. The authors also suggest that reforms programs need to be maintained to motivate savings, investments, and, eventually, long-run EG.

Indeed, the related literature has gauged EG by various measures (i.e., real per capita growth, total productivity growth, and growth in capital accumulation). Also, the banking development has been expressed by various indicators in which the most popular are: total bank credits, central bank assets, and credit to private sector all are computed as a percent of GDP (King & Levine, 1993). A strand of literature has focuses on the banking development-growth nexus as the main focus of the investigation. For instance, King and Levine (1993) illustrate that the banking sector considers among the most important sectors that have a desirable impact on the EG. The authors provide their evidence from a wide range of countries and by employing different indicators for both banking development and the EG. This view is supported by many studies (Ghali, 1999; La Porta et al. 2002; Al-Aawad & Harb, 2005; Kar et al., 2011; Trabelsi, 2012; Abdelhafidh, 2013). For example, Ghali (1999) has found a unique causal impact that runs from the finance development toward EG of Tunisia. His investigation has been done by employing a couple of proxies to financial development (i.e., total bank claims on the private sector as a portion of nominal GDP and total bank deposit as a portion of GDP). However, some literature provides evidence of a strong long-term impact and weak short-term impact from financial development to EG (Al-Aawad & Harb, 2005; Kar et al., 2011; Ben Salem & Trabelsi, 2012; Abdelhafidh, 2013).

Using panel data analysis of the Generalized Method of Moments (GMM), the findings of Levine et al. (2000) support the elevating impact of the banking sector on EG in a broad panel of countries. In a similar approach, Beck et al. (2000) reveal that financial development leads to growth, which is achieved through economic productivity, not through capital accumulation. Rousseau and Watchel (2000) indicate that the banking and market developments are exogenous mechanisms that have significant contributions in growth process. For the Mediterranean economies, Boulila and Trabelsi (2004) provide a strong support for the demand-leading hypothesis; as the economy grow, the size of the demand on the financial services increases leading to develop financial systems. Rioja and Valev (2004a, b) confirmed that the EG is affected by the financial development more strongly in high-income economies when compared to low-income economies.

Based on the reviewed literature, one can conclude that the banking sector is important and indispensable for EG, especially, in emerging economies in which banking development contributes significantly to EG. Based on these findings, the question raised here is whether this conclusion applies in the context of emerging countries, within the context of the lack of research in relation to the investigation of whether banking industry development elevates economic growth in Jordan as an example of an emerging country. While the banking system of Jordan is anticipated to elevate EG by facilitating sufficient credit to different economic activities. Therefore, this study attempts to investigate whether or not banking development is making a significant influence on the economy. Due to the lack of studies on this regard for Jordan banking sectors, this study will fill the gap in the literature to examine the impact of banking finance on EG in Jordan-as an emerging country.

3. Model Specification

In line with the theoretical and empirical arguments, the functional model below is suggested to explore the role that banking industry development played in elevating Jordan's economic growth utilizing a time-series data during the period of 1980–2018:

$$\text{GDP} = f\,(\text{BID}, R, \text{BD}) \quad (1)$$

where GDP is the economic growth indicator measured by GDP per capita; BID indicates to banking industry development as proxied by the domestic credits facilitated by the banking sector to the private sector as a percentage of GDP; R is the lending interest rate that considers the major determinants of economic growth with a significant impact on the credit providing function, also used to capture the impact of domestic monetary policy; and BD is the ratio of

bank deposits to GDP that are used to control the size of the banking sector. The raw data of the considered variables have been downloaded from the Word Bank (2019).

To capture growth impacts in the long-term economic period, the functional specification of Equation (1) is expressed in logarithmic form:

$$\text{Ln GDP}_t = \beta_0 + \beta_1 \text{Ln BID}_t + \beta_2 R_t + \beta_3 \text{ Ln BD}_t + \varepsilon_t \quad (2)$$

where at period t, Ln GDP is the natural log of GDP per capita; Ln BID is the natural log of the percentage of private credit; R is the lending interest rate; Ln BD is the natural log of the banking deposits ratio; ε is the error disturbance; β_0 represents a constant or intercept term; and β_1, β_2, and β_3 are parameters to be estimated with expected signs to be positive, either positive or negative, and positive, respectively.

4. Econometric Methodology

The primary phase in the empirical analysis is the unit root testing using augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to examine the stationarity of the considered variables. By doing so, identifying the integration order of the considered variables provides significant insights that will be valuable in testing the relationship between the variables within the appropriate econometric techniques.

As a subsequent phase, the existence of the long-run level relationship should be examined between each pair of variables. For this, the study employs the bounds testing approach within the ARDL framework of Pesaran et al. (2001). This technique is applicable regardless of the integration order of the explanatory variables: it can be either a first-order, I(0); second-order, I(1); or mixed-orders of integrations. The Wald F-statistics are used to test the null hypothesis of no long-run level relationship between the variables. Rejecting the stated null hypothesis provides evidence for existing the long-term level relationship among the suggested variables. Compared to other traditional approaches, this approach is more superior by having a set of advantages: The integration order of the variables can be mixed; it is suitable in case of small sample size; selecting the optimal lags is reachable by allowing to use different lag for each variable. By adopting this approach, the following bounds model is estimated using the ordinary least squares method (OLS):

$$\begin{aligned}\Delta \text{In GDP}_t = {} & a_0 + \sum_{i=1}^{p} b_i \Delta \text{In GDP}_{t-i} + \sum_{i=0}^{q} c_i \Delta \text{ BID}_{t-i} \\ & + \sum_{i=0}^{q} d_i \Delta R_{t-i} + \sum_{i=0}^{q} e_i \Delta \text{In BD}_{t-i} + \sigma_1 \text{In GDP}_{t-1} \\ & + \sigma_2 \text{In BID}_{t-1} + \sigma_3 R_{t-1} + \sigma_4 \text{In BD}_{t-1} + \varepsilon_t\end{aligned} \quad (3)$$

where Δ symbolizes a change in the GDP, BID, R, and BD variables; a_0 is the intercept; b_i, c_i, d_i, and e_i are the short-term parameters to be estimated; σ_1, σ_2, σ_3, and σ_4 are the long-term parameters of the first lag of the explanatories at their levels; and ε_t is the disturbance error-term of the econometric function.

Once the null-hypothesis of the above bounds test is rejected; the existence of a level long-term relationship between the variables will be, formally, confirmed. Then, the following dynamic long-term ARDL model of Pesaran and Shin (1995, 1999) can be applied to extract the estimated long-term parameters:

$$\begin{aligned}\text{LnGDP} = {} & \vartheta_0 + \sum_{i=1}^{p} \vartheta_1 \Delta \text{GDP}_{t-i} + \sum_{i=0}^{q} \vartheta_2 \Delta \text{BID}_{t-i} \\ & + \sum_{i=0}^{q} \vartheta_3 \Delta R_{t-i} + \sum_{i=0}^{q} \vartheta_4 \Delta \text{In BD}_{t-i} + \varepsilon_t\end{aligned} \quad (4)$$

where all of the variables are well-defined in previous section; and ϑ_1, ϑ_2, ϑ_3, and ϑ_4 are the long-term dynamic parameters to be estimated by the ARDL mechanism.

Subsequently, the short-term parameters will be estimated by utilizing the conditional error correction model (ECM). By doing so, the error correction term (ECT, ε_{t-1}) will also be estimated through the following mechanism:

$$\begin{aligned}\Delta \text{InGDP} = {} & \beta_0 + \sum_{j=1}^{p} \beta_1 \Delta \text{InGDP}_{t-j} + \sum_{j=0}^{q} \beta_2 \Delta \text{InBID}_{t-j} \\ & + \sum_{j=0}^{q} \beta_3 \Delta \text{In} R_{t-j} + \sum_{j=0}^{q} \beta_4 \Delta \text{InBD}_{t-j} \\ & + \beta_5 \varepsilon_{t-1} + u_t\end{aligned} \quad (5)$$

where all of the variables are well-defined in previous section; β_0 is the equation constant term; β_1, β_2, β_3, and β_4 are the short-term parameters to be estimated by the ECM; β_5 is the estimated coefficient of one lagged period of the ECT, with the expected negative and statistically significant value, thus proving how quickly the disequilibrium between the short-run and long-run values of the explained variable is eliminated in each specific period (Gujarati, 2003); and u_t is the random error term.

As the final step of the adopted econometric methodology, the conditional Granger causality analysis should be conducted to determine the directions of the causal impacts between the considered variables. This analysis applies within the mechanism of the VECM, allowing for the inclusion of an ECT to capture the short-run deviations of series from their long-run equilibrium path (Narayan & Smyth, 2004). The conditional Granger causality test is conducted as follows:

$$\begin{bmatrix}\Delta \ln \mathrm{GDP}_t\\ \Delta \ln \mathrm{BID}_t\\ \Delta R_t\\ \Delta \ln \mathrm{BD}_t\end{bmatrix}=\begin{bmatrix}\mu_1\\ \mu_2\\ \mu_3\\ \mu_4\end{bmatrix}+\begin{bmatrix}\varrho_{11,1} & \varrho_{12,1} & \varrho_{13,1} & \varrho_{14,1}\\ \varrho_{21,1} & \varrho_{22,1} & \varrho_{23,1} & \varrho_{24,1}\\ \varrho_{31,1} & \varrho_{32,1} & \varrho_{33,1} & \varrho_{34,1}\\ \varrho_{41,1} & \varrho_{42,1} & \varrho_{43,1} & \varrho_{44,1}\end{bmatrix}\begin{bmatrix}\Delta \ln \mathrm{GDP}_{t-1}\\ \Delta \ln \mathrm{BID}_{t-1}\\ \Delta R_{t-1}\\ \Delta \ln \mathrm{BD}_{t-1}\end{bmatrix}$$
$$+\cdots+\begin{bmatrix}\varrho_{11,i} & \varrho_{12,i} & \varrho_{13,i} & \varrho_{14,i}\\ \varrho_{21,i} & \varrho_{22,i} & \varrho_{23,i} & \varrho_{24,i}\\ \varrho_{31,i} & \varrho_{32,i} & \partial_{33,i} & \varrho_{34,i}\\ \varrho_{41,ii} & \varrho_{42,i} & \varrho_{43,i} & \varrho_{44,i}\end{bmatrix}\begin{bmatrix}\Delta \ln \mathrm{GDP}_{t-i}\\ \Delta \ln \mathrm{BID}_{t-i}\\ \Delta R_{t-i}\\ \Delta \ln \mathrm{BD}_{t-i}\end{bmatrix}$$
$$+\begin{bmatrix}\varnothing_1\\ \varnothing_2\\ \varnothing_3\\ \varnothing_4\end{bmatrix}\mathrm{ECT}_{t-1}+\begin{bmatrix}\varepsilon_{1,t}\\ \varepsilon_{2,t}\\ \varepsilon_{3,t}\\ \varepsilon_{4,t}\end{bmatrix} \quad (6)$$

where some of the variables present here have been defined in the previous section, Δ indicates the difference operator, μ_1 to μ_4 are the constant terms, ϱ's are the causal parameters to be estimated, $\varnothing_1$ to $\varnothing_4$ are the parameters of the lagged ECT (ECT_{t-1}) derived from the estimated long-run model, ∂'s are the causal parameters to be estimated, and ε_1 to ε_4 are random-error terms which presumed to be serially independent.

5. Empirical Results

5.1. Unit Root Testing

Table 1 presents the test statistic values of the ADF and PP unit root tests for all of the considerable variables. The statistic values of these tests indicate that GDP is not stationary at the level but stationary at the first difference. According to statistic values, the banking industry development indicator (BID) was found stationary at level based on the ADF test at a marginally significant level of (0.10) but had a non-stationary series based on the PP test, whereas it presented a stationary series at the first difference in both tests. The lending interest rate series (R) is non-stationary at level in both ADF and PP tests but is stationary at the first difference. The BD variable observed a non-stationary series based on the ADF and PP tests at their levels, but it is stationary at the first difference. To conclude, the empirical outcomes of the unit root tests provide evidence of a mixed order of integrated; the dependent variable of GDP is a first-order stationary series, whereas the explanatory variables are mixed-order stationary series. The unit root tests affirm that none of the variables are stationary at the second order; this is compatible with the ARDL model assumptions. Thus, this is sufficient justification to investigate the existence of a long-run level relationship using the ARDL bounds testing framework.

5.2. Bounds Testing

The F-statistics of the bounds testing approach are reported in Table 2. The empirical outcomes reveal that the null hypothesis of no level long-term relationship between the variables is rejected under all scenarios of the bounds test (F_{iii}, F_{iv}, and F_v). In other words, the calculated F-statistics of the bounds test exceed the upper bounds' critical values. Thus, the alternative hypothesis that the level long-term relationship between the variables exists will be accepted and adopted by the study. This, in turn, provides a strong justification to proceed with the next

Table 1: Series Stationary Testing with ADF and PP Tests

Panel A: The ADF Test Statistics for Unit Root Testing							
Variable	Test statistics (Levels)			Test statistics (First Differences)			
	τ_T	τ_μ	τ	τ_T	τ_μ	τ	Integration Order
Ln GDP	–2.516	–1.851	0.110	–2.785	–4.022***	–4.078***	I(1)
Ln BID	–3.297*	–1.666	1.122	–5.553***	–5.485***	–5.246***	I(0)
R	–2.510	–2.539	–0.195	–3.198	–3.251**	–3.307***	I(1)
Ln BD	–1.859	–2.228	1.640	–6.092***	–5.880***	–5.393***	I(1)
Panel B: The PP Test Statistics for Unit Root Testing							
Ln GDP	–1.611	–1.330	0.051	–3.698**	–3.754***	–3.805***	I(1)
Ln BID	–2.091	–1.954	1.410	–4.661***	–4.230***	–3.587***	I(1)
R	–1.630	–1.741	–0.206	–2.929	–3.035**	–3.094***	I(1)
Ln BD	–1.859	–2.191	1.440	–6.091***	–5.880***	–5.451***	I(1)

ADF is the Augmented Dickey-Fuller and PP is the Phillips-Perron tests of unit root, respectively. τ_T, τ_μ, and τ represent the models with a drift and trend, with a drift and without trend, and without a drift and trend, respectively. ***, ** and * denote the rejection of the null hypothesis of the individual series has a unit root (non-stationary) at the 0.01 0.05 and 0.10 levels, respectively. I(0) denotes that the individual series is integrated at the level. I(1) denotes that the individual series is integrated at the first order.

steps of the utilized methodology, as explained in the econometric methodology section. Estimating the ARDL long-term model, the ECM, and the conditional Granger causality tests will comprise the coherent analytical framework for this study.

5.3. Level Long-Term Relationship

The estimated coefficients of the long-term ARDL model are reported in Table 3. The coefficient of the BID is positive, with a value of 21.87 percent, and statistically significant, at a 0.05 level of significance. This indicates that banking industry development positively elevates economic growth, which is compatible of the results of previous studies (for instance Rousseau & Watchel, 1998; Kar & Pentecost, 2000; Levine, 2005). Thus, the empirical outcome supports the supply-leading hypothesis and is consistent with the findings of King and Levine (1993) and Levine et al. (2000). In contrast, the estimated coefficient of the interest rate on credit facilities (lending interest rate, *R*) is negative and significant, with a value of –5.24 percent. This, in turn, indicates the harmful role that interest rates play in economic growth. Thus, we can conclude that as the lending interest rates increase, economic growth will decrease, which is consistent with empirical evidence from Abusharbeh (2017), Almahadin (2019), and Almahadin and Tuna (2019).

Regarding the effect of banking sector size, as measured by the ratio of banking sector deposits to GDP, the estimated coefficient is reported to be positive and significant, with a value of 21.68 percent. This result is in line with the role of banking industry development, indicating that the size of the banking sector has a positive relationship with economic growth. In other words, banking sector size is an important factor that enhances the role of the banking industry in accelerating economic growth (King & Levine, 1993).

5.4. Short-Term Relationship

The estimations of the ECM in the short-term relationship are presented in Table 4. As shown, the estimated coefficient of banking industry development is recorded as positive and significant, with a value of 24.18 percent. This value indicates the positive short-term relationship between banking development and economic growth in Jordan. This relationship is consistent with the empirical results of (Ghali, 1999; Abdelhafidh, 2013; Almahadin, 2019). In opposition to this, the estimated short-term coefficients of the lending interest rate provide evidence of negative impact at the first

Table 3: The Estimated Coefficients of the Long-Term ARDL Model

Variable	Coefficient	*t*-Statistic	*P*-value
BID	0.2187**	2.0811	0.0450
R	–0.0524**	–2.1206	0.0407
BD	0.2168**	2.4655	0.0189
C	–23.5800***	–3.7923	0.0006

Notes: ***, ** and * indicate the significance level of 0.01, 0.05 and 0.10, respectively.

Table 2: Bounds *F*- and *t*-statistics for the Existence of a Levels Relationship

Without Deterministic Trends						
p	F_{iii}	***P*-value_F_{iii*}**	t_{iii}	***P*-value_t_{iii*}**		
1	6.92625***	0.0005	–4.76052***	0.0000		
2	2.87634**	0.0445	–2.78833**	0.0102		
3	4.08390**	0.0149	–2.86111**	0.0100		
With Deterministic Trends						
p	F_{iv}	***P*-value_F_{iv*}**	F_{v}	***P*-value_F_{v*}**	t_{v}	***P*-value_t_{v*}**
1	5.74145***	0.0009	6.77590***	0.0006	–4.86046***	0.0000
2	2.92170**	0.0348	3.65156**	0.0191	–3.21374***	0.0039
3	3.58652**	0.0200	3.92702**	0.0183	–3.10347***	0.0061

Notes: F_{iii}, F_{iv}, and F_{v} denote the *F*-statistics of the bounds model with unrestricted intercepts and without deterministic trends, whit both unrestricted intercepts & restricted deterministic trends, and with unrestricted intercepts & without deterministic trends, respectively within a corresponding *P*-values. t_{iii} and t_{v} are the *t*-ratio used to test if $\alpha_0 = 0$ of the bounds model without & with deterministic trends, respectively. *** and ** denote that the calculated *F*-statistic is exceeds the UCB value at 0.01 and 0.05 levels of significance, respectively which means that the null hypothesis of no level long-term relationship between the variables is rejected.

and second lags. Thus, one can conclude that increased lending interest rates negatively affect economic growth. Regarding the relationship between banking sector size and economic growth, the reported results show the coefficient to be positive and significant, with an estimated value of 23.53 percent. The empirical results of the ECM of the short-term relationship are, thus, strongly compatible with the results of the long-term model.

Concerning the estimated coefficient of the ECT (ε_{t-1}), a negative and highly significant value of 85 percent is observed. The negative and significant ECT value indicates a long-term relationship between the dependent and independent variables. In other words, the value of the ECT indicates that the convergence of the economic growth process will reach the long-term equilibrium path with a speed of adjustment of approximately 85 percent through the channels of the explanatory variables. Finally, the bottom panel of Table 4 presents a set of diagnostic tests of the estimated ECM. As clearly shown, the value of *R*-squared is around 80 percent, and the *F*-statistic value is 15.77 and highly significant, thus supporting the fitness of the model. At the same time, the Durbin Watson statistic is around 1.7, which is close to the rule of thumb of 2, indicating that there is no autocorrelation problem with the model.

5.6. Causality Investigation

The empirical outcomes of the conditional Granger causality test are reported in Table 5. Among the main results, the banking industry development gauge is found to result in economic growth. This result, in turn, supports the theoretical arguments of the supply-leading hypothesis and is strongly consistent with the empirical results of the level long-term estimations. Economically, one can conclude that banking development is an essential and critical source of economic growth in Jordan. Thus, the intermediary role of the banking sector as a fund facilitator leads to elevated economic growth (Ben Salem & Trabelsi, 2012). Moreover, the causality test outcomes provide empirical evidence of an existing bidirectional causal relationship between banking industry development and bank size; as measured by banking sector deposits, which is in line with the empirical outcomes of Almahadin and Tuna (2019). At the same time, the bidirectional causal relationship is observed between bank deposits and lending interest rates. In contrast, the unique direction of the causal associations tends to pass from lending interest rate to banking industry development and from economic growth to banking sector size. Regarding the causality in the short term, as can be shown in the *t*-statistics of the ECM_{t-1}; presented in the last column of Table 5. The empirical outcomes indicate that three causal relationships being with banking industry development, bank size, and lending interest rate and move toward all other variables.

Table 4: The Error Correction Estimations of the Short-Term Relationship

Variable	Coefficient	*t*-Statistic	*P*-value
ΔBID	0.2418***	2.9601	0.0060
ΔR	–0.7131	–0.8126	0.4235
ΔR_{-1}	–2.8976**	–2.6263	0.0140
ΔR_{-2}	–2.7169***	–2.9389	0.0067
ΔBD	0.2353*	1.9494	0.0617
C	–0.4110	–0.8620	0.3962
ε_{t-1}	–0.8526***	–5.7243	0.0000

Diagnostics: *R*-squared (0.8034), Adjusted *R*-squared (0.7525), *F*-statistic (15.7713), (*F*-statistic probability = 0.0000), and Durbin-Watson statistic (1.71488). Notes: ECT is the estimated coefficient of the error correction term in the error correction model, ***, ** and * indicate the significance level of 0.01, 0.05 and 0.10, respectively.

5.7. Diagnostic and Stability Tests

Table 6 reports the most recommended diagnostic tests to ensure the adequacy of the estimated models. As shown, the statistic value of the JB test provides evidence for the normal distribution of model residuals. To test for serial correlation in the residuals of the estimated models, the Breusch–Godfrey LM test was used, and the statistic value indicates that the residuals are not serially correlated. In addition, the Breusch–Pagan–Godfrey test, the Harvey test, the Glejser test, the ARCH test, and the White test are employed to test for heteroscedasticity problems in the residuals of the estimated models. The statistical values provide evidence of inexistent heteroscedasticity in the residuals of the estimated models; the statistic values of all of the tests are insignificant. Finally, the Ramsey regression equation specification error test (RESET) is utilized to ensure that substantial nonlinear combinations exist among the independent variables of the linear model. Based on the reported test statistic of the RESET, the estimated model did not suffer from any misspecification problems, meaning that the estimated model is well-specified.

The stability of the estimated long-term coefficients is tested by using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) tests of Brown et al. (1975). The outcomes of these tests are presented in Figure 1. The plots of both the CUSUM and CUSUMSQ tests did not cross the critical boundary of a 0.05 level of significance. Thus, one can conclude that the estimated long-term coefficients were stable over the period of investigation. In other words, the estimated models do not suffer from any structural or systematic instability over the sample period of the current study.

Table 5: The Conditional Granger Causality Test

Y/X	BID	BD	*R*	GDP	ECM$_{(t-1)\text{-}t\text{-statistic}}$
Without Deterministic Trend					
BID	–	2.6814* (0.0866)	2.2654 (0.1270)	1.3200 (0.3305)	–1.1148 (0.2909)
BD	3.6369** (0.0391)	–	3.7059** (0.0370)	4.8146** (0.0168)	–2.7699** (0.0197)
R	0.5868 (0.7106)	1.9227 (0.1773)	–	1.3691 (0.3137)	–0.7583 (0.4657)
GDP	3.4582*** (0.0007)	1.0495 (0.4412)	1.5267 (0.2657)	–	–0.5183 (0.6155)
With Deterministic Trend					
BID	–	3.3538** (0.0489)	3.0256* (0.0641)	2.0589 (0.1549)	–1.8250* (0.0979)
BD	3.1069** (0.0599)	–	4.8665** (0.0162)	6.7683*** (0.0053)	–3.2892*** (0.0081)
R	0.7702 (0.5921)	2.9719* (0.0671)	–	2.2901 (0.1240)	–1.8564* (0.0930)
GDP	3.3139*** (0.0005)	0.9892 (0.4705)	1.5352 (0.2634)	–	0.3516 (0.7324)

Notes: H_0: Variable *X* does not Granger Cause Variable *Y*. *P*-values are given in parentheses. ***, ** and * indicate the significance level of 0.01, 0.05 and 0.10, respectively.

Table 6: Diagnostics Tests for the Estimated ARDL Models

Test	JB	Breusch-Godfrey LM	Breusch-Pagan-Godfrey	Harvey	Glejser	ARCH	White	Ramsey RESET
F-Statistic	0.1408	0.7001	0.5369	0.5955	0.5451	0.7828	0.4869	0.382
Probability	(0.9319)	(0.5068)	(0.8337)	(0.7884)	(0.8275)	(0.4662)	(0.8695)	(0.687)

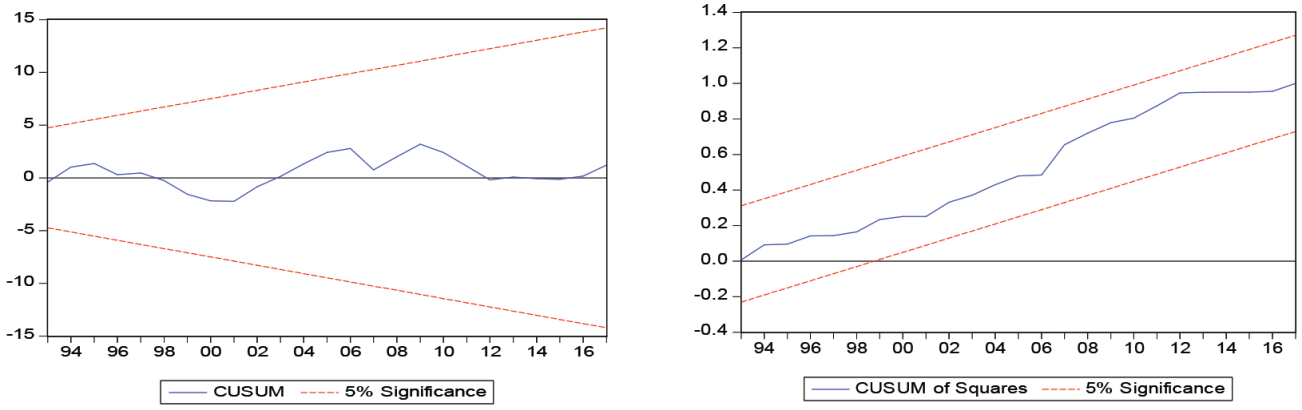

Figure 1: CUSUM and CUSUMSQ Stability Tests

6. Conclusion and Policy Implications

This study aimed to investigate whether banking industry development elevated economic growth in Jordan between 1980 and 2018. For this purpose, the study adopted one of the most acceptable financial time series econometric methodologies, namely, bounds testing within the ARDL framework. When using this sophisticated methodology, the possibility of finding a level long-term relationship between the considered variables should first be found before proceeding to estimate the long-term model. Moreover, the ECM is also estimated to assess the short-term relationships in addition to estimating the speed of the adjustment coefficient. In order to ensure more robust results, the study

analyzed the causal effects among the variables using the conditional Granger causality within the VECM.

The empirical outcomes of the unit root tests affirmed that the dependent variable is stationary at the first order and that none of the variables found the stationary condition at the second order. The bounds test revealed that a level long-term relationship exists between GDP and the considered explanatory variables (i.e., BID, *R*, and BD). This, in turn, provided sufficient justifications to proceed with estimating the long-term ARDL model. The estimated long-term parameter of the banking industry development indicator was found to positively affect economic growth with the highest coefficient value compared to other estimations in the model. From an economic perspective, this result provides significant support for the supply-leading hypothesis, which asserts that banking development is one of the main elements that determines economic growth. Thus, the empirical outcomes indicate that Jordan's economic growth is elastic to changes in banking industry development. In contrast, the lending interest rate proxy has a negative impact on economic growth. The negative impact of this variable reveals the harmful and undesirable role that increased lending interest rates play in economic growth. As a result, monetary policymakers should expend considerable effort in maintaining steady and effective interest rate policies that lead to more investment in both domestic and international fields. The estimations of the ECM provide a comprehensive picture of the short-term relationship, and the results are highly consistent with the results of the long-term model. The estimated ECT reveals that the convergence process of economic growth will reach a long-term equilibrium path with a relatively high speed of adjustment through the channels of the explanatory variables. This provides supplementary evidence for the existence of long-term feedback between the dependent and determinant variables of the functional model.

Among the major results of the causality analysis, a unique direction causal effect was found to pass from banking industry development to economic growth. This result also supports the theoretical arguments of the supply-leading hypothesis, as in the empirical results of the level long-term model. Economically, one can conclude that banking development is an essential and critical source of accelerated economic growth in Jordan. Thus, the intermediary role of the banking sector as a fund facilitator leads to elevated economic growth. In terms of the diagnostic and stability tests, the estimated models were found to be robust and stable over the sample period without any observable problems. Finally, the empirical evidence of the current study may provide important policy implications for both policymakers and bankers. They should work seriously to maintain a stable regulatory system that enhances the role of the banking system in stimulating economic growth. At the same time, considerable attention should be paid to designing a steady policy of interest rates to avoid the inherently undesirable impact of high interest rates on the economy.

References

Abdelhafidh, S. (2013). Potential financing sources of investment and economic growth in North African countries: A causality analysis. *Journal of Policy Modeling, 35*(1), 150–169.

Abu-Bader, S., & Abu-Qarn, A. S. (2008). Financial development and economic growth: empirical evidence from six MENA countries. *Review of Development Economics, 12*(4), 803–817.

Abusharbeh, M. T. (2017). The impact of banking sector development on economic growth: Empirical analysis from Palestinian economy. *Journal of Emerging Issues in Economics, Finance and Banking, 6*(2), 2306–2316.

Al-Awad, M., & Harb, N. (2005). Financial development and economic growth in the Middle East. *Applied Financial Economics, 15*(15), 1041–1051.

Almahadin, H. A. (2019). Spillover Effects of US Monetary Policy on Banking Development: Evidence from the Asian Region. *Global Business Review.* https://doi.org/10.1177/0972150919857486

Almahadin, H. A., & Tuna, G. (2019). Dynamic impact of interest rate volatility and spillover effect of the US interest rate on banking sector development of Turkey: empirical evidence from cointegration and causality analysis. *Asia-Pacific Journal of Accounting & Economics, 26*(5), 577–588.

Almahadin, H. A., Kaddumi, T., & Qais, A. K. (2020). Banking soundness-financial stability nexus: empirical evidence from Jordan. *Banks and Bank Systems, 15*(3), 218–227.

Bagehot, W. (1873). *Lombard Street: A description of the money market. New York:* Scribner, Armstrong & Company.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (1999). A new database on financial development and structure. *The World Bank*.

Ben Salem, J. B., & Trabelsi, M. (2012). More on finance and growth in the MENA region: more growth, more finance. *Middle Eastern Finance and Economics, 17*, 113–124.

Bolbol, A. A., Fatheldin, A., & Omran, M. M. (2005). Financial development, structure, and economic growth: the case of Egypt, 1974–2002. *Research in International Business and Finance, 19*(1), 171–194.

Bong, A., & Premaratne, G. (2019). The Impact of Financial Integration on Economic Growth in Southeast Asia. *Journal of Asian Finance, Economics and Business, 6*(1), 107–119. http://doi.org/10.13106/jafeb.2019.vol6.no1.107

Boulila, G., & Trabelsi, M. (2004). The causality issue in the finance and growth nexus: empirical evidence from Middle East and North African countries. *Review of Middle East Economics and Finance, 2*(2), 123–138.

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society: Series B (Methodological), 37*(2), 149–163.

Camba, A. C., & Camba, A. L. (2020). The Dynamic Relationship of Domestic Credit and Stock Market Liquidity on the Economic Growth of the Philippines. *Journal of Asian Finance,*

Economics and Business, 7(1), 37–46. https://doi.org/10.13106/jafeb.2020.vol7.no1.37

Central Bank of Jordan. (2018), Annual Report 2018. Retrieved from http://www.cbj.gov.jo/EchoBusV3.0/SystemAssets/8c90c6af-fa44-4aa7-b2ce 2ec90cada8cc.pdf

Christopoulos, D. K., & Tsionas, E. G. (2004). Financial development and economic growth: evidence from panel unit root and cointegration tests. *Journal of Development Economics, 73*(1), 55–74.

Demetriades, P. O., & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of Development Economics, 51*(2), 387–411.

Ghali, K. H. (1999). Financial development and economic growth: The Tunisian experience. *Review of Development Economics, 3*(3), 310–322.

Gujarati, D. N., & Porter, D. C. (2003). *Basic econometrics (ed.).* Singapore: McGraw Hill Book Co.

Hicks, J. (1969). *A theory of economic history* (Vol. 9). Oxford: Oxford University Press.

Kar, M., & Pentecost, E. J. (2000). *Financial development and economic growth in Turkey: further evidence on the causality issue* (Economic Research Paper No. 00/21). Centre for International, Financial and Economics Research, Department of Economics, Loughborough University, Loughborough, UK, December 2020.

Kar, M., Nazlıoğlu, Ş., & Ağır, H. (2011). Financial development and economic growth nexus in the MENA countries: Bootstrap panel granger causality analysis. *Economic modeling*, *28*(1–2), 685–693.

King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The quarterly journal of economics, 108*(3), 717–737.

Kumar, A., & Paramanik, R. N. (2020). Nexus between Indian Economic Growth and Financial Development: A Non-Linear ARDL Approach. *Journal of Asian Finance, Economics and Business, 7*(6), 109–116. https://doi:10.13106/jafeb.2020.vol7.no6.109

La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). Government ownership of banks. *The Journal of Finance, 57*(1), 265–301.

Levine, R. (2005). Finance and growth: theory and evidence. *Handbook of Economic Growth, 1*, 865–934.

Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics, 46*(1), 31–77.

Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3–42.

Miller, M. H. (1998). Financial markets and economic growth. *Journal of Applied Corporate Finance, 11*(3), 8–15.

Narayan, P. K., & Smyth, R. (2004). The relationship between the real exchange rate and balance of payments: empirical evidence for China from cointegration and causality testing. *Applied Economics Letters, 11*(5), 287–291.

Ngoc, B. H. (2020). The Asymmetric Effect of Inflation on Economic Growth in Vietnam: Evidence by Nonlinear ARDL Approach. *Journal of Asian Finance, Economics and Business, 7*(2), 143–149. https://doi.org/10.13106/jafeb.2020.vol7.no2.143

Patrick, H. T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change, 14*(2), 174–189.

Pesaran, M. H., & Shin, Y. (1995). *An autoregressive distributed lag modelling approach to cointegration analysis*. Cambridge Working Papers in Economics 9514, Faculty of Economics, University of Cambridge.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289–326.

Pesaran, M.H., & Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In: Storm, S. (Ed.), *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium, Chapter 11*. Cambridge: Cambridge University Press.

Pieroni, L. (2009). Military expenditure and economic growth. *Defence and Peace Economics, 20*(4), 327–339.

Rioja, F., & Valev, N. (2004a). Finance and the sources of growth at various stages of economic development. *Economic Inquiry, 42*(1), 127–140.

Rioja, F., & Valev, N. (2004b). Does one size fit all?: a reexamination of the finance and growth relationship. *Journal of Development Economics, 74*(2), 429–447.

Robinson, J. (1952). *The Generalization of the General Theory, in: The Rate of Interest and Other Essays.* London: MacMillan.

Rodrik, D. (2000). Institutions for high-quality growth: what they are and how to acquire them. *Studies in Comparative International Development, 35*(3), 3–31.

Rousseau, P. L., & Wachtel, P. (1998). Financial intermediation and economic performance: historical evidence from five industrialized countries. *Journal of Money, Credit and Banking,* 657–678.

Rousseau, P. L., & Wachtel, P. (2000). Equity markets and growth: Cross-country evidence on timing and outcomes, 1980–1995. *Journal of Banking & Finance, 24*(12), 1933–1957.

Schumpeter, J. (1961). 1911. *The Theory of Economic Development.* Cambridge, MA: Harvard University Press.

Shokr, M. A., & Al-Gasaymeh, A. (2018). Bank lending channel and banking sector efficiency: panel data of Egypt. *International Journal of Emerging Markets, 13*(5), 1291–1310. https://doi.org/10.1108/IJoEM-08-2017-0289

Tekin, R. B. (2012). Economic growth, exports and foreign direct investment in Least Developed Countries: A panel Granger causality analysis. *Economic modelling, 29*(3), 868–878.

World Bank. (2019, August 14). World Development Indicators: Retrieved from https://databank.worldbank.org/source/world-development-indicators