Impact of Financial Inclusion on Economic Growth in Saudi Arabia: An Autoregressive Distributed Lag Modeling Approach

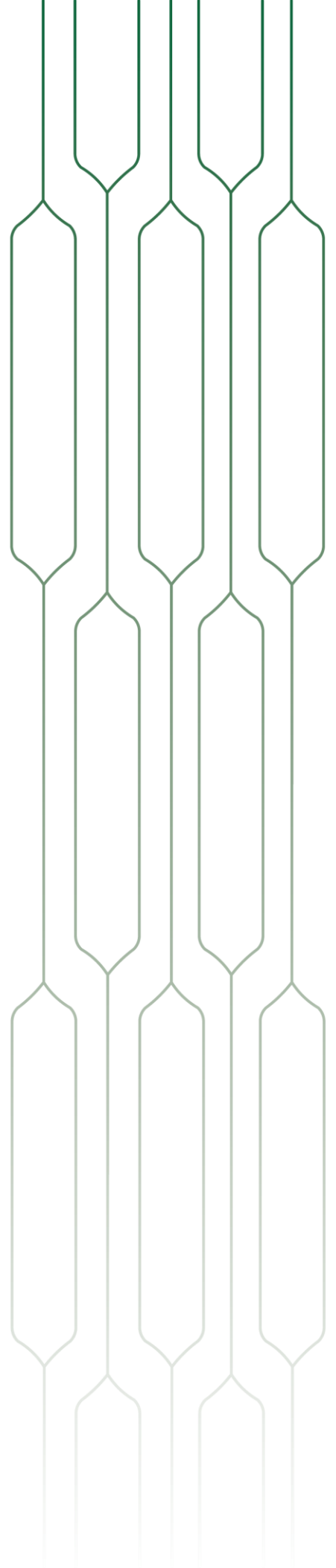Alabdulrazag A. Bashier[1], Harrathi Nizar[1], Omar Alsowaidan[2]

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Abstract

Policymakers in developing countries have shifted from the prioritization of financial development to the prioritization of financial inclusion as a policy tool to foster sustainable economic growth. However, the expected positive impact of financial inclusion on economic growth remains unclear due to the inconsistency of empirical evidence in the literature. Therefore, this paper empirically examines the impact of financial inclusion in Saudi Arabia, measured as a multidimensional index, on economic growth, using quarterly data over the period 2009-2018. The methodology uses the autoregressive distributed lag estimation technique and the required statistical tests to ensure the model's validity. The empirical findings reveal evidence of a significant long-run positive impact of financial inclusion on per-capita GDP in Saudi Arabia. Furthermore, estimates confirm the finance-led growth hypothesis in Saudi Arabia. These findings indicate that financial inclusion plays a crucial role in promoting economic growth. For this reason, financial inclusion should feature as a cornerstone of any future economic growth strategy in Saudi Arabia to foster and promote growth by lowering the cost of financial services and reducing financial illiteracy.

Keywords*: Financial Inclusion, Sadia Arabia, Autoregressive Distributed Lag Modeling, Economic Growth, Cointegration*

JEL Classification*: G 20, G 21*

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1. Introduction

In recent years, financial inclusion has become a major tool for policymakers around the world to assist in planning and implementing robust policies for sustainable economic growth. Theoretically and empirically, financial inclusion has been identified as imperative for economic growth and sustainable development (Bakar et al., 2018; Ramananda and Sankharaj, 2015). For example, several studies indicate that financial exclusion is associated with a 1% loss in terms of gross domestic product (GDP) (Chattopadhay, 2011, cited in Ramananda and Sankharaj, 2015).

In large countries worldwide, financial inclusion has emerged as a national priority. This is partly due to substantial gaps in access to finance, which has motivated policymakers to design strategies to achieve specific targets in terms of financial inclusion (Dinabandhu and Susanta, 2018). Both in policy and empirical research, it is increasingly recognized that financial inclusion positively influences economic growth and poverty, specifically by supplying financial infrastructure (Ruixian et al., 2021; Ali et al., 2020; Minhaj et al., 2020; Nasir et al., 2019; Dinabandhu and Susanta, 2018). Financial inclusion acts as a mediator between the demand and supply sides of funds (i.e., savers and investors). Due to this, creating some level of liquidity in the financial system can stimulate economic growth and reduce poverty.

Across the global economy, banking systems have been developing in terms of the nature of their operations and the diversity of their services, especially in the domain of technology; this has underpinned their access to all segments of society. Furthermore, this has led to the removal of restrictions on capital and financial flows, which has coincided with unprecedented technological and information development. After the financial crisis of 2008, various imbalances were uncovered in the global financial system, which resulted in a burgeoning interest in financial legislation to promote financial stability, economic

growth, and improved living conditions. In particular, many countries sought to prioritize financial inclusion as a mechanism for achieving these outcomes.

According to the World Bank (2017), between 2014 and 2017 worldwide level about 515 million adults have an account at formal financial institution, which present about 69% of adults are having an account. Based on the income level, around 94% of adults in high-income economies have an account, whereas, the percentage in the developing countries is 63%. Furthermore, there is a persistence gender gap, 72% of men have an account compared to 65% of women do. Moreover, this gender gap in developing countries is 9%. On contrary, about 74% of adults among the richest 60% economies have an account. Looking at the Account ownership in terms of age, it is lower among young adults, the less educated, and those who are out of the labor force. Then the question is who remains unbanked and what are the reasons? Globally, around 1.7 billion adults do not have a bank account, mostly in developing economies, and about 56% are women.

Today, our society is reaping the benefits of many technologies that emerged due to the digital revolution as well as due to advances in the international financial system. Most members of the population have bank accounts, Automated Teller Machine (ATM) cards, and credit cards; some people regularly engage in e-shopping, and others use e-banking services to pay utility bills. However, as discussed above, a small yet significant segment of today's population lacks access to bank accounts. There are several reasons for this: (1) the lack of availability of such services, (2) the lack of information and awareness about available financial services, and (3) the lack of confidence that certain individuals may have concerning the banking system.

This research is motivated by the ongoing practical debate and the lack of empirical studies on the consequential link between financial inclusion and economic growth, especially in Saudi Arabia.

The present paper aims to fill this gap by using a measure of financial inclusion in Saudi Arabia, which policymakers can leverage to achieve the goals of the Saudi Vision 2030 regarding a greater level of financial inclusion. At the same time, this research seeks to explore the concept of financial inclusion systematically also to investigate its effect on economic growth in the Saudi context. It is worth noting that this study differs from the existing literature; first, two comprehensive multidimensional indices of financial inclusion. Second, it applied the Autoregressive Distributed Lag (ARDL) to identify the long-run relationship between financial inclusion and economic growth[1].

The empirical findings of this paper are expected to provide policymakers, the public, and members of the academic community with convincing evidence regarding the effect of financial inclusion on economic growth in Saudi Arabia. Furthermore, the recommendations provided, which are based on the research findings, may help to formulate policies and measures pertaining to financial inclusion and economic growth in Saudi Arabia.

The organization of the paper as follows: Section 2 reviews recent and relevant, theoretical and empirical literature; Section 3 states data and methodology; Section 4 presents and discusses the empirical findings; and, finally, Section 5 offers concluding remarks and policy recommendations.

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[1] To our knowledge, none of the related empirical studies has used the ARDL approach to examine the relationship between economic growth and financial inclusion.

2. Literature Review

Through examining the existing literature, this section presents the theoretical and conceptual framework used to explain the channels through which financial inclusion affects economic growth. This section also surveys the recent empirical literature on the association between financial inclusion and economic growth.

2.1. Theoretical and Conceptual Framework

Many scholars have attempted to define the concept of financial inclusion. Most efforts have concentrated on the functions and outcomes of financial inclusion, particularly economic growth, income inequality, and poverty. Claessens (2006) stated that financial inclusion refers to access to financial services, such as credit, insurance, and deposits, which are recognized as critical determinants of economic growth (cited in Julie, 2016). Yousefi (2015) reported that if households and corporations could access banking services, and especially if an increasing number of women could use these services, this would have a robust and positive impact on economic development.

The importance of the relationship between financial inclusion and economic growth stems from the fact that financial inclusion is fundamental for GDP growth and the reduction of income inequality and poverty in any country. As a result, greater access to financial services, such as credit, insurance, and deposits, is critical to economic growth.

2.1.1 The Concept of Financial Inclusion

Financial inclusion is defined as "the process of ensuring access to financial services and timely and adequate credit when needed by vulnerable groups such as low-income groups at an affordable cost by mainstream financial institution players" (Ramananda and Sankharaj, 2015). United Nations (2013) defined the financial system as the set of institutions that can extend credit to all individuals and enterprises that are "bankable", providing savings, payment, insurance, and remittance services.

Economic theories have not overlooked the relationship between financial inclusion and economic growth. The theoretical foundation of this relationship can be attributed arguments of Schumpeter (1911) and McKinnon and Shaw (1973) that government's restrictive measures of financial systems such as interest rate ceilings and directed credit to preferential non-productive sectors, and impeded financial development.

The endogenous growth literature stressed the role of financial development-financial sector services on capital accumulation and technological innovation- for long-run economic growth (Abu-Bader & Abu-Qarn, 2007).

The purpose of the Alliance for Financial Inclusion is to find unified solutions and standards to accelerate the process of financial inclusion and enable the largest possible segment of the population to benefit from banking and financial services. In addition, in 2015, the World Bank and the British Ministry of Development launched a global program to extend the use of electronic payments and transactions significantly (World Bank, 2015).

Many concepts of financial inclusion have been developed by international institutions. For example, the Organization for Economic Cooperation and Development (OECD) defines financial inclusion as the process by which a broad range of formal and controlled financial services and products are accessed at a reasonable time and price. The Arab Monetary Fund further recommends enhancing financial well-being by applying innovative models that promote financial literacy and provide access to these products and services to various groups of society. In addition, the World Bank defines financial inclusion as the ease and affordability with which individuals and businesses can access financial products and services that meet their needs. In the same context, the Center for Financial Inclusion in Washington defines financial inclusion as the provision of high-quality financial services that are affordable, distinctive, and accessible to everyone, including the disabled or poor, individuals in rural or remote areas, and all other groups (Shaker Alsamraeei, 2018).

Consequently, while these definitions differ in subtle ways, the common strand is that financial inclusion is concerned with providing all individuals and entities with a complete range of financial services that are easy to understand and access.

Financial inclusion benefits societies by increasing economic growth, improving living conditions and reducing poverty. Based on the previously identified benefits, we conclude that there are three main aspects in which financial inclusion benefits society: (1) the social aspect, which is related to improving living conditions in society, especially for the socioeconomically disadvantaged; (2) the economic aspect since greater financial efficiency contributes to economic growth; and (3) the strategic aspect since financial inclusion has become an important national strategic objective due to its relevance for achieving objectives such as financial stability, financial integrity, and consumer protection. Furthermore, financial inclusion reduces the leakage of savings outside formal financial channels and facilitates access to financial services for individuals and businesses. All of these contribute to financial stability (Areef, 2019).

2.1.2 Theoretical Framework

There are two channels and mechanisms through which a conceptual explanation of financial inclusion exerts a positive impact on economic growth. The first is that the low cost of accessing credit decreases the vulnerability of poor and weak groups by upgrading living standards. The function of this channel can be better understood in terms of the low credit costs that may encourage these groups to acquire financing for their projects and, thus, be able to start production activities in remote areas; in turn, this leads to an increase in production and employment. The resulting value added promotes an increase in national output, thereby contributing to economic growth at the macro level. The outcome of such a process is the improvement of living standards for underprivileged, low-income, or marginalized groups through an improvement of their income (Sethi & Acharya, 2018). In

this way, financial inclusion also contributes to poverty reduction in rural areas while stimulating economic growth.

The second channel is through the financial system whereby poor and weak groups can access bank deposits and insurance products, which means that excluded individuals and businesses will increase their funds in the financial markets. Furthermore, people will be able to invest their funds in the financial system, which in turn efficiently redistributes these savings among long-term investment plans. This procedure also results in more production and employment, thereby enhancing the income of the poor (Claessens & Perotti, 2007: cited in Minhaj et al., 2020).

Figure 1
Conceptual Framework Showing the Relationship Between
Financial Inclusion and Economic Growth
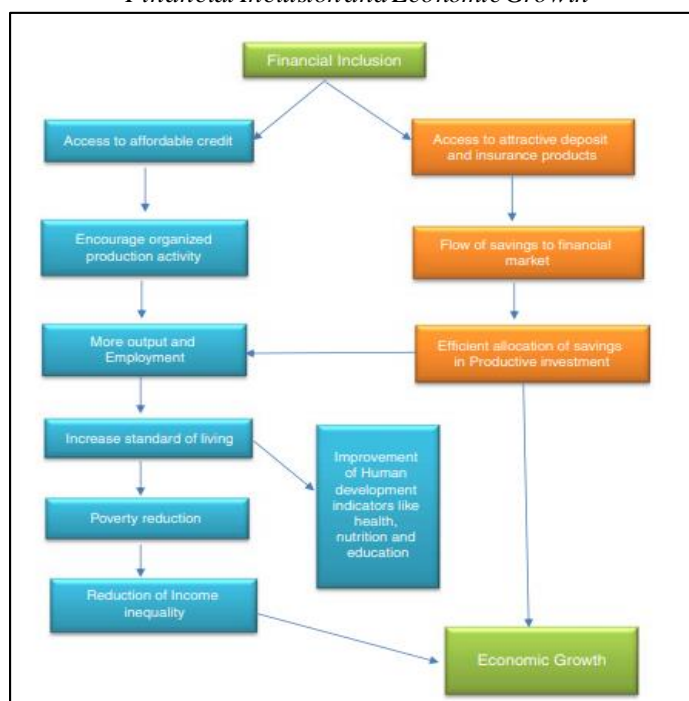
Source: Dinabandhu Sethi and Susanta Kumar Sethy. (2018); PP: 137. FINGRW19

The transformative power of financial inclusion should not be underestimated. This is because when socioeconomically disadvantaged groups, including low-income households and certain micro-enterprises, have improved access to finance, this can open earning opportunities and self-reliance. Consequently, this can positively influence the country's

economic performance. Proponents suggest that financial exclusion leads to a loss of opportunities growth, inhibited national growth, and higher rates of poverty.

Sinclair et al. (2009) provided that financial exclusion raises costs to those who cannot afford them. On the other hand, a well-developed financial system reduces information and transaction costs, and consequently, affects saving rates, investment decisions, technological innovation, and growth rates (Beck et al., 2009, cited in Kumar and Mishra). This may be contested based on the numerous customers who are the principal target of financial inclusion initiatives.

Kempton et al. (2000) showed that social exclusion was linked to poverty, deprivation, and limited opportunities. Furthermore, it was viewed as a broader concept than financial exclusion that served as a shorthand term for the consequences interrelated problems (e.g., unemployment, low skills, low income, poor housing, poor health, high crime environments, poverty, and family breakdown) that individuals or regions suffering Social exclusion has also been identified as a source of social class formation and a contributing factor to the growth of polarization.

Those who are included in the financial system tend to become fearful and distrustful of those who are excluded (and vice versa), which can contribute to the development of polarized societies that undermine economic health. In such cases, wealthy individuals, businesses, and regions typically become richer, whereas the unfavorable situation for those in a disadvantaged position compounds. Therefore, financial inclusion fills the gap between the included and excluded and the rich and the poor, as well. Therefore, financial inclusion cannot be isolated from socioeconomic, cultural, and geographic factors. Despite the disadvantages of financial exclusion, financial inclusion has not been fully realized, as evidenced by the size of the financially excluded group (Agnello, & Sousa, 2012; Park & Mercado, 2015; Nanda & Kaur, 2016).

2.2.   Empirical Literature Review

In both developing and developed countries, researchers and policymakers have focused on both the theoretical and applied aspects of the nexus between financial inclusion and economic growth. However, various financial indicators have been used in applied research to estimate the nexus relationship with certain microeconomic and macroeconomic variables, particularly economic growth. The most common financial indicators used by scholars and researchers are usage, access, and penetration. However, there is no consensus regarding the measures that should be used to calculate these indicators. To combine all of these individual indicators into one measure, Sarma (2008) developed a multidimensional index of financial inclusion.

A considerable body of applied research has investigated the impact of financial inclusion on economic growth, along with a set of macroeconomic variables, at the level of individual countries as well as at the panel and cross-sectional country level using various financial inclusion indicators, including the number of bank branches, ATMs, and deposit accounts. These studies have used state-of-the-art estimation approaches to assess the effect of financial inclusion on economic growth, including Fully-Modified Least Squares (FMOLS) (Al-Ma'aitah, 2021; Alshorman, 2018), Vector Autocorrecting (Panel VAR) (Ali et al., 2020; Minhaj et al., 2020; Sharma, 2015), Autoregressive Distributed Lag (ARDL) models (Nasir et al., 2019; Muhammad et al., 2019; Nasir et al., 2019; Dinabandhu and Susanta, 2018; Moïse and Xu, 2018), and panel data (Loan et al., 2021; Ruixian et al., 2021). Empirical evidence concerning the effect of financial inclusion on economic growth is mixed and controversial. Nevertheless, the preponderance of empirical evidence supports the positive effect on economic growth. For example, (Sharma, 2015; Julie, 2016; Jamea' and Majed, 2016; Moïse and Xu, 2018; Alshorman, 2018; Al-Ma'aitah, 2021) provided evidence on the positive effect of financial inclusion on economic growth, while

Muhammad et al. (2019) provided the negative effect. Empirical studies indicate that the mixed empirical evidence can be attributed to the strength of financial systems (Baker and Zunaidah, 2019). In particular, it has been claimed that weak financial systems are responsible for the negative effect of financial inclusion on economic growth. In the remainder of this section, a review of the literature is given regarding the research problem in the context of Saudi Arabia, which is based on evidence from cross-country applied research. Using annual data in Jordan, Al-Ma'aitah (2021) applied the FMOLS approach and demonstrated that financial inclusion positively influences economic growth.

Loan et al. (2021) investigated the relationship between financial inclusion and economic growth in emerging markets at the international level by constructing a multidimensional financial inclusion index. The empirical findings revealed a positive association between financial inclusion and economic growth. Furthermore, the authors found that an individual's status as low income correlated strongly with greater financial exclusion.

Ruixian et al. (2021) applied panel estimation to examine the impact of financial inclusion on economic growth in 27 EU countries using annual data from 1995-2015. They divided their sample into sub-samples based on national income level (i.e., high/low) and length of membership in the EU (i.e., new/old members). The findings demonstrated that financial inclusion (in terms of depth, access, and efficiency) exerted a positive impact. Additionally, the authors found that financial inclusion was more significant in low-income and new EU member states compared to high-income and old EU countries.

In the same context, Ali et al. (2020) studied the impact of financial inclusion on economic growth in 45 members of the Islamic Development Banks (IsDB) over the period 2000-2016 using estimation GMM, 2SLS, Panel VAR, and Granger tests. Their findings showed a positive bidirectional causal relationship between these two variables. Minhaj et al. (2020) examined the impact of financial inclusion on economic growth in Islamic Development

Banks over the period 2000-2016 using GMM, 2SLS, Panel VAR, and Granger tests. Their findings showed that financial inclusion positively influenced economic growth. Muhammad et al. (2019), whose study was undertaken using data from the period 2010-2015, observed a positive association between economic development, proxied by HDI, and the number of ATMs and bank branches per 100,000 adults to proxy financial inclusion. It was found that ATMs/1,000 km^2 exerted a negative impact on economic development. Moreover, Nasir et al. (2019) studied the effect of financial inclusion on economic growth in Pakistan. The authors applied the ARDL estimation approach and ECM to annual data from the period 1985-2017. Their findings indicate a short-run positive impact of financial inclusion on economic growth in Pakistan.

Saibal (2019) investigated the impact of Aadhaar, Inclusion, and Mobile (AIM) on selected states in India using data over the period 2001-2014. The author observed that the mobile penetration rate was positively associated with economic growth. Alshorman (2018) estimated the impact of financial dimensions, as well as the multidimensional index, on economic growth in Jordan over the period 2000-2015. To achieve this, the author applied the FMOLS technique. It was observed that all financial inclusion indices positively affected economic growth. Dinabandhu and Susanta (2018) examined the association between financial inclusion and economic growth in India over the period 1975-2014. The authors used a multidimensional financial inclusion index proposed by the HDI method, and along with the ARDL and NARDL approaches to cointegration, the Toda-Yamamoto Granger causality test was applied. The authors identified a long-run relationship between the two variables, where financial inclusion positively affected economic growth and unidirectional causality was found to run from financial inclusion to economic growth. Moïse and Xu (2018) studied the association between financial inclusion and economic growth using quarterly data covering the period 2004-2016 by applying the ARDL approach and Granger

causality. Their findings provided further evidence for the positive association between financial inclusion and economic growth.

Using annual data over the period 1995-2014 and applying multi-linear regression, Abu Jamea' and Majed (2016) concluded that financial inclusion positively influenced economic growth in Palestine. Julie (2016) studied the relationship between financial inclusion and economic growth in Kenya over the period 2002-2012 using a multiple regression approach. The author's empirical findings supported the positive impact of financial inclusion. Sharma (2015) studied the nexus between financial inclusion and economic growth in India for the period 2004-2013. The VAR model was applied, along with the Granger causality test, and the study used the multidimensional financial inclusion index. The author concluded that a positive relationship existed between the two variables.

3. Methodology and Data Source

3- 1 Econometric Model

To understand the relationship between financial inclusion and economic growth in Saudi Arabia, it is necessary to identify the direction of the causal relationship between the two variables. That is to say, it is important to understand whether there is a financial inclusion-growth nexus or a growth-financial inclusion nexus, which is an issue that can be illuminated by investigating the dynamics of the Saudi economy. Following the supply-lead hypothesis, financial inclusion is considered the driving engine for economic growth. However, the demand-following hypothesis suggests that economic growth drives financial infrastructure and banking facilities.

All variables are annual data, the current per-capita GDP may significantly be influenced by lagged values causing a lag effect. Hence, to attain the desired outcome, it was necessary for the employed econometric model to consider such effect.

Within this context, to explore the impact of financial inclusion on per-capita GDP growth in Saudi Arabia, this study adopted the linear ARDL model bounds testing approach to cointegration developed by Pesaran et al. (2001) who advocated that ARDL approaches to cointegration were suitable for small samples and could overcome the potential endogeneity problem.

The extended long-run economic growth model used in this study has the following form:

$$LYPC_t = \beta_0 + \beta_1 LK_t + \beta_2 LL_t + \delta LFII_t + \varphi LENG + \mu_t \qquad (1)$$

where YPC denotes per-capita GDP (measured in millions of constant Saudi Riyals), K denotes capital measures by gross fixed capital formation (measured in millions of constant Saudi Riyals), L denotes the labor force (measured in millions of individuals), FII is the financial inclusion indicator, LENG denotes the energy consumption, and μ_t denotes the error term with zero mean and constant variance. All variables were converted to natural logarithm, so the associated coefficients refer to the long-run estimated elasticities.

The rationale for using the ARDL model developed by Pesaran et al. (2001) is to uncover the role and contribution of financial inclusion to economic growth. In addition, the error correction form derived from the ARDL model makes it possible to capture short-run dynamic and long-run connections between financial inclusion and per-capita GDP. Therefore, the empirical model has the following form:

$$\Delta LY_t = \alpha_0 + \rho LY_{t-1} + \theta_1 LK_{t-1} + \theta_2 LL_{t-1} + \theta_3 LFII_{t-1} + \theta_4 LENG + \sum_{i=1}^{q_1} \alpha_i \Delta LY_{t-i} +$$
$$\sum_{i=1}^{q_2} \beta_i \Delta LK_{t-i} + \sum_{i=1}^{q_3} \gamma_i \Delta LL_{t-i} + \sum_{i=1}^{q_4} \theta_i \Delta LENG_{t-i} +$$
$$\sum_{i=1}^{q_5} \emptyset_i \Delta LFII_{t-i} + \varepsilon_t \qquad (2)$$

where ΔL denotes the first log-difference, and the optimal lags $(q_1; q_2; q_3; q_4, q_5)$ included in the estimated model were selected using Akaike's Information Criteria (AIC).

Based on the above considerations, the bounds testing approach to cointegration is used to explore the existence of a long-run cointegration relationship between the variables. Based

on Pesaran et al. (2001), the null hypothesis of no cointegration is conducted through the Wald joint nullity test (F-test) of the estimated coefficient of the long-run relationship, which can be stated as follows: $H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = 0$. The null hypothesis of no cointegration is rejected when the F-statistic is greater than the upper bound critical value, while the null hypothesis cannot be rejected if the F-statistic is less than the lower bound critical value.

3.2. Measurement of Financial Inclusion

In this study, the following financial indicators are used to measure financial inclusion: access, usage, and penetration. These financial indicators have been widely recommended and used by researchers as indicators of financial inclusion (Moïse & Xu, 2018). However, despite their widespread use, there is noticeable disagreement in terms of how these indicators should be measured. For example, Anzoategui et al. (2014) and Moïse and Xu (2018) used deposit accounts, loan applications, and loans received from financial institutions; Lukman (2019) used bank accounts per 1,000 adults; Joseph et al. (2019) used deposit accounts, ATMs, and mobile/internet banking; and Bkwayep et al. (2020) used the following financial indicators: credits, deposits, insurance, ATMs per 100,000 adults and banking branches as well.

In the research undertaken by Immaculate (2018), the index of financial inclusion consisted of the following dimensions: access, usage, and banking penetration. In the case of the access dimension, it was measured using the variables of the number of ATMs per 100,000 people and the number of commercial bank branches per 100,000 people. ATMs are widely used and accessed easily outside normal bank opening hours. Furthermore, commercial bank branches provide financial services to customers and scattered separated over the region. In turn, we derived the index for the access dimension by averaging the ATMs and commercial bank branches indices. The average of the two indices was then regarded as a

combined Sami et al. (2020) used access (number of bank branches per 100,000 adults and ATMs per 100,000 adults), while Kenneth (2019) and Inoue and Hamori (2016) used the number of commercial bank branches per 100,000 adults and the number of bank branches per 1,000 km^2.

Usage is viewed as important when measuring financial inclusion because it considers the actual activities in relation to banking services. In this case, we considered the following forms of usage: (1) savings and (2) loans. These were measured as depositors per 1,000 adults and borrowers per 1,000 adults, respectively. Depositors with commercial banks are the number of holders of deposit accounts (i.e., checking accounts and savings accounts) at commercial banks and other resident banks. By contrast, borrowers are the number of non-financial corporations (e.g., households). Notably, Sami et al. (2020) used the dimensions of deposit accounts per 1,000 adults and the number of borrowers, while Nitin (2013) considered credit and deposit.

Regarding the third and final indicator used in the present research, namely penetration, it is worth noting that Nitin (2013) used the number of credits divided by the total population as the penetration indicator. In addition, usage was proxied by credit and deposit accounts, and access was measured as branch density (i.e., the number of branches per 1,000 km^2).

To address the present study's objective, we explored the theoretical and conceptual framework of the nexus between financial inclusion and economic growth. To facilitate this, the study used the work of Sarma (2008) as a basis, along with information from the World Bank, the IMF financial inclusion surveys, the Saudi Central Bank, and the available literature. Consequently, the present research focused on the following major dimensions of financial inclusion proposed by Moïse and Xu (2018):

1 – Access

The number of commercial bank branches per 100,000 adults was used to measure the accessibility of services.

2 – Penetration

To measure penetration to financial services, we used the number of deposit accounts per 1,000 adults held in commercial banks.

3 – Usage

Not only having a bank account is not enough for an inclusive financial system; but also the banking services are adequately utilized. Therefore, to measure the usage of financial services, we considered the outstanding deposits with commercial banks (% of GDP).

3.3   Measuring Financial Inclusion Indicators

Various indicators of financial inclusion have been used in previous studies to estimate its connection to specific microeconomic and macroeconomic variables, particularly economic growth. The most common financial inclusion indicators used by scholars and researchers were usage, access, and penetration.

However, there is no consensus on the measures under each of these indicators. To combine these individual indicators into a single measure, Sarma (2012, 2008) developed a multidimensional index of financial inclusion measured by numerous indicators in the economics literature. Hence, this section proceeds to outline these indicators as well as the construction method of the multidimensional index of financial inclusion. This is an important contribution of the present study because previous research projects have not included all financial indicators that influence financial inclusion (Immaculate, 2018).

Immaculate (2018) considered three dimensions of financial inclusion to establish a more holistic view through the construction of a multidimensional index. To construct a multidimensional index of financial inclusion, Immaculate (2018) employed the approach

proposed by Sarma (2012, 2008), Immaculate (2018) included banking penetration, access to banking services, and usage dimensions in constructing the index. Hence, this paper follows Immaculate (2018) in constructing a multidimensional index of financial inclusion in Saudi Arabia, taking into consideration the availability of data.

The calculation procedure followed by Immaculate (2018) consists of three steps. The first step involves computing dimension indices, which initializes the use of financial inclusion indicators by constructing an index for each indicator. This can be achieved by applying the following formula:

$$d_{i,t}^{j} = \left(\frac{A_{i,t}^{j} - m^{j}}{M^{j} - m^{j}} \right) \qquad (3)$$

where country $i, j = 1, 2, 3, 4, 5$ denotes the financial indicator number, $A_{i,t}^{j}$ denotes the actual value of variable j, m^{j} denotes the minimum value for variable j, and M^{j} denotes the maximum observed value for variable j. The index $d_{i,t}^{j}$ lies between 0 and 1 reflecting the maximum and the minimum values of a certain variable.

The second step involves combining the dimension indices (access, usage, and penetration) for the indicators. The combined dimension indices are as follows: the access dimension is calculated as $\tilde{d}_{1,i,t} = d_{1,i,t}$, the usage dimension is calculated as $\tilde{d}_{2,i,t} = d_{2,i,t}$, and the penetration dimension, which undergoes no transformation, is denoted as $\tilde{d}_{3,i,t} = d_{3,i,t}$.

The final step is to derive the multidimensional index of financial inclusion, $IFI_{i,t}$, by combining all three dimensions, assuming that equal weights are attached to the dimensions as in equation 4.

$$IFI_{i,t} = \frac{1}{2} \left[\frac{\sqrt{(\tilde{d}_{1,i,t})^2 + (\tilde{d}_{2,i,t})^2 + (\tilde{d}_{3,i,t})^2}}{\sqrt{3}} + \left(1 - \frac{\sqrt{(1 - \tilde{d}_{1,i,t})^2 + (1 - \tilde{d}_{2,i,t})^2 + (1 - \tilde{d}_{3,i,t})^2}}{\sqrt{3}} \right) \right] \qquad (4)$$

The resulting index of financial inclusion lies between 0 and 1 such that 0 denotes complete financial exclusion while 1 indicates complete financial inclusion. The newly constructed

index of financial inclusion is, therefore, a measure of financial sector inclusiveness in Saudi Arabia. It can be regarded as an appropriate and robust measure because it considers various important variables that influence financial inclusion.

3.4   Data Description and Variables

The annual data for the period 2009-2018 obtained from the World Development Indicators (WDI), the Saudi Central Bank, and financial inclusion surveys were converted to quarterly data. The collected data were related to the following variables: per-capita GDP (Ali et al., 2020; Al-Ma'aitah, 2021), gross fixed capital formation (Millions $), labor force size, energy consumption, and the financial inclusion indicator. Table 2 shows the descriptive statistics of the data.

(Table 1)
Descriptive Statistics

Variable	Mean	Max.	Min.	Std. Dev
Per-capita GDP (YPc)	20171	21399	1888	920
Capital (K)	582274	691402	437527	76062
Labor (L)	9.94	11.41	7.83	1.36
ENG	1286	1610	864	266
Financial Inclusion Index (FII)	0.38	0.42	0.32	0.04

The dynamic behavior of the financial inclusion index over time is illustrated in Figure 2. This figure shows a decline in financial inclusion from 2012 to 2015 due to the decrease in oil prices and income, while the financial inclusion index witnessed an increase during the periods 2010-2012 and 2016-2018.

Figure 2
Dynamic Behavior of the Financial Inclusion Index
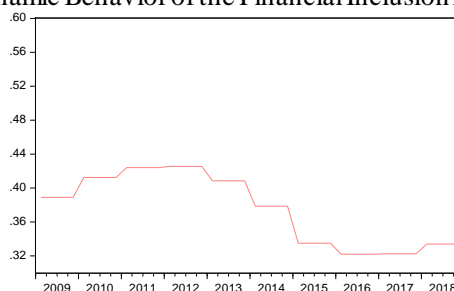
The Augmented Dickey-Fuller (ADF) test is used to examine the stationarity properties of variables used in the empirical analysis. Additionally, Table 3 shows the results of the bounds test of the null hypothesis of no cointegration. Given that the F-statistic equals 6.45, along with the greater upper bound for all significance levels, the null hypothesis of no cointegration is rejected.

(Table 2)
Results of Bounds Test and Critical Values

F- Statistic	Significance level	I(0)	I(1)
6.454	10%	2.2	3.09
	5%	2.56	3.49
	2.5%	2.88	3.87
	1%	3.29	4.37

4   Estimated Results and Findings

This section presents the estimation results and discussion. The ARDL model and the bounds testing approaches were used to investigate the short-run and long-run impacts of financial inclusion on economic growth.

To explore the short- and long-run linkages between per-capita GDP and the financial inclusion index, the empirical analysis is conducted using the Error Correction Model derived from the ARDL specifications. In addition, the dummy variable included in the estimated model indicates a structural change in 2016.

Moreover, the breakpoint Unit Root Test shows a break at 2016 Q1. The ECM-ARDL estimates, as reported in Table 4, indicate the negative and insignificant impact of labor, while it is positive and significant in the one and second-period pass lags on per-capita GDP. In addition, the results indicate that energy has a negative and significant impact in the one and second-period pass lags on per-capita GDP. Moreover, the gross fixed capital has a positive impact on per-capita GDP. Furthermore, the results reveal a high speed of

adjustment, where the estimated error correction term (ECM) equals -0.632, which means that the model adjusts 63% of the short-run disequilibrium toward long-run equilibrium. Moreover, residual diagnostic tests are used to test the results robustness. The results of the Breusch-Godfrey serial correlation LM test and Breusch-Pagan-Godfrey heteroscedasticity test reveal that the null hypothesis of no serial correlation and no heteroscedasticity cannot be rejected. Consequently, the model does not suffer from autocorrelation and heteroscedasticity problems. In addition, the results of the Ramsey test indicate correct model specification, and the error term is normally distributed.

(Table 3)
ECM-ARDL (1, 0, 3, 1, 3) Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LLAB)	-0.013	0.034	-0.388	0.701
D(LLAB(-1))	0.072	0.033	2.173	0.040
D(LLAB(-2))	0.072	0.033	2.173	0.040
D(LCAPP)	0.223	0.038	5.786	0.000
D(LENG)	0.090	0.062	1.449	0.160
D(LENG(-1))	-0.141	0.053	-2.660	0.014
D(LENG(-2))	-0.141	0.053	-2.660	0.014
DUM	0.025	0.004	5.607	0.000
CointEq(-1)*	-0.632	0.092	-6.866	0.000

Diagnostic Tests

Test	Tests -Statistics	Prob
Breusch-Godfrey LM	0.283	0.756
Breusch-Pagan-Godfrey	1.599	0.157
Normality	J-B=2.369	0.305
Ramsey	0.174	0.680

Note: The symbols *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively. ECM denotes the estimated error correction term.

Table 5 presents the estimated results of the long-run cointegration relationship between per-capita GDP, capital, labor force, energy consumption, and financial inclusion index. The results offer evidence for positive and significant long-run impacts of gross fixed capital and energy on economic growth. We find that a 1% increase in gross fixed capital and energy increases per-capita GDP by 0.269% and 0.316%, respectively. In addition, the results reveal negative long-run impacts of the labor force on per-capita GDP. The reason

may be due to Saudi Arabia's high percentage of foreign workers and the fact that the majority of these workers are unskilled. Moreover, the results show that there is positive and significant long-run sensitivity of per-capita GDP to changes in the financial inclusion index. A 1% increase in FII index increase GDP by 0.11%.

The results of the present study are in line with previous literature that provide evidence on the positive relation between financial inclusion and economic growth. For example, (Sharma, 2015; Julie, 2016; Jamea' and Majed, 2016; Moïse and Xu, 2018; Alshorman, 2018; Al-Ma'aitah, 2021) provided evidence on the positive effect of financial inclusion on economic growth. These results are indicative of the long-run causal impact of the financial inclusion index on per-capita GDP. In this way, they provide evidence for the important role of financial inclusion in enhancing economic growth.

(Table 4)
Long-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LFII	0.116	0.042	2.742*	0.011
LLAB	-0.176	0.066	-2.644*	0.014
LCAPP	0.269	0.059	4.543*	0.000
LENG	0.316	0.082	3.858*	0.000
C	0.196	1.480	0.132*	0.895
Note: The symbols *, **, and *** denote significance at the 1%, 5%, and 10% levels, respectively.				

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6   Conclusion and Policy Implications

A priority of all countries, regardless of their economic situation, is to promote economic growth. In the literature, various drivers of economic growth have been identified, including investment in human capital, growth in exports, and financial development. Policymakers in developing countries have shifted from the prioritization of financial development to the prioritization of financial inclusion as a policy tool to foster sustainable economic growth.

However, the expected positive impact of financial inclusion on economic growth remains unclear due to the availability of inconsistent empirical evidence in the literature.

This research examine the link between financial inclusion and economic growth in Saudi Arabia using quarterly data over the period 2009-2018. The estimation methodology used the ARDL. The empirical findings show that a significant and positive relationship exists between the multidimensional financial inclusion index and growth in Saudi Arabia.

Consistent with Vision 2030, which aims mainly to promote the growth of GDP, the findings of this research demonstrate that promoting financial inclusion acts as a driving force for economic growth in Saudi Arabia. Therefore, this research suggests that Saudi Arabia should accelerate the financial inclusion process by focusing on individuals' financial inclusion literacy, particularly rural, female, and young demographic groups. Moreover, policymakers should consider the higher transaction fees issue that may discourage the use of banking services, whether they involve saving or borrowing. In particular, reducing transaction costs is important for promoting financial inclusion as it will enable more individuals and businesses in Saudi Arabia to reap the benefits that it offers.

In light of the above conclusion, this research represents a significant contribution to both policy and the existing literature, targeting the role of financial inclusion in promoting economic growth. Hence, the results will enrich the existing literature by focusing on the Saudi Arabia case.

It is recommended that future studies should consider including other factors in their modeling, such as institutional quality and the financial system. This will enable more holistic insights to be gained into the determinants of economic growth in Saudi Arabia.

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