Finance- Growth Nexus and Institutions

by

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Abstract

This thesis examines the finance-growth nexus and the factors that may promote or mitigate this relationship, covering 107 diverse countries from 1986 to 2016. The selected factors are formal institutions, informal institutions, geographic-location, and income-level. Because financial development is a very multidimensional concept and the number of proxies is still expanding, reaching 38 proxies, a longitudinal analysis is employed in the first empirical approach where the autoregressive distributed lag model is employed for this time-series regression. The results confirmed that financial development promotes growth in the long-term, financial depth is a crucial pillar of financial development, and the finance-growth nexus differs slightly according to the proxies' selected. The effect increases when using depth indices and decreases slightly as the indicator expands to cover depth, efficiency, and capital market performance. The second empirical approach employs panel models, and the results confirmed the existence of finance-growth nexus. For the factor selected, the judicial effectiveness level endorses the finance-growth nexus, whereas the uncertainty avoidance level hinders this relationship which is aligned with the thesis assumptions that the lack of well-functioning legal frameworks affects the finance-growth nexus by abolishing trust, increasing risks, and decreasing interest in investing and opening new businesses. For informal institutions that reflect norms, values, beliefs, 'socially shared unwritten rules which shape individual and wider social behaviour. This thesis focused on the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The results revealed that increased uncertainly avoidance results in a

less positive effect on financial development. Risk avoidance hinders the first pillar, 'financial depth', from promoting financial efficiency, which reflects the performance of financial institutions in lending and promoting investments. For geographic location and income level, the sign of the effect depends on the subgroup, where high-income countries, middle-income countries, and East and South Asian countries show a significant effect on the nexus. This thesis provides additional evidence on the positive finance-growth nexus by expanding the sample periods and countries to overcome the selection biases of the most current empirical analyses. It also provides novel evidence of the significant influence of informal institutions (culture) on the finance-growth nexus. Up to my knowledge, only a few researchers have examined the influence of cultural characteristics on financial structure whether it is bank based or market based, and others have examined the influence of the financial structure on economic growth. This thesis aims to contribute to this research and also thoroughly explains the multidimensional dilemma in which the financial development concept is still expanding. However, most current literature has employed one or more proxies supported with relevant literature without assessing all the proxies. Finally, the effect of financial development varies from country to country, and it is greatly beneficial for policymakers to know which factors may hinder the positive effect of financial development before conducting and implementing any development plan to promote the financial sector.

Dedication

This thesis is dedicated to my parents, whom I infinitely and genuinely love,

and to my one and only daughter Sheikha.

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Abbreviations

ADF   -   Augmented Dickey–Fuller Test.

AIC   -   Akaike Information Criterion.

ARDL   -   Autoregressive Distributed Lag.

BA   -   Banking Assets.

CBN   -   Central Bank of Nigeria's.

COGAD -   Commission on Growth and Development.

CUSUM -   Cumulative Sum of Recursive Residuals.

DCPS   -   Domestic Credit Provided By Banks.

EASIA   - East, South Asia and Pacific.

ECM   - Error Correction Model.

EG   - Engle and Granger Method.

EUR   - Europe and Central Asia.

FD1   - The First Proxy for Financial Development, Incorporates Only Financial Depth Indicators.

FD2   - The Second Proxy for Financial Development, Incorporates Both Depth and Efficiency Indicators.

FD3   - The Comprehensive Proxy for Financial Development, Incorporates Financial Depth, Financial Efficiency, and Capital Market Performance.

FE   - Fixed Effect.

FGLS   - Feasible Generalised Least Squares.

FMLS   - Fully Modified Least Squares.

FSD   - Financial System Deposits.

GDP   - Gross Domestic Product.

GDS   - Gross Domestic Savings.

GGFC   - General Government Final Consumption.

GMM   - Generalised Method Of Moments.

GPS   - Global Preference Survey.

HICs   - High-Income Countries.

IMF   - International Monetary Fund.

INV   - Gross Capital Formation As A Percentage Of The Nominal GDP.

JEI   - Judicial Effectiveness Index.

LATIN   - Latin America and the Caribbean.

LICs   - Low Income Countries.

LL   - Liquid Liabilities.

M1   - Narrow Money Aggregates, Includes Money In Circulation Plus Checkable Deposits In Banks.

M2   - Money Aggregates, Includes M1 Plus Savings Deposits And Money Market Mutual Funds.

M3   - Money Aggregates, Includes M2 Plus Large Time Deposits in Banks.

MENA   - Middle East and North Africa.

MICs   - Middle Income Countries.

OECD   - Organisation for Economic Co-operation and Development.

OLS   - Ordinary Least Squares.

OPN   - Total Trade Openness As A Percentage Of GDP.

PCA   - The Principal Component Analysis.

PP   - Phillips-Perron Unit Root Tests.

PRI   - The Property Rights Index.

PSCE   - Panel-Corrected Standard Error

R&D   - Research and development.

RE   - Random Effect.

ROA   - Return On Assets.

ROE   - Return On Equity.

SAMA   - Saudi Arabian Monetary Authority.

SASIA   - South Asia.

SMEs   - Small and Medium Enterprises.

STKC   - Stock Market Capitalisation.

STKRN   - Stock Market Turnover.

STKTD   - Stock Market Total Value Traded.

SUBS   - Sub Saharan Africa.

UAI   - Uncertainty Avoidance Index.

VAR   - Modified Vector Auto Regression.

VECM - Vector Error Correction Model.

WDI   - World Development Indicators.

WVS   - World Value Survey.

Chapter One: Introduction

1.1 Introduction

Economists have long been preoccupied with the notion of economic growth, and there is consensus that the concept is central to a nation's general stability, especially in terms of living standards and the overall well-being of the population. Accordingly, countries aim to implement national development plans, which continually foster and improve economic growth, and both economists and policymakers are interested in studying the potential determinants of economic growth and mechanisms through which the most significant benefit can be achieved. In examining these determinants, it can be noted that most countries that have aimed for sustained rapid growth have maintained impressive public investment rates in three key areas: infrastructure, education, and health.

Researchers have therefore emphasised the importance of focusing on the determinants of economic growth, which include these three key areas, along with other further areas. The Commission on Growth and Development (COGAD) has outlined 16 elements considered policy ingredients for growth strategy (Spence, 2008). These 16 determinants are as follows: high levels of investment, technology transfer, competition and structural change, labour markets, export promotion and industrial policy, exchange rates, capital flows and financial market openness, macroeconomic stability, savings, financial sector development, urbanisation and rural investment, equity and equality of opportunity, regional development, environment and energy use, effective government, and the quality of debate.

In the current context, at the beginning of the third millennium, some countries have been observed to achieve remarkable economic growth, while others have stagnated or fallen behind, experiencing widespread poverty and poor economic and human development instead. The general belief in such cases is that such poverty is the result of a lack of natural resources.

Two historical circumstances have indirectly inspired this research on broadening the understanding of the relationship between economic growth and financial development. The first is that some countries have achieved enormous growth rates despite relative deficiencies in natural resources. The 13 highest growth economies in the post-war period (i.e. Botswana, Brazil, China, Hong Kong, China, Indonesia, Japan, the Republic of Korea, Malaysia, Malta, Oman, Singapore, Taiwan, China, and Thailand) reveal vast dissimilarities in terms of natural resources. These dissimilarities have led some observers to consider some of these cases to be 'economic miracles' that cannot be easily explained and are unlikely to be repeated. Others, however, believe much may be learned from studying these cases more closely. The COGAD has identified five characteristics common to these 13 high-growth economies, including one factor thought to be especially crucial: a high rate of savings and investment (Spence, 2008). This finding suggests that further research into the role financial institutions play in the economy could prove insightful.

The second circumstance inspiring this thesis is that, although the finance-growth nexus has been extensively researched, the evidence remains contradictory, as confirmed by an in-depth review of the existing empirical literature, which is discussed in detail in Chapter 4. For example, Honoham (2004) depicted the finance-

growth nexus as the most striking macroeconomic relationship uncovered in the past decade, whereas Samargandi (2015) described it as still very much a work in progress. Given the evident lack of consensus in the existing literature, it is imperative to summarise this conflict. Since early in the 20th century, a growing body of empirical research has emphasised the importance of the role of financial institutions and financial markets in the economic growth process (Goldsmith, 1969; Greenwood & Smith, 1997; Gurley & Shaw, 1955; King & Levine, 1993b; Schumpeter, 1911). The conclusions of such studies, however, have been contradictory concerning the connection between financial development and economic growth. Some such studies (e.g. Lucas, 1988; Robinson, 1952; Thornton, 1996) have even found the correlation to be either weak or absent. Another strand of research has focused on explaining the apparent ambiguity of this relationship (Beck, 2011; Nili & Rastad, 2007). These researchers attribute the disappearance of a positive correlation between these factors to the potential presence of a natural resource, such as oil (Loayza & Ranciere, 2006). They also attribute the variation in findings to differences in research scope and duration, differentiating between long- and short-term effects where the correlation is positive in the first case and negative in the second. Another potentially relevant claim is that the relationship between financial development and economic growth is merely nonlinear (i.e. the effect is positive only up to a certain point).

From the results of this empirical literature, the influence of financial development on economic growth varies from one country to another. The number of studies that provide additional results concerning the finance-growth nexus exceeds the modest number examining the causative and obstructive factors that may affect

this relationship. Three key factors have been studied extensively for their potential influence on the finance-growth nexus. The first is the presence of a natural resource that tends to erode the positive effects of financial development on the economy (Badeeb & Lean, 2017; Samargandi et al., 2014). The second involves the economic status of the country in question (i.e. whether it is considered a developed or developing economy). The precise role of this factor remains unclear. For example, Calderón and Liu (2003) and Tsai and Wu (1999a) concluded that the influence is positive and substantial in developed countries but negative and insubstantial in developing countries. In contrast, Chortareas et al. (2015a) found a positive influence of financial development and financial institutions on economic growth in developed nations. The third key factor is the level of income (Chung-Hua & Chien-Chang, 2006; Seven & Yetkiner, 2016). Several other potential elements have also been less extensively investigated, including democracy, innovation, the rule of law, and financial structure. As demonstrated in this introduction, the finance-growth nexus is a fascinating topic that has aroused the interest of both economists and policymakers due to its essential role in promoting saving and investments.

1.2 Background and Challenges

A brief history and background of the finance-growth nexus are essential to ensure a clear understanding of the current empirical and theoretical basis. Accordingly, the current status of the finance-growth nexus academic field is assessed to build the key objectives and contributions of the thesis. However, it is well known that each thesis faces challenges. These challenges and limitations and what was done to overcome them are discussed at the end of this section.

The finance-growth nexus was discovered and discussed from the mid-19th century onwards (Bagehot, 1873; John et al., 1942). In the 19th century, banks were the only financial institutions and were the focus of researchers. Following that, rapid financial development resulted in significant changes in economies. Financial institutions and services rapidly became the underpinning of every transaction in modern economies. Moreover, it became exceedingly difficult to imagine or visualise how the economy would work without finance and money. There has been a rise in competition between countries to promote the financial sector. Despite that, variation still exists between countries regarding the financial sector influence on economic growth.

Rapid advancement in financial products and institution types has led to significant changes in the way studies proxy financial development, maintaining this nexus as a focus of researchers. Over time, financial development has continued to be a multidimensional concept where the measures that can represent it vary from a single proxy to 38 proxies and still expanding due to the rapid advancement in this sector. Furthermore, financial sector institutions have grown from banks to a pool of diverse entities, including financial institutions, sovereign funds, pension funds, insurance companies, and capital markets.

Theoretically, many theories support the positive influence of financial development on the economy and various channels between finance and growth. However, empirically, the results still exhibit contradictory findings. For example, many authors empirically found no relationship between finance and economic growth and faced difficulty in arriving at a general statement pertaining to this (Adu

et al., 2013; Akinboade & Kinfack, 2014; Cevik & Rahmati, 2018; Gries et al., 2011; Neusser & Kugler, 1998; Robert, 1988; Robinson, 1952; Abdel-Gadir, 2012; Zang & Kim, 2007). However, other researchers concluded that financial development positively influences economic growth (Abduh et al., 2012; Arestis & Demetriades, 1997; Bloch & Tang, 2003; Goldsmith, 1969; W. S. Jung, 1986; King & Levine, 1993b; Muyambiri & Odhiambo, 2018; Nkoro & Uko, 2013; Odhiambo, 2011a; Ogunmuyiwa & Ekone, 2010; Patrick, 1966).

Adding further empirical evidence to this nexus is quite essential; however, examining the factors that may erode or promote this relationship is more imperative. Discussing such factors justifies why the results vary between countries and assists policymakers in addressing issues that might erode this substantial influence before conducting national development plans to promote the financial sector.

This thesis builds on the literature by creating and refining a broad and up-to-date new database based on the availability of relevant data to assess the relationship between financial development and economic growth and adds further evidence regarding financial development effects on economic growth. Furthermore, this thesis investigated a new factor, the 'informal institution', along with other factors that have previously been examined in the literature, such as the 'formal institution', 'level of income', and 'geographic location'. The first two factors representing institutions are critical. The first factor represents the cultural aspects of institutions and the extent of its influence, whereas the second represents the formal aspects of institutions, such as regulations and laws. The role of institutions has recently become controversial and attractive because institutions have been shaped in various countries differently.

Acemoglu et al. (2005) discussed how institutions shape economic outcomes, which is the fundamental cause of differences in economic development by determining the incentives and constraints on economic actors. This thesis focuses on the effect of this vital factor (institutions) on the finance-growth nexus by looking at their interaction with the level of financial development in order to determine whether they enhance or erode the finance-growth nexus.

Concerning the challenge, discussing a vast multidimensional concept, such as financial development, consumes much time in reading and analysing the related literature and determining the reasons for the choice of proxy. The literature was combined, read, and analysed to compare and understand this multidimensional concept thoroughly. Regarding this first challenge, it is common in the literature for authors to justify the selected proxy by discussing similar studies that used the same proxy without considering other proxies and multidimensional aspects.

Like most literature, limitations in data availability exist for some variables, such as the financial sector depth and informal institution dataset. Despite these concerns, this thesis created and refined a broad and up-to-date new database based on the availability of relevant data.

To the best of my knowledge, no similar work has explored the relationship between informal institutions (the cultural aspect of uncertainty avoidance) and the finance-growth nexus. Finding similar work provides reference guidelines and experience in tackling the same issue. However, other factors examined in this thesis, such as formal institutions, level of income, and geographic location, have been examined in the literature. The literature is beneficial as a reference guideline

concerning the interactions with financial development to assess whether these factors erode or promote this finance-growth nexus. This lack in finding a similar study prompted using two alternative methods to examine the same factor to add robustness to the findings of this thesis.

Nevertheless, measuring these cultural aspects has dramatically increased in importance, which has prompted some key organisations to adopt ways to measure these aspects and build indicators (e.g. Falk et al., 2018). A new Global Preference Survey (GPS) focuses on the lack of some informal institutional aspects, such as time preference, risk preference, positive and negative reciprocity, altruism, and trust. These preferences affect individual savings decisions, labour market choices, and prosocial behaviours, and the outcomes vary across countries, ranging from per capita income and entrepreneurial activities to the frequency of armed conflicts.

1.3 Motivation

The core motivation for this thesis is the importance of economic growth for general human well-being. Typically, economic growth (or simply 'growth') is described in terms of a country's gross domestic product (GDP) (i.e. the total value of goods and services produced domestically over a certain period), which acts as a measure of economic size and health. A large degree of variation in the growth rate is possible, and it is critical to understanding its role in decreasing poverty, improving life expectancy, increasing infant survival rates, promoting education, and improving general living standards.

The second motivation is the importance of the financial sector and the rapid advancement in financial products and institutions. Finance has become a key pillar

of economies, which makes imagining any contemporary economy operating without a robust financial sector that supports it impossible. Despite the difficulty imagining a modern economy without a financial system, the results of the current literature on the finance-growth nexus still vary between countries, which makes this field intriguing. This variation of results strongly prompted several questions about the factors behind this and created a strong desire to examine the factors closely and, most importantly, investigate the potential effect of behavioural and cultural aspects of institutions.

1.4 Aims and Objectives

The key objective of this thesis is to provide a deeper understanding of the relationship between finance and growth. In particular, this research aims to answer the following three research questions:

- Does a correlation exist between a more robust financial sector and stable long-term economic growth?

- What is the relationship between financial developments and economic growth in the specific research sample of more than 100 economies at different levels of economic characteristics?

- Which other factors 'for example cultural and social characteristics, are significant in fostering or eroding the influence of this finance-growth nexus?

The answers to these questions may have important implications for economic policymakers, and the purpose of this thesis is to achieve the following seven specific goals:

- to provide a comprehensive review and discussion of the existing literature on the finance-growth nexus, giving specific attention to the methodologies, sample sizes, indicators, and justifications of the results;

- to create and refine a broad and up-to-date new database based on the availability of relevant data to undertake a detailed exploration of the short- and long-term relationships between financial development and economic growth in a maximum number of countries;

- to examine the finance-growth nexus in the context of a single country from the sample using time series data;

- to supplement existing empirical evidence with new findings demonstrating that the specific measure chosen to proxy the level of financial development matters in terms of finance-growth nexus research based on time series methods;

- to re-examine this finance-growth nexus using a panel dataset of 107 countries and the panel regression method, focusing on multiple individuals at multiple time intervals;

- to investigate the effect of four internal factors thought to potentially foster/erode the positive effects of financial development on the economy (i.e. the rule of law, culture, level of income, and geographic location) using the interaction terms; and

- to increase the robustness of the results by re-examining the finance-growth nexus concerning two of these internal factors (i.e. the rule of

law and culture) using the same dataset of 107 countries with a dynamic panel regression, comparing subsample groups.

1.5 Contribution to the Field

The contribution of this thesis is two-fold. First, the representation of the influence of financial development on the economy and treating the financial development as a multidimensional concept by investigating whether the index chosen matters in such a critical nexus. Thus, three alternative proxies were generated using the principal component analysis (PCA), followed by a comparison to provide empirical evidence concerning the issue raised by Adu et al. (2013), that the effect of financial development is sensitive to the proxy choice. This issue was addressed by testing this claim in country contexts and using additional variables for the metrics of financial depth, efficiency, and capital market performance. The components of this generated index using the PCA can alter according to the financial and economic characteristics of each country, which requires the researcher to have a deep understanding of the country financial and economic characteristics to select relevant indicators according to the composition of the financial sector of the countries.

Second, the representation of the effect of financial development on the economy is assessed after considering critical factors that may erode or promote this nexus. It inspects whether this significant nexus is affected by social and economic factors, such as informal institutions (culture), formal institutions (judicial effectiveness), level of income, and geographic locations, through a comprehensive and up-to-date dataset from 107 countries and the parallel implementation of the two most relevant research methods to yield extremely robust results.

This second contribution is the main contribution to the field and is highly apparent concerning the first investigated informal institution factor, culture. This variable has been researched previously (e.g. Aggarwal & Goodell, 2016; Kwok, 2006), but such investigations have focused on the cultural influence on financial structure, not financial development and provided evidence that countries characterised with higher uncertainty avoidance are likely to have a bank-based rather than market-based system. However, several papers have investigated whether, how, and why the structure of the financial system (i.e. bank-based or market-based systems) influences economic growth, and the results were conflicting, as many countries from both categories were demonstrated to be successful in achieving sustainable economic growth. For example, of the 13 highest growth economies in the post-war period, Germany and Japan are classified as bank-based systems, whereas the United States and the United Kingdom have market-based systems.

This thesis attempts to fill a gap in the existing literature, claiming that the informal institution represented by 'uncertainty avoidance' affects savings and investment decisions and, by extension, the finance-growth nexus, regardless of whether the financial structure in question is a bank-based or market-based system. Although the finance-growth nexus has already been extensively discussed in the literature, the findings remain contradictory, leaving room for substantial further contributions. This thesis aims to advance the understanding of this nexus in three crucial ways. First, it sheds new light on the existing contradictory findings and the efforts that have been made to understand this problem. Second, it investigates several potential factors that may promote or erode the finance-growth nexus. Third, the thesis

employs the new results produced in this study to illuminate additional potentially productive paths of further research in related areas by explaining how the mechanism of these factors affects and the theories behind it. Theoretically, this thesis contributes by simply adding new factors and deep theoretical insights and demonstrating how the addition of new factors significantly alters our understanding of this important nexus and reorganize our casual maps and provide justifications why the impact varies from one country to another.

1.6 Content

The organisation of this thesis is as follows. Chapter one sets the tone of the thesis by providing a basic summary of the topic and the proposed research, including outlining the motivations, objectives, and contributions to the field that the thesis aims to achieve.

Chapter two reviews the various schools of thought and general theories related to the topic of the finance-growth nexus and provides an in-depth assessment of the views and findings of seminal studies. The chapter explains how these theories relate to the role of the financial sector in the economy, including the Adam Smith growth model, Harrod-Domer model, Keynesian growth model, neoclassical growth model, McKinnon-Shaw model, Solow growth model, and endogenous growth model. In addition, the chapter illustrates the channels that allow financial development to promote growth and discusses pioneering studies from the 19th through the mid-20th century. This literature has drawn attention to this vital relationship and has effectively provided a roadmap for later researchers to relate their results of empirical analysis to these theories, which have further developed and deepened the understanding of

financial development and economic growth in general and the finance-growth nexus in particular. Moreover, this chapter discussed behavioural economic theories such as John Maynard Keynes, The prospect, Loss aversion, Endowment effect, disposition effect, and smooth ambiguity theories. Following these behavioural theories, financial structure theories were discussed like bank-based, market-based, finance law, and institutional theories. Finally, this chapter ended by illustrating the channels for financial development to impact the economy.

Chapter Three addresses the fact that financial development is a broad, multidimensional concept that has proven extremely complex to measure. The chapter provides several definitions of financial development, followed by an in-depth analysis of several proxies used in this regard. The measures for financial development range from a single proxy to 38 proxies, and this chapter provides an overview of all possible proxies, regardless of whether they are used.

Chapter Four discusses the existing literature on the finance-growth nexus. It has been divided into three subsections: (1) an overview of studies that conclude the finance-growth nexus does not exist, (2) an overview of studies that conclude the finance-growth nexus exists, and (3) an overview of studies that have examined internal factors related to the finance-growth nexus.

Chapters five, six, and seven constitute the core of this thesis and present the empirical analysis. Chapter five examines the effect of financial development on economic growth within the context of Saudi Arabia using time series data, a method that focuses on a single country at multiple time intervals. The chapter employs an autoregressive distributed lag (ARDL) approach using data collected from 1970 to

2015. It discusses the mathematical process used to construct the financial development index known as the PCA, which aims to convert a set of time series variables that demonstrate a linear correlation with one another into a set of variables with no such correlation. The chapter uses ten proxies for financial development to cover all financial dimensions (i.e. depth, efficiency, and capital market performance). Thus, the chapter investigates whether the finance-growth nexus is monotonic and how the measure chosen to proxy financial development matters in this relationship.

Chapter six examines the finance-growth nexus using a panel dataset from 107 countries over the period from 1986 to 2016. It employs a linear regression with a panel-corrected standard error (PSCE) estimator to assess long- and short-term effects. Furthermore, the chapter uses additional regression equations to attempt to determine whether the level of the influence of financial development on an economy can be linked to four specific internal factors: informal institutions (culture), formal institutions (judicial effectiveness and role of law), level of country income, and geographic locations. Moreover, this chapter re-examines the finance-growth nexus using the same panel dataset of 107 countries from 1986 to 2016 with 5-year averaged data. It employs the generalised method of moments (GMM), and the primary objective of this alternative method is to improve the robustness of the results returned by (PSCE) model by triangulating different approaches.

Finally, Chapter seven discusses the study findings and conclusions. The contributions are discussed for a broader and more in-depth understanding of the mechanism of financial development affecting growth and to find vital related factors.

Moreover, this chapter outlines the potential policy implications inherent in the findings and presents recommendations for future research derived from all chapters.

Chapter Two: Theoretical Background of the Finance Growth Nexus

2.1 Overview

As discussed in Chapter 1, the key objectives of this thesis are to investigate the relationship between finance and economic growth and to determine whether certain factors (e.g. formal and informal institutions, level of income, and geographical location) could play a substantial role in fostering or eroding this finance-growth nexus. Based on these key objectives, this chapter begins with an in-depth assessment of the views and findings of the pioneering studies focusing on the finance-growth nexus beginning in the mid-19th century until the mid-20th century (1801–1950). These early studies played a crucial role in beginning to illuminate the vital relationship between financial institutions and economic growth, which has recently been described as one of the most striking empirical macroeconomic relationships uncovered in the past decade (Honohan, 2004). Previously, the role of finance in economic growth was not explicitly addressed; instead, it was assumed that finance was a neutral force that made no difference in economic decision-making, even though it effectively underpins every transaction in modern economies. Moreover, it is virtually impossible to imagine what the field of economics would entail without money and finance.

Next, the chapter reviews the key elements of some of the well-known economic theories related to the finance-growth nexus. The specific theories were chosen based on the research goals and are divided into three categories: (a) economic growth theories focused on the main determinants of economic growth, (b) financial

theories focused on the structure of the financial sector and its effect on the economy, and (c) economic behaviour theories focused on investigating psychological, cognitive, emotional, cultural, and social factors in the economy. In other words, the first category of theories relates to growth determinants. The second category deals with the structure of financial institutions and the corresponding implications, and the third category concerns the rationality of individuals and institutions and the corresponding implications.

Discussing and understanding the key theories and pioneering research relevant to this topic lay the foundation of this thesis and allow a comparison with more contemporary empirical studies, which are reviewed in Chapter 4. This foundation clarifies the general contributions of the current research to the field. The chapter ends with a discussion of the various channels that encourage financial development and promote economic growth.

2.2 Finance-growth Nexus in a Historical Context

Although the link between financial development and economic growth has gained prominence in recent years, it cannot be considered a recent discovery. The importance of financial institutions in promoting economic growth was highlighted as long ago as 1873 by Bagehot and Schumpeter and again in 1911 by Schumpeter. Bagehot (1873) provided instances of how money market developments in England could create capital flows across the country, searching for the highest rate of return. However, in 1911, Schumpeter stated that financial institutions play a crucial role in society, transforming the savings of deposit holders into loans to the entrepreneurs and borrowers, providing ample support in promoting innovation and influencing

competition across various industries that promote growth. According to Sinha (2001), these examples of the relationship between finance and economic growth did not have a central phase in the thinking of classical economists, and Schumpeter (1911) put the role of financial institutions at the centre of economic development.

A few decades later, Chapman et al. (1942) presented their empirical ideas about historical evidence from the United Kingdom (UK) and the United States (US). In the context of US economic growth, Bradford (1940) determined that banking and financial markets do not promote economic growth by directing the use of various resources to increase the productive use of those resources; however, he demonstrated that financial development plays a critical role in overcoming the bottlenecks related to money supply and credit flow inherent in a young economy. John (1978) later argued that the period from 1900 to 1940 created comparatively little panic in the US because the economy witnessed development in terms of financial and economic growth during this time, similar to the financial issues faced by less developed economies in contemporary times (i.e. the US economy addressed several issues related to credit flow and the efficiency of banking and other financial sector organisations).

In most economic studies prior to the 1970s, financial development was addressed as an essential pillar of economic growth. However, neoclassical economics experts formulated their models concerning two main assumptions. The first states that the capital market operates causelessly and perfectly, and the second asserts that changes in the financial market trends and the performance of the capital market have a direct effect on economic growth. Robinson (1952) argued that financial

development could be stimulated through increases in the demand for financial services and general economic growth. This claim was supported by Lucas (1988), who found that (a) economic growth stimulates financial development, and (b) the influence of financial development is overrated.

Goldsmith (1969) performed a cross-country analysis of 35 countries in the period between 1860 and 1963 and found a close correlation between financial developments and economic growth in several countries. He claimed that this implied that financial development promotes economic growth by mobilising savings to finance the most productive investments.

Patrick (1966) thoroughly investigated the finance-growth nexus and focused on whether this relationship is a demand-following or supply-leading phenomenon. He discussed the channels and supported them with historical examples and described each phenomenon theoretically. Demand-following implies that the financial development follows the real growth per capita and this means that the modern financial institution, their financial assets and liabilities, and related financial services are in response to the demand of investors and savers in the economy. This demand is highly affected by economic growth. According to the demand-following approach, finance is passive and enabling the growth process.

The other approach, 'supply leading', implies that the creation of financial institutions, services, assets, and liabilities in advance of their demand is growth-inducing through two functions. The first is transferring resources from no growth sectors to modern sectors dominated by internationally modern technology and rationality. The second function is to promote and stimulate an entrepreneurial

response by adding new access to funds. According to the second approach, finance is not passive but preconditioned and presents an opportunity to induce real growth by financial means.

Jung (1986) was one of the earliest researchers to use time-series data and analyses to investigate the relationship between financial development and economic growth. Furthermore, he evaluated the argument of Patrick (1966), who addressed two potential patterns in his assessment of the relationship between financial development and economic growth.

Jung (1986) criticised Patrick's (1966) argument that the direction of causality between financial development and economic growth tends to change over time as the extent of financial development and economic growth changes. In the first pattern, Patrick (1966) stated that economic growth encouraged expansion within the financial system of a country where the extent of economic growth influences the demand for financial services. In the second pattern, an increment in the efficiency of the financial system influences the demand for a wide range of financial services. When the financial system transfers the resources from savers to the investors, then the financial system influences economic growth. This pattern points towards a positive relationship between financial development and economic growth.

Patrick's (1966) viewpoint was that, as a result of heightened entrepreneurship and innovation, financial development contributes to an increase in investment. Entrepreneurs are increasingly able to borrow from financial institutions as a result of financial development, which eventually contributes to sustainable economic growth. Thus, according to Patrick (1966), 'as the process of real growth occurs, the supply-

leading impetus gradually becomes less important, and the demand-following financial response becomes dominant' (p. 177).

In response, however, Jung (1986) cited the lack of quantitative evidence available at the time (concerning both developed and developing countries) that could be used to arrive at such a conclusion. This gap in the literature was the basis of the research conducted by Jung (1986) to investigate the causal relationship between financial development and economic growth. Jung (1986) argued that it is crucial to acknowledge the limitations of any study that has investigated the causal relationship between financial development and economic growth. The quantitative measures used for both financial development and economic development tend to be imperfect because these measures, as with other economic data, tend to be qualitative. Moreover, financial development measures tend to be controversial because they do not necessarily acknowledge differences in the institutional environments of different countries (e.g. developed versus developing countries). Every country has a different financial structure, which is entirely dependent on the stage of economic development of the country.

The two proxies of financial development used by Jung (1986) were the complexity of the financial structure using the currency ratio and the ratio of the broad money supply (M2) to the nominal gross domestic product (GDP). The first measure reflects the complexity of the financial structure. He justified using two proxies due to the importance of capturing both quantitative and qualitative developments within the financial sector of an economy, overcoming the limitation that quantitative

measures for financial and economic development tend to be imperfect because these measures tend to be qualitative.

The time-series data analysis undertaken by Jung (1986) was comprehensive and included 56 countries in the sample. Nineteen of the sampled nations were developed, industrialised countries, whereas the remaining 37 countries were developing economies. Jung (1986) concluded that financial development positively contributes to economic growth with statistical significance at the 5% level. The explanation for this was based on the supply-leading relationship (i.e. as the financial system channels resources from savers to investors in the form of saving and lending, the corresponding development of the financial system contributes to an increase in economic growth). Furthermore, in the case of both developed and developing countries, Jung (1986) concluded that when the currency ratio was used as a measure of financial development, causality patterns for both supply-leading and demand-following relationships were observed. Another noteworthy finding was that, for fast-growing economies (i.e. those exhibiting an above-average rate of economic growth), the use of the currency ratio as an independent variable in the regression measuring financial development also led to a strong acceptance of the supply-leading hypothesis.

McKinnon (1973) and Shaw (1973) also argued that financial development promotes growth but stipulated that the banking system must be free from any financial restrictions in the form of interest-rate ceilings, reserve rates, and regulations for credit programmes. This stipulation is because these factors could restrict the

efficiency of the financial system and lead to a negative effect on the efficiency of the economy.

Calomiris and Hubbard (1990) determined that, when lending firms experience imperfections within capital markets, financial firms may experience a downturn in their efficiency concerning such activities as managing credit flow and determining the cost of capital. All of these factors can have a negative influence on economic growth. Using a general equilibrium model of credit allocation, banking and financial companies can better manage credit flow and investment.

Watkins (1963) discussed the US National Banking Act of 1864, which restricted banking practices by prohibiting branching and making real estate loans and required banks to manage a high level of minimum capital. These regulations created several barriers to the development of the banking and financial sector (Jones, 2016). However, the emergence of 'free banking' laws in the 1880s and 1890s played a critical role in increasing both the money supply and banking system efficiency. They also created new business opportunities for banking firms in the form of providing low-cost loans and other types of funds to both small and large organisations.

Fogel (1994) also claimed that financial sector reforms in the US served to provide additional support to banking and other industries. The emergence of the Federal Reserve Act of 1913, for example, helped in the management of market competition and played a key role in reducing panic on the part of banks during the economic crisis of 1907 (Dehejia, 2017). These findings further support the idea that financial development has played a critical role in the economic development of the US.

Caprio and Summers (1996) noted that Solow's (1956) basic neoclassical growth framework has long served as an organising framework for understanding the facts of growth in the context of the US and other countries. In the context of different time durations, significant variation has been identified in the economic growth trends of the US.

These studies have all recorded upward trends in the economic growth of the US due to continuous financial and economic reforms. Solow (1994) argued that reforms in the financial sector encouraged banking firms to help out other industries by providing easier or quicker access to financing, which directly affected the general economic growth. The author further cited the importance of sustainable economic development in which government agencies offer extensive support to banking and other industries to encourage the economic cycle. Holmstrom and Tirole (1993) insisted on the importance of the market and especially market capitalisation and liquidity, which reflects the capital mobilisation ability of the stock market and reveals information on firms, facilitating growth.

2.3 Economic Growth Theories

Several key theories are available concerning determining and analysing different aspects of economic growth. These concepts have played a critical role in improving the understanding of economic growth determinants and have been a central consideration for policymakers. A systematic review of the most important of these theories is conducted below, including the Adam Smith growth model, Harrod-

Domar growth model, Keynesian growth model, neoclassical model, McKinnon-Shaw model, Solow growth model, and endogenous growth model.

2.3.1 Adam Smith Growth Model

Adam Smith is known as the father of modern economics, and his theory of economic growth significantly emphasises the free-market economy. In addition, he proposed the crucial aspect of development theory. His most famous work, *The Wealth of Nations*, discusses essential factors, such as the division of labour and capital accumulation. His theory stipulates that the increased division of labour in modern times largely accounts for increases in the production scale and overall workforce productivity (Meade, 2013). However, the division of labour is limited by the extent of the market, and changes that expand the market allow for a stronger division of labour, creating economic growth. Acemoglu (2012) argued that these ideas concerning the division of labour play an essential role in business expansion projects. In the context of the contemporary business environment, the division of labour comprises a profitable approach only if the company has access to an adequate market for its range of goods and services. Thus, companies attempt to expand their business with reference to international trade practices.

In the context of economic development, the Adam Smith growth model posits that the division of labour has increased the value of corporate returns, and the productivity of labour has risen with market expansion. Thus, in contrast to the neo-classical models mentioned below, Adam Smith's growth model is based on increasing returns to scale in production. In the context of agricultural production, however, the plausibility of the assumption soon reaches its limits and this puts Adam Smith's

growth theory based on the division of labour -- based on increasing returns to scale -- at odds with his theory of the invisible hand, which in the formulation of Arrow and Debreu (E'trica 1954) and Debreu (1959, Theory of Value) requires decreasing returns to scale to ensure the existence of competitive market equilibrium. Becker (2017) argued that the division of labour acts as a critical driver for accelerating investment and capital accumulation. Companies have recorded substantial increases in both production output and living standards; thus, society has experienced an increase in living standards. The author also argued that the importance of the division of labour is further enhanced in developed and industrialised nations.

Balassa (2013) observed that low productivity might be due to small amounts of capital stock, which can be attributed to low levels of individual savings. Similarly, a key reason for low individual income is that productivity remains low. Further assessment of the Adam Smith growth model suggests that the economic growth of a country is influenced by both agriculture and industry. However, the most significant contribution of the Smith approach, as noted above, is that it emphasises capital accumulation and division of labour.

Bairoch (2013) supported Smith's arguments in this regard, stating that capital accumulation and investment depend on savings generated through the growth of industry and agriculture. However, developing countries have recorded several economic growth-related issues, and appropriate transformation is required in transforming capital from savings to investment. This approach advocates promoting economic development through appropriate levels of division of labour and capital accumulation.

According to McCombie and Thirlwall (2016), the Adam Smith approach addresses several aspects of economic development that are now considered key drivers of economic growth and success. These include population growth, capital or investment growth, the division of labour concerning technological progress, and the application of appropriate modifications to the institutional framework of the economy in the form of free-market trading. By considering several variables, businesses and government agencies can achieve significant success by working collaboratively in the field of economic growth (Dopfer & Potts, 2015). Smith also stated the importance of a stable legal framework which is significantly enhanced in the contemporary context of economic development that has been addressed as an invisible hand of the market. It has played a critical role in increasing the effectiveness of corporate trading across national borders. To summarise, Adam Smith's model of economic growth is rooted primarily in the idea that the extent of the market limits the division of labour and that capital accumulation is vulnerable to investments and savings.

2.3.2 Harrod-Domar Model

In contrast to the Adam Smith model, the Harrod-Domar model views capital rather than labour as the main driver of economic growth. In other words, this model takes an abundance of suitably qualified labour for granted, and consequently, capital becomes the bottleneck for economic growth. Therefore, increases in both the quantity and quality of available capital can lead to economic growth.

The Harrod-Domar model provides approaches for examining the potential variables of economic development. The model assumes that a country's economic growth rate is primarily stimulated through the following two variables:

1. Level of savings: This is considered a key driver of economic success insofar as higher levels of savings enable a higher volume of investment within a country (Jones, 2011).

2. Capital-output ratio: A lower capital-output ratio indicates that investment is efficient, and a corresponding increment in the growth rate should be identifiable.

Given these elements, a simplified version of the Harrod-Domar model is written as follows:

$$Rate\ of\ economic\ growth\ (g)\ =\ Level\ of\ savings\ (s)/Capital\ output\ ratio.$$

Ahlstrom (2010) asserted that the level of savings is calculated by deducting the ratio of national savings in the national income from the average propensity to save. The Harrod-Domar model further suggests that the capital-output ratio is linked to several other variables, such as the amount of capital necessary to increase output and the amount of depreciation on existing capital. A high capital-output ratio indicates that investment is inefficient concerning the current economic scenario.

Van den Berg (2016) argued that developing countries with low rates of economic growth tend to manage their growth through low savings rates. This method creates a vicious circle of low investment and low output in addition to low savings. The researcher suggests that countries might stimulate economic growth by instead turning towards higher levels of savings, which could be managed either domestically

or via overseas markets. In this model, savings are viewed as a key driver in situations of self-sustaining economic growth.

2.3.3 Keynesian Growth Model

In the labour- and capital-based growth theories above, economic growth is constrained by the quantity and quality of available resources. In the aftermath of the Great Depression and its situation of underused productive resources, the model developed by Keynes (1936) asserts that a lack of demand for production output may be a key factor limiting economic growth. In such situations, increases in spending by both the government and consumers may be required for economic growth.

The economist John Maynard Keynes originally developed the model as an attempt to understand better what happened during the Great Depression. The model proposes an economic theory of total spending, determining its effects on output and inflation. According to the Keynesian growth model, European government agencies ought to increase either demand or public spending to help local authorities better manage the effects of the depression and boost economic growth (Kar et al., 2011). In this context, Hsu et al. (2014) stated that this approach provides support for expansionary fiscal policies involving government spending on a wide range of key development projects, such as unemployment benefits and education.

Keynes argued that inadequate demand during the Great Depression led directly to a period of increased unemployment. He identified four key components of the output of economic goods and services (i.e. investment, consumption, government purchases, and net exports) and asserted that economic growth would result if an increase in demand could be achieved for any of them. However, a recession

negatively affects demand as spending by the government and population decreases (Sterling, 2014). For example, economic downturns create a wide range of economic uncertainties that corrode consumer confidence in job security, which leads to tighter individual spending habits, especially concerning luxury items. This reduction in individual spending leads to reduced investments by businesses, given the reduced demand for their products. Thus, appropriate government decisions can significantly enhance the management of public spending to reduce the effects of a recession (Chandra, 2011). Moreover, according to Keynesian economics, state intervention is deemed an essential practice in moderating potential booms and busts over a wide range of economic activity throughout the business cycle.

In contrast, Naudé (2010) argued that the application of Keynes' approach is an important cause of inflation. To manage the situation during the depression, for example, government agencies attempted to reinvigorate the demand cycle by encouraging investment in infrastructure projects. However, the increased demand for various goods and services resulted in a corresponding pricing increase, and the cycle drove inflation (Chang, 2011). To take another example, local UK government agencies created more than a million new construction sites, providing an additional 8.5 million jobs. Such activities have had a substantial influence on government spending, which is considered an essential catalyst for economic growth and mitigation of the consequences of economic crises.

Keynes advocated deficit spending during the contractionary phase of the business cycle and in dealing with economic depression. However, politicians have adopted this approach even in the expansionary phase to attempt to pre-empt future

economic downturn (Nyasha & Odhiambo, 2014) and Another issue of deficit spending is that it may cause 'political business cycles (Nordhaus,1975).

2.3.4 Neoclassical Model and Solow growth model

As the 20th century progressed and the world economy stabilised, intensive research began to occur in the context of growth economics, giving rise to what has become known as the neoclassical model of economic growth in the 1950s and 1960s (Odhiambo, 2011b). The focus of this model is on capital accumulation as a primary element of economic development. The model highlights capital and labour as the two key drivers of production output but also takes into account other factors, such as technological progress. One key assumption of neoclassical growth is that the capital market operates costlessly and perfectly (Meade, 2013). The other is that the primary function of money is transactional rather than contributing to capital accumulation. The following formula for the economic growth rate under this model (Becker, 2017):

$Y = AF\,(K, L)$

where Y is the GDP, K denotes the value of stock capital, L is the amount of unskilled labour, and A represents the exogenous variable of technology. Under this formula, any change in variables alters the values of the GDP and overall production function.

According to Balassa (2013), this theory applies in situations where society can accumulate capital without increasing the value of the labour force. Additionally, the author asserted that capital theory is substantially distinct from population theory. In other words, according to this theory, increased accumulation of capital during periods of constant population levels results in increases in national and per capita

incomes. However, at the same time, the marginal productivity of capital declines because more capital was accumulated at the state of technology. One of the the cornerstones of the competitive general equilibrium paradigm of neoclassical economics mentioned by Alam (2013) is constant returns to scale (CRS), which puts it into contrast with Adam Smith's growth theory as discussed above in Section 2.1.

The Solow growth model, developed by the Nobel Prize-winning economist Robert Solow in 1956, is one of the neoclassical growth model and was based on the Keynesian and Harrod-Domar models. This model also considered the basis for the modern theory of economic growth.

Nyasha and Odhiambo (2014) stated that Solow growth model works on various assumptions that have played a critical role in increasing the understanding of several aspects of economic growth. In their formula, the first such assumption is that the population of a country grows at a constant rate (g). The current population is denoted by N, and N' denotes the future population. Using the equation $N' = N(1+g)$, economists have made appropriate predictions of population growth based on this theory. For example, if the current population of a county is 100, and the expected growth rate of the population is 2%, then the population after one period is 102.

Chang (2011) noted a second assumption aimed at determining the relationship between income and spending within a population. The author argued that all consumers within an economy move a certain proportion (s) of their income into savings while consuming the remaining income. In this process, C denotes the consumption value, and Y represents the output figures. These variables are linked in the consumption equation $C = (1-s)\,Y$.

In the context of economic growth, Chandra (2011) stated that consumption patterns play a critical role in encouraging demand for a wide range of goods and services. Therefore, information related to consumption patterns and spending encourages government agencies and other institutions to develop highly efficient financial development plans, which positively stimulate economic growth.

Jones (2011) asserted that this model also considers an assumption related to technological advancement. In the contemporary business environment, it can be assumed that all firms rely on similar types of production technology to create a wide range of goods and services in which capital and labour are considered important inputs. The Solow growth model assumes that the production function can be demonstrated under the constant-returns-to-scale concept. For example, if a production manager within an organisation has doubled both the level of capital stock and labour resources, then the level of output is also expected to double (Sterling, 2014).

Hsu et al. (2014) stated that the Solow model is often considered a mathematical analysis based on the attention it pays to assess both output and capital per worker rather than aggregating the value of output and capital stock. In the capital accumulation equation, K represents the present value of the stock capital, K' indicates the value of the capital stock after one period' i, d denotes the capital depreciation rate, and I is the level of investment during the first period:

$$K' = K(1-d) + I \qquad\qquad\qquad 1$$

In contrast, Van den Berg (2016) identified certain negative aspects of the Solow growth model, which have been shown to hamper the reliability of the model

outcomes. The author stated that this model fails to predict absolute convergence, a situation that emerges when significant variations in interest rates are identified, when growth is slower, or when the initial value of the capital stock is low.

Bairoch (2013) argued that this approach focuses on determining the implications of a population increase. The neoclassical approach examined the effects of a population increase regarding a particular state of technology in the production process. This assessment implies that an increase in the population level also increases the labour supply, which causes a decline in wage rates. This has been considered a key driver in increasing employment opportunities. If an organisation faces no change in the demand schedule, companies experience a decline in the wage rate. Moreover, it has led to general economic development and business growth in various contexts (Dopfer & Potts, 2015).

Furthermore, Ahlstrom (2010) stated that the neoclassical growth theory considers the development of business and other economic activities to be a gradual and continuous process. Several countries have applied this approach to pay extra attention to the harmonious and cumulative nature of the development process. The development and application of a wide range of technologies in this respect have provided extensive support for the development process, which could be considered a crucial driver of economic development.

Van den Berg (2016) identified optimism about development as another critical feature of neoclassical theory, especially with respect to future possibilities for continuing development. For example, optimism places significant faith in an

individual's ability to overcome the limitations imposed by society through such means as technological advancement and improvements in the efficiency of labour. In this regard, Spanjer (2009) discussed that any decrease in ambiguity aversion (i.e. a decrease in the level of pessimism) reflects a more optimistic outlook.

2.3.5 McKinnon-Shaw Model

McKinnon and Shaw developed two financial liberalisation models that highlighted various implications concerning increases in interest rates. McKinnon's model emphasised the potential link between deposit rates and investment rates, whereas Shaw's model focused on the functional relationships between a country's borrowing and lending activities (Kar et al., 2011). In the context of contemporary economies, the effectiveness of financial development depends heavily on access to and the reliability of a wide range of financial services capable of transforming savings into investments.

Hsu et al. (2014) found that the main distinction between the McKinnon and Shaw models was related to which organisations raise finances. The McKinnon model emphasised external sources, whereas the Shaw model theorised that all finances could be raised through internal business operations. In this sense, the two models complemented one another because most companies and government agencies tend to consider internal and external sources of funding jointly when deciding how best to finance their activities (Sterling, 2014). These models provide strong support for increasing the effectiveness of economic development projects to promote economic growth.

Naudé (2010) asserted that the implications of the McKinnon-Shaw model are incredibly rigorous concerning financial development plans because they provide a concentration of unrestricted real interest rates, which are adjusted based on market mechanisms. According to Odhiambo (2011b), interest rates are a key indicator of financial development, and high interest rates are indicative of a lack of confidence by the banking industry in a country's economic policies because high interest rates generally increase the risk entailed in investments.

From the perspective of the McKinnon model, the Keynesian and neoclassical approaches are subject to restrictive assumptions that ultimately cause them to fail. Moreover, they mislead investment decisions because capital markets tend to function competitively based on a single rate of interest. According to McCombie and Thirlwall (2016), these two earlier models both fail to explain the functioning of capital markets in less developed countries where securities are traded at multiple interest rates. Further assessment of the McKinnon model reveals that money and capital markets complement one another in the development of an efficient financial system. However, developing nations face obstacles to implementing single interest rates, which reduces the efficiency of the financial systems in these countries. A study by Jones (2011) paid significant attention to external finance and its relationship with the McKinnon model, concluding that countries that restrict the use of external finances in business operations and public-sector spending tend to face currency-related problems that hamper their overall economic development.

Chandra (2011) asserted that the process of financial development in the McKinnon model can be considered an important approach for promoting interest rate

stabilisation. If the gap between interest rates on loans and the return on savings decreases, this could promote both types of transactions within a society. In the contemporary economic environment, the efficiency of economic growth is significantly correlated with the savings and investment cycle (i.e. where savings are mobilised into investments with equal interest rates). According to Chang (2011), interest rates play a critical role in building an efficient financial system through which government agencies can stimulate economic growth and industrialisation within a country. The author further stated that financial sector development creates a basis for influencing other activities, such as spending and investment, which have helped government agencies enhance GDP growth and other economic indicators.

2.3.6 Endogenous Growth Model

The endogenous growth model emerged in the 1980s and has redefined the concept of economic growth and other variables. McCombie and Thirlwall (2016) stated that this model is based on the assumption that the long-term economic growth of a country is determined primarily by endogenous variables (i.e. internal elements of the organisational system, such as human capital, innovation, and investment capital). Such variables as technological progress and scientific advancement, however, are considered dependent economic forces. It has also been argued that population growth with innovations had had a great impact on the overall economic growth as compared to physical capital (Kar et al., 2011). There are several models of endogenous growth theory like AK model by Rebelo (1990), Barro Model (1990), Arrow-Sheshinskj-Romer model, and The Lucas (1988) model. Sala-i-Martin (1990) discussed in details

most of the endogenous growth models present a simple new model of R&D and growth.

Odhiambo (2011) asserted that the endogenous growth theory offers a useful conceptual framework for explaining differences in the wealth of developed and underdeveloped nations. Naudé (2010) stipulated that investment in physical capital, such as items related to infrastructure, can be considered an important subject regarding diminishing returns. Such differences disappear over a period in which productivity growth is determined exogenously due to the emergence of a wide range of uncontrollable factors.

According to Bairoch (2013), endogenous growth models assume that such factors as population growth, the accumulation of human capital, and knowledge are critical drivers of economic development. The author further argued that a wide range of intellectual property rights provides support for a knowledge-based economy, which does not diminish the value of capital returns. Ahlstrom (2010) argued that in endogenous growth models, an economy's productivity growth is significantly influenced by public spending on research and development (R&D) and education. This influence is because, if a country has gained the expertise necessary to achieve faster technological progress, it should also be able to offer greater returns concerning overall economic development by cultivating an appropriate environment for economic growth drivers.

Given that some countries have achieved faster economic growth than others, Van den Berg (2016) aimed to examine this variation. The concept of endogenous

technological change has emerged in this respect as a crucial tool for determining the relevance of technological adoption with reference to population growth in places like Africa. This approach has also proved useful for understanding the economic implications of ageing populations in Europe, Japan, and China, allowing economies to examine the effect of technological modifications concerning population growth (Nyasha & Odhiambo, 2014). With respect to the current study's focus on the relationship between financial development and economic growth, this model has provided valuable insight related to the factors of population growth and technological advancement.

Naudé (2010) presented additional insight regarding the economic growth of a country as per the endogenous growth model. The author stated that government policies could stimulate a country's economic growth rate if the economy is focused on transforming its operations concerning intense competition in the markets. These practices have led to a positive effect on the overall economic development because they encourage efficiency in processes and innovations.

Odhiambo (2011) observed upward trends concerning the scale of returns on capital investments related to infrastructure development, education, health, and telecommunications. Moreover, private-sector investment in R&D is viewed as a key driver of technological progress in the contemporary business environment.

Hsu et al. (2014) concluded that the protection of intellectual property and patents through legal norms and policies provides a strong incentive to contemporary businesses and entrepreneurs for increasing engagement in R&D practices that could have a positive effect on the efficiency of production operations and other practices.

This effect is because R&D activities are considered critical drivers of overall economic growth.

In addition, investment in human capital is a vital component of economic growth and advancement under this model. It assists companies in increasing investment in a wide range of research work. Furthermore, Chandra (2011) suggested that government policy should encourage entrepreneurship as an essential tool for creating new businesses, jobs, investments, and innovations.

2.4 Behavioural Economic Theories

The concept of behavioural economics has recently become a mainstream idea in economic thinking, as have the normative economic theories presented above in the economic growth theories section. Behavioural economics should not be considered a replacement for standard economic theories. However, behavioural economics increases the explanatory power of economics by providing a more realistic psychological foundation (Wilkinson & Klaes, 2017). Three major factors can help explain why behavioural economics has become increasingly mainstream: (1) the gap between theories and reality, (2) the major assumptions underlying the standard economic model of 'rational behaviour and idealized economy', and (3) the economic crises that have forced researchers and policymakers to pay more attention to the psychological factors influencing the decisions of economic agents (Galeshchuk, 2014).

The interest in behavioural economics can be traced to the pioneering economic theories based on assumptions of rational behaviour and idealised economy discussed above. Adam Smith, for example, who is known for his rhetorical

justification of the free market, mentioned the influence of socio-psychological motivations: 'How selfish soever man may be supposed, there are evidently some principles in his nature which interest him in the fortune of others and render their happiness necessary to him' (Smith, 1759, p. 9).

John Maynard Keynes, who is popularly associated with challenging the neoclassical ideas of economics regarding free markets and changing the theory and practice of macroeconomics, made a similar remark between 1936 and 1946. In 1936, he argued that economic and financial decision-making is driven by a series of fundamental psychological laws (i.e., the propensity to consume, attitudes towards liquidity, and expectations of returns from investment; Baddeley, 2013). For Keynes, economic behaviour is the outcome of a complex mixture of rational and psychological or emotional factors. He applied his psychological analysis most clearly when analysing the interactions between players in financial markets and the macroeconomy (Baddeley, 2013).

Keynes believed that social and psychological justification exists for significant inequalities of income and wealth. However, this does not extend to such large disparities as exist today. There are valuable human activities that require the motive of money-making and the environment of private wealth ownership for their full fruition (Keynes, 1936, p. 185).

Morgan (2015) has stated that behavioural economics determines the implications of psychological, emotional, and cultural factors on the economic decisions of both individuals and key regulatory institutions. This type of investigation aims to evaluate different agents in psychology, neuroscience, and microeconomic

theory that could have a significant effect on a wide range of market-related decisions. Behavioural economics assists key decision-makers and economic agents in considering psychological factors that could act as key drivers of an economic crisis and influence policy formation in financial institutions (Davis et al., 2015).

This section discusses some of the essential behavioural economic theories, which are selected based on their ability to disrupt the financial sector and financial institutions. These include prospect theory, loss-aversion theory, disposition- and endowment-effect theories, and game theory.

The prospect theory is a famous behavioural model. It attempts to illustrate how people decide between alternatives that involve risk and uncertainty. It was developed by Daniel Kahneman and Amos Tversky in 1979 (Wakker, 2010). Galeshchuk (2014) performed a systematic investigation of different theories of behavioural economics, noting that the prospect theory stipulates that behaviour is often focused on two separate factors (utility and value) and is thus not always rational. Utility refers to perceptions regarding net profit, whereas the concept of value addresses two independent parameters: income and expenditure. In the context of behavioural economics, this theory places significant emphasis on individual psychological factors and their influence on economic predictions. Financial institutions attempt to consider the perception of people in the economic decision based on income and wealth (Frederiks et al., 2015). According to Chuah and Devlin (2010), prospect theory states that an individual's value function (whether for money or otherwise) is concave for gains but convex for losses. In other words, people are more sensitive to losses than gains of similar magnitude. Prospect theory plays a

unique role in drawing psychophysical considerations into theories of decision-making, especially those related to risk-taking.

Loss aversion theory asserts that people tend to prefer avoiding losses over acquiring equivalent gains. In other words, this theory emphasises the possibility that losses are disliked more than gains of equal size are liked (Camerer, 2005).

Endowment effect theory was developed by Kahneman et al. in 1991 through an experiment involving 77 students who were divided into three groups (sellers, buyers, and price choosers). The price choosers behaved more like buyers than sellers. Kahneman et al. (1991) have claimed that the endowment effect is an implication of loss aversion, and Thaler (1980) has described the endowment effect using the observation that people often demand much more to give up an object than they would be willing to pay to acquire it.

The disposition effect, according to Ritter (2003), refers to the behavioural pattern in which people avoid realising paper losses and seek to realise paper gains. Weber and Camerer (1998) have described the disposition effect as 'the tendency to sell assets that have gained value (winners) and keep assets that have lost value (losers)' (p.167). Best, J. (2008) has stated that the term ambiguity appears very rarely and has defined it as 'the capability of being understood in two or more ways' (OED 1989). He has stated that it is very common that most decision-makers or financial market participants define indeterminacy almost exclusively in terms of risk and uncertainty and ignore the persistence of ambiguity. The reason is to avoid challenges posed by unknowns (ambiguity) by preferring other concepts when describing the limits of modern knowledge (uncertainty risk).

Risk and uncertainty are interconnected concepts, each term drawing heavily on the other. According to Park (2017), risk refers to decision-making situations in which all potential outcomes and their likelihood of occurrence are known to the decision-maker, while uncertainty refers to situations in which either the outcomes and/or their probabilities of occurrence are unknown to the decision-maker. It remains fundamentally important today to differentiate risk from uncertainty, a distinction first made by Frank Knight and John Maynard Keynes in the 1920s. Knight (1921) has argued that risk is a future event with a probability, while uncertainty cannot be quantified objectively. Due to its mathematical intractability, neoclassical economics has traditionally neglected this distinction (a point raised by Keynes). However, several papers have illustrated these differences and stressed the importance of such topics in understanding the preferences and strategies of political and economic actors. In general, there is significant scepticism regarding the way Frank Knight has differentiated between measurable uncertainty and risk. However, several papers have discussed uncertainties that are not risks and what makes some uncertainties different from risks. Such authors include Ellsberg (1961) in his paper Risk, Ambiguity, and the Savage Axioms. Elliott (1961) has explained Ramsey-Savage by interpreting the decision between two alternatives (I and II) as revealing the likelihood a person assigns to both I and II is α and β. If he does not definitely prefer II to I, it is to be inferred that he regards α as 'not less probable than' β, which we write as $\alpha \geq \beta$.

Following that, Schmeidler (1989) has illustrated that uncertainty aversion means that 'smoothing' or averaging utility distributions is beneficial to the decision

maker. In other words, substituting objective mixing for subjective mixing improves the decision maker's decision.

In their analysis of the political economy, Nelson and Katzenstein (2014) have re-examined the role of risk and uncertainty in light of the financial crisis of 2008. They have found scant evidence of a single good reason for the 2008 crisis and have stressed the importance of social backs and beliefs of market players since accepting that players make decisions in the presence of uncertainty as well as without uncertainty. They have underlined the significance of uncertainty and reintroduced social styles of analysis into the international political field. Based on Pacces' (2010) conclusion, rational choice under uncertainty caused the financial crisis along with three regulatory areas: the role of rating agencies, capital adequacy requirements, and corporate governance of banks. He concluded that regulations might exacerbate the very externalities they are intended to prevent and knowing this can avoid incoming crises. The question 'Why does uncertainty matter?' has been investigated by Traeger (2014), who has illustrated several related theories like the smooth ambiguity model, which distinguishes between uncertainty characterised by a unique probability distribution (risk) and more general uncertainty (also known as ambiguity, hard uncertainty, deep uncertainty, or Knightian uncertainty).

Other models discussed by Traeger (2014) are the well-known Epstein-Zin-Weil model and the reformulated version of the Epstein-Zin-Weil model. Both disentangle uncertainty attitude from the propensity to smooth consumption over time. Traeger (2014) has combined the three models and obtained a threefold disentanglement between risk aversion, intertemporal consumption smoothing, and

ambiguity aversion. He has presented derived formulas to escort a cost-benefit analysis of incorporating uncertainty into integrated assessment models.

Finally, game theory uses mathematics to analyse the strategies of individuals as they deal with competitive situations in which a participant's choice of action is critically dependent on other participants' actions. Although it originally occupied a somewhat isolated niche when it was first developed in the 1960s and 1970s, game theory is now a standard tool in economics (Samuelson, 2016a). The primary aim of this theory is to empirically determine how people make choices under conditions of uncertainty and strategic interaction (Gintis, 2005), starting with behaviour. Economists use this theory mostly for extending possible insight into decision-makers' behaviour in a small number of interactive settings. One notable use of this theory is the examination of the strategies of duopolists and oligopolists (Buchanan, 2001). Most macroeconomic applications of dynamic game theory have centred on economic growth and income distribution, macroeconomic stabilisation, the interaction between the government and the private sector, and international policy coordination (Pohjola, 1986).

2.5 Financial Structure Theories

Another important category of theories attempts to illustrate the effect of financial structure on economic growth. The bank-based finance-growth model is one of these and has been adopted by several countries, including Japan, France, and Germany. Sterling (2014) has stated that the relationship between financial sector development and economic growth correlates highly with the efficiency of a country's financial structure. A bank-based system is also known as an 'intermediary-based

economic system'. In this context, intermediation plays a crucial role in controlling all transactions related to deposits and investment and can be considered a critical element in the broader financial market. In addition, the structure of the banking system can directly influence a country's economic growth rate and investment trends. A bank-based system theory has been adopted by government agencies when monitoring costs are modest (Nyasha & Odhiambo, 2014). This type of structure has played a critical role in encouraging the flow of funds when various types of agency problems are mitigated through the implementation of an appropriate monitoring system.

According to Odhiambo (2011b), countries like Japan, France, and Germany follow a bank-based model in which banks provide around 20% of corporate financing. This model implies that banks in these countries have made substantial efforts to create a relationship-based banking culture in which long-term loans are provided to clients, with preferential interest rates for those who have a 'good history'. These practices have been addressed as a vital part of bank-based economies. Edwards and Fischer (1996) have studied the generally held view of the merits of the 'bank-based' system (most specifically, the German bank-based system). They have found that one of the reasons leading to the preference for the bank-based system is that it reduces loan costs. They have stated that the close involvement of banks decreases the agency cost of supplying debt financing and allows firms to finance a higher level of investment. They noted that public companies in Japan and West Germany depended on debt more than equity twice or three times as high as that of American companies following a market-based system.

The market-based finance-growth model has been adopted by several economies, including the UK and the US. Lee (2012) has noted that this model provides excellent support in developed countries where borrowing and lending activities occur through organised entities such as the London Stock Exchange and the New York Stock Exchange. These lending activities are primarily associated with market-based economies in which financial intermediaries, such as banks, do not actively participate in lending and investment decisions. Although banks also manage their practices in these countries, banking organisations work in a highly competitive corporate environment (Gambacorta et al., 2014). In this context, the relationship between lenders and borrowers is generally limited to financial transactions like granting loans or taking deposits. In this type of financial structure, loans are primarily offered on a short-term basis.

Odhiambo (2011b) has asserted that both bank-based and market-based finance models have made significant contributions to economic growth. After a certain period, neither bank loans nor bonds from the market influence the real GDP growth. In developed countries nowadays, GDP growth per capita declines, and markets have made more significant contributions to economic performance than banks. According to Lee (2012), the competition between the bank-based and market-based financial systems indicates that one model is gaining dominance over the other due to globalisation. Eichberger and Spanjers (2009) have examined the impact of incalculable risk (ambiguity) – explained as the degree of confidence in their additive beliefs – on two alternative institutional arrangements for financial intermediation in an economy. The first arrangement was the secondary asset market. The second was

competitive banking sector. They found that consumers with low degrees of confidence prefer the asset market, while consumers with high degrees of confidence may favour the bank deposit contract. Furthermore, Spanjers (2018) has provided a coherent framework for analysing how ambiguity—or more precisely, incalculable risk—impacts investor behaviour and suggested that ambiguity should be reduced by increasing stability, transparency, and predictability.

There is a clear separation between these two types of financial systems. As a result of the contemporary changes in the economic climate, banks have become increasingly active players in financial and investment markets and have undertaken significant changes in their business operations (Gambacorta et al., 2014). Banks are now operating more efficiently, moving from the original 'brick and mortar' concept to exclusively electronic-based systems. All these factors play a critical role in promoting general economic development.

Another theory that addresses financial structure and mechanisms affecting the economy is finance law theory. Unlike the preceding theories, it focuses on legal institutions rather than the dominant financial institutions within a country. Finance law theory claims that investigating legal institutions is a more instrumental way to distinguish between financial systems than focussing on whether countries are bank based or market based (La Porta et al., 2000). The theory of law and finance proposes that finance is essentially a collection of contracts conducted and compiled by legal rights and enforcement mechanisms. From this viewpoint, the development of both markets and intermediaries is enabled by a well-functioning legal system (Levine, 2005). This theory has attracted the interest of many writers and researchers.

Accordingly, several empirical articles have been published to support its claims. Schnyder (2016) has referred to the literature accumulated on this subject over the last 20 years as the 'law and finance school'. However, Schnyder has also undertaken a comprehensive review of this literature and criticised the theory on which it is based as a surprisingly 'thin' theory of law that has very little to say about the mechanism that links law to firm-level practices (Schnyder, 2016).

The final two theories relate to institutions and the importance of their role within the economy. First, the institutional theory formulated by Richard Scott (2008) asserts that '[i]nstitutions are social structures that have attained a high degree of resilience. [They] are composed of cultural-cognitive, normative, and regulative elements that, together with associated activities and resources, provide stability and meaning to social life' (p. 48).

A second key institutional theory was developed by Douglass North, who is known as the progenitor of the new institutional economics perspective. North has significantly influenced contemporary economic development thinking, which was primarily drawn from the principles of neoclassical economics (Faundez, 2016). North has stressed the importance of institutions within the economy. He has asserted that the relevant entities can be divided into 'formal' institutions such as constitutions, contracts, and forms of government (e.g., North 1990, 1991; Lownpes, 1996; Farrell and Héritier, 2003) and 'informal' institutions, such as traditions, customs, moral values, religious beliefs, and other such 'norms of behaviour that have passed the test of time' (Pejovich 1999b, p. 166).

2.6 Financial Development and Growth Channels

The financial sector's primary roles in economic growth are (1) savings mobilisation and (2) promoting investments by providing an easy means of transferring money from lenders to borrowers and producing information about possible investments. Schumpeter (1911) has discussed the financial sector's role as a service provider and its effects on economic growth. He has listed the following as critical services in this regard: savings mobilisation, risk management, project assessment, manager tracking, and facilitating transactions through technological improvement.

Levine (2005) has also discussed the financial system's effects on economic growth, summarising them under the headings of five primary functions:

- producing information about possible investments and allocating capital;

- monitoring investments and exerting corporate governance after providing finance;

- facilitating the trading, diversification, and management of risk;

- mobilising and pooling savings; and

- facilitating the exchange of goods and services.

Along with the technology and innovation function highlighted by Schumpeter (1911), these five functions have been referred to extensively in the literature as channels between financial development and economic growth.

Figure 1 Growth channels through which financial institutions and capital markets enable financial development to lead to growth.

Financial Development

↑ Efficient Alocation of Resources
↑ Savings Mobilsation
↑ Overall Productivity
↑ Jobs and Investment Activities
↑ Monetary and Fiscal Policy Changes

↑ Financial Stabilty
↑ Capital Market Efficiency
↑ Greater Competition

Economic Growth
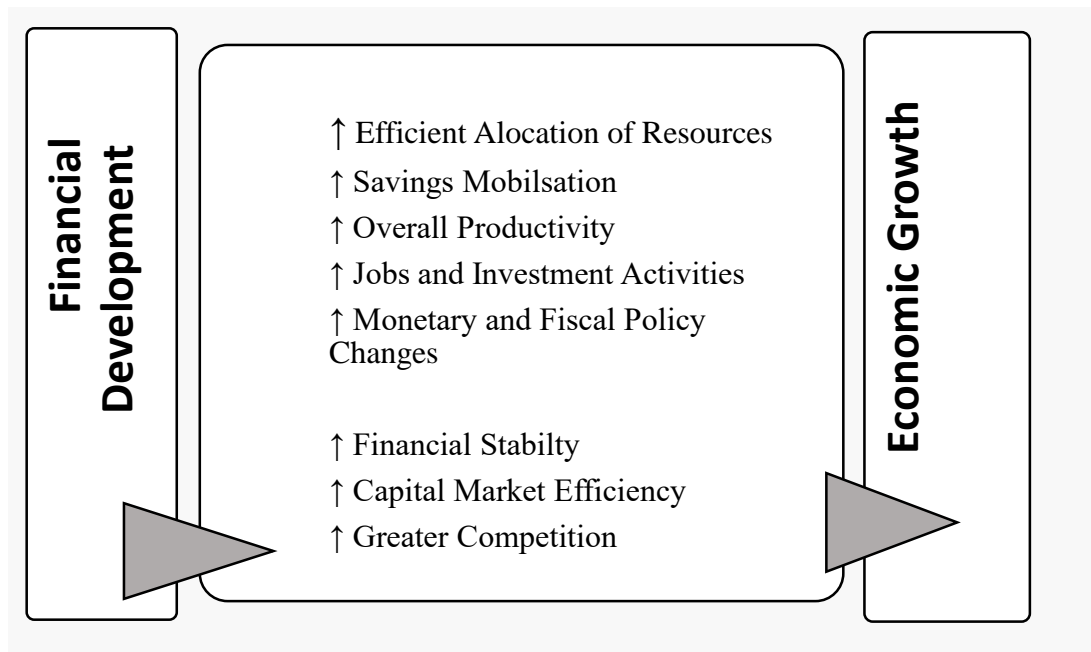
Concerning financial development's role of facilitating the efficient allocation of resources, Barr et al. (2010) argued that financial institutions indirectly influence every significant economic transaction. According to Mondria et al. (2010), one of the essential functions of the macroeconomy is transferring economic resources over time and across national borders.

Financial institutions also serve to mobilise savings. They enable individuals to deposit their excess funds while using these savings to facilitate investment by providing loans. Thus, the credit facilities offered by banks serve as an incentive and offer an opportunity for businesses to invest in expanding their production capacity, which results in an increase in overall productivity within the economy (Boyd & Smith, 1992). Because finance is a crucial business aspect of any industry within a country, financial institutions strive for the efficient allocation of resources, especially

credit to potential businesses across industries to facilitate innovation (Masten et al., 2008).

Cameron (1967) investigated the effect of banks on industrialisation in seven developed economies and found that financial institutions, particularly banks, play a positive role in promoting industry. Hall and Lerner (2010) reinforced this conclusion, stating that the increased number of financial institutions over time has led to a reduction in borrowing costs due to the greater availability of funding at competitive rates. This increase has also led to increased access to resources on the part of small firms who were previously constrained in their access to funding compared to larger organisations.

Jappelli and Padula (2013) also discussed the savings promoting effects of financial institutions in detail, asserting that financial institutions lead to an asset-holding switch to longer maturities and higher savings. Davis and Stiel (2001) provided a detailed assessment of the effect of financial institutions on savings and concluded that the increased participation of financial institutions in capital markets has led to an increase in total savings.

These excess savings are subsequently driven towards funding the most productive assets, and this facilitates the efficient use of scarcer resources while reducing the cost of information, transactions, and monitoring. However, Johnson et al. (2010) provided a comparative analysis that argues that, despite the increasing prevalence of financial institutions, the savings rate has not necessarily increased across all countries. This outcome is because levels of savings are influenced by factors such as the prevailing interest rates in a given economy. In this regard, Barsky

et al. (2014) argued that the expansionary monetary policy pursued by the US Federal Reserve has contributed to record low interest rates and, consequently, a low level of savings in the US. In other words, this low savings level is attributed to factors other than the prominence and heightened influence of institutional investors.

Concerning financial development and fiscal and monetary policies, financial institutions and capital markets influence regulatory and monetary authorities, and vice versa, with any changes in this regulation leading to shifts in the behaviour of financial institutions. Davis and Stiel (2001) claimed that the behaviour of financial institutions may place pressure on governments to engage in financial deregulation to preserve the upward trend of financial institutions while introducing more regulation to protect investors from unfair competition. Kumar and Baldacci (2010) argued that financial institutions play a significant role in making the process of financing a deficit easier because the increased availability of funding facilitates the borrowing process for governments and the private sector. This facilitation is due to a decrease in borrowing costs, which ultimately makes it easier to finance a deficit and contributes to more lavish government spending, which can stimulate economic growth and lead to job creation (Stockhammer, 2008). Ultimately, this process increases overall economic activity which, when combined with increased investments by the private sector, leads to a positive effect on labour and capital productivity, advancements in innovation, and improved corporate governance. A more robust financial system where banks engage in higher levels of lending and serve as financial intermediaries allows for improved access to funding, especially in such industries as manufacturing

and the industrial sector where firms are more reliant on external finances for rapid growth and development (Rajan & Zingales, 1998).

Financial development and financial institutions also influence capital markets. Boehmer and Kelley (2009) conducted a detailed study on the role of financial institutions (i.e. banks and institutional investors) and their effects on the informational efficiency of capital market prices. They collected data on a broad panel of securities listed on the New York Stock Exchange between 1983 and 2004 and measured the informational efficiency of prices by assessing the extent to which securities deviated from a random walk. The researchers concluded that those securities with higher institutional ownership have greater price efficiency and that market efficiency is directly and positively correlated to the level of financial institutional holding, despite controlling for analyst coverage, short selling, changes in liquidity, and other organisational characteristics. The findings of this study highlight the positive effects of financial institutions on capital markets in terms of heightened informational and market efficiency.

Biddle et al. (2009) also concluded that a positive relationship exists between financial institutions and the promotion of capital markets. These researchers argued that financial institutions tend to retain securities for long-term rather than short-term transactions, which reduces the volatility and noise within capital markets. This approach has a positive effect on enhancing market efficiency because asset prices are more likely to reflect the available information instead of diverging away from their fair values, which tends to be the case when greater short-term and speculative investment activity exists in the capital markets.

The importance of financial institutions in the global economy has steadily increased since the early 1990s. This increase is evident from the increases observed in the assets under management measure. Kennedy (2016) reported that the total assets under management of the 400 largest institutional investors amounted to EUR 56.3 trillion in 2016, which increased from EUR 50.3 trillion in 2015, EUR 42.7 trillion in 2014, and EUR 39.2 trillion in 2013. The company Blackrock alone accounts for EUR 4.4 trillion, which is 7.85% of all the available assets under management (Kennedy, 2016).

Increasing the rate of capital accumulation (both physical and human) to improve the efficiency of productive assets represents a *sine qua non* for achieving long-term sustainable economic growth and increasing well-being. Financial intermediation plays a vital role in this process. According to Guler and Guillen (2010), financial intermediation is the vector for mobilising savings to cover a company's investment needs. Thus, institutional investors have a crucial responsibility in improving the performance, efficiency, and development of capital markets.

2.7 Summary

This chapter began by outlining the findings of the pioneers in the field of the finance-growth nexus, beginning from the early 19th century. This outline was followed by a comprehensive theoretical overview, discussing and presenting seminal economic theories related to this thesis. These theories were divided into three categories: (a) economic growth theories, aiming to discover the main determinants of economic growth; (b) economic behaviour theories, aiming to investigate

psychological, cognitive, emotional, cultural, and social factors related to the economy; and (c) financial theories, aiming to investigate the structure of the financial sector and its economic effects.

In the first category, the theories include the following. The Adam Smith growth model claims that economic growth consists of a rise in the productivity of labour through the division of labour, along with an increase in productive labour through capital accumulation. The Harrod-Domar model is a Keynesian model of economic growth linking growth to the savings level and productivity of capital. The more general Keynesian model highlights government expenditure and consumer demand as determinants of growth. The neoclassical growth model adds technological change, capital, and production as influencers within the economy, and the McKinnon-Shaw model focuses on the link between deposit rates and investment rates and between borrowing and lending activities. The Solow growth model focuses on the link between an economy's output over time and changes in capital accumulation, and the endogenous growth model highlights investment in human capital, innovation and knowledge as essential contributors to economic growth.

In summary, these economic growth theories all examine the causes of economic growth, and the list of potential determinants noted in these models includes public capital, savings, investment, productive capital, labour, labour division, savings, investment, government spending, and technological progress. This section does not discuss all theories of economic growth, but only a selection of the most relevant theories chosen based on their importance and relationship to this thesis.

All economic growth determinants discussed in this section are vulnerable to financial development influences. The first of these, division of labour, is strictly limited to the size of capital, which can be expanded by efficient financial institutions through providing loans and facilitating expansions. The second determinant, savings, is primarily accrued by financial institutions, which not only play a role in mobilising savings but even more importantly facilitate the transfer of money between lenders and borrowers. The third and fourth determinants are government expenditure and investment, and efficient financial development proved that it can promote investment and can facilitate bond issues by governments.

Concerning the economic behaviour theories discussed in this chapter, the following behavioural determinants were highlighted: loss prospects, gain prospects, utility value, risk-taking ability, and beliefs. Considering these elements can help predict which issues may pfcapiromote or erode financial development, especially for increasing savings and investments. Finally, the theories regarding financial structure and how it affects the economy were discussed in terms of bank-based and market-based growth models and finance law theory, which distinguishes between the roles of formal and informal institutions within an economy.

This chapter concludes by discussing the channels that allow financial development to promote growth. The most important of these channels include mobilising savings, efficient allocation of resources, and promoting investments.

Chapter Three: Financial Development: The Complexity of Measuring a Multidimensional Concept

3.1 Overview

The purpose of this chapter is to define the concept of financial development and review the different proxies used for it in the literature. The analysis of different measures of financial development is essential given the concept's general breadth and the fact that no single ideal variable of representation exists. Instead, the best proxy to use in each study depends on data availability and the study purpose. It should also be noted that any single measure of financial development can only partially capture the multidimensional nature of finance, which includes the ability of the financial system to improve risk management, successfully pool savings, exert corporate control, allocate capital to relevant and productive investment opportunities, and successfully facilitate the exchange of goods and services. In other words, the best way to deal with the breadth of this concept is to incorporate a variety of financial development measures into the analysis.

This chapter begins by providing several definitions of financial development, a concept defined differently by various authors, albeit with one similarity (i.e. that it is a broad measure). These definitions are followed by the analysis of several studies that have used a variety of different measures of financial development. The number of individual proxies used in a single study has been as high as 38 in a study on the World Bank by Cihak et al. (2012) and was 20 in a study by Svirydzenka (2016). In contrast, some studies have used only a single measure of financial development,

which reflects the size of the financial institutions (e.g. Jung, 2017; Bloch & Tang, 2003). This use of different measures of financial development by different researchers underscores the breadth of the concept. The selection of a suitable measure is based on such factors as the study objectives, data availability, and relevancy of the variable in the financial system context. The last forty years have seen rapid deregulation, innovation, and globalization and It was largely due to financial development and financial institutions. Financial institutions influenced by regulations, policies, and innovation and vice versa. for example , institutions may exert pressure on governments to engage in financial deregulation so that investment trends in institutional funds continue to rise while at the same time, more regulation is placed on investors to protect them against unfair competition. In regard to the public financial policies whether it is monetary or fiscal, Kumar and Baldacci (2010) argue that institutional investors play a major role in making the process of financing a deficit easier. This is because increased availability of funding contributes to the ease with which governments and private sector can borrow due to a decrease in borrowing costs, which ultimately makes it easier to finance the deficit. This ability of governments to finance their deficit facilitated by the institutional investors subsequently contributes to greater government spending to stimulate the economic growth and lead to employment creation (Stockhammer, 2008). Ultimately, it contributes to greater economic activity, which when combined with increased investment by the private sector leads to a positive impact on labour and capital productivity, advancements in innovation, as well as improved corporate governance. As a result of this advancement, the indicators that reflect financial development have

expanded to today and therefor, this chapter will illustrated the financial development as a multi dimensional concept.

3.2 Financial Development Definitions

Various authors have provided several possible definitions of financial development. Levine (2005) defined financial development by stating that it involves the improvement of the functions provided by financial systems. These functions include a capital allocation to productive investment opportunities through financial markets and financial institutions, the pooling together of savings, the ability to review and monitor investments, risk transfer and the diversification of risk, and the exchange of goods and services. According to this definition, financial development is essential because each of these functions of finance can influence investment and savings decisions and the resultant efficiency with which funds are allocated within a financial system (Levine, 2005).

Referring to the argument by Bernanke et al. (1999) regarding the ability of financial systems to lower the amplification of economic cycles and absorb economic shocks via a financial accelerator, Levine (2005) stated that finance affects the accumulation of human capital, physical capital, and total factor productivity, and these three issues comprise the three forces that influence economic growth. This proposal led Levine (2005) to also consider reductions in macroeconomic volatility and inequality as a vital function of financial development.

The World Bank study (Cihak et al., 2012) defined the financial sector as the set of institutions, markets, instruments, and the regulatory and legal frameworks that allow transactions to be undertaken by extending credit. This study also stated that

financial sector development relates to the ability to overcome the costs incurred by different participants in the financial system. The process is associated with cost reduction through the acquisition of information, contract enforcement, and undertaking transactions result in the emergence of markets, financial contracts, and financial intermediaries.

The various combinations of transaction costs, information, and contract enforcement along with differences in regulatory, legal, and tax structures worldwide result in differences in financial markets, contracts, and intermediaries across countries (Cihak et al., 2012). This structure explains the use of various definitions of financial development and the variety of proxies used for measurement.

In addition to the definitions of financial development provided by Levine (2005) and Cihak et al. (2012), the Global Financial Development Report of the World Economic Forum (Schwab et al., 2008) defined financial development as 'the factors, policies, and institutions that lead to effective financial intermediation and markets, as well as deep and broad access to capital and financial services' (p. 3). This definition encapsulates the support provided by the financial system, including the business environment and financial institutions, markets, and intermediaries that facilitate the diversification of risk and allocation of capital. The result of this process of financial intermediation is the ability of households and firms to access capital. Svirydzenka (2016) defined financial development as follows:

> A combination of depth (size and liquidity of markets), access (ability of
> individuals and companies to access financial services), and efficiency (ability

of institutions to provide financial services at low cost and with sustainable

revenues, and the level of activity of capital markets). (p. 5)

This definition further highlights the broad nature of the concept of financial

development.

3.3 Financial Development Measures

Many researchers have evaluated the effect of financial development (e.g.

Bernanke et al., 1999; Levine, 2005; Beck et al., 2009, 2009; Dabla-Norris & Srivisal,

2013). Numerous such studies have measured financial development through two

proxies: the ratio of broad money (M2) as a percentage of GDP and the ratio of private

credit to the GDP. These measures reflect the depth and size of financial development

and are primarily used because of the readily available nature of the relevant data at

both a cross-country level and over an extended period (i.e. dating back to 1960 for

many countries).

Depth measures of financial development have been popular among

researchers because a larger financial institution has a higher likelihood of lending and

greater efficiency in financial development. However, some researchers, such as

Demetriades and Hussein (1996) and Liang and Jian-Zhou (2006), have criticised the

depth indicators for failing to consider the efficiency and soundness of the financial

system. This criticism justifies why some studies have instead used efficiency

measures for financial development. The advantage of choosing a single proxy for

financial development among the many available possibilities is primarily to avoid the

multicollinearity problems that can occur when combining more than one proxy for

the same variable in a single equation.

Financial development, as defined earlier, relates to any process that marks an improvement in the quantity, quality, and efficiency of financial institutions. This process involves the interaction of many activities and institutions and is associated with economic growth. As mentioned, as many as 38 proxies have reflected this multidimensional concept within a single study, as suggested by the World Bank (Cihak et al., 2012) and presented in Table 1 below.

Table 1. Indicators of Financial Development Used by the World Bank (Cihak et al., 2012)

Type of indicator	Financial institutions	Financial markets
Access	Accounts held in commercial banks per 1000 adults	Percentage of market capitalisation outside of the top 10 largest firms
	Commercial bank branches per 100,000 adults	Number of debt issuers (domestic and external, financial and nonfinancial firms)
	Proportion of people in a country with a bank account	Government bond yields
	Firms in a country with a line of credit as a percentage of total firms	Ratio of private debt to total debt securities
	New corporate bond issuance as a percentage of the total GDP	
Depth	Private-sector credit as a percentage of the GDP	Stocks traded as a percentage of the GDP
	Mutual fund assets as a percentage of the GDP	Stock market capitalisation as a percentage of the GDP
	Deposit as a percentage of the GDP	Total debt securities of nonfinancial firms as a percentage of the GDP
	M2 as a percentage of the GDP	Percentage of market capitalisation outside of the top 10 largest firms
	Gross value added to the financial sector as a percentage of the GDP	
Efficiency	Spread between lending and deposits	Stocks traded as a percentage of market capitalisation (referred to as the stock market turnover ratio)
	Net interest margin	Price influence
	Noninterest income as a percentage of total income	Private information trading
	Overhead costs as a percentage of total assets	Liquidity as a percentage of transaction costs
	Profitability (return on assets and return on equity)	Quoted bid-ask spread for government bonds
	Broad indicators (Herfindahl index)	
Stability	Capital adequacy ratios	Volatility of the stock price index
	Z-score	Volatility of the bond index
	Liquidity ratios	Price-to-earnings ratio
	Asset quality ratios	Duration
	Vulnerability of a stock market to earnings manipulation or earnings management	

Notes: Abbreviations: GDP: gross domestic product; M2: broad money supply.

As illustrated in table 1, these proxies can be broadly categorised into four groups: access, depth, efficiency, and stability. These four categories can be further grouped according to their application to financial institutions and financial markets independently.

The financial depth category includes all possible proxies that capture the financial sector as a proportion of the economy. In other words, it includes the size of financial institutions and markets in a country as a proportion of economic output. The financial efficiency category comprises all proxies that relate to the efficiency of financial institutions in performing the critical role of channelling financial resources from the lender to the borrower. The financial access category is similar in this regard and includes proxies that facilitate access to financial institutions and financial markets by households and firms. The last category is financial market performance, which includes all proxies that reflect the size and efficiency of capital markets.

Examining these categories, it can be said with certainty that the first category, which reflects the size and depth of financial development, is a prerequisite for the other three categories because, in the absence of financial institutions and markets, the efficiency of the financial system and capital markets is irrelevant. Therefore, size as a category of financial development serves as a bridge for efficiency. Although there has been criticism regarding using financial depth as a proxy for financial development, its role as a prerequisite for efficiency and access makes it essential.

It is important to acknowledge that financial development continues to be a multidimensional process. Over a period, the global financial industry has evolved significantly. The modern financial system is now highly complex and multifaceted

(Ductor & Grechyna, 2015). For example, although financial institutions continue to be dominant players within the financial industry, other market participants, such as investment banks, pension funds, insurance companies, hedge funds, sovereign wealth funds, mutual funds, and nonfinancial institutions, are becoming increasingly vital stakeholders in the process of financial development (Pradhan et al., 2016).

Svirydzenka (2016) from the International Monetary Fund (IMF) emphasised that the diversity and complexity of the modern financial system entail the necessity of considering several variables when investigating how financial development influences economic growth. In other words, it is beneficial to consider different variables to measure financial development because it helps to overcome the limitations of single indicators.

As supported by Sahay et al. (2015), Svirydzenka (2016) also created several indices to summarise financial development in terms of financial institutions and markets and concerning depth, access, and efficiency based on the inadequacy of using a single financial development indicator. Financial institutions include insurance companies, banks, and pension funds, whereas financial markets include the bond and equity markets.

The financial development index constructed by Svirydzenka (2016) used a three-step approach to reduce the multidimensionality of data on financial development into a single summary index, as previously used in the literature. The three steps included (1) the normalisation of variables; (2) aggregating the normalised variables into subindices, each representing a particular functional dimension; and (3) aggregating these subindices into the final index. Svirydzenka's (2016) procedure

considered 20 different financial development variables based on a variety of examples from previous literature (e.g. United Nations Development Programme indices, such as the Gender Development Index and Human Development Index; Cardarelli et al., 2009). The 20 indicators of financial development used by Svirydzenka (2016) are divided into six categories summarised in Table 2.

Table 2.Indicators of Financial Development Used by Svirydzenka (2016)

Financial institutions

Category	Financial development indicator
Depth	Private-sector credit as a percentage of the GDP
	Pension fund assets as a percentage of the GDP
	Mutual fund assets as a percentage of the GDP
	Insurance premiums (life and nonlife premiums) as a percentage of the GDP
Access	ATMs as a percentage of 100,000 adults
	Bank branches as a percentage of 100,000 adults
Efficiency	Net interest margin
	Spread between lending and deposits
	Non-interest income as a percentage of total income
	Overhead costs as a percentage of total assets
	Return on assets
	Return on equity

Financial markets

Depth	Stock market capitalisation as a percentage of the GDP
	Stocks traded as a percentage of the GDP
	International debt securities of the government as a percentage of the GDP
	Total debt securities of financial firms as a percentage of the GDP
	Total debt securities of nonfinancial firms as a percentage of the GDP
Access	Number of debt issuers (domestic and external, financial and nonfinancial firms)
	Percentage of market capitalisation outside of the top 10 largest firms
Efficiency	Stocks traded as a percentage of market capitalisation (referred to as the stock market turnover ratio)

Notes: Abbreviations: GDP: gross domestic product; ATM: automatic teller machines

Table .2 above lists the financial development depth proxies, which are similar to those used by the World Bank (2012). However, the proxies of pension funds and insurance company size have been added to keep pace with the diversity and complexity of the modern financial system. Concerning the efficiency category, most of the proxies focus on bank efficiency. The first is the net interest margin (i.e. the value of the net interest revenue of a bank as a percentage of the interest-bearing assets held by that bank), which measures the efficiency within intermediate savings to investment and the spread between lending and deposits. This category is followed by two operational efficiency measures, which include noninterest income as a percentage of total income and overhead costs as a percentage of total assets. The profitability measures include return on equity (ROE; measured as the profit after tax as a percentage of total equity) and return on assets (ROA; measured as the operating profit as a percentage of total assets). It should be noted that as with the other measures, ROA and ROE are relatively simple and crude measures of the efficiency of banks. For instance, efficient banks are more likely to earn a higher profit margin and therefore be considered more profitable.

However, this relationship between efficiency and profitability is not always accurate because inefficient financial institutions can also report higher profits during periods of rising interest rates because their interest income on loans is increased. Similarly, during periods of economic downturn when interest rates are kept low (to stimulate economic growth), compressed net interest margins and low profitability mean an otherwise efficient financial institution may report lower profits.

It is imperative to assess whether the proxies selected to measure efficiency are reflective of bank activities only or if they also cover the activities of other financial institutions within the context of the study. This assessment is necessary is because, in countries with nonbank-based economies, such indicators do not reflect the efficiency of other important financial institutions, and it is thus more appropriate to use financial development proxies that cover both banks and other financial institutions, such as the World Bank's (2012) proxies. Concerning financial market indicators, the proxies are similar:

- the size of the stock market (stock market capitalisation as a percentage of the GDP),

- the extent to which the stock market is considered active (stocks traded as a percentage of the GDP),

- the volume of debt securities outstanding (measured through the total debt securities of financial firms as a percentage of the GDP and the total debt securities of nonfinancial firms as a percentage of the GDP), and

- the proportion of market capitalisation outside of the top 10 largest firms to reflect access to stock markets.

The rationale for this is that a higher degree of concentration in the stock market is reflective of an increase in the difficulty experienced by small issuers or new firms in accessing the stock market. In some countries, bond market performance should also be added, which can be measured by the number of debt issuers (both domestic and external, financial and nonfinancial firms). This variable highlights the number of

unique issuers so that any repeat issuance from the same organisation in a given year is only counted once.

To conclude, concerning financial market performance, the stock market efficiency is usually addressed using the stock market turnover ratio (i.e. stocks traded as a percentage of the market capitalisation). This ratio is considered a suitable measure of the efficiency of the financial markets because a higher turnover is representative of heightened efficiency and an increase in liquidity in the market.

As mentioned, the definition of indicators for financial development is made more complicated by the wide range of financial services provided by different institutions within each country's financial system. In addition, the range of institutions and agents engaged in financial intermediation activities continues to increase, which adds to the complexity of the financial system. Therefore, it is essential to present some of the relevant literature that acknowledges and discusses this issue.

Ang and McKibbin (2007) investigated the question of whether financial development leads to economic growth or vice versa, with a focus on the small, open economy of Malaysia. These researchers acknowledged the variation in financial systems worldwide, which can be either market-based according to the Anglo-Saxon model or bank-based according to the German-Japanese model. The bank-based financial system was considered more prevalent in Malaysia because the majority of companies during the period of analysis (1960–2001) were unlisted, and banks (rather than capital markets) therefore comprised the primary source of financing. Ang and McKibbin (2007) considered bank-based financial measures more suitable for investigating the relationship between financial development and growth. However,

they admitted that selecting variables that are representative of the financial services produced in an economy and that can measure the efficiency and extent of intermediation is not straightforward when conducting empirical research on the subject of financial development and growth.

Ang and McKibbin (2007) argued that the extent of financial deepening could be best ascertained through the ability of intermediaries to minimise transaction and information costs, facilitate savings, and appropriately manage risks and transactions. Despite the simplicity of this idea, relevant data on financial development are still lacking, and despite the efforts of academics and researchers to improve the existing financial development measures, the proxies used for financial development are still not entirely satisfactory.

To increase the accuracy of time-series data analysis, considering the absence of a single satisfactory measure of financial development, Ang and McKibbin (2007) instead used a combination of three such measures: (a) the logarithm of liquid liabilities (M3) to the nominal GDP, (b) the logarithm of commercial bank assets as a proportion of commercial bank assets plus central bank assets, and (c) the logarithm of domestic credit provided by banks to the private sector as a percentage of the nominal GDP.

The reason that Ang and McKibbin (2007) did not rely only on M2 or M3 as a percentage of the nominal GDP as a measure of financial deepening is that such a measure only highlights the extent of transaction services provided by the financial system and overlooks the ability of that system to successfully transfer funds from savers to borrowers searching for investment opportunities. Using monetary aggregates as measures of financial development has also been criticised because globalisation and

the increased interconnectedness of financial markets have improved the availability of foreign funds within a country's financial system, reducing the adequacy of monetary aggregates as financial development measures. This situation explains the use of the logarithm of domestic credit provided by banks to the private sector as a percentage of the nominal GDP as a measure of financial development, which Ang and McKibbin (2007) claimed is superior to other measures in this regard. The rationale for excluding the public sector in this measure is the greater operational and functional efficiency of the private sector relative to it, justifying the exclusion of credit offered to the public sector as a better reflection of the efficient allocation of available resources.

Moreover, the reason for using the logarithm of commercial bank assets as a proportion of commercial and central bank assets is the acknowledgement that commercial banks within a financial system have a greater incentive to identify profitable projects and investment opportunities, which increases the efficiency of resource allocation from commercial banks compared to central banks (Ang & McKibbin, 2007).

Jalil and Feridun (2011) investigated the effect of financial development on economic growth in Pakistan between 1975 and 2008 using three different measures. Based on the research by Gelb (1989) and King and Levine (1993), the first of these measures was the M2 ratio to the nominal GDP, which was used to measure financial depth. Although an increase in the M2 ratio to the nominal GDP generally illustrates an increase in financial depth, within developing countries, M2 also considers a significant volume of currency. In this scenario, the effect of an increase in M2 is monetisation rather than financial depth (Demetriades & Hussein, 1996). Therefore, as

argued by Rioja and Valev (2004), liquid liabilities are considered a more suitable proxy for measuring financial development insofar as this measure considers the overall size of the financial sector, including deposits from central banks and other financial institutions.

The second proxy used by Jalil and Feridun (2011), which was also used by Rajan and Zingales (1998), is the credit extended by banks to the private sector as a percentage of the GDP. The third proxy is commercial bank assets as a percentage of the sum of commercial bank and central bank assets. This indicator was initially used by King and Levine (1993a) to measure the extent to which financial intermediaries are effective in reviewing and monitoring firms, including their corporate governance, engaging in risk management activities, and channelling savings into investments.

Similarly, Samargandi et al. (2014) also used three variables of financial development in their study on Saudi Arabia: (1) the ratio of the broad money supply (M2) as a percentage of the GDP, (2) the ratio of liquid liabilities (M3) to the nominal GDP, and (3) the ratio of credit provided by banks to the private sector to the nominal GDP. The M2 money supply included M1 (demand deposits and currency outside the banking channel) and savings and time deposits, whereas the M3 money supply included M2 plus other quasi-monetary deposits.

This section concludes by discussing literature that has used a single proxy, or one constructed proxy, of financial development, usually related to the depth and size of financial institutions. This choice of variable relates to (a) the fact that size is a prerequisite for all other proxies and (b) the correlation problems that can arise if more proxies are included in the same equation. Almalki and Batayneh (2015), Rehman et

al. (2015), and Jung (1986) used a single proxy for financial development, whereas others, including Calderón and Liu (2003) and Hassan et al. (2011), opted to run their models multiple times to assess multiple proxies. Another approach adopted by several researchers is that of converting a set of related proxies into a single proxy using a mathematical method called the principal component analysis (PCA; Ang & McKibbin, 2007; Samargandi et al., 2014; Jalil & Feridun, 2011; Adu et al., 2013). Overall, the two most-used proxies are broad money over the GDP and private credit to the private sector.

3.3.1 Quantitative vs Qualitative Financial Development Measures

Financial development has been frequently measured, and as discussed in the previous section, the proxies used in the relevant research usually reflect (a) the depth and size of financial development, (b) the efficiency of financial development and how efficient financial institutions are in facilitating savings and promoting investment, and (c) the depth and efficiency of capital market performance. Few researchers have added access to financial institutions, which reflects how a new classification is raised where measures are characterised as quantity and quality measures.

Ito and Kawai (2018) discussed the existing proxies and whether they are qualitative or quantitative. They defined quantitative measures as those gauging the size and depth of the banking, bond, equity, and insurance markets, and qualitative measures as relating to the degree of financial market diversity, liquidity, and efficiency. Ito and Kawai (2018) observed that financial development has come under greater scrutiny as an essential determinant of economic performance, including its effect on economic growth, savings, and stability. However, they also noted that empirical

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evidence on the relationship between financial development and economic performance has continued to generate mixed results, which could be attributed to the use of different measures of financial development, reinforcing the earlier argument by Adu et al. (2013).

According to Ito and Kawai (2018), the most popular measure for efficiency is 'private sector credit as a percentage of [the] GDP'. This measure is considered a quantity measure, and earlier classification considers it an efficiency proxy because it reflects how efficient financial institutions are in providing loans.

However, Barajas et al. (2013) criticised this use of private-sector credit as a percentage of the GDP as a measure of financial development because an increase in this metric does not necessarily imply an improvement in financial development. The concept of private-sector credit varies across countries insofar as the role of banks differs between nations. For instance, in middle-income countries (MICs) and low-income countries (LICs), bank assets primarily comprise low-risk holdings, such as government bonds and corporate lending (i.e. with a low probability of default), and fewer loans are provided to small and medium enterprises (SMEs) and individuals (i.e. where the risk is perceived to be higher). In contrast, lending to SMEs and unsecured borrowing for households play a more significant role in high-income countries (HICs). The precise meaning of private credit tends to differ based on a country's income level (Barajas et al., 2013).

The multidimensional nature of the financial system and financial development in the current economic environment prompted Ito and Kawai (2018) to focus not just on banking sector development as a means of measuring financial development but also

on analysing other types of financial markets, including the equity, bond, and insurance sectors. Moreover, rather than concentrating solely on the extent of activity and size of the financial industry, there is an argument for paying greater attention to the qualitative aspects of financial development.

Hasan et al. (2009), for example, asserted that the quality of financial institutions and development is more important than the quantity. When it comes to profitability and cost-efficiency, the focus should continue to be on the quality of financial intermediation. The research by Hasan et al. (2009) was used by Ito and Kawai (2018) to argue that quality measures of financial development consider market liquidity, market efficiency, the institutional environment, human capital development, information and telecommunication infrastructure development, and market diversity. The most important of these elements are discussed below.

Market diversity, for example, plays a vital role in the overall quality of a financial market. Financial markets offering a more comprehensive array of instruments provide improved opportunities for market participants (e.g. institutional and retail investors) to manage opportunities better and mitigate risk by facilitating greater investment portfolio diversification (Munemo, 2017). When capital is priced efficiently and competitively, a suitable signal is sent to investors that facilitates the efficient accumulation and allocation of available capital. Additionally, market diversity improves the quality of financial development insofar as diverse financial markets allow economic agents to smooth their intertemporal consumption (Ito & Kawai, 2018).

Market liquidity as a qualitative factor is also influential in affecting the quality of financial market development. The reason for this is that high levels of liquidity enable market participants to conduct transactions (a) in a shorter period (b) at a lower transaction cost (c) at a price close to the market price, offering a lower liquidity discount (Ito & Kawai, 2018). This argument is consistent with the earlier argument by Samargandi et al. (2015), who stated that higher levels of liquidity support the competitive and efficient trading of assets, which facilitates the exchange of products and services in an economy.

In addition to diversity and liquidity, efficiency is another essential qualitative factor that promotes the development of financial markets. For capital resources to be allocated appropriately, for example, financial markets must function efficiently. This need for efficiency is evident from Murari's (2017) argument that, in inefficient financial markets, there can be little competition, and a lack of competition within the financial sector contributes to the tendency of financial industry participants (e.g. financial institutions) to engage in rent-seeking behaviour, which negatively affects economic development in the long term (Shahbaz et al., 2018). Therefore, it is clear that the extent to which a financial system is considered efficient is a relevant measure of financial development.

A final relevant aspect of the quality of financial development is the institutional environment of a country, which includes both institutions and legal foundations where economic decisions and financial transactions are undertaken (Caporale et al., 2015). The legal and institutional environment influences the savings and investment decisions of both households and firms. If the legal system is such that instances of

corruption are minimised, law and order are promoted, and property rights are protected, the result is a positive effect on the financial decision-making of market participants (Ito & Kawai, 2018).

3.3.2 Summary of Financial Development Measures

The 20 proxies used by Svirydzenka (2016), 38 proxies used by World Bank (Cihak et al., 2012), and different variables used by other authors investigating the effect of financial development on economic growth (e.g. Ang & McKibbin, 2007; Jalil & Feridun, 2011; Adu et al., 2013) illustrate that financial development is a broad concept. No single variable appropriately measures financial development.

A challenge noted in all the empirical literature on the subject of financial development and growth is that the broad nature of the measures in question means they are only partially able to capture the multidimensional nature of finance. This multidimensionality includes such varied functions as the ability to improve risk management, successfully pool savings, exert corporate control, allocate capital to relevant investment opportunities, and facilitate the exchange of goods and services. A suitable way to overcome this research challenge is to incorporate several different measures of financial development, as recommended by Jalil and Feridun (2011), Adu et al. (2013), and Svirydzenka (2016).

In addition, as already noted, the use of different financial development measures by diverse researchers underscores the breadth of the concept, and the selection of the most appropriate measures for any given study must be based on several factors, including the objectives of the study, availability of data, and relevance of the variable in the financial system. As argued by Ang and McKibbin (2007), even in a

bank-based financial system where bank-based financial measures are considered appropriate for investigating the relationship between financial development and growth, the process of selecting appropriate variables (i.e. that are representative of the financial system and economy under study) is complex. The selection of indicators is further complicated by the range of financial services provided within the financial system of each country, and the typical range of institutions and agents engaged in financial intermediation activities also adds to the complexity of the topic.

3.3.3 Does the Measure of Financial Development Matter?

Having reviewed the use of various measures of financial development by different researchers in this chapter, the broad nature of the concept of financial development is evident. This naturally raises the further question of whether the financial development measure chosen in the given study matters in terms of its effects on macroeconomic variables, such as economic growth.

The existing research on the relationship between financial development and growth has yielded mixed findings concerning the effect and direction of causality. Lu and Yao (2009) observed that most studies using panel data and cross-sectional methods have concluded that financial development positively affects economic growth, even after potential biases, such as simultaneity, unobserved country-specific effects, and omitted variable bias, have been considered (e.g. King & Levine, 1993b; Khan & Semlali, 2000; Levine, 2005).

Another emerging issue within the literature on financial development and growth is whether the financial development measure chosen in a study has any influence on the magnitude and direction of causality between two variables. Adu et al.

(2013) investigated the long-run growth effects of financial development in Ghana using the following variables:

- credit provided by banks to the private sector as a percentage of the GDP (or private-sector credit as a percentage of the total credit);

- broad money supply (M2) as a percentage of the GDP;

- narrow money supply (M1) as a percentage of the broad money supply (M2);

- total currency as a percentage of broad money supply; total currency as a percentage of the GDP;

- total domestic credit provided by the banking sector as a percentage of the GDP; and

- total bank deposit liabilities as a percentage of the GDP.

These researchers have found that the influence of financial development on growth is indeed dependent on the choice of proxy used for financial development. For example, when using private-sector credit as a percentage of the GDP or of the total credit in the economy, Adu et al. (2013) noted that financial development has a positive relationship with economic growth in Ghana. However, when broad money supply as a proportion of the GDP was used, the effect of the financial development on growth was not positive and statistically significant. Instead, the coefficient was significant and negative. Findings such as this serve to justify the use of numerous variables when investigating the relationship between financial development and growth.

In the literature on the effect of financial development on growth, many studies have relied on a single indicator of financial development (usually credit to the private

sector as a percentage of the GDP), and the study by Adu et al. (2013) has been influential in explaining the conflicting reported results. The importance of exercising caution when it comes to selecting financial development indicators is evident.

3.4 Formal and Informal Institutions

Institutions, according to North (1991), can be defined as 'a set of rules, compliance procedures, and moral and ethical behavioural norms designed to constrain the behaviour of individuals in the interests of maximizing the wealth or utility of principals' (pp. 201-202), and they can be classified as either formal or informal. Formal institutions consist of laws, written constitutional policies, rights, and regulations as enforced by official authorities (Kaufmann et al., 2018; Williamson, 2000). Informal institutions comprise unwritten social norms and the customs or traditions that form thought and behaviour (Leftwich & Sen, 2010; Berman, 2013; Redding, 2005). Formal institutions change faster than informal institutions, with the speed of change ranging between 10 and 100 years (Williamson, 2000).

Since North's (1990) original classification of institutions as formal or informal, many researchers have begun to investigate the role of each type of institution on other economic variables. For instance, Holmes, Miller, Hitt, and Salmador (2013) investigated the influence of formal and informal institutions on foreign direct investments. Dobler (2011) investigated their effect on economic growth, and Williamson (2009) analysed their effect on economic performance. All three of these studies, along with others, used culture as a proxy for informal institutions.

Development practitioners tend to focus on formal institutions, considering informal ones to be separate and even detrimental to development outcomes

(Unsworth, 2010). Formal and informal rules and norms can be complementary, competing, or overlapping (Jütting et al., 2007, p. 36; Leftwich & Sen, 2010, p. 17). Whether they are comparatively more robust/fragile or inclusive/discriminatory is expected to depend on context (Unsworth, 2010). In certain instances, informal institutions erode formal ones; in others, they substitute for them (Leftwich & Sen, 2010, p. 17; Jütting et al., 2007, pp. 35-36). Informal social norms often shape the design and implementation of formal state institutions (Migdal, 2001; Jütting et al., 2007, p. 7).

3.4.1 Formal Institutions: Definition and Measures

Faundez (2016) described formal institutions as 'a set of rules within a normative hierarchy similar to those found in modern legal systems and usually shaped by informal institutions' (p. 390). The Property Rights Index (PRI) is one of the most popular indices used for formal institutions (Faundez, 2016; How, 2003; Rodrik, 2004), and it evaluates the degree to which a country's legal structure provides clear laws allowing the acquisition and use of private property by individuals. The index relies on a mix of survey data and independent assessments to provide a quantitative measure of the extent to which (a) property rights are protected by law and (b) the relevant laws are respected. It also evaluates the likelihood that the state seizes private property. The index relies on several sources for assessing property rights: the World Economic Forum, 'World Competitiveness Report'; World Bank, 'Doing Business', Credendo Group, and 'Country Risk Assessment'.

The second important index used with formal institutions is the Judicial Effectiveness Index (JEI), which also relies on many of the same resources listed above.

Judicial effectiveness means that efficient and fair judicial systems are in place to ensure that laws are fully respected and that appropriate legal actions are taken against violations. In other words, this index reflects how well legal frameworks function in terms of protecting citizens against unlawful acts by others, including governments and powerful private parties.

The PRI and the JEI are not the only proxies for formal institutions. Several alternative proxies are also used in this regard, such as the following:

- the Gastil Index by Freedom House (2008),

- the Polity IV Index by Marshall et al. (2013),

- the Honest and Efficient Government Index by Helliwell (2006),

- the Democratic Process Index by Helliwell (2006),

- the Political Constraints III Index by Henisz (2002),

- the Political Constraints V Index by Henisz (2002), and

- the Law and Order Index by Political Risk Services (1996).

3.4.2 Informal Institutions: Definition and Measures

Culture can be defined as the social behaviour and norms found in human societies and has been proxied for study by several organisations. The most two popular models that proxy culture are the Hofstede model and the World Value Survey (WVS). Culture and other social characteristics are incredibly complex phenomena because they are difficult both to describe neutrally and to measure accurately because any process of comparison between countries based on personal and descriptive assumptions is mostly ineffective.

Professor Geert Hofstede is one of the first specialists to achieve some success in interpreting the social characteristics of this type. He used a method involving grouping these attributes into four dimensions using a scoring system ranging from 0 to 100. In an attempt to illustrate how cultural differences between countries can be described, he surveyed 116,000 participants in 72 countries from 1967 to 1973 (Hofstede, 2001). The four dimensions used in his survey results are power distance, individualism, masculinity, and uncertainty avoidance. Later, fifth and sixth dimensions were also added: long-term orientation and indulgence versus restraint (Hofstede, 1980).

The power distance index reflects the degree to which those with less power in a society accept and expect that power is unequally distributed (Daniels & Greguras, 2014). Higher scores on this index mean that it is more likely that people in that society accept a specific hierarchical order in which each individual has a particular place. This order contrasts with societies with low levels of power distance, which are characterised by attempts to equalise the distribution of power and efforts to alleviate inequality (Tung & Verbeke, 2010).

Individualism contrasts with collectivism, and this index refers to the degree to which individuals are integrated into groups (Hofstede, 1980). A higher score indicates a greater emphasis on individualism, whereas a lower score highlights collectivism (Deschepper et al., 2008).

The feminine versus masculine index is associated with societal preferences for stereotypically male characteristics. These include assertiveness, heroism, a sense of achievement, and fondness for material success and rewards (Hofstede, 1980).

The Uncertainty Avoidance Index (UAI) reflects the degree to which a country's residents feel comfortable dealing with uncertainty regarding a future environment (De Bellis et al., 2015). A lower score on this index indicates that societal residents are flexible. This flexibility can be observed in their willingness to take risks consciously, their conflict acceptance, and their tolerance level (De Mooij & Hofstede, 2010).

Finally, the long-term orientation index is associated with society's relationship with its past while navigating the present and future challenges. The long-term orientation index is also known as the Confusion Dynamism Index. A lower degree of this index (short-term) suggests that traditions are honoured, and steadfastness is valued. Countries with a high degree in this index view adaptation and circumstantial, pragmatic problem-solving as a necessity. Countries with a short-term degree usually have little to no economic development, while long-term oriented countries continue to develop to a point.

In summary, the Hofstede model provides six cultural proxies to cover different social characteristics, all of which are calculated based on a survey with scores ranging from 0 to 100. Similar to the Hofstede model, the WVS measures provide several indices comprising 290 questions that measure such diverse characteristics as (a) cultural values, attitudes, and beliefs towards gender, (b) family and religion, (c) attitudes and experiences of poverty, education, health, and security, (d) social tolerance and trust, (e) attitudes towards multilateral institutions, (f) cultural differences, and (g) similarities between regions and societies. The periods of WVSs currently available are 1981–1984, 1989–1993, 1994–1999, 1999–2004, 2005–2009, and 2010–2014.

Many contemporary studies have adopted these two organisations'
questionnaire results as proxies for culture, with each study using the index for cultural
values most closely related to their subject of research. For example, studies
investigating the cultural values that might affect growth used the WVS questionnaire
sections related to trust, respect, self-control, and obedience (Williamson & Mathers,
2011). In contrast, studies investigating the cultural values that might affect
international entrepreneurship used the questionnaire sections related to self-expression
and internationalisation (Muralidharan & Pathak, 2017). Similarly, concerning the
Hofstede model survey, studies investigating cultural values that might affect growth
used the UAI (Dutta & Mukherjee, 2012), whereas studies investigating the effect on
foreign direct investment used hierarchical distance and collectivism/individualism
(Rihab and Lotfi, 2011).

Along with the Hofstede and WVS models, other models, such as the European
Value Survey and Barometer Survey, have developed similar preference-based
measures. However, most of these have limited geographic coverage (Falk et al., 2018).

Furthermore, a recent Global Preference Survey dataset has been created by
Falk et al. (2018) who stated that the survey measures were created to reduce the
current lack of global datasets with measurements specifically designed to capture
economic preferences. The five areas addressed by this new survey tool are time
preferences, risk preferences, positive & negative reciprocity, altruism, and trust.

3.5 Summary

This chapter presents and discusses the concept of financial development, its
definitions, and the various number of proxies used in the literature to measure financial

development. This chapter discussed these proxies' classifications and which aspect of financial development activities they reflect regardless of whether the proxy is used later in the upcoming models. Discussing these proxies aims to clarify the big picture of this comprehensive financial development concept and how the measures in the literature vary from study to study. A separate section is added in this chapter to present and discuss the concept of formal and informal institutions and their definitions and measures.

Financial development is a multi-pronged and multifaceted concept. Thus, four definitions of the same concept were presented in this chapter. The definitions can be simplified and summarised as any change in the quantity and quality of financial institutions and the financial sector in general. These changes can include sensible, measurable changes in the size and depth of the financial sector. For example, these can include the number of institutions and their assets, which lead to a direct change in the number of financial institutions in the sector. Moreover, such changes can include any nonmeasurable changes, such as the establishment of regulatory and legislative bodies and capital markets, because such changes alter the quality of the financial institutions in the sector.

The number of proxies used in the literature ranged from a single proxy to up to 38 proxies. However, the number of proxies is expected to continue to rise over time due to the rapid expansion in financial services and institutions. These proxies can be classified under three categories: (a) financial depth indicators in which proxies attempt to capture the size of financial institutions, (b) financial efficiency indicators that capture how efficiently financial institutions perform, and finally, (c) capital market

performance, reflecting capital market size and performance. Another classification of these proxies is to divide them into two types: quantitative and qualitative measures. Quantitative measures include gauging the size and depth of the banking, bond, equity, and insurance markets, and qualitative measures are related to the degree of financial market diversity, liquidity, and efficiency. There is no single ideal variable of representation of financial development. Instead, the best proxy to use in each study depends on data availability and the study purpose.

For institutions, this chapter presents the definitions of formal and informal institutions. The first consist of laws, written constitutional policies, rights, and regulations as enforced by official authorities, whereas the latter consists of the social behaviour and norms found in human societies. Formal institutions are examined extensively in the literature, and two famous indicators are the PRI and JEI. Informal institutions have several indices discussed in this chapter, such as the cultural indicators provided by the Hofstede model, WVS, European Value Survey, Barometer Survey, and Global Preference Survey.

Chapter Four: Literature Review

4.1 Overview

The relationship between financial development and economic growth is not a recent discovery: the work by Bagehot (1873) and Schumpeter (1911) motivated subsequent research by economic historians and scholars, such as Davis (1965), Cameron (1967), Goldsmith (1969), and Hicks (1969). These pioneering studies, which were discussed in the second chapter, focused primarily on the historical experiences of the UK and the US to illustrate how the presence of a competent financial system and advanced financial development can help to promote economic growth.

The importance of the relationship between financial development and economic growth has been widely acknowledged in the economic development literature (e.g. Jung, 1986; Hassan et al., 2011; Bhattacharya et al., 2018). The literature review in this chapter presents time-series and panel data studies with an emphasis on differentiating between (a) the methodologies employed by different researchers, (b) the proxies used for financial development and economic growth across different countries, (c) the research findings, and (d) the factors noted in each study that might erode or promote the observed effects.

Despite the growing body of literature on financial development and its relationship with economic growth, researchers have yet to agree on the nature of this relationship, including the role financial intermediaries play in the process of economic growth. The results from existing empirical research vary not only by country but also based on the studied period, econometric models, and specific variables. The critical

aspects of the debate and primary differences between the existing research findings centre on the potential causality between financial development and economic growth and the channels through which financial development influences economic growth.

The literature review in this chapter begins by critically analysing studies that have conducted both time-series and panel analyses of the effect of financial development on economic growth to conclude that the effect is weak or nonexistent. This analysis is followed by a similar analysis of time series and panel research that has observed neither a positive nor negative relationship between economic growth and financial development. The final section discusses studies that have examined external or internal factors related to the finance-growth nexus.

4.2 Overview of Studies Concluding No Finance-growth Nexus

This section begins by discussing existing time-series literature that has thoroughly examined a single country to find no effect of financial development on economic growth. Then, the section presents and discusses existing panel-data literature examining a group of countries to reach a similar conclusion.

Robinson (1952) and Lucas (1988), who were discussed in Chapter 2, were early researchers who investigated the relationship between financial development and economic growth. Robinson (1952) was one of the first to argue that financial development more typically follows economic growth, rather than vice versa, due to the corresponding increase in demand for financial services. Lucas (1988), however, described the effect of financial development as overrated.

Thornton (1996) employed the Granger causality test to investigate the relationship between financial development and economic growth in 22 developing

countries across Latin America, the Caribbean, and Asia. More specifically, the researcher measured financial deepening through the ratio of total bank deposits to the nominal GDP (the currency was excluded from this definition, as it is not intermediated as part of the banking system). In contrast, economic growth was measured through the use of the real GDP based on prices in the year 1985.

The use of the real GDP as a dependent variable instead of the GDP per capita indicates that the effect of population growth exceeding the growth in the real GDP is overlooked in Thornton's (1996) study. This problem highlights a limitation in the methodology used in this study: rapid population growth is an essential feature of some of the developing countries included in the sample (e.g. Asian and Latin American countries), which implies that the choice of the real GDP instead of the real GDP per capita as a dependent variable may have influenced the results.

The time-series data for the 22 developing countries sampled by Thornton (1996) included annual data obtained from the IMF database. The augmented Dickey–Fuller (ADF) test statistics for the level of financial development and real GDP and the first difference in financial development and the real GDP were reported. These indicated that all the time series (apart from Malaysia) were stationary when the first difference was undertaken, whereas the time-series for Malaysia was stationary without undertaking the first differentiation. The confirmation of stationarity allowed the autoregressive time-series model to be employed, and the first lag of financial development and economic growth was used.

The results revealed that financial development and economic growth had no unidirectional causality in 15 of the 22 countries (i.e. Costa Rica, Ecuador, Guatemala,

Guyana, Honduras, Myanmar, Paraguay, Peru, Sri Lanka, Trinidad and Tobago, Uruguay, and Venezuela), and a negative effect on economic growth in a single country (Mexico). Based on these findings, Thornton (1996) was unable to conclude the existence of any relationship or unidirectional causality (whether positive or negative) between financial development and economic growth at the 5% or 10% level of significance. This finding led the researcher to conclude instead that financial development may contribute to economic growth only episodically.

Similarly, Gries et al. (2011) investigated the causal interaction between financial development, trade openness, and economic growth across 13 countries in the Caribbean and Latin America. They used a composite indicator for financial development incorporating a new variable (i.e. depth), which was created using the PCA to combine the following four proxies: commercial bank assets to commercial and central bank assets, liquid liabilities to the GDP, private credit by deposit money banks to the GDP, and bank deposits to the GDP. Like Thornton (1996), they used the Granger causality method. However, they also added other methods, including the modified vector autoregression (VAR)/vector error correction model (VECM) approach, which permits the identification of long-term cumulative effects by allowing for dynamic interactions among variables.

Gries et al. (2011) also found a lack of evidence that financial development contributed to economic growth in the studied countries. Furthermore, they concluded that even though the evidence on bi-directional finance-growth causality was strong, this evidence was not statistically significant in the long term. When they used financial development and trade openness (i.e. the sum of imports and exports as a proportion of

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the GDP) as independent variables to assess the effect on the GDP growth per capita as a dependent variable, they were unable to conclude with statistical significance that financial development indirectly affects economic growth.

Xu (2000) investigated how financial development influences investment and, ultimately, economic growth by analysing the effect of permanent financial development on domestic investment and the GDP across 41 countries over the period from 1960 to 1993. The researcher used a VAR approach and converted the dataset into seven-year averages to eliminate the random effect that might affect liquid liabilities and the GDP in a given year. The proxies used to measure financial development included (a) credit extended by financial institutions to the private sector as a proportion of the GDP (credit to the GDP ratio) and (b) the commercial bank assets to the total financial assets ratio. Xu (2000) failed to find a significant positive effect on 14 of 41 total countries sampled and concluded that the hypothesis that financial development merely follows economic growth could be rejected.

Based on findings by authors such as Rajan and Zingales (1998), who empirically provided evidence that financial development promotes economic growth by reducing the costs of external finance to firms, the opposing literature began to be undermined. Neusser and Kugler (1998), for example, conducted a study of 13 countries in the Organisation for Economic Co-operation and Development (OECD) between 1960 and 1994. Using cointegration and causality tests as data analysis techniques, they investigated the effect of financial development on the manufacturing GDP and manufacturing total factor productivity to conclude that the causal relationship between financial development and economic growth can be considered

weak at best. This relationship was especially the case for countries with a lower GDP (i.e. smaller countries), which led Neusser and Kugler (1998) to comment on the difficulty in arriving at a general statement on the relationship between financial development and economic growth across the examined countries:

> [I]t is hard to ascertain the originating direction of causality once the feedback process is underway. It is not possible to make a general statement encompassing the whole sample as to whether financial development is truly an engine of growth and manufacturing or just a sign of the evolution of the whole economy due to independent factors. (Neusser & Kugler, 1998, p. 645)

Zang and Kim (2007) also investigated the finance-growth nexus. However, they used a different causality methodology (i.e. the Sims-Geweke causality tests), and they expressed similar concerns about the existence of a simultaneity bias between the indicators used for financial development and economic growth. Following the argument by Rajan and Zingales (1998), Zang and Kim (2007) criticised the methodology used by King and Levine (1993a), stating that financial development may not be a causal factor and but one which is instead more likely a leading indicator, such that financial markets contribute to higher lending because participants in the financial market expect an increase in economic growth rate. Zang and Kim's (2007) analysis used panel datasets that had been used earlier by Levine et al. (2000). The three key indicators they used to measure intermediary financial development included the following:

- the ratio of commercial bank assets divided by commercial and central bank assets (i.e. measuring the extent to which central and commercial banks play a role in the allocation of savings within the economy);

- the amount of credit extended by financial intermediaries to the private sector as a proportion of the GDP (which was considered the preferred indicator by Levine et al. (2000) because it includes credit issued only by private banks and financial institutions and not by central banks); and

- liquid liabilities of the financial system as a proportion of the GDP.

Economic growth was measured through the GDP per capita. A useful aspect of the methodology used by Zang and Kim (2007) is that they took an average of all four indicators over five years because the growth indicators would otherwise be subject to change based on fluctuations in the business cycle.

The conclusion reached by Zang and Kim (2007) is consistent with the earlier findings by Robinson (1952) and Lucas (1988). They found no evidence of any positive unidirectional causal effect of financial development on economic growth. Instead, they concluded that growth is preceded by financial development because higher economic growth results in an increase in demand for financial services, which leads to the existence of more highly developed financial markets and intermediaries.

Care should be taken, however, in interpreting the findings by Robinson (1952), Lucas (1988), and Zang and Kim (2007). These results do not necessarily imply that financial development has no essential role in contributing to economic growth. Instead, as acknowledged by Zang and Kim (2007), these findings suggest that the observations based on the available data are inconsistent with the argument that

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financial development leads to economic growth. This result is because the financial data used by Zang and Kim (2007) are subject to macroeconomic conditions, and the authors acknowledged the need to find new indicators of financial development that more closely represent the quantity and quality of financial services.

Thornton (1996), Gries et al. (2011), Neusser and Kugler (1998), and Zang and Kim (2007) investigated several countries in a single paper using a time-series approach in which they investigated each country separately. In contrast, the following authors conducted research investigating a single country but reached the same conclusion (i.e. no significant relationship exists between financial development and economic growth).

Abdel-Gadir (2012) investigated the finance-growth nexus in the context of Sudan between 1970 and 2007 using the autoregressive distributed lag (ARDL) cointegration approach. He found evidence of only a weak relationship between the two variables. The study used two proxies for financial development: the ratio of liquid liabilities to the GDP and the ratio of bank credit to the private sector to the GDP. The researcher attributed the lack of evidence in favour of the finance-growth nexus to three factors: (a) insufficient allocation of resources by banks, (b) the lack of an appropriate investment climate to promote long-term investment and growth, and (c) the poor quality of credit disbursal in the Sudanese banking sector.

Similarly, Adu et al. (2013) used the ARDL cointegration approach to investigate Ghana. They created a new proxy for financial development by combining eight different proxies based on data from 1961 to 2010, a period covering both pre- and post-economic reforms and structural adjustment periods for Ghana. The

researchers found that the effect was both positive and significant when they used the ratio of bank credit to the private sector to the GDP as a proxy for financial development but was negative if they used a different proxy, such as the ratio of liquid liabilities to the GDP. Their empirical analysis confirmed the sensitivity of the effect to the choice of the proxy. Therefore, these researchers recommended caution when choosing a proxy for financial development.

Cevik and Rahmati (2013) based their study on the country of Libya. Although several studies in the past have investigated the relationship between financial development and economic growth, very few investigations have analysed this from the perspective of Libya. In recent years, Libya's financial systems have undergone significant developments; however, the country is still dependent on traditional banking and other conventional financial systems. Cevik and Rahmati (2013) analysed the long-term relationship between financial intermediation and nonhydrocarbon output growth. To conduct the study, the authors used ordinary least squares (OLS) estimates, which demonstrated that financial development tends to have a significant negative effect on the real nonhydrocarbon GDP per capita growth. The authors concluded that developments in the financial sector tend to result in an insignificant influence on economic growth in Libya, and they further supported this result with a VAR-based estimate given that the coefficient of financial intermediation was negative.

Alkhuzaim (2014) used the cointegration technique and Granger causality test to analyse the long-term relationship and direction of causality within the finance-growth nexus. Their study was based in the country of Qatar and used data from the years 1990 to 2012. As proxies for financial development, the study used (a) ratio of

the M2 to the GDP, (b) ratio of the bank credit to the private sector to the GDP, and (c) the ratio of the domestic credit provided by the banking sector to the GDP. They found only a weak and insignificant relationship between financial development and economic growth, which demonstrated that the finance-growth nexus is not dependent on the proxies selected by the researcher. Based on this, Alkhuzaim (2014) further concluded that financial sector development does not have a direct and substantial effect on economic growth. Instead, growth must be considered dependent on a wide array of other factors and forces.

Akinboade and Kinfack (2014) compared Cameroon and South Africa to explain the salient differences in their levels of financial sector development and economic growth. The authors found that Cameroon's financial sector policies failed to promote growth, and the bank system failed to collect savings due to a loss of confidence in the banking sector.

Marshal, Solomon, and Onyekachi (2015) used a time-series analysis to evaluate Nigerian data spanning the 33 years from 1980 to 2013. The motivation for conducting the study in Nigeria was that the country had experienced significant improvements in its banking industry during the period in question, with the sector significantly increasing in importance and thus tending to have a significant effect on the country's overall growth and development. The researchers aimed to analyse various bank-related factors and their overall influence on financial development and economic growth, and they provided a thorough examination of the various ways in which the banking industry and its transactions can influence financial development. The GDP was used as the proxy for economic growth, and credit to the private sector,

credit to the government sector, and contingent liability served as proxies for domestic bank credit. The results revealed an insignificant relationship between the proxies, which illustrated that the indicators used by these researchers were incapable of significantly influencing either the overall development of the financial sector or the overall development of the economy.

Like Marshal et al. (2015), Iheanacho (2016) also investigated Nigeria but instead used an ARDL cointegration over the period from 1981 to 2011. The results of this study align with the findings by Marshal et al. (2015) and confirm that the relationship between financial development and economic growth in Nigeria is negative but insignificant. Iheanacho (2016) attributed this result to the fact that Nigeria is an oil-dependent economy.

Badeeb et al. (2016) focused on determining the existence of an 'oil curse' in the finance-growth nexus and based their research on the country of Malaysia because it is one of the world's fastest-growing economies. Moreover, there has been significant debate on the role of oil in economic development. The authors attempted to analyse how the oil industry influences the region's economy and determine the best path for its future growth and development. Badeeb et al. (2016) provided a comprehensive analysis of the various factors that can influence the financial development of a region as well as the resultant influence on economic growth and prosperity. The research used data for the years 1970 to 2013, which were collected using World Bank indicators. The authors used the real GDP per worker as a proxy for economic growth, and the researchers used financial development, investments, and proxies to measure oil dependence. An ARDL test was used to analyse the long-term relationships in question,

and it was determined that the oil curse is a real phenomenon based on an insignificant association between financial development and oil dependence. Thus, oil rent was shown to have a weak and insignificant effect on the finance-growth nexus.

The final mentioned time-series study that failed to find evidence of the finance-growth nexus was conducted by Soedarmono et al. (2017) and focused on Indonesia. According to the authors, Indonesia was selected as the context of study because past studies have neglected this country concerning the variables in question. The researchers focused on examining linearity in the finance-growth nexus. The variable of bank credit was broken down into investments, consumption, and working capital credit, which were used as proxies for financial development and investments in the country. These indicators were chosen as proxies because they were thought to provide more information about the subject matter and enable more effective and efficient research. The panel data used in the study covered the period from 2000 to 2009 and included the GDP and macroeconomic metrics for 33 Indonesian provinces. These data were collected from the Central Statistics Agency, whereas the Bank of Indonesia provided data on bank loans and deposits. A regression model was used to analyse the data collected from these sources, and the results revealed an insignificant effect of bank credit factors, such as investments, consumption, and working capital credit on the finance-growth nexus, leading the researchers to conclude that the finance-growth nexus is not significantly affected by the situation of bank credit in Indonesia.

Regarding cross-sectional research, Kar et al. (2011) based a study on panel data from 15 Middle East and North Africa (MENA) countries over the period from 1980 to 2007. The MENA nations were chosen as the context of study due to the

considerable level of liberalisation within their financial sector. The public expects governments to take significant steps to reduce the load on them. These reforms could include lifting various bank-related restrictions and simplifying various types of transactions, a process that could entail reducing the interest-rate ceiling, setting high reserve requirements, directed credit programmes, or other reforms. Such actions could help improve the financial performance of the country and its general financial condition.

Kar et al. (2011) used a panel causality testing approach using three proxies to determine the finance-growth nexus: monetary aggregates, domestic and private credit values, and banking variables. Monetary aggregates were used because they provide a simple way to measure the degree of monetisation in an economy and are usually designed to reveal the real size of a given economy's financial sector. Domestic credit was used as a more representative measure of financial development because the circulation of currency in an economy is not part of the broad money stock. Similarly, private credit is also an adequate measure of financial intermediation, acting as an indicator of a country's financial development. Kar et al. (2011) found no significant relationship between finance and growth within the 15 MENA countries. Furthermore, causality between financial development and economic growth was highly sensitive to the measurement of financial development in this context.

Hassan et al. (2011) used a different approach to sample selection. Instead of using heterogeneous cross-country samples or single-country time-series methods, as most previous studies have done (e.g. Adu et al., 2013; Alkhuzaim et al., 2014), these researchers categorised geographic regions into homogenous samples of countries to

address the relationship between financial development and economic growth. Thus, instead of pooling global data or conducting an analysis of individual countries, Hassan et al. (2011) used the classifications of geographic regions provided by the World Bank to investigate the effect of financial development on economic growth. This approach allowed the researchers to capture temporal economic reform dimensions through a combination of time-series and geographical cross-sectional data. In addition, it also increased the available observations for estimating parameters when conducting the panel data regression and other multivariate analysis techniques, which would not have been possible to estimate for a single country.

Hassan et al. (2011) used six proxies to measure financial development and one to measure economic growth. The first variable used as a measure of financial development was domestic credit provided by financial institutions. Higher levels of this variable in a country indicate that businesses have a greater dependence on the banking sector for their financing, which indicates an increase in financial development. However, a crucial assumption in the analysis by Hassan et al. (2011) was that financial institutions across the sampled countries were not subject to government-mandated loans to specific favoured industries, which can influence the lending criteria and decisions of financial institutions concerning allocating funds to specific companies and industries. This assumption affects the appropriateness of using domestic credit provided by financial institutions as a measure of financial development in developing countries. Brown et al. (2009), for example, found that banks in developing countries lack effective corporate governance and independence,

and are instead influenced by governments, particularly when it comes to lending decisions.

The other measures of financial development used by Hassan et al. (2011) included (a) domestic credit to the private sector as a percentage of the GDP, (b) M3 money supply as a proportion of the GDP, (c) the ratio of gross domestic savings (GDS) to the GDP, (d) the ratio of trade to the GDP, and (e) the ratio of general government final consumption (GGFC) expenditure to the GDP. Two financial variables were included in each regression (i.e. M3 money supply as a proportion of the GDP and the ratio of the GDS to the GDP). However, the other measures of financial development were not included insofar as they exhibit a high positive correlation with one another, contributing to increased autocorrelation, which was corrected with the inclusion of the two measures for financial development as an independent variable.

To help control the business cycle, Hassan et al. (2011) calculated nine nonoverlapping five-year averages for each variable and included a dummy variable. An OLS regression was then conducted via the use of robust heteroscedastic errors, which is consistent with the data analysis method followed by Jung (1986). The multivariate time-series model used by Hassan et al. (2011) included the estimation of VAR models and testing which proxy variables (if any) Granger-cause economic growth.

Hassan et al. (2011) concluded that a low initial GDP per capita contributed to a higher rate of economic growth after controlling for financial development. Moreover, a positive and statistically significant long-term relationship between financial development and economic growth was noted based on the results of the

regression. Consistent with the findings by Pagano (1993) based on neoclassical economic theory, Hassan et al. (2011) also concluded that GDS as a measure of financial development has a positive effect on economic growth. Further, Hassan et al. (2011) concluded that domestic credit to the private sector as a measure of financial development has a positive effect on economic growth in developing countries across the Caribbean, Latin America, and East Asia. In contrast, the effect of domestic credit to the private sector on economic growth was negative in the developed HICs.

The findings by Hassan et al. (2011) can be explained as follows. When levels of economic growth are lower (as in the case of developing countries), financial development (i.e. in the form of increased lending by banks to the private sector and an increase in gross savings) positively influences economic growth. The rationale for this is that the borrowing power of households and consumers conferred by the banking sector allows them to increase their consumption and investments. Because consumption and investment are significant components of aggregate demand, the increase in these factors leads to a corresponding increase in aggregate demand (and consequently economic growth) within these economies.

Hassan et al. (2011) supported earlier findings (e.g. Ang & McKibbin, 2007; Giuliano & Ruiz-Arranz, 2009) and the economists' viewpoint that long-term sustainable economic growth is dependent on the ability of economies to increase the accumulation rate of their human and financial development. Therefore, increased levels of financial development continue to be an essential condition to facilitate economic growth.

Conversely, in the case of developed countries, Hassan et al. (2011) failed to conclude that financial development has a positive effect on economic growth. After financial markets have already been developed, any further increase in financial development (as measured by increased lending by banks to the private sector) is unlikely to increase economic growth. Instead, an increase in gross savings means reduced consumption, which lowers aggregate demand and economic growth, which explains the negative effect of financial development on economic growth.

Using the argument of Jalil et al. (2011), Hassan et al. (2011) also stated that a well-functioning financial system and increased levels of financial development alone are not necessarily sufficient for economic growth in either developing or developed countries. A well-functioning financial system should instead be combined with other variables, such as appropriate governmental trade and fiscal policies that focus on promoting trade openness (e.g. reductions in trade barriers and protectionist policies). Along with increased political stability and robust legal infrastructure, these variables contribute to an increase in economic growth across both developing and developed nations.

4.3 Overview of Studies Concluding a Finance-growth Nexus

As in the previous section, this section first discusses the existing time-series literature followed by the existing panel-data literature. The studies presented here present empirical evidence that financial development promotes economic growth.

First, to return to a study discussed in the previous section, Thornton's (1996) time-series research on 22 developing countries across Latin America, the Caribbean, and Asia found that 15 countries demonstrated either a negative relationship or no

relationship between financial development and economic growth. However, this researcher also suggested that for seven of the 22 countries, financial development and economic growth were determined contemporaneously (i.e. the null hypothesis was rejected in both directions). Thus, financial development and economic growth exhibited a relationship in these economies. The ability of financial development to promote economic growth was supported in the case of five countries (i.e. the Dominican Republic, El Salvador, Jamaica, Malaysia, and the Philippines) at a statistically significant level of 5%. In Nepal and Thailand, it was supported at a level of 10% significance. For these seven countries, Thornton (1996) reported evidence of a unidirectional causality between financial development and economic growth. Jung (1986) was one of the earliest researchers to use time-series data and analysis to investigate the relationship between financial development and economic growth. Two proxies of financial development used by Jung (1986) currency ratio and M2 to nominal GDP -With 56 countries included in the sample, the time-series data analysis undertaken by Jung (1986) was comprehensive. Nineteen of the sampled nations were developed, industrialised countries, whereas the remaining 37 countries were developing economies. The selection of the countries in the sample was based primarily on the availability of data because only countries with at least 15 consecutive annual observations qualified for the research. Four different OLS regressions were performed using the time-series data analysis: two included the currency ratio and income, and two included monetisation and income. Given the relatively limited number of observations for some countries due to the annual frequency of the observations, a

maximum lag length of up to two years was used to improve the reliability of the results.

Moreover, to reduce the occurrence of serial correlation in the residuals as a result of potentially omitting relevant lagged variables, a maximum likelihood correction for the first-order autocorrelation of the residuals was employed across all conducted regressions. In the case of the developing countries included in the sample, Jung (1986) concluded that financial development positively contributes to economic growth with statistical significance at a 5% level. The explanation for this was based on the supply-leading relationship (i.e. as the financial system channels resources from savers to investors in the form of saving and lending, the corresponding development of the financial system contributes to an increase in economic growth).

Furthermore, in the case of both developed and developing countries, Jung (1986) concluded that when the currency ratio was used as a measure of financial development, causality patterns for both supply-leading and demand-following relationships were observed. Another noteworthy finding was that for fast-growing economies (i.e. those exhibiting an above-average rate of economic growth), the use of the currency ratio as an independent variable in the regression measuring financial development also led to a strong acceptance of the supply-leading hypothesis.

Despite Jung's (1986) use of a comprehensive methodology, a limitation of the analysis was that the data included relatively few observations because some of the developing countries lacked a comparative amount of available data. Although this limitation was overcome to an extent through the use of first and second lags, indicating the dynamic nature of the regression, the limited time-series data could have affected

the results. This limitation was acknowledged by the researcher, who stated that future research should focus on lengthening the time series for various countries included in the analysis, as it would improve the reliability and validity of the results.

Some 30 years later, the same researcher conducted another study on the finance-growth nexus in South Korea, which has undergone significant financial and economic development in the past three decades, making it an optimal choice for investigating the effect of financial development on economic growth (Jung, 2017). As a dependent variable, economic growth was measured using the real GDP per capita. The level of financial development was measured using the ratio of the M2 to the real GDP and the variables of real exports and real imports between 1961 and 2013. This measure is consistent with the methodology used by Jung (1986) and Chang and Caudil (2005). The time-series dataset was obtained from two sources: The World Bank database and the United Nations Conference on Trade and Development. The variables used by Jung (2017) were converted into the natural logarithm form, as they exhibited exponential growth.

The stationarity for financial development (as measured through the M2 to the real GDP and real GDP per capita) was measured via four analyses: the ADF, Phillips–Perron (PP), and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests. The rationale for including the KPSS test was the criticism that the ADF and PP tests may be insufficient when the variables have undergone structural changes. The period from 1961 to 2013 was considered adequate because it is long enough to include a sufficient number of observations to ensure the reliability and statistical significance of the results. Moreover, this time frame also covered the various macroeconomic environments

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experienced by South Korea in the last few decades, including periods of economic growth and crisis (e.g. the Asian Financial Crisis in 1996–1997 and the Global Financial Crisis of 2008).

Based on Jung's (2017) use of a four-variable VAR model, the results led to the conclusion that the (a) real GDP per capita, (b) financial development (M2 as a percentage of the GDP), and (c) real imports and exports (i.e. imports and exports growth-adjusted for inflation) are cointegrated through cointegration tests, as suggested by Johansen and Juselius (1990). Granger causality tests were also conducted based on the VECM with one cointegrating vector, which led to the conclusion of unidirectional causality (i.e. from financial development to economic growth but not from economic growth to financial development). This test suggests that financial development in South Korea had a positive effect on economic growth. These results indicate the importance of financial development in promoting economic growth in South Korea. However, the study (Jung, 2017) used only a single variable to measure financial development (i.e. the M2 as a percentage of the GDP). This limitation of the study could have been overcome by collecting more data on financial development (e.g. bank lending to the private sector, stock market capitalisation as a proportion of the GDP, and the size of the local capital market in South Korea as a proportion of the GDP). Siddiki (2002) investigates Bangladesh financial development and trade liberalisation impact upon the economy of Bangladesh during the period 1975-1995 using both the cointegration (EG) method of Engle and Granger and the fully modified least squares (FMLS) method. The result showed a positive and significant impact of financial development and trade liberalisation on n real per capita income in Bangladesh.

Furthermore, Daly& Siddiki (2001). investigated the determinants of economic growth in India for 1954-1994 and found the same results that financial development promotes growth in India. Auerbach, Uddin & Siddiki (2004) conducted a further investigation about the role of finance in economic allocation and growth, from an analytical perspective and discussed the literature supporting financial liberalization.

Nkoro and Uko (2013) focused on the country of Nigeria, which was primarily selected because of the economic changes and reforms it has undergone in recent years made examining the financial condition of the nation and the various factors that affect its financial growth and performance all the more critical. In this study, the authors analysed the effect of financial sector developments on Nigeria's economic growth using the cointegration technique developed by Engle and Granger in 1987. The authors used annual data for the period from 1980 to 2009 to provide an estimate for the short- and long-term relationships between financial development and economic growth in the country of Nigeria. Because quarterly data for the GDP were unavailable, the real annual GDP was used as a proxy for economic growth. The proxies used for financial development included (a) the ratio of the market capitalisation to the GDP, (b) the ratio of the M2 to the GDP, (c) the ratio of the credit to the private sector to the GDP, (d) the prime interest rate, and (e) the ratio of the deposit liability to the GDP. The data were collected from the Central Bank of Nigeria Statistical Bulletin and the Nigeria Securities and Exchange Commission. Nkoro and Uko (2013) found a positive relationship between developments in the financial sector and economic growth in Nigeria.

Odhiambo (2011b) examined the finance-growth nexus in Tanzania using the Granger test to analyse causality between the two variables. The study found a strong, positive, unidirectional relationship between economic growth and financial development in this economy (Odhiambo, 2011b). The author further stated that this result applied in all cases, whether causality is calculated in the short or long term. Moreover, the researcher found a bi-directional causality between financial development and foreign capital inflows. Based on these results, Odhiambo (2011b) concluded that financial developments in Tanzania in both the short and long term have a direct and positive effect on the economic growth of the country. According to the study, financial development in Tanzania follows economic growth, regardless of the period for which causality is estimated.

Ogunmuyiwa and Ekone (2010) analysed the effect of the money supply on economic growth in Nigeria between the years 1980 and 2006. The main reason for selecting the context of Nigeria was because, since the 1980s, a variety of evidence had suggested the existence of a significant relationship between the stock of money and economic activities in the country. Furthermore, in the last few years, the Nigerian government gained control over the economy by controlling the supply of money within the country. In other words, the Nigerian government controls the economy regarding its activities and overall growth and development.

Therefore, by analysing the finance-growth nexus in Nigeria, Ogunmuyiwa and Ekone (2010) aimed to evaluate the direction of the flow of economic activities and assess the performance of the economy in a detailed manner. The data for the study were collected from various issues of Central Bank of Nigeria's CBN publications,

IMF, and the World Bank African Development Reports, and the analysis used both inferential and descriptive methods of OLS. Along with this, the authors also used regression analyses and Granger causality tests to assess the direction of causality between money supply and growth. The authors found a direct and positive relationship between the aggregate money supply and economic growth and development. They further found that the money supply is not adequate for predicting growth in the real GDP. The authors stated that a gap still exists between the money supply and economic growth, and attention should be focused on improving the relationship between the two variables in the expectation that this will provide more control to authorities and the government.

In a study based on the single context of Bahrain's dual financial system, Abduh et al. (2012) examined the long- and short-term relationships between Islamic and traditional financial development and economic growth. In recent years, numerous studies have analysed the effectiveness of Islamic finance and its relationship with and effect on economic growth. However, very few such investigations have focused on Bahrain, which was the key motivator for this study. The analysis used quarterly data from the first quarter of 2000 to the fourth quarter of 2010 collected from the Monthly Statistical Bulletin of the Central Bank of Bahrain and the International Financial Statistics of IMF. The data were analysed using the Johanson and Juselius (1990) cointegration test and the VECM. Islamic total financing and Islamic total deposits were used as proxies for the financial sector, and the total conventional loans and total conventional deposits were used as proxies for the conventional sector. Limiting the

proxies for the financial sector to the ratio of credit to the private sector is not justifiable and cannot provide adequate information about the subject matter.

The authors determined that, in the long term, both Islamic and conventional financial development was positively and significantly associated with economic growth. On this basis, in the long run, developments in both sectors have a significant and positive effect on economic growth in the country. Furthermore, the researchers also determined that domestic finance provided by the banking sector significantly contributes to the overall growth and development of the economy of Bahrain. In this regard, the banking sector is a vital part of the country's economy and tends to have a significant influence on its overall performance and functioning.

Muyambiri and Chabaefe (2018) evaluated the finance-growth nexus in Botswana. The main reason for choosing this context was that almost no other research had been based there. The researchers explored the way developments in the financial sector influence the country's economic potential and growth. They used stationary tests to ensure that all selected variables were integrated to the maximum order of one. Furthermore, they also employed the Phillips-Perron (PP) Unit Root Tests and ADF generalised least squares tests to check the order of integration. During the study, the researchers determined that in the short-term, investments tend to have a significant effect on the bank-related and stock-exchange-based financial sectors, and in the long term, stock-exchange-based financial developments have a significant effect on the financial performance and economic growth of the country. In addition, the researchers also determined that the factor of financial development correlates positively to the aspect of economic growth and development. Finally, the authors stated that

developments in the financial sector, such as stock market performance, determine the overall growth and prosperity in the economic environment of the country.

Some studies have used a cross-sectional panel-data approach and concluded a significant positive effect of financial development on economic growth. For example, Roubini and Sala-i-Martin (1992) analysed the relationship between the trade regime, degree of financial development, and growth performance in 58 countries. They acknowledged that the relationship between financial development and economic growth could be interpreted in two ways: (a) higher financial development leads to an increase in economic growth, or (b) higher economic growth promotes the emergence of a developed financial system, including new financial assets and transactions supported by a range of financial intermediaries.

Referring to an argument by Saint–Paul (1992) stating that capital markets facilitate the spread of risk through financial diversification, Roubini and Sala-i-Martin (1992) stated that financial development helps economies to access and use more specialised technologies. This statement implies that financial development leads to economic growth and that economic growth enhances incentives for financial development. To test the effect of financial development on growth, Roubini and Sala-i-Martin (1992) used the reserve ratio as a proxy for financial development. The reserve ratio refers to the ratio of commercial bank reserves to the money supply (M1 and quasi-money). In the study, the average reserve ratio was computed for 58 countries from 1960 to 1984. The researchers concluded that, for commercial banks, a higher degree of financial repression through an increase in required reserves reduces the amount of lending by commercial banks and reduces economic growth.

King and Levine (1993a) also used the cross-country regression approach to investigate the relationship between financial development and economic growth. The underlying idea in this study was for the authors to test Schumpeter's (1911) argument that the financial system is capable of promoting economic growth. The study used data from 80 countries over the period from 1960 to 1989, comprising a notably large dataset for panel-data analysis.

The four indicators of financial development used by King and Levine (1993a) included the following:

- financial depth as measured by the ratio of liquid liabilities of the financial system to the GDP, where liquid liabilities include currency outside the banking system and the interest-bearing liabilities of nonfinancial and financial institutions;

- the ratio of deposit money held in domestic banks to deposit money plus central bank assets;

- the ratio of claims on the nonfinancial private sector to the total domestic credit; and

- the ratio of claims on the nonfinancial private sector to the GDP.

However, a limitation concerning the second of these measures is that they fail to consider to which party the credit is allocated by the financial system. A limitation regarding the third and fourth measures is that they reflect the overall size of the public sector and the extent of its borrowing. Therefore, this may not be the most suitable method for highlighting the level of financial services.

King and Levine (1993a) concluded that an increase in financial development is significantly and positively correlated to (a) economic growth, (b) the accumulation of physical capital, and (c) improvements in economic efficiency. Their study highlights the importance of finance and financial development for economic growth, and the researchers state that the 'relationship between growth and financial development is not just a contemporaneous correlation and that finance seems important to lead economic growth' (King & Levine, 1993a, p. 730).

However, the methodology used by King and Levine (1993a) has been criticised by Arestis and Demetriades (1997), who noted that the causal interpretation of data on the relationship between financial development and economic growth is based on fragile statistical foundations. Arestis and Demetriades (1997) used the same data used by King and Levine (1993a) to conclude that the contemporaneous relationship between financial development and economic growth is considerably more robust in contrast to the relationship between lagged financial development and growth. This result led Arestis and Demetriades (1997) to acknowledge a limitation of the cross-country regression methodology: that the issue of causality cannot be satisfactorily addressed. Another limitation of this method is the econometric issues that result from the heterogeneity of the slope coefficient when comparing the effect of financial development on economic growth across different countries (Durlauf et al., 2005).

Arestis and Demetriades (1997) used quarterly data from 1979 to 1991 to study the relationship between financial development and economic growth in Germany and the USA for four different variables: (1) the logarithm of the real GDP per capita (as a proxy to measure economic growth), (2) the ratio of the stock market value to the GDP

(as a proxy for stock market capitalisation), (3) the ratio of the M2 to the nominal GDP, and (4) the ratio of domestic bank credit to the nominal GDP (as a proxy for financial development). The methodology also included the use of a unit-root test followed by VAR and cointegration rank, which led the researchers to conclude that, for Germany, a positive relationship exists between the real GDP per capita and the development of the banking system. Furthermore, they concluded that stock market volatility has a negative and statistically significant effect on the real GDP. However, the effect of economic growth on financial development was surprising and was explained through the existence of unidirectional causality from financial development to economic growth for Germany.

Arestis and Demetriades (1997) reached a different conclusion, however, for the US, which was attributed to differences in economic structure, the role of financial markets, and the endogeneity of stock market capitalisation. They concluded that little statistically significant evidence supports the notion that financial development contributes to economic growth in the US. Conversely, they found considerable evidence to support the idea that economic growth (the real GDP) contributes to the development of capital markets and the banking system. In other words, they found support for the positive effect of economic growth on financial development in the US. Given these different findings for the US and Germany, Arestis and Demetriades (1997) suggested the need for further research and the importance of considering the individual circumstances of each country, including policy considerations and institutional factors.

Bloch and Tang (2003) studied the role of financial development in economic growth in the context of East Asian countries, such as Hong Kong, Indonesia, South Korea, Malaysia, Singapore, Taiwan, and Thailand. To measure financial development, they used the value of credit by financial intermediaries to the private sector divided by the GDP (i.e. the value of credits by financial intermediaries [banks and nonbanks] to the private sector divided by the GDP). To measure economic growth, they used the real GDP per capita. The cross-country analysis used Pearson's correlation coefficient and a panel data regression of the real GDP growth using private credit to the GDP as a regressor between 1960 and 1992. Based on the cross-country evidence, Bloch and Tang (2003) concluded that, on average, financial development (as measured by private credit to the GDP) is a statistically significant independent variable influencing economic growth (i.e. the GDP per capita) across the studied countries. The relationship was statistically significant at a 1% level, as the *p*-value was less than .01. The estimated coefficient of 0.0335 led Bloch and Tang (2003) to conclude that, for each 1% increase in the level of financial development (i.e. private credit as a percentage of the GDP), the real GDP per capita increases by 3.35%.

Bloch and Tang (2003) conducted further tests controlling for country-specific effects by including the income level in the economy as a control variable in the panel data regression. This variable was not shown to be statistically significant in influencing the GDP growth per capita. The researchers also conducted a dynamic panel data analysis by constructing a balanced panel dataset with cross-country data on financial development (private credit to the GDP) and economic growth (the GDP per capita). This analysis included the division of the entire period under study (i.e. 1960

to 1990) into six equal subperiods, followed by calculating the five-year averages for the financial development and economic growth variables, which translated into 426 observations (71 observations multiplied by 6).

This dataset was then used to run another panel data regression of the real GDP growth using private credit to the GDP as a regressor. These findings were consistent with their earlier results, as Bloch and Tang (2003) noted that private credit to the GDP as an independent variable had a positive and statistically significant effect on economic growth as a dependent variable. However, the strength of the relationship was slightly weaker based on the regression result. The estimated coefficient was 0.0212, that is, for each 1% increase in the level of financial development (private credit as a percentage of the GDP), the real GDP per capita increased by 2.12%. This finding was statistically significant at the 5% level.

Calderón and Liu (2003) used the Geweke decomposition test on pooled data from 109 countries (comprising both developed and developing economies) for the period 1960 to 1994 to investigate the direction of causality between financial development and economic growth. The authors used two measures of financial development. The first is the ratio of broad money (M2) to the GDP, where a higher ratio indicates a more extensive financial sector and more significant financial development. The second is the ratio of credit extended by financial intermediaries to the private sector to the GDP, where an increase indicates a greater offering of financial services and increased development of financial intermediaries and economic growth (Calderón & Liu, 2003).

The second measure does not consider credit issued by central banks, which led Calderón and Liu (2003) to argue that the ratio of credit to the private sector to the GDP is a superior measure of financial development compared to the other measures. They criticised King and Levine's (1993a) use of gross claims for this ratio because it included credit issued by central banks and monetary authorities. The rationale for the exclusion of credit extended by central banks is that central banks primarily offer credit to commercial banks, a practice that increases during periods of the financial crisis because central banks act as a lender of last resort (Saci et al., 2009). Thus, the inclusion of credit offered by the public sector when measuring financial development can introduce bias in the results. Moreover, using credit over measures of monetary aggregates, such as M1, M2, or M3, is beneficial, as it is more accurate in highlighting the exact volume of funds that have been channelled in the private sector (De Gregorio & Guidotti, 1995).

Calderón and Liu (2003) also addressed the stock-flow issue of financial intermediary balance sheet items that were measured at year-end in contrast to the nominal GDP as measured over the year. They argued that, due to inflation, the solution proposed by King and Levine (1993a) to average the balance sheet items over the current year (t) and previous year (t–1) followed by dividing it by the GDP in the current year) does not overcome the distortion in the figures. This issue was resolved through deflation of the year-end figures by a year-end consumer price index (CPI). Consistent with the findings of King and Levine (1993a), Calderón and Liu (2003) also concluded that financial development leads to economic growth, including the

coexistence of Granger causality from financial development to economic growth and from economic growth to financial development.

These findings suggest that financial deepening contributes to economic growth, and this growth, in turn, helps with further financial development. However, this relationship was more robust in developed compared to developing economies (Calderón & Liu, 2003) due to the presence of more developed financial markets in developed countries that enable market participants (e.g. firms and consumers) to access funding at a competitive rate. Thus, a certain level of financial deepening is critical for financial markets to influence economic growth, which explains why Calderón and Liu (2003) concluded that developing economies have enormous scope for further improvement in terms of financial development.

Cavenaile and Sougné (2012) used a panel cointegration technique to analyse the potential long-run relationship between economic growth, banking development, and institutional investors across six OECD countries (Belgium, Canada, Chile, Japan, Spain, and the US). The financial development indicators included (a) private credit by deposit money banks and other financial institutions over the GDP as a proxy for the development of the banking sector and (b) the natural logarithm of the real GDP per capita as a proxy for economic growth. They concluded that heterogeneity exists in the long-run relationship between financial development and economic growth.

For Belgium and Canada, Cavenaile and Sougné (2012) concluded that a bi-directional relationship exists in which financial development promotes economic growth, while economic growth also promotes financial development. In contrast, they concluded that, although economic growth promotes the development of the banking

sector and institutional investors in Chile, in the case of the US, economic growth was only found to promote development in the banking sector. However, this was because the financial system in the US is stock market-oriented. Cavenaile and Sougné (2012) argued the importance of considering specific circumstances, including institutional factors and prevalent policies in each country, when interpreting and understanding the relationship between financial development and growth, supporting the earlier conclusion by Arestis and Demetriades (1997).

The measures of financial development as used by Cavenaile and Sougné (2012) were also employed by Hassan et al. (2011) for the period from 1980 to 2007 to conduct a cross-sectional regression analysis. Hassan et al. (2011) found a statistically significant and positive long-run relationship between financial development and economic growth, reinforcing the findings of King and Levine (1993a).

However, a methodological limitation of the study undertaken by Cavenaile and Sougné (2012) was that they used annual observations between 1980 and 2008, which equates to only 29 observations. The use of statistical techniques, namely cross-country regression based on 29 observations, reduced the reliability of the findings, which was also confirmed by the fact that the findings were not statistically significant.

A meta-analysis conducted by Arestis et al. (2015) discussed the literature on financial development and economic growth and included a significant number of empirical studies published in relevant journal articles. They measured the degree of heterogeneity and analysed the underlying reasons for the observed differences and concluded that, despite the evidence relating to publication bias, a positive relationship exists between financial development and economic growth.

An essential finding by Arestis et al. (2015) was that the type of data and different variables in the measurement of financial development and growth could contribute to heterogeneity in the data and influence the findings. For instance, the use of bank-based variables of financial development (e.g. private credit by deposit money banks and other financial institutions over the GDP as a proxy for the development of the banking sector used by Cavenaile and Sougné in 2012) reduces the correlation with economic growth in contrast to the use of market-based variables. This finding indicates that the use of market-based variables for financial development can contribute to the existence of a stronger relationship between financial development and growth, which would be the case if using bank-based variables. This finding is also relevant when justifying the empirical specification later in this chapter.

Moreover, another interesting finding of Arestis et al. (2015) is that using the period from 1990 onwards led to a weaker correlation between financial development and growth, which is due to the endogeneity results in the existence of a downward bias to the estimations regarding the relationship between financial development and growth. A potential economic explanation behind this statistical phenomenon is that other factors apart from financial development (e.g. trade openness and human development) also became more significant in influencing economic growth, which weakened the correlation between financial development and growth (Arestis et al., 2015).

Abedifar et al. (2016) used panel data from 22 Muslim countries with a dual banking system (i.e. Islamic and traditional banking) between the years 1999 and 2011. They selected these Muslim nations because the presence of a dual banking system can

have a significant effect on the financial performance of a country and can play an essential role in its economic growth and development.

In recent years, the role of Islamic banking in many countries has grown by a significant level. In this study, the authors investigated the finance-growth nexus through the lens of the banking industry, and in particular, Islamic banking organisations. They used the following three ratios for the three proxies for financial intermediation: (a) total deposits of commercial banks to the GDP, (b) total deposits in the financial system to the GDP, and (c) private capital to the GDP. The authors found a significant positive relationship between the variables and concluded a positive association between financial development and economic growth in the sample of 22 Muslim countries. The authors further stated that financial development is a precursor to economic growth in these countries. Thus, to achieve economic growth, authorities should focus on improving financial performance.

Goldsmith (1969) conducted one of the earliest studies using a cross-country analysis. Goldsmith investigated 35 countries between 1860 and 1963 and concluded that a parallel could be drawn, establishing a relationship between financial development and economic growth if a period of several decades is considered. Goldsmith (1969), Shaw (1973), and McKinnon (1973) reported a close correlation between financial development and economic growth within several countries.

Prescott and Boyd (1986) argued that financial intermediaries are part of an efficient arrangement because they assist in borrowing from and lending to a large group of agents. They serve as a source of information and create relevant information, including a reduction in transaction costs. The result is that the allocation of limited

financial resources becomes more efficient in the economy, contributing to an increase in economic growth and development (Prescott & Boyd, 1986). This finding was also supported by Greenwood and Jovanovic (1990).

However, a distinction between the findings of these two studies is that Greenwood and Jovanovic (1990) stated that, when users use financial intermediaries, there are still associated costs. Greenwood and Jovanovic (1990) argued that accessibility to the credit provided by financial intermediaries is a result of investment activities. Therefore, as more people can access the financial resources provided by financial institutions, the ability of the financial industry to provide reliable information and use this information to make informed decisions regarding the allocation of limited available capital is enhanced.

Calomiris and Hubbard (1990) studied the extent to which firms experience imperfections in capital markets and the resultant effect this has on their ability to access credit, the cost of capital for investment, and economic growth. Using a general equilibrium model of credit allocation where different loan contracts are offered to different types of borrowers, Calomiris and Hubbard (1990) concluded that the extent to which different borrowers can obtain credit is dependent on the distribution of the aggregate net worth of the individuals, the distribution of internal finances, and whether the projects can be observed. For lower-level financial development, Calomiris and Hubbard (1990) concluded that the misallocation of credit from financial institutions and a lower quality of borrowing are likely. This finding led the researchers to conclude that a positive effect exists of financial development on economic growth and that a lack of financial development results in a negative effect on economic growth.

4.4 Overview of Studies Examining Finance-growth Nexus Factors

As mentioned, although the literature on financial development and its relationship with economic growth is expanding, researchers have yet to agree on the direction of the relationship. Moreover, the number of credible and persuasive studies addressing the internal factors that might affect this finance-growth nexus is relatively low, especially considering its essential role in justifying why this effect varies between countries.

Reviewing the literature on these internal factors in a study such as this is critical. First, it helps to understand better which factors have been extensively examined and yield empirical evidence related to the finance-growth nexus. Second, it helps to understand new factors that are being examined and the preliminary evidence provided so far for their effect. Finally, it helps to identify potential new factors to examine.

Numerous researchers have contributed to the literature on the relationship between financial development and economic growth in various contexts by employing contemporary advanced econometrics methods. To the best of my present knowledge, based on the extensive review of the extant literature on the finance-growth nexus provided here, relatively few researchers have investigated the effect of internal factors on the finance-growth relationship. This argument is also supported by Sodeyfi (2016) and Alvarado et al. (2017).

This section of the chapter thus analyses the empirical literature on the internal factors that may affect the finance-growth nexus to explain why such factors could influence this relationship. Up to the present, the internal factors most frequently

discussed in the literature as potentially influencing the relationship between financial development and economic growth include the economic status of the country, technological innovation, democracy, the income level in a country, the rule of law, and the corruption level. These are each discussed below.

Concerning the economic status of a country, significant evidence suggests that the effect of financial development on economic growth is more substantial in the case of developed countries compared to developing countries (Tsai & Wu, 1999; Calderón & Liu, 2003). Such findings are based on a comparison of the regression results for the subsamples of each group of countries, and they explain why most of the countries that failed to prove the finance-growth nexus in the studies discussed above tended to be developing rather than developed countries (Saci et al., 2009). In contrast, other studies have primarily concluded a positive effect of financial development on economic growth within developed countries (e.g. Tsai & Wu, 1999; Calderón & Liu, 2003; Chortareas et al., 2015b; Tsai & Wu, 1999b).

In terms of studies that have focused solely on developing countries when exploring the relationship between financial development on economic growth and the effect of internal factors, Saci et al. (2009) investigated 30 developing economies to analyse how financial development influences economic growth. Through the use of generalised methods of movement (GMM), one-step estimation with a dynamic panel model, and proxies for financial development that consider stock market effects and the banking sector, Saci et al. (2009) concluded that the evidence is mixed. The researchers observed that stock market variables of financial development positively affect economic growth in a statistically significant manner, but the same could not be

concluded for the banking sector variables. When private-sector lending and liquid liabilities were used as variables of financial development, Saci et al. (2009) concluded that financial development negatively affects economic growth within the sampled countries.

Other research has found that the relationship between financial development and growth may be fundamentally different in resource-dominated economies (Badeeb & Lean, 2017; Samargandi et al., 2014). Badeeb and Lean (2017) used the context of Yemen to investigate whether a country's dependence on oil influences the relationship between financial development and economic growth using the ARDL cointegration approach. They also employed the Granger causality test based on the VECM to assess the causal relationship between financial development and economic growth. Interestingly, Badeeb and Lean (2017) concluded that the interaction between financial development and dependence on oil was negative, which indicates that the positive effect of financial development on economic growth reduces in significance with an economy's increase in dependence on oil and natural resources. The findings by Badeeb and Lean (2017) are based on a single country, which limits the generalisability of the findings; nevertheless, given the oil dependence of Yemen, the findings imply that dependence on natural resources, such as oil, reduces the extent of the positive effect of financial development on economic growth, a finding supported by Samargandi et al. (2014).

Another internal factor mentioned in the literature is technological innovation. Bhatti et al. (2013) used data from 36 countries from The Organisation for Economic Co-operation and Development (OECD) and non-OECD countries to perform a

dynamic panel analysis to assess whether financial development combined with a higher level of technological innovation (including R&D activities) may contribute to an increase in economic growth. The researchers concluded that the relationship between financial development and economic growth is complex and conditioned upon R&D spending, where a higher level of R&D spending (and consequently technological innovation) is associated with a weak or negative effect of financial development on economic growth. Thus, technological innovation as an internal factor may be a critical variable influencing the finance-growth nexus (i.e. stronger technological innovation results in a negative or weak positive effect of financial development on economic growth). The researchers found that, at a very high level of R&D spending, the relationship between financial development and economic growth became negative.

Democracy is another internal factor that may affect the finance-growth nexus. Williams (2017) used data from 171 countries over the period from 1960 to 2014 to investigate whether the existence of sound democratic institutions affects the finance-growth nexus. The large sample size suggests strong reliability and generalisability of the research results. The study employed a dynamic panel estimator technique and included a combination of developed and developing countries. Williams (2017) concluded that financial development promotes domestic economic growth. However, the researcher failed to conclude any significant effect of the presence of democratic institutions on the relationship between financial development and economic growth.

The methodology employed by Williams (2017) was based on an earlier empirical analysis conducted by Ishtiaq et al. (2016), who stipulated that economic

growth may be dependent on a range of factors, including traditional factors, such as labour, capital, and technological advancement, and new factors, including financial development and the nature of a country's political regime. According to these researchers, the influence of democracy and the political environment continues to be unexplored when analysing the finance-growth relationship, and this research gap provided the motivation for this study, which investigated the effect of financial development on economic growth under both democracy and dictatorships using data from 1974 to 2013. Even though democracy was found to promote economic growth in terms of its direct effect, its indirect effect through financial development was negative. However, Ishtiaq et al. (2016) found that the magnitude of this negative effect was minimal. Brach and Spanjers (2012) stressed out the importannce of the impact of incalculable political risk, i.e. political ambiguity, on economic development and the choice of development strategy for the period from 1980 to 2008 and found that political ambiguity has a negative effect on economic growth represented by level of capita GDP and growth.

Pan and Wang (2013) investigated the income level as an internal factor related to the finance-growth nexus by dividing 89 countries into three income groups: industrial countries, emerging market economies, and other developing countries. After extracting the unobserved common factors driving both financial development and economic growth, these researchers concluded that the common factors played a more significant role in accounting for the variance of output growth in industrial countries and emerging market economies. In contrast, other developing countries were more influenced by asymmetric shocks.

Seven and Yetkiner (2016) investigated the role of financial development in influencing economic growth in LICs, MICs, and HICs. The authors used a panel data analysis for the 21 years between 1991 and 2011 to investigate the relationship between financial institutions, stock markets, and economic growth based on different levels of income. This methodology was adopted to explain the channels through which financial development influences economic growth. The researchers concluded that, in LICs and MICs, the income level was a statistically significant variable in strengthening the positive effect of financial development on economic growth because banking development in these economies was associated with a positive effect on economic growth. Furthermore, in MICs and HICs, the development of stock markets affected economic growth positively, which led Seven and Yetkiner (2016) to conclude that although a well-functioning financial system contributes to economic growth in developing economies, it is not necessarily sufficient to promote economic growth in HICs.

Chung-Hua and Chien-Chang (2006) attempted to explain the discrepancies that occur between the findings of different studies. They investigated the role of income level as an internal factor twice using two proxies for financial development: bank lending and activities, and capital market performance. The conditional regression revealed that the effect of financial development based on the bank lending proxy was negative, whereas it was positive for the income level using the capital market performance proxy. The empirical analysis conducted by these researchers found that income level is a significant internal factor related to the finance-growth nexus. More specifically, it mitigates the negative effect of bank lending development on economic

growth in HICs and strengthens the positive effect of capital market financial development on economic growth in MICs.

The last two internal factors that may influence the finance-growth nexus discussed in this section are the rule of law and corruption level. Chung-Hua and Chien-Chang (2006) also investigated these two factors and used two similar indicators to assess the role of the rule of law: the creditor protection index and anti-director rights index, which is primarily used as a measure of shareholder protection. The researchers used a conditional regression to conclude that adequate shareholder protection promotes the finance-growth relationship, whereas high levels of corruption and adequate creditor protection mitigate the influence of financial development on economic growth.

Dutta and Mukherjee (2012) analysed whether culture can be a determinant of financial development and stressed out that no earlier literature has examined culture as an informal institution play on financial development, unlike other variables that are widely discussed, like investor protection, legal origin, religion. In their opinion, the only way to test the relationship between culture and economic outcomes is to rely on survey-based evidence which measures culture directly by assessing belief and attitude in individuals. The more individuals trust the society, the more likely they are to engage in financial markets, according to Dutta and Mukherjee (2012). Through combining data from World Value Surveys and European Value Surveys (WVS and EVS), they determined the Cultural Value of a country. In particular, they aggregated the key values of trust, respect, control, and obedience. Additionally, in order to ensure the robustness of their cultural measurement, they also consider the Uncertainty Avoidance Index

(UAI) by Hofstede where a high uncertainty avoidance ranking indicates the country has a low tolerance for uncertainty and ambiguity and rule-oriented society that institutes laws, rules, regulations, and controls in order to reduce the amount of uncertainty (Dutta & Mukherjee ,2012). In their study, the authors found that culture plays an important role in financial development and is not less important than other famous factors such as political factors. Financial developments were measured by five alternative proxies, covering depth, efficiency and capital market performance. Quantile regression shows that culture has the greatest impact on financial efficiency and capital market performance comparing to financial depth. Regarding economic growth, they examine the impact of economic growth on financial development, not the other way around. Furthermore, their results demonstrate that economic growth has the potential to promote financial development.

Table 3. Literature Summary Table

Author	Topic/objectives	Financial Development's proxies	Methodology	Results
Robinson (1952)	Interest rate and other related topics	-	-	Financial development impact is overrated
Goldsmith (1969)	Financial structure and development	¬ The financial interrelations ratio and other ratios	A cross-country analysis	The relationship exists between financial development and economic growth
Jung (1986)	The causal relationship between financial development and economic growth in developed & developing countries	¬ Currency ratio ¬ Broad money supply ratio	Time-series	Financial development positively contributes to economic growth
Lucas (1988)	Investigate the mechanics of economic development	-	-	Economic growth stimulates financial development and the influence of financial development is overrated
Calomiris and Hubbard (1990)	Firm Heterogeneity, Internal Finance, and Credit Rationing	¬ Total deposits of commercial banks ratio ¬ Total deposits in the financial system ratio ¬ Private capital ratio	General equilibrium model	Positive effect exists of financial development on economic growth and the lack of financial development results in a negative effect on economic growth.
Roubini and Sala-i-Martin (1992)	The relationship between the trade regime, degree of financial development, and growth performance in 58 countries	¬ ratio of commercial bank reserves to the money supply	cross-sectional panel-data approach	Significant positive effect of financial development on economic growth
King and Levine (1993a)	The relationship between financial development and economic growth	¬ Liquid liabilities ratio. ¬ deposit money held in domestic banks to deposit money +central bank assets ¬ claims on the nonfinancial private sector to the total domestic credit ¬ the ratio of claims on the nonfinancial private sector to the GDP	Cross-country regression approach	The increase in financial development is significantly and positively correlated to (a) economic growth, (b) the accumulation of physical capital, and (c) improvements in economic efficiency.

Table 3.   Literature summary table

Author	Topic/objectives	Financial Development's proxies	Methodology	Results
Thornton (1996)	Finance-growth nexus in 22 developing countries	Total bank deposits to the nominal GDP	Granger causality	Financial development and economic growth had no unidirectional causality in 15 of the 22 countries
Xu (2000)	How financial development influences investment and, ultimately, economic growth across 41 countries	¬ Credit extended by financial institutions to the private sector ratio ¬ Commercial bank assets to the total financial assets ratio	a VAR approach	Failed to find a significant positive effect on 14 of 41 total countries
Daly& Siddiki (2001)	Economic growth determinants in India	¬ Liquid liabilities of the financial system ¬ The ratios of M1 or M2	ARDL approach	Financial development promotes growth in India.
Siddiki (2002)	Trade and Financial Liberalisation and Endogenous Growth in Bangladesh	the broad money supply	Engle and Granger method (EG) Fully modified least squares method (FMLS)	Positive and significant impact of financial development and trade liberalisation on Growth.
Bloch and Tang (2003)	The role of financial development in economic growth in East Asian countries	¬ value of credit by financial intermediaries to the private	the cross-country evidence	financial development is a statistically significant independent variable influencing economic growth
Calderón and Liu (2003)	Finance-growth nexus between developed and developing economies	¬ broad money (M2) ¬ Credit extended by financial intermediaries to the private sector to the GDP	Geweke decomposition test	financial deepening contributes to economic growth, and this growth, in turn, helps with further financial development
Ogunmuyiwa and Ekone (2010)	Money supply and economic growth in Nigeria	¬ Money supply	OLS Granger causality tests	Direct and positive relationship between the aggregate money supply and economic growth and development

Table 3. Literature summary table

Author	Topic/objectives	Financial Development's proxies	Methodology	Results
Gries et al. (2011)	Finance-growth nexus	PCA to combine the following four proxies: ¬ Commercial bank assets to commercial and central bank assets ¬ Liquid liabilities ¬ Private credit by banks	Granger causality method modified vector autoregression (VAR) vector error correction model (VECM)	Lack of evidence that financial development contributed to economic growth in the studied countries
Kar et al. (2011)	Financial development and economic growth nexus in the MENA countries	¬ Monetary aggregates ¬ Domestic and private credit values ¬ Banking variables	Panel causality testing approach	No significant relationship between finance and growth within the 15 MENA countries. causality between financial development and economic growth was highly sensitive to the measurement of financial development.
Hassan et al. (2011)	finance-growth nexus	¬ domestic credit by financial institutions ¬ domestic credit to the private sector ¬ M3 money supply ¬ gross domestic savings	Combination of time-series and geographical cross-sectional	Positive and statistically significant long-term relationship between financial development and economic growth
Odhiambo (2011b)	Financial Intermediaries and financial deepening	Monetary aggregates	Granger causality test	Strong, positive, unidirectional relationship between economic growth and financial development
Hassan et al. (2011)	Finance-growth nexus	¬ private credit by deposit money banks and other financial institutions over the GDP	cross-sectional regression analysis	a statistically significant and positive long-run relationship between financial development and economic growth
Abduh et al. (2012)	long- and short-term relationships between Islamic and traditional financial development and economic growth	¬ Islamic total financing ¬ Islamic total deposits	Johanson and Juselius (1990) cointegration test and the VECM	both Islamic and conventional financial development was positively and significantly associated with economic growth

Table 3. Literature summary table

Author	Topic/objectives	Financial Development's proxies	Methodology	Results
Abdel-Gadir (2012)	finance-growth nexus in Sudan	¬ liquid liabilities ¬ bank credit to the private sector	the autoregressive distributed lag (ARDL) cointegration approach	found evidence of only a weak relationship between the two variables
Cavenaile and Sougné (2012)	Economic growth, banking development, and institutional investors across OECD countries	¬ Private credit by deposit money banks and other financial institutions over the GDP	a panel cointegration technique	a bi-directional relationship exists in which financial development promotes economic growth, while economic growth also promotes financial development.
Adu et al. (2013)	Investigate finance-growth nexus in Ghana	¬ a new proxy for financial development by combining eight different proxies	ARDL cointegration approach	the effect was both positive and significant when they used the ratio of bank credit to the private sector to the GDP as a proxy for financial development but was negative if they used a different proxy, such as the ratio of liquid liabilities to the GDP.
Cevik and Rahmati (2013)	The long-term relationship between financial intermediation and nonhydrocarbon output growth in Libya	¬ Credit to the private sector	ordinary least squares (OLS) VAR-based estimate	Financial development tends to have a significant negative effect on the real nonhydrocarbon GDP growth. developments in the financial sector has insignificant influence on economic growth in Libya
Nkoro and Uko (2013)	Finance-growth nexus in Nigeria	¬ market capitalisation ¬ M2 ¬ credit to the private sector ¬ the prime interest rate ¬ deposit liability	cointegration technique developed by Engle and Granger	Positive relationship between developments in the financial sector and economic growth in Nigeria.

Table 3. Literature summary table

Author	Topic/objectives	Financial Development's proxies	Methodology	Results
Alkhuzaim (2014)	Analyse the long-term relationship and direction of causality within the finance-growth nexus	¬ M2 ¬ bank credit to the private sector ¬ domestic credit provided by the banking sector	Granger causality test	Weak and insignificant relationship between financial development and economic growth,
Marshal, Solomon, and Onyekachi (2015)	analyse various bank-related factors and their overall influence on financial development and economic growth,	¬ credit to the private sector ¬ credit to the government sector ¬ contingent liability	time-series analysis	insignificant relationship
Abedifar et al. (2016)	panel data from 22 Muslim countries	¬ total deposits of commercial banks ¬ total deposits in the financial system ¬ private capital		positive association between financial development and economic growth in the sample of 22 Muslim countries
Jung's (2017)	finance-growth nexus	¬ M2 as a percentage of the GDP	VAR model Granger causality	Finance and growth are integrated and unidirectional causality from financial development to economic growth exist but not from economic growth to financial development

4.5 Summary and Conclusion

Based on the panel data and time-series analyses presented in this chapter, evidence suggests that, despite the methodological limitations associated with panel data and cross-country regressions, a positive relationship exists between financial development and growth. The various relationships uncovered by different studies indicate that country-specific factors, such as policy considerations and institutional factors, should be considered by researchers when investigating the relationship between financial development and growth.

Researchers in various contexts have reported numerous statistically insignificant negative and positive correlations between financial development and economic growth. This finding serves as a significant challenge for researchers who have claimed the existence of a generally positive and statistically significant influence of financial development on economic growth. There is evidence that time-series data generate findings in this regard that differ from the results obtained by studies using cross-country regression and panel data analyses (e.g. Bloch & Tang, 2003).

This difference may be attributed to the underlying differences between time-series and panel-data methodologies. First, the cross-country approach considers the average of important variables over long periods. Thus, how these variables (e.g. financial development and economic growth and control variables, such as income per capita) interact with each other and their evolution over time are overlooked. However, these difficulties are overcome to an extent when researchers use time-series models.

The second explanation for the difference between findings when using cross-country regression based on a panel data analysis versus time-series analysis is that the

cross-country regression approach assumes that each sampled economy follows a stable growth pattern (Quah, 1993). This assumption is criticised, however, because countries are likely to experience economic crises in the highly interconnected contemporary financial markets and the uncertainty-filled global economy, implying that each country does not follow a stable growth path.

Third, the cross-country panel-data approach assigns countries an equal weight, irrespective of the size of their economies (as measured by the GDP per capita). The cross-country regression approach assumes that weighting is homogenous (Maddala & Wu, 2000), and even if the analysis of a large sample of countries permits observance of a statistically significant and causal relationship between financial development and economic growth, this relationship is the only representative of an average correlation. In other words, as argued by Demetriades and Hussein (1996), such a relationship may or may not necessarily apply to the specific individual countries in a given sample.

The internal factors discussed in the literature that influence the relationship between financial development and economic growth include the economic status of the country, technological innovation, democracy, income level in a country, rule of law, and corruption level. Except for democracy, each of these factors influenced the relationship between financial development and economic growth.

Overall, given the overwhelming evidence on the relationship between financial development and economic growth, it is reasonable to conclude that financial development increases economic growth and promotes financial development. At the same time, it is unlikely that financial development is a critical factor in facilitating economic growth. Instead, financial development works alongside other factors, such

as a significant pool of skilled workers in an economy, a stable political and economic

environment, appropriate corporate governance, and well-designed industrial policies

(Bloch & Tang, 2003).

Chapter Five: Financial Development and Economic Growth in the Context of Saudi Arabia (Case Study)

5.1 Overview

The relationship between financial development and economic growth is an extremely important and intriguing topic. It has been described as one of the most striking empirical macroeconomic relationships uncovered in the past decades (Honohan, 2004; Kim et al., 2018). Previously, the role of finance was not explicitly addressed. It had been assumed that finance is neutral and does not affect economic decision-making, although finance underpins every economic transaction in modern economies. Furthermore, there would be many difficulties and issues in visualising economics in the absence of finance and money. There is, fortunately, a large and expanding pool of literature that supports this relationship between finance and economic growth (Demetriades & Andrianova, 2004).

Financial development and financial institutions influence economic growth through different channels, which include endorsing the nonfinancial sector by promoting innovation, allocating resources efficiently, increasing overall productivity, and creating jobs (Ibrahim, 2013). For the financial sector, alongside its central role, which is to mobilise savings, financial development and financial institutions promote stability and greater competition. Because financial development is a multidimensional concept, numerous methods have been used to scale it.

In the 1990s and as mentioned in the previous chapter, two indicators were extensively used: the broad money index (M3) and the index of domestic credit provided by banks (*DCPS*) (Calderón & Liu, 2003; King & Levine, 1993a; Levine,

1997; World Bank, 1989). However, authors such as Demetriades and Hussein (1996), Luintel and Khan (1999), and Liang and Jian-Zhou (2006) have criticised the use of such an index for measuring financial development. According to the discussions these authors have presented, the depth indicators reflect only the size. However, they do not highlight the access and soundness of the financial systems. Therefore, methods of measuring financial development have evolved a great deal, which is due to the key role of financial development. Despite numerous studies that have been conducted, the effect of financial development varies in the literature. Such a mixture of results is primarily due to the proxy that has been chosen to capture financial development along with the different econometric approaches (Hassan et al., 2011).

One of the latest methods is a mathematical process called PCA, which conducts a new index by extracting information from many different component indicators, avoiding possible multicollinearity problems. These problems generally happen while combining more than one proxy in an equation. Over the years, the PCA has been used in numerous situations, primarily because of its ability to use and follow a vast number of indicators related to the topic (Adu et al., 2013; Ang & McKibbin, 2007; Lenka, 2015b; Ndako, 2010). In the context of Saudi Arabia, one paper used this method to conduct a new financial development index (Samargandi et al., 2014). These scholars combined three component indicators and generated a new proxy for financial development.

The rationale for this chapter is based on two factors. First, it aims to conduct a comprehensive financial development index by including as many influential variables as possible. As discussed in Chapter 4, many indicators are used in the literature only

because many past research studies disagreed on even a single indicator reflecting financial development (Kar et al., 2011). Second, this chapter aims to contribute to this area by empirically showing how and to what extent the proxy is chosen for financial development can impact the economic growth-promoting role of financial development.

Moreover, this chapter considers that the Saudi Arabian financial system has undergone a substantial number of reforms over the years. In addition, the number of papers conducted about Saudi Arabian financial development influence is considerably low compared to the critical role of financial development. The objective of this chapter is to assess the long- and short-term relationship between financial developments and economic growth in Saudi Arabia and to shed light on how much the measurement method is useful in the context of the finance-growth nexus. Additionally, this chapter examines whether this relationship between financial development and economic growth is monotonic.

5.2 Brief Overview of the Saudi Arabian Economy

5.3 Research Methodology and Model Specification

Saudi Arabia, officially known as the Kingdom of Saudi Arabia, is a member of OPEC and classified as a developing country. Geographically, it is the second-largest state in the Arab world, with an area of about 830,000 square kilometres and a population of 31 million. OPEC reports that Saudi Arabia is the world's fourteenth largest country and the second-largest OPEC member. Like most GCC countries, Saudi Arabia pegs its currency to the U.S. dollar to prevent currency fluctuations and eliminate uncertainties in international transactions, and it usually upholds its mandate

of maintaining this peg. To reiterate the pegging, they increase assets reserves for many years to act as a buffer against any potential impacts to government revenues or the fixed-exchange-rate arrangement.

Every five years, Saudi Arabia publishes a development plan. This strategic document outlines the targeted aims to be achieved within the next five-year timeframe. The plans are designed to be responsive and tailored to national requirements, given changing dynamics both domestically and abroad. They are also used as a measuring tool to gauge the effectiveness of implementation against the aims. The following is a summary of each stage of Saudi Arabia's transition.

1970–2004

Oil has dominated Saudi Arabia's economy since it was discovered in 1938, making it highly vulnerable to external factors. Similar to all other oil rentier economies, government expenditure is almost the sole contributor to economic activity and tends to move with oil revenue. Before oil discovery, the economy consisted of agriculture, grazing, and some primitive industries. Following the oil discovery and up to 2004, the government implemented a considerable number of infrastructure projects, encouraged and supported the private sector by providing loans and services, and focused on manufacturing by establishing industrial projects. During this period, these development plans brought fundamental changes to the structure of the national economy, providing a substantial boost in the contribution of non-oil sectors to the GDP (International Monetary Fund, 2016). The Capital Market Authority was established in 2003 to regulate and develop the Kingdom's capital market.

2004–2015

Due to the decline in oil revenue, Saudi Arabia tried to rationalise public expenditure, making outstanding efforts to adopt an expansionary fiscal policy and enhance the performance of public institutions. From 2004, Saudi Arabia expanded the periodic plan from a five-year strategic plan to a long-range plan of twenty years. This new, long-range plan focuses on economic drivers, accelerating growth, and creating a shift towards a knowledge-based economy (International Monetary Fund, 2016). In the finance sector, many financial institutions have grown and improved their performance in enabling and supporting private sector growth. The stock market crashed in mid-2006, and by the end of the year, the TASI index had lost 65% of its value, and the market capitalisation had fallen by half to $326.9 billion. From the crash until 2015, the capital market expanded, and many disclosure roles were enacted to obligate companies.

2016–2018

In April 2016, Saudi Arabia developed a plan that included the following goals: double the amount of foreign direct investment, raise the contribution of the private sector from 40% to 65% and of SMEs from 20% to 35%, rank among the top 10 countries in the Global Competitiveness Index, increase the assets under public investment fund from $600 billion to over $7 trillion, become one of the 15 largest economies in the world, and, most importantly, increase the effectiveness of the public sector. This new plan sets well-defined goals and targets identified by numbers. Most favour increasing institutional investment in the country in the future. By the end of 2018, the number of listed companies reached around 200 and had a market capitalisation of 2.4 trillion dollars.

5.3.1 Introduction of Model Specification

This chapter employs an ARDL approach to calculate the effect of financial development on economic growth using annual data from 1970 to 2016. As this chapter is analysing a time-series dataset, the two suggested regression models are the Johansen and Juselius (1990) cointegration techniques and the ARDL cointegration technique introduced by Pesaran and Shin (1995), called the bound cointegration technique. The choice to use the second option is because the variables in this model are not stationary at the same level, are integrated in a different order I(0) and I(1), and do not require the same stationary level. However, the ARDL cointegration technique requires that no variable is integrated in order 2 and applicable for variables with a mixture of integration of order 1 and 0, which is the case with the variables used in this model.

This selected approach can estimate short-run and long-run relationships and contains the lagged values of the dependent and explanatory variables. The approach uses a combination of endogenous and exogenous variables. In this approach, the long-run relationship of the series is established when the F-statistic exceeds some critical value band, which is discussed later. In this model, the F-statistics exceeds these critical values, and long-run estimations were used. The key benefit of this approach rests in its identification of the cointegrating vectors when multiple cointegrating vectors exist (Nkoro & Uko, 2016).

This chapter examines the effect of financial development along with other explanatory variables on level of gross domestic product using the ARDL cointegration technique. This model is run three times, where three alternative proxies of financial

development are applied. Additionally, this chapter assesses the effect of level of gross domestic product along with explanatory variables on financial development to determine whether the relationship between financial development and level of gross domestic product (the finance-growth nexus) is monotonic in the context of Saudi Arabia. Four equations and models are estimated soon after with the same ARDL cointegration technique.

The research methodology section begins by explaining the specifications of the four models in this study and the hypotheses tested by these selected models. The model specification is followed by an overview of the data collected to represent the variables of the four models. Then, the estimation procedure is explained in detail, including the criteria chosen to select the lag length of each ARDL model in this study. This research methodology section also discusses the mathematical process used to construct the financial development index, also known as the PCA, which primarily aims to convert a set of time-series variables that have a linear correlation with each other into a set of variables that do not have a linear correlation.

5.3.2 Model Specification

This study uses the endogenous growth model and, more specifically, the 'AK' model developed by Rebelo (1990). This model is represented in the equation below:

$$Y = F\ (K,\ L) = AK \qquad\qquad (2)$$

where A is an exogenous constant, and K is the aggregate capital broadly defined to include physical, human, and financial capital. Through this model, the real aggregate output growth is driven by the total factor productivity A and the capital K.

Because this model broadly defined the aggregate capital to include financial capital, many finance-growth restructure models use it as a basic model, and the financial development variable has been placed in their endogenous growth models, such as that by Puatwoe and Piabuo (2017).Therefore , the equation generally can be illustrated as follow:

$$Y_t = \alpha_0 + \beta_1 Financial\ development\ + \beta_2 Oppennes +$$

$$\beta_3\ Investment\ + \epsilon t \hspace{3cm} (4)$$

In this study, four regressions will be conducted by using different financial development proxies and this is to investigate the impact of the proxy chosen to represent the multi-dimensional concept of financial development upon finance-growth nexus. Accordingly, the four regressions model will be presented in Equations (5) to (8), where 0n equation (5)to (7) the dependent variable Y is the logarithm of the real GDP while the dependent variable in equation(8) is the comprehensive proxy for financial development.

$$Y_t \quad = \alpha_1 + \alpha_{11}\ FD1_t\ + \alpha_{21}\ OPN_t + \ \alpha_{31}\ INV_t + \ \epsilon t \hspace{1.5cm} (5)$$

$$Y_t \quad = \alpha_2 + \alpha_{12}\ FD2_t\ + \alpha_{22}\ OPN_t + \ \alpha_{32}\ INV_t + \ \epsilon t \hspace{1.5cm} (6)$$

$$Y_t \quad = \alpha_3 + \alpha_{13}\ FD1_t\ + \alpha_{23}\ OPN_t + \ \alpha_{33}\ INV_t + \ \epsilon t \hspace{1.5cm} (7)$$

$$FD3_t = \mu_0\ + \mu_1\ Y_t \quad + \mu_2\ OPN_t\ + \ \mu_3\ INV_t\ \ + \ \epsilon t \hspace{1.5cm} (8)$$

Where FD_1 is the first proxy for financial development that incorporates only financial depth indicators, FD_2 is the second proxy, reflecting both the depth and efficiency of financial development. Finally, FD_3 is a comprehensive proxy for financial development that includes financial depth, financial efficiency, and capital

market performance. Two control variables were added to the models: *OPN* is the total trade openness as a percentage of the nominal GDP, while investment (*INV*) is the gross capital formation as a percentage of the nominal GDP. Equation (8) is investigating whether the finance-growth nexus is monotonic or supply-leadingand can be illustrated as follow:

It is expected that all variables have a positive effect on level of gross domestic product. For α_{11}, α_{12}, α_{13} and μ_1, the effect is expected to be positive and large because of the significant role of financial development in shifting economic growth in many countries. The theory supports this estimate by Goldsmith (1969), who was the first to investigate the link between financial development and level of gross domestic product. Moreover, both McKinnon (1973) and Shaw (1973) also put forward considerable evidence of such a relationship. Moreover, the effect of level of gross domestic product on financial development which represented by μ_1 is expected to be positive and large and this is based on the pioneering papers (e.g. Robinson, 1952; Lucas, 1988) claiming that finance follows growth.

If the result in this research is not positive, this might be because Saudi Arabia is an oil-rich country, which might compel us to examine this effect on both the oil and nonoil sectors. For α_{21}, α_{22}, α_{23}, α_{31}, α_{32}, α_{33}, μ_2 and μ_3, the coefficients are expected to be positive but not too high due to the positive effect of both investment and trade openness in promoting level of gross domestic product. Nevertheless, because Saudi Arabia is an oil-rich economy, these coefficients might be low.

5.3.3 Methodological Framework

Autoregressive Distributed Lag Model.

Due to the difference in the level of stationarity in our selected variables, these four regression model estimations employed the ARDL approach,which also called the bound testing approach,. The ARDL model was introduced by Pesaran and Shin (1995) and has been used extensively in the literature. The ARDL bounds test approach is considered beneficial compared to the other cointegration methods because of its high robustness to successfully deal with the stochastic behaviour of different variables (Belloumi, 2014).

There is no underlying assumption involved in the ARDL model regarding the order of integration of the variables, which also improves the reliability and accuracy of the findings based on this method (Dufour & Kiviet, 1998). The ARDL method also helps to avoid the issue of pretesting, which is related to the order of integration of variables. In contrast, the other standard cointegration techniques encounter the pretesting problem related to the order of integration of variables (Nkoro & Uko, 2016), further reinforcing the appropriateness of the ARDL model. Another reason that ARDL is a suitable model is its ability to differentiate between the short- and long-term effects of the different variables, which is essential when it comes to the economic analysis, as is the case in this research (Bahmani-Oskooee & Hegerty, 2007; Jiang et al., 2015).

An ARDL model incorporates the lags of different variables within the model. These lags are included within the economic model as part of the ARDL for a range of reasons. These lags comprise the effect lag, decision lag, and recognition lag (Hsiao, 1981). The economic models that incorporate the different lags into the analysis are considered superior because they help uncover the potential effect of independent variables on the dependent variable with lag (Banerjee et al., 1990). A highly suitable

model is the error correction model (ECM), which is a short-term dynamic model that takes the first difference of the variables and the error correction term (Belloumi, 2014). The ECM is a modified version of the ARDL model because, within the ARDL, the dependent variable is a function of its lag and independent variables, including their lags. This function is further illustrated by the ARDL equations presented below. This model cannot be used if any variable is stationary in the second difference $i = 2$.

For farther details, the used ARDL model in this chapter estimates the four regression models (4)-(7) using equation (9) and the regression model (8) using equation (10):

$$\Delta Y_t = \beta_0 + \beta_1 Y_{it-1} + \beta_2 FD_{t-1} + \beta_2 OPN_{t-1} + \beta_3 INF_{t-1} + \sum_{(i=0)}^{p} \psi_{1i}\ \Delta Y_{t-1} + \sum_{(i=0)}^{q1} \psi_{2i}\ \Delta FD1_{t-i} + \sum_{(i=0)}^{q2} \psi_{3i}\ \Delta OPN_t$$

$$+ \sum_{(i=0)}^{q3} \psi_{4i}\ \Delta OPN_t + \epsilon t \qquad\qquad (9)$$

$$\Delta FD_t = \beta_0 + \beta_1 FD_{it-1} + \beta_2 Y_{t-1} + \beta_2 OPN_{t-1} + \beta_3 INF_{t-1} + \sum_{(i=0)}^{p} \psi_{1i}\ \Delta Y_{t-1} + \sum_{(i=0)}^{q1} \psi_{2i}\ \Delta FD1_{t-i} + \sum_{(i=0)}^{q2} \psi_{3i}\ \Delta OPN_t$$

$$+ \sum_{(i=0)}^{q3} \psi_{4i}\ \Delta OPN_t + \epsilon t \qquad\qquad (9)$$

Where p is a number of lags of y (lag order of y) and q is a number of lags of x (lag order of x), β_0 denotes a drift component, Δ denotes a difference operator, and εt is the white noise error term

The null hypothesis in Equation (9) is represented as H_0: $\beta_1 = \beta_2 = \beta_3 = 0$, where no long-term relationship exists between the variables, to test the long-term relationship in the ARDL model. In contrast, the alternative hypothesis confirmed the existence of cointegration in the long-term relationship H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq 0$. The F-

statistic compared Pesaran , Shin& Smith (2001) upper and lower critical bounds at the 5% level. The optimal lag to test this long-term relationship among the variables was chosen based on the Schwarz criterion.

Error Correction Model.

If the cointegration and long-term relationship are confirmed in the ARDL model, then the ECM can be estimated to assess the short-term relationship between the variables of the ARDL model. The equation is estimated by the ECM and is represented in Equation (11) and (12) below:

$$\Delta Y_t = \beta_0 + \beta_1 Y_{it-1} + \beta_2 FD_{t-1} + \beta_2 OPN_{t-1} + \beta_3 INF_{t-1} + \sum_{(i=0)}^{p} \psi_{1i} \, \Delta Y_{t-1} + \sum_{(i=0)}^{q1} \psi_{2i} \, \Delta FD1_{t-i} + \sum_{(i=0)}^{q2} \psi_{3i} \, \Delta OPN_t$$

$$+ \sum_{(i=0)}^{q3} \psi_{4i} \, \Delta OPN_t + vECT_{t-1} + \epsilon t \tag{10}$$

$$\Delta FD_t = \beta_0 + \beta_1 FD_{it-1} + \beta_2 Y_{t-1} + \beta_2 OPN_{t-1} + \beta_3 INF_{t-1} + \sum_{(i=0)}^{p} \psi_{1i} \, \Delta Y_{t-1} + \sum_{(i=0)}^{q1} \psi_{2i} \, \Delta FD1_{t-i} +$$

$$\sum_{(i=0)}^{q2} \psi_{3i} \, \Delta OPN_t + \sum_{(i=0)}^{q3} \psi_{4i} \, \Delta OPN_t + vECT_{t-1} = \pi r^2 - \epsilon t \tag{11}$$

Where ECT is known as Error Correction Term, which indicate that the speed of adjustment parameter, the ECT shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted in current point. Therefore, Equation (10) & (11) not only assesses the short-term relationship but also shows the speed of the adjustments yearly to achieve long-term equilibrium.

Stability Tests.

The model and stability of its parameters are essential for economic inference where instability may lead to difficulties in interpreting the regression results and are usually accrued if an important variable is omitted or a regime shift occurs (Hansen, 1992). Because of the importance of model stability, considerable literature has

developed tests for such a problem. One of the most common tests in applied econometrics is the cumulative sum (CUSUM) test, which was proposed by Durbin and Evan (1975). The CUSUM is an essential test to detect instability in the intercept alone. The CUSUM of squares is another such test.

5.4 Sources of Data and Variable Abbreviations

This chapter used annual data for the period from 1970 to 2015. All datasets (Y, OPN, and INV) and all components of the financial development indices (FD_1, FD_2, and FD_3) were retrieved as row data from the World Development Indicators (WDIs; World Bank, 2016) and the 53rd Yearly Book from the Saudi Arabian Monetary Authority (SAMA, 2017). All variables in this model were transferred to a logarithm to eliminate the problem of heteroscedasticity and achieve a stationary invariance. This transfer was suggested by Lütkepohl and Xu (2012), who investigated the role of log transformations in forecasting economic variables and stated that the log transfer decreases variation in volatility and is a means of stabilising variance. Moreover, this study also confirmed that using the log can result in dramatic gains in forecast precision if the log transformation renders the variance more homogeneous throughout the sample.

5.4.1 Dependent Variable

Economic level of gross domestic product is the dependent variable in three models represented in Equations (5)(6)(7). Economic growth is captured by the logarithm of the real GDP, which is defined as the sum of the gross value from all resident producers in the economy plus any product taxes minus any subsidies not included in the value of the products (World Bank, 2009). It is calculated without

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deducting the depreciation of fabricated assets or the depletion and degradation of natural resources. This variable was retrieved as row data from the World Development Indicators WDI (World Bank, 2016). In the last model represented in Equation (9), the dependent variable is the comprehensive financial development index (FD_3), which is explained as an explanatory variable for the model represented in Equation (4).

5.4.2 Financial Development

Different measures of financial development have been conducted over the years. For instance, Almalki and Batayneh (2015) used a single variable to represent financial development: credit to the private sector as a percentage of the GDP. Lawal et al. (2016) used three variables in their model to represent financial development: the net credit to the private sector to the nominal growth, the broad money supply (M2) to growth, and the stock market turnover ratio to growth. The use of more than one index for financial development in a single model may cause multicollinearity problems because all variables reflect one factor. Some researchers have used the PCA to conduct a new index for financial development to avoid such a problem. Similar and alternative statistical procedures to principal component analysis (PCA) exist. The first is exploratory factor analysis (EFA), although there are significant differences between the two approaches. In EFA, the measured responses are based on the underlying factors, while in PCA, the principal components are based on the measured responses. Furthermore, EFA assumes that variance in the measured variables can be broken down into variance due to common factors and variance due to unique factors. The principal components are linear combinations of the measurements and contain common and unique variances. DeCoster (1998) concluded that EFA is appropriate when the

research aims to find factors responsible for a set of observed responses, and PCA is appropriate when the intention is to reduce the data. The second alternative is linear discriminant analysis (LDA), which, like PCA, reduces dimensionality. However, linear discriminant analysis maximises the separability among known categories by creating a new linear axis and projecting the data points on that axis.

Principal component analysis is chosen in this study because it converts a set of results representing variables with a linear correlation into variables that do not have a linear correlation. Moreover, PCA does not aim to underline the variables that primarily contribute to financial development. Since financial development comprises multidimensional variables and all the indexes are related to each other to reflect the whole picture.

In the literature using this method, the number of component variables to conduct a comprehensive financial development index varies. Jalil and Feridun (2011), Samargandi et al. (2014), and Ang and McKibbin (2007) used three component variables, whereas Adu et al. (2013) and Lenka (2015b) used eight and 15 component variables, respectively. There is no right or wrong count of financial development proxies in this matter. However, there are certainly better and worse ways for conducting financial development indicators when considering the availability of the datasets and the current situation of a country. This chapter adopts the PCA to conduct three financial variables indices: FD_1, FD_2, and FD_3 (the last of which is the most comprehensive).

For the financial development index FD_1, which represents financial depth, only three component variables were used. The first component variable is liquid liabilities, which is money supply M3 to the nominal GDP (*M3/Y*). The second component is money supply M2 to the nominal GDP (*M2/Y*), and the third component is financial system deposits to the nominal GDP (*FSD/Y*). The second index, FD_2, contains all three component variables of FD_1 and three more variables: domestic credit to the private sector to the nominal GDP (*DCPS/Y*), bank credit to the private sector to the nominal GDP (*BCPS/Y*), and bank assets to the nominal GDP (*BA/Y*).

The comprehensive financial development index FD_3, which includes financial depth, financial efficiency, and capital market performance, combines 10 component variables, including the six above variables, stock market capitalisation to the nominal GDP, stock market trading value to the nominal GDP, and the stock market turnover ratio. All variables were transferred to the logarithm.

These 10 variables constructing the three financial development variables (FD_1, FD_2, and FD_3) were employed in at least one article from the relevant literature and were retrieved from the row data from the WDIs (World Bank, 2016) and the SAMA (2017) 53rd Yearly Book. The 10 proxies are explained by illustrating the definitions and justifications for why they are used as a proxy for financial development. Liquid liabilities (*M3/Y*) constitutes one of the traditional measures of financial development. It is calculated by adding currency and deposits in the central bank (M0), transferable deposits and electronic currency (M1), time and savings deposits, foreign currency transferable deposits, certificates of deposit, securities repurchase agreements (M2), traveller's cheques, foreign currency time deposits, commercial paper, and shares of

mutual funds or market funds held by residents. Liquid liabilities have been used extensively to measure the size of financial development in the finance-growth literature (Campos et al., 2008; King & Levine, 1993a, 1993b). This measure (M2/Y) is usually referred to as broad money.

Money supply (*M2/Y*) is the sum of currency and deposits in the central bank (M0), transferable deposits and electronic currency (M1), time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2). Similar to the M3 indicator, this proxy reflects the size of financial development and has been used along with the M3 in several papers to check the robustness of results (Calderón & Liu, 2003). Occasionally, it has been used as a replacement for M3, where M3 data are unavailable. Financial system deposits (*FSD/Y*) entails the sum of demand, time, and savings deposits in deposit money banks and other financial institutions as a share of the GDP. This measure reflects the size of financial development and has been used less extensively in the financial development literature (King & Levine, 1993a; 1993b) because of the lack of available data in certain developing countries.

Arestis and Demetriades (1997) used the M2 money supply to the nominal GDP and the ratio of stock market value to the GDP (a proxy for stock market capitalisation). They employed a methodology including the use of the unit-root test followed by the VAR and cointegration rank, which led Arestis and Demetriades (1997) to conclude that, for Germany, a positive relationship exists between the real GDP per capita and the development of the banking system. Furthermore, they concluded that stock market volatility has a negative and statistically significant effect on the real GDP. However,

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it was a surprising conclusion concerning the effect of the economic growth on financial development, which was explained through the existence of unidirectional causality from financial development to economic growth for Germany. However, they reached a different conclusion for the US, which was attributed to the differences in economic structure, the role of financial markets, and the endogeneity of stock market capitalisation. They concluded a lack of statistically significant evidence suggesting that financial development contributes to economic growth in the US. Conversely, they found considerable evidence to support that economic growth (the real GDP) contributes to the development of capital markets and the banking system; therefore, a positive effect exists of economic growth on financial development in the US.

Total banking assets (*BA/Y*) is another measure used in the literature. It is calculated as an aggregate of asset and liability items in the balance sheets of commercial banks. This measure has been used by several academics (e.g. Atiq & Haque, 2015; Tang, 2006), and it has been commonly regarded as a scale to show the level of development of the banking system in an economy. This indicator is similar to the M2 and M3 indicators in that the ratio of total banking assets to the GDP as a proxy is a comprehensive measure of the size of financial development (depth) and not the extent to which banks in this industry participate in facilitating and mobilising savings.

Bank credit to the private sector (*BCPS/Y*) as a measure reflects the efficiency of the financial sector (not its relative size) by representing one of the main functions of financial intermediaries, namely, to channel savings to borrowers. Under the assumption that the private sector is more productive than the public sector in using funds, this measure is superior to the other measures, which include the availability of

credit to the public sector along with the availability of credit to the private sector within the same category. This indicator is defined as the value of domestic private credit extended to the real sector by depositing bank money as a percentage of the local currency GDP. It has been used extensively by several academics (e.g. Levine et al., 2002; SaraZervos, 1998).

Domestic credit to the private sector (*DCPS*/*Y*) is another measure of financial development used in the literature. This measure includes credit for both deposit-taking banks and other financial institutions. It has been widely used in countries where financial intermediaries other than banks are allowed to provide credit to the private sector. This measure isolates credit being channelled to the public sector (Komal & Abbas, 2015). A higher *DCPS* indicates a higher degree of dependence upon the banking sector for financing and implies a higher level of financial development.

Higher domestic credit provided by the financial institutions in a country indicates a higher degree of dependence placed by the businesses in the banking sector for their financing, which indicates an increase in financial development. However, an essential assumption in the analysis by Hassan et al. (2011) was that financial institutions across the countries in the sample are not subject to the mandated loans to specific favoured industries by the government, which can influence the lending criteria and decision-making by the financial institutions as to which company and within which industry to lend. This assumption affects the appropriateness of domestic credit provided by the financial institutions as a measure of financial development in developing countries. Brown et al. (2009) found that banks in developing countries lack

effective corporate governance and independence because they are influenced by governments, particularly when it comes to lending decisions.

The GDS is calculated by taking the GDP minus any final consumption expenditure. It comprises all the savings of the household, private corporate, and public sectors. As a matter of economics, sustainable growth relies on the percentage of savings diverted to investment, and financial systems play a primary role in diverting these savings into investments. In this regard, Hassan et al. (2011) employed it as a measure for financial development and stated that most of the developing countries that have experienced financial repression and credit control suffer from negative real interest rates, which decrease the savings incentives. This proxy may not fully represent all the functions of financial development, but it is a vital proxy because a high GDS indicates positive real interest rates and a high level of investment, which stimulates growth.

Some papers have instead used the total deposits in savings banks as a share of the GDP, which consists of passbook-type savings deposits and money market deposit accounts at banks and thrifts. Stock market performance measures were added because stock markets play a virtual role in financial development, as stock markets are considered an appropriate channel for money to flow from surplus units to deficit units in the economy through initial public offerings and investment funds. It also helps in mobilising financial savings, providing liquidity, and increasing the level of policy efficiency of companies.

Due to the critical role of stock markets in financial development, many performance indicators have been used to measure financial development along with

the depth and efficiency indicators. The first stock performance measure used in this chapter is the stock market total traded value to the GDP, which is calculated as the ratio of the total value of all traded shares in a stock market exchange to the GDP (and is sometimes expressed as a percentage). It captures trading relative to the size of the economy. The second measure is stock market capitalisation to the GDP, which is calculated as the ratio of the total value of all listed shares in a stock market to the GDP. The third measure is stock market turnover to the GDP and is calculated as the total value of shares traded during a given period, divided by the average market capitalisation for that period. It measures trading relative to the size of a stock market. Stock market performance indices have been used extensively in the literature as indicators of financial development (e.g. Chakraborty, 2008; Dutta & Mukherjee, 2012; Tang, 2006). Figure 2-4 illustrates the three financial development indexes and their components Along with these 10 measures used in conducting our financial development proxy, some measures could not be added due to the lack of available data for the period of the study:

- central bank assets as a percentage of the GDP,

- credit to the government and state-owned enterprises as a percentage of the GDP,

- remittance inflows to the GDP,

- total reserve to GDP,

- net inflows of foreign direct investment as a share of the GDP,

- outstanding domestic private debt securities to the GDP, and

- outstanding domestic public debt securities to the GDP.

Figure 2 Comparison Between The Performance Of The Four Depth Indicators And The

PCA Depth Indicator
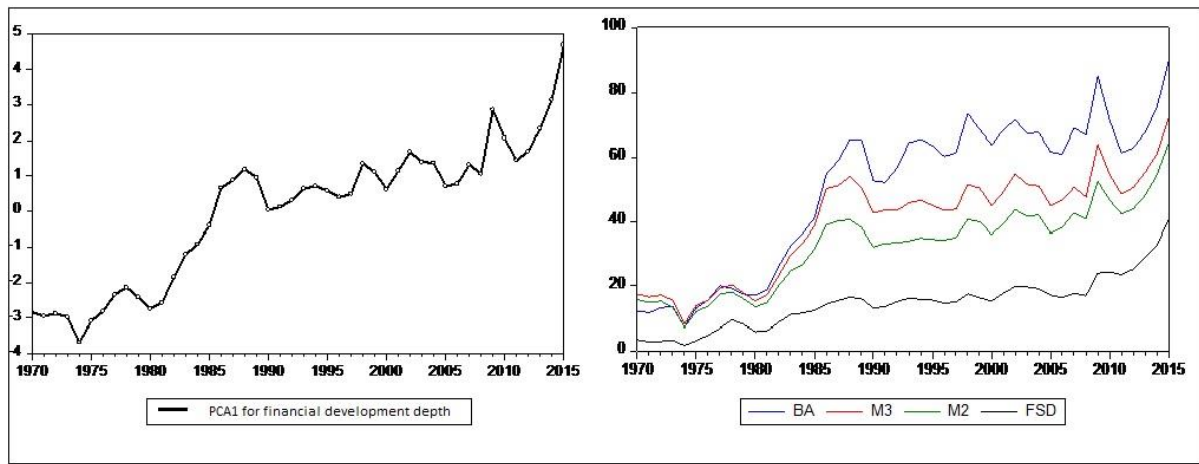
Figure 3 Comparison between The Performance Of the three Efficiency Indicators and the

PCA Efficiency Indicator
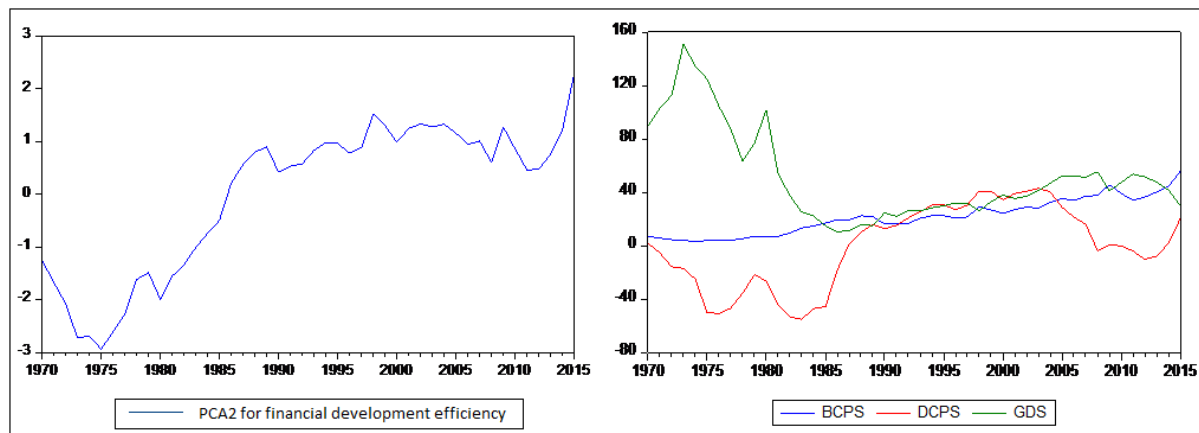
Figure 4 Comparison between The Performance Of the three Performance Indicators and

the PCA Performance Indicator
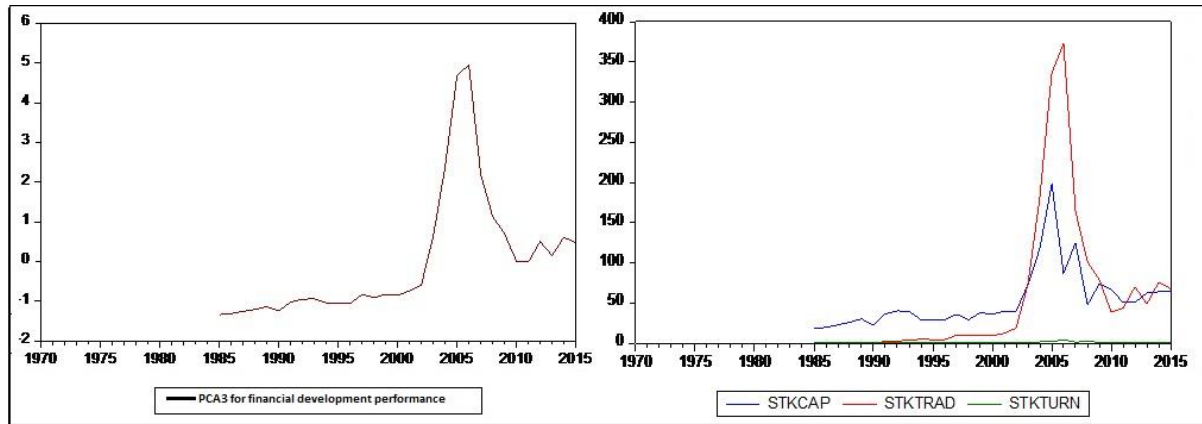
5.4.3 Control Variables

Two control variables were added to the models. The first variable is the total trade openness as a percentage of the nominal GDP. Trade openness is defined as the sum of both exports and imports of goods and services. The second variable is the gross capital formation as a percentage of the nominal GDP (*INV*). The GDS is calculated as the GDP less final consumption expenditure (total consumption). Both the variables were transferred to a logarithm and were retrieved as row data from the WDIs (World Bank, 2016).

Trade and investment are treated as one of the primary tools to boost economic growth through many channels. Moreover, these variables are also used as a control variable (Samargandi et al., 2015; Sanogo & Moussa, 2017) to assess the effect of financial development on economic growth. It is expected that both investment and trade openness promote level of gross domestic product. However, because Saudi Arabia is an oil-rich economy, these coefficients might be low.

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Table 4. Variables descriptions and sources.

Classification	Abbreviation	Description	Source
Economic growth	Y	Logarithm of GDP (constant 2010 USD)[1]	World Development Indicators from the World Bank
Trade openness	OPN	Logarithm of trade openness as a percentage of GDP[2]	World Development Indicators from the World Bank
Investment	INV	Logarithm of Gross fixed capital formation (% of GDP)	World Development Indicators from the World Bank
Financial Development Index	FD_1	Constructive index using principal component analysis	-
Financial Development Index	FD_2	Constructive index using principal component analysis	-
Financial Development Index	FD_3	Constructive index using principal component analysis	-
Liquid liabilities	(M3/Y)	M3 as a percentage of GDP	52nd Annual Report of the Saudi Arabian Monetary Agency
Money supply 2	(M2/Y)	M2 as a percentage of GDP	52nd Annual Report of the Saudi Arabian Monetary Agency
Financial system deposits	(FSD/Y)	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP	Global Financial Development from the World Bank
Gross domestic savings	(GDS)	Gross domestic savings as a percentage of GDP[3]	World Development Indicators from the World Bank
Domestic credit to the private sector	(DCPS/Y)	Private credit by deposit money banks and other financial institutions as a percentage of GDP	Global Financial Development from the World Bank
Bank credit to the private sector	(BCPS/Y)	Private credit by deposit money banks as a percentage of GDP	52nd Annual Report of the Saudi Arabian Monetary Agency
Total banking assets	(BA/Y)	Total banking assets as a percentage of GDP	52nd Annual Report of the Saudi Arabian Monetary Agency
Stock market capitalisation	STKC	Ratio of the total value of all listed shares in a stock market to the GDP	52nd Annual Report of the Saudi Arabian Monetary Agency
Stock market total value traded	STKTD	Ratio of the total value of all traded shares in a stock market exchange to the GDP	52nd Annual Report of the Saudi Arabian Monetary Agency
Stock market turnover	STKRN	Total value of shares traded during a given period and divided by the average market capitalisation	52nd Annual Report of the Saudi Arabian Monetary Agency

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[1] The GDP at purchaser's prices is the sum of the gross value added by all resident producers in the economy plus any product taxes minus any subsidies not included in the value of the products. It is calculated without deducting depreciation of fabricated assets or depletion and degradation of natural resources. Data are in constant 2010 USD. Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor was used.

[2] Trade is the sum of exports and imports of goods and services measured as a share of the GDP.

[3] Gross domestic savings (GDS) is the GDP less the final consumption expenditure (total consumption).

5.5 Preliminary Analysis

5.5.1 Financial Development Variables: Principal Component Analysis

The PCA uses an orthogonal transformation to convert an observation set of possibly correlated variables into a set of linearly uncorrelated variables called principal components. The number of new principal components can be equal to or less than the original variables using this procedure, but typically, the first component is the best among them, considering as much of the dataset variability as possible. The PCA was conducted three times to generate three financial development proxies using different original variables for each of these three proxies of financial development.

The procedure results are presented in Table 5 For the first proxy of financial development FD_1, which reflects financial depth activities, the PCA results indicate that the first principal component is the best in considering the four original variables, explaining 87% of the standardised variance, where the other component explains less than 0.11%. Therefore, the first component was used as an indicator of financial development depth FD_1 because it better explains the variations of all four original variables. The second proxy of financial development FD_2 reflects financial depth and efficiency. Seven original variables were used to generate new principal components explaining the standardised variance of these variables. The first component explained around 87% as an indicator of the financial development depth and efficiency FD_2. The final, comprehensive proxy of financial development (FD_3) reflects depth efficiency and capital market activities, and the first component explained only 80% of the

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standardised variance. However, this component was used as an indicator because it is

the best component reflecting this index.

Table 5. Principal Component Analysis Results

Eigenvalues (Sum = 10, Average = 1)					
Variable	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
FD₁	3.510088	3.050048	0.8775	3.510088	0.8775
FD₂	6.137126	5.574786	0.8767	6.137126	0.8767
FD₃	7.950292	6.402903	0.7950	7.950292	0.7950

Eigenvalues (loading)			
Variable	*FD₁*	*FD₂*	*FD₃*
ln M2	0.524932	0.398038	0.349229
ln M3	0.528837	0.401191	0.348966
ln GDS	0.423383	0.306924	0.224042
ln FSD	0.515291	0.389539	0.341902
ln BA	-	0.397722	0.350113
Ln BCPS	-	0.383877	0.347067
ln DCPS	-	0.359338	0.298667
ln SRKTD	-	-	0.243329
ln STKC	-	-	0.332593
ln STKTRN	-	-	0.295138

Notes: *FD₁, FD₂, and FD₃ indicate financial development depth proxy , financial development depth and efficiency proxy, and the comprehensive financial development proxy respectively. LnM2 and lnM3 indicate the logarithm of money supply 2 and 3 . GDS: gross domestic savings; FSD: Financial System Deposits; BA: Bank assets ; BCPS: Bank Credit to the Private Sector; DCPS: Domestic Credit to the Private Sector; STKTRN: stock market turnover ratio; Stock market capitalisation*

5.5.2 Descriptive Statistics

All descriptive statistics are presented in Table 6, which represents the summary statistics of the six variables used in the four models: level of gross domestic product (Y), financial development 1 (FD_1), financial development 2 (FD_2), financial development 3 (FD_3), trade openness (*TRADE*) and gross capital formation (*INV*) along with the summary statistics of 10 financial proxies employed in constructing the three financial development variables. The summary statistics include the number of observations, the mean, the standard deviation, and the minimum and maximum values for each variable used in these four models.

Table 6. Descriptive Statistic of Model Variables

Variables	Obs	Mean	Median	Max	Min	SD
Level of gross domestic product (*Y*)	46	363.421	350.461	678.730	129.182	131.321
Trade Openness (*OPN*)	46	77.849	75.615	120.620	56.088	12.707
Investment (*INV*)	46	20.57	20.487	29.99	8.834	4.448
Financial Development Index (*FD*1)	46	0.000	0.800	2.665	-5.155	1.894
Financial Development Index (*FD*2)	46	0.000	1.126	3.366	-6.154	2.505
Financial Development Index (*FD*3)	46	0.000	1.216	3.869	-6.304	2.851
Liquid Liabilities (*M*3/*Y*)	46	40.0635	45.0000	72.2800	8.7200	15.9673
Money Supply 2 (*M*2/*Y*)	46	32.8248	35.0550	64.3700	7.5800	12.9740
Financial System Deposits (*FSD/Y*)	46	14.7215	15.3350	40.5700	1.6600	8.1310
Gross Domestic Savings (*GDS*)	46	51.2811	41.2000	151.1100	10.3800	34.5446
Domestic Credit to the Private Sector (*DCPS/Y*)	46	44.4861	50.6450	74.2100	3.4600	20.1809
Bank Credit to the Private Sector (*BCPS/Y*)	46	20.5407	20.7000	54.1900	2.0500	12.7820
Total Banking Assets (*BA/Y*)	46	49.7696	61.1850	90.0200	7.3100	23.7816
Stock Market Capitalisation to the GDP	31	52.923	39.740	198.090	17.800	37.716
Stock Market Total Value Traded to the GDP	31	56.350	9.990	372.790	0.200	92.667
Stock Market Turnover to the GDP	31	69.600	30.400	429.190	1.130	89.175

Source: Author calculations.

Given the information presented in Table 6, all datasets are available from 1970 until 2015 except the dataset related to stock market activity, which is available from 1985 until 2015. This information can be justified by the fact that the first establishment of an official entity to facilitate stock market activities occurred in 1984, where commercial banks founded the Saudi Share Registration Company.

During the period of this study, the GDP ranged from 129.1 to 678.8 billion dollars, and trade openness ranged from 56.0% to 120.6%. However, the average rate of trade openness is 77.8% and only reached 120% once in 1973, when the oil price rose nearly 400% during the 1973 oil crisis period. Investment, which is the gross fixed capital formation as a percentage of the GDP, ranged between 8.83% in 1974 and 29% in 1978.

5.5.3 Test on the Stationary of the Series

Stationarity is a 'mean-reverting process', where shocks in a stationary time series die out steadily and, over time, it remains at its mean. However, shocks in a nonstationary variable persist over time; thus, it diverges from its mean (Levin et al., 2002). It is imperative to check the stationarity status of the time series before moving on with econometric tests. If stationary and nonstationary time series are not distinguished at the beginning, the econometric analysis yields spurious results because stationary and nonstationary time series have different properties (Ng & Perron, 2001). Hence, the first step in this methodology is to check the stationarity status of the time-series analysis so that that stationary time series can be used in further econometric tests. A time series is nonstationary when it contains a unit root. A time series with a one-unit root is known as an integrated of order one ($y_t \sim I\ (1)$).

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However, a time series with no unit root is stationary and known as an integrated of order zero ($y_t \sim I(0)$; Brooks, 2014). The nonstationary time series is differenced to remove the unit root and convert the nonstationary time series into a stationary time series. The most commonly used tests for determining stationarity are the ADF test and the PP test. They both follow a similar pattern to determine the unit root in the time series. However, the ADF test does not consider the autocorrelated residuals, whereas the PP test does consider them, which makes the PP test slightly more robust than the ADF test (Phillips & Perron, 1988). Therefore, the PP test can be used to varify the results of the ADF test. Therefore, the ADF and PP tests are used for this purpose on all variables. Upon the results of the stationary tests, the most effective and efficient technique are chosen.

Table 7 lists the results of all the time-series variables, showing that their *p*-values vary from one variable to another, which means that the null hypothesis for the presence of a unit root cannot be rejected for some variables. In addition, Y and FD_2 are stationary at Level I(0), whereas the remaining variables are stationary for the first difference I(2) according to the ADF test. On this basis, the shocks observed in the time series in ADF indicate that these shocks die over a period but continue to be a part of their means.

Table 7.Stationary Tests Results

Variables	ADF test		ADF test	
	Level I(0)		First difference I(1)	
	Intercept	Intercept and trend	Intercept	Intercept and trend
Y	*-3.247056	-3.227395	* -4.444972	* -4.604229
FD_1	-1.581792	-2.019108	*-6.050842	*-6.009170
FD_2	-1.542582	-1.844205	*-6.308429	*-6.290760
FD_3	-0.970059	-1.778124	*-6.468519	*-6.453164
INV	-1.828279	-1.43825	*-7.360321	*-6.609407
OPN	-2.730898	-2.791058	*-9.37452	*-9.274124

Notes: * Indicates significance at 5%. FD1, FD2,and FD3 indicate financial development depth proxy , financial development depth and efficiency proxy, and the comprehensive financial development proxy respectively. INV: gross capital formation ;OPN: trade openness .

5.6 Empirically Estimated Results and Interpretations

5.6.1 Results of the Cointegration Test

The ARDL cointegration test results are summarised in Table 8. They confirm the existence of long-run cointegration among the variables of all four models. For the first model, investigating the economic effect of financial development size and depth, the optimal lag length was 1, 2, 2, and 2, determined using the Akaike information criterion (AIC). Because the F-statistic (5.9066) was higher than the critical values, the null hypothesis of the long-term relationship nonexistence was rejected; thus, cointegration exists among the underlying model variables at the 1%, 5%, and 10% significance levels. For the second model, investigating the role of financial depth and efficiency, the appropriate lag length using the AIC was 1, 2, 2, and 2.

However, the null hypothesis can be rejected, and the long-term cointegration is evident at the levels of 5% and 10%, but not at the 1% level of significance because the F-statistic (4.9241) is within the critical values of the 1% level of significance. For the third model, which examines the effect of a comprehensive financial development proxy on the economy, the null hypothesis is rejected, and long-term cointegration is evident among the underlying variables at the 99% level of confidence. The optimal lag length determined using the AIC was 1, 2, 2, and 2 for this model. To summarise, all three models that investigate the effect of financial development on economic growth exhibit a long-term relationship among the variables. This ARDL testing approach has been suggested for small observational data and provides better results.

Table 8. F-Statistic to Test the Existence of a Long-Run Relationship

Model	F-Statistic	Decision	
$F_Y(FD_1, OPN, INV)$ ARDL 1,2,2,2	***5.90668	Cointegration exists	
$F_Y (FD_2, OPN, INV)$ ARDL 1,2,2,2	**4.924113	Cointegration exists	
$F_Y (FD_3, OPN, INV)$ ARDL 1,2,2,2	***6.127291	Cointegration exists	
$F_{FD3} (Y, OPN, INV)$ ARDL 1,1,3,1	***4.1746	Cointegration exists	
Critical Value Bounds	1%	5%	10%
Lower Bound	4.29	3.23	2.72
Upper Bound	5.61	4.35	3.77

Notes: FD1, FD2,and FD3 indicate financial development depth proxy , financial development depth and efficiency proxy, and the comprehensive financial development proxy respectively. INV: gross capital formation ;OPN: trade openness

5.6.2 Results of Long-Term Relationships

The estimated long-term coefficients of the four ARDL specifications are presented in Table 9. In all specifications, the financial development coefficient is positive, which confirms the positive key role of financial development in enhancing level of gross domestic product in Saudi Arabia. The positive effect of financial development on level of gross domestic product is consistent with the findings in the literature. Increased financial development (e.g. through the role of financial markets and intermediaries) assists in facilitating borrowing from and lending to a large group of agents who serve as a source of information and create relevant information, including a reduction in the transaction costs. The result is that the allocation of limited financial resources becomes more efficient in the economy, contributing to an increase in economic growth and development (Greenwood & Jovanovic, 1990; Jung, 2017).

However, more components in the financial development proxy result in a lower effect and a lower level of statistical significance. In the first model, where the financial development proxy was restricted to only the size and depth indicators, any increase in financial development causes an increase in the real economic growth by 0.59% in the long term. Investment also has a significant and positive effect on economic growth (2.6%), whereas trade openness has a negative and insignificant effect. This finding can be explained through the argument by Hassan et al. (2011), who stated that a well-functioning financial system and increased financial development are not necessarily sufficient in contributing to economic growth for both developing and developed countries. A well-functioning financial system when combined with other variables (e.g. trade openness in the form of a reduction in trade barriers and

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protectionist policies), negatively weights the influence of financial development on economic growth.

Similarly, for the second model, any increase in the FD_2 financial development proxy that includes both size and efficiency by 1% causes an increase of 0.42% in level of gross domestic product. The effect of trade openness is not significant, and the investment effect is similar to its effect on the first model but reaches 2.29%.

Finally, the most comprehensive financial development proxy (FD_3) has a significant effect on level of gross domestic product in the long term, but compared to the two proxies above, it has a lower effect. In more detail, any increase in the comprehensive proxy of financial development of 1% boosts level of gross domestic product by 0.25% at the 99% level of confidence. Trade openness as a variable does not exhibit any significant effect on economic GDP in this model or the two previous models. For investment (gross capital formation), a significant and positive effect was found in this model, along with the two previous models. Overall, an increase of 1% in investment should boost level of gross domestic product by between 1.34% and 2.6% in the long term.

These findings are explained as follows. When the level of gross domestic product is lower (i.e. for developing countries, such as Saudi Arabia), financial development in the form of increased lending by banks to the private sector and an increase in gross savings positively affects the level of gross domestic product. The rationale is that the ability of households and consumers to borrow from the banking sector allows them to increase their consumption and investment. As consumption and investment are significant components of aggregate demand, the increase in

consumption and investment increases the aggregate demand and, consequently, the level of gross domestic product within the developing economies. These findings by Hassan et al. (2011) support the earlier findings (e.g. Ang and McKibbin, 2007; Giuliano & Ruiz-Arranz, 2009) and the viewpoint of economists that the long-term sustainable economic growth is dependent on the ability of economies to increase the rates of accumulation of their human and financial development. Therefore, the increased level of financial development continues to be an important condition to facilitate an increase in level of gross domestic product.

Table 9. Estimates of Long-Term Coefficients Using the ARDL Model

| | Model Number | | |
Repressor	1	2	3
FD_1	**0.5963 [3.824]		
FD_2		***0.4238 [3.185]	
FD_3			***0.253667 [5.57]
OPN	(-1.813) [-0.853]	(-1.170) [-0.956]	(0.635) [1.005]
INV	*2.679 [1.700]	**2.296 [2.490]	***1.341 [3.652]

Notes: FD1, FD2,and FD3 indicate financial development depth proxy , financial development depth and efficiency proxy, and the comprehensive financial development proxy respectively. INV: gross capital formation ;OPN: trade openness

Table 10.Error Correction Model Results

| | Model Number | | |
Repressor	1	2	3
ECM (-1)	***-0.084 [0.014]	***-0.12 [4.635]	***0.21 [0.0316]
ΔFD_1 (-1)	**-0.044 [0.01]		
ΔFD_2 (-1)		**-.047 [0.25]	
ΔFD_3 (-1)			*-0.03 [-0.018]
ΔOPN (-1)	**0.38 [0.104]	[4.18]	***0.35 [0.091]
ΔINV (-1)	0.095 [0.052]	0.10 [1.35]	*-0.10 [-0.051]

Notes: FD1, FD2,and FD3 indicate financial development depth proxy , financial development depth and efficiency proxy, and the comprehensive financial development proxy respectively. INV: gross capital formation ;OPN: trade openness

5.6.3 Results of Short-Term Relationships

The estimated coefficients of the three error correction models are presented in Table 10 and show that all financial development indicators have negative and significant effects on economic growth in the short term. Moreover, all three values of the ECM are statistically significant and negative, which indicates that any disequilibrium that happens because of the previous year's shock is dissolved by 0.08%, 0.12% and 0.21% in the current year to reach long-term equilibrium. This finding of statically significant and negative short-term effects of financial development on economic growth agrees with the findings by Abdel-Gadir (2012), Samargandi et al. (2014), and Lenka (2015a).

5.6.4 Growth-Finance Nexus Results

In Table 8, the *F*-statistic value is higher than the upper pound, which confirms a long-term cointegration between variables only at 10% and 5%. Therefore, the long-term coefficients estimated in Table 11 reveal that economic growth boosted financial development in Saudi Arabia in the period from 1970 to 2015. Consequently, the finance-growth relationship is monotonic, and any change in economic growth boosts financial development by 3.15% in the long term. The short-term error correction for this ARDL model is estimated in Table 12 and shows no significant effect of financial development in the short term.

5.6.5 Model Diagnosis Tests

All four estimated models used in this chapter are diagnosed, and the results are presented in Table 13. The diagnostic tests for all four models demonstrate that none of these models contain any serial correlation and normality problems. However, Models

1, 2, and 3 failed the Breusch-Pagan-Godfrey heteroscedasticity test. In the literature, many researchers have confirmed that it is natural to find a heteroscedasticity problem in such ARDL models because ARDL models mix time-series data with different stationary levels, which was the case in this chapter. Samargandi et al. (2014), Shrestha and Chowdhury (2005), and Frimpong and Oteng-Abayie (2006) encountered the same issue of heteroscedasticity in such an ARDL model and linked it to the mix of time-series data integrated of order I (0) and I(1).

However, through the use of the Harvey h heteroscedasticity test, all four models can pass the diagnosis test, and no heteroscedasticity is found. Harvey's (1976) tests group-wise heteroscedasticity by assessing the residuals by fitted values. In summary, the four estimated models are relatively robust, considering the justification of homoscedasticity levels. For the stability test, a CUSUM of recursive residuals was performed for all four models, and the results are presented in Figures 2-5. The CUSUM line in all four models lies within the 5% significance level. Therefore, the null hypothesis is accepted, which indicates the stability of the coefficients.

Figure 5 Cumulative Sum of Recursive Residuals

(CUSUM) Charts for Model(1)
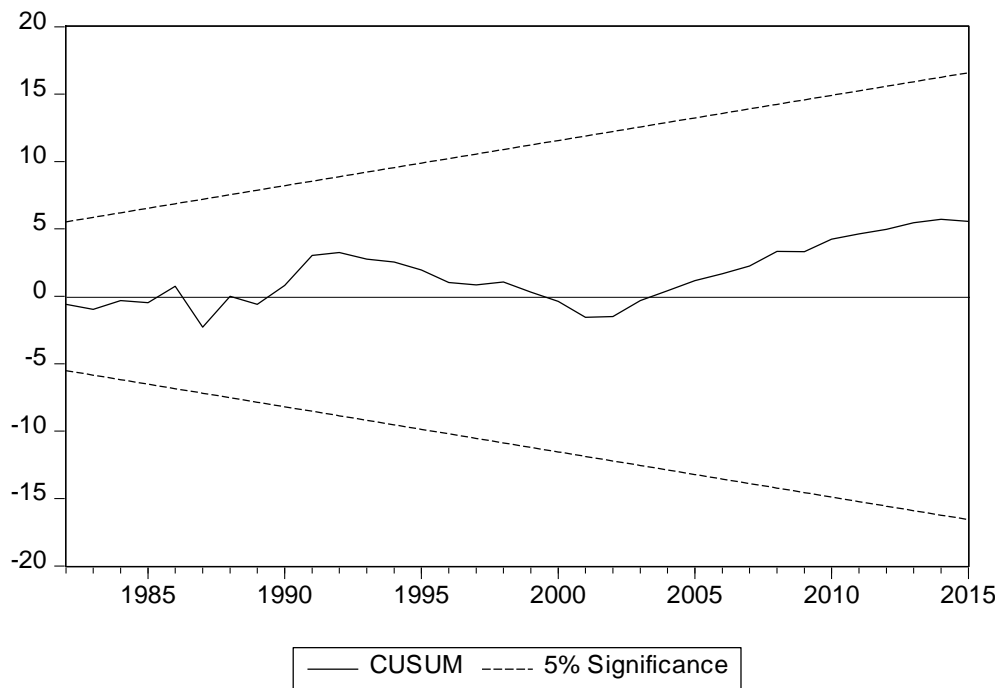
Figure 6 Cumulative Sum of Recursive Residuals

(CUSUM) Charts for Model (2)
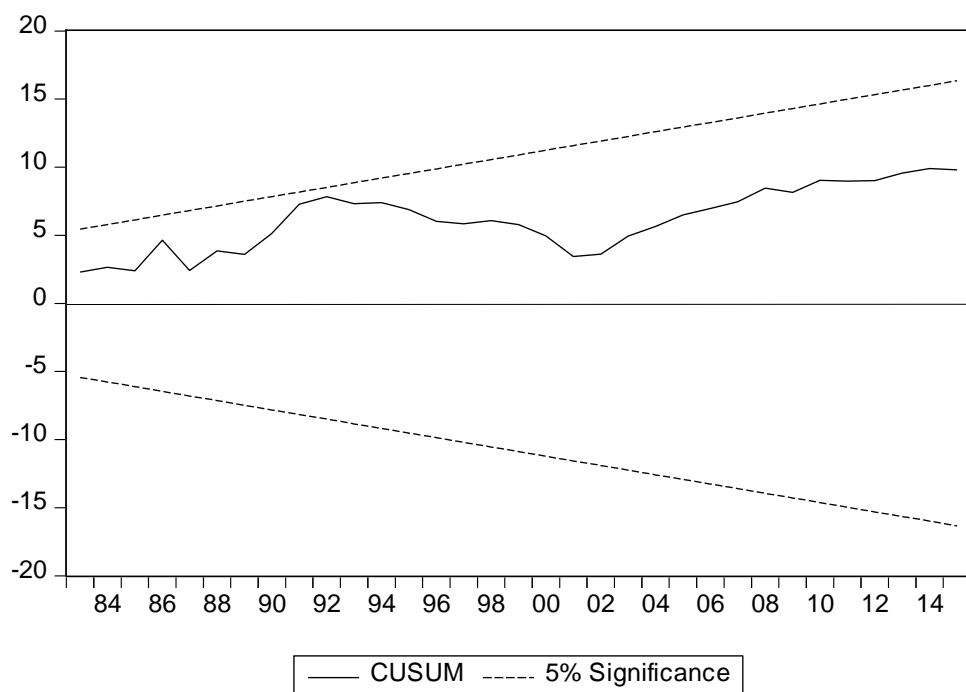
Figure 7 Cumulative Sum of Recursive Residuals

(CUSUM) Charts for Model(3)
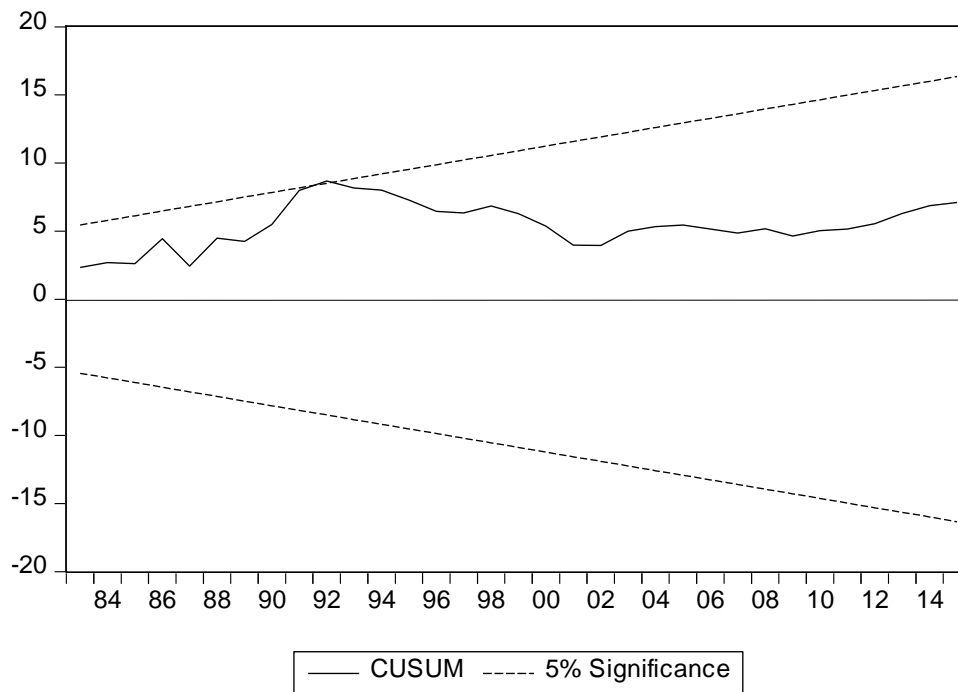
Figure 8 Cumulative Sum of Recursive Residuals

(CUSUM) Charts for Model(4)

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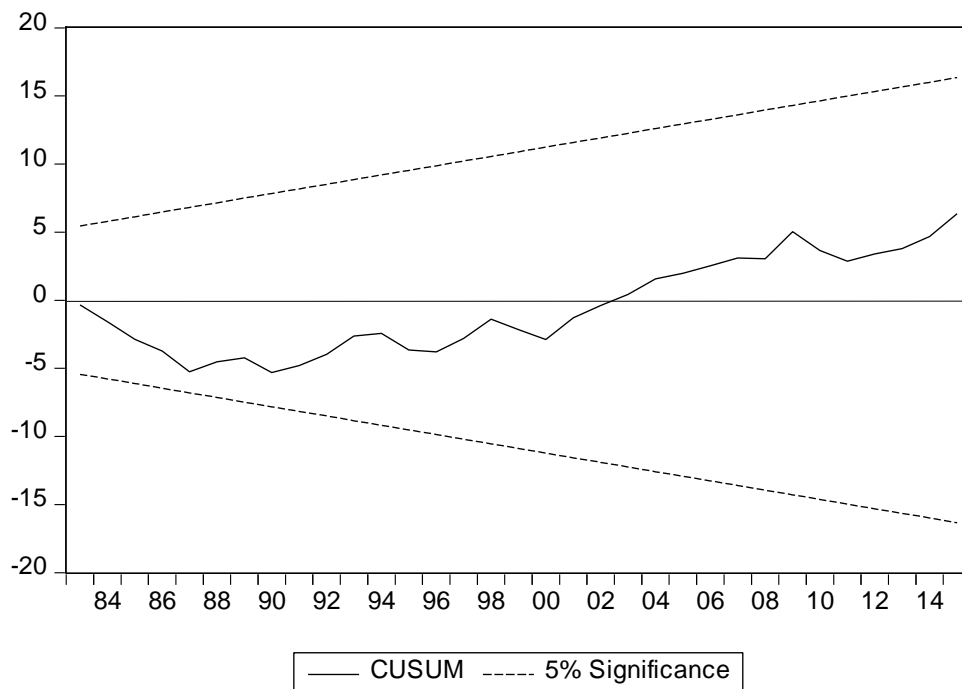
Table 11.ARDL Model (1.1.3.1) Selected Based on the Akaike Information Criterion (Dependent Variable is FD3)

Regressor	Coefficient	Standard error	T. Stat.	P
Y	3.1568	1.373	2.3	0.028
OPN	3.6728	4.542	0.8	0.4245
INV	-4.3755	1.321	3.3	0.0023
ECM (-1)	-0.2145	0.0449	-4.7704	0.000

Table 12.Short-Term Error Correction Estimates for ARDL

Variables	Coefficient	Standard error	T. Stat.	P
ΔY	-0.7327	0.8674	-0.8447	0.4043
ΔOPN	0.6881	0.634	1.08526	0.2857
ΔOPN(-1)	-2.3416	0.7459	-3.1392	0.0036
ΔOPN(-2)	-1.3301	0.6767	-2.0567	0.0477
Δ INV	-0.0404	0.3384	-0.1194	0.9056

Notes: FD1, FD2,and FD3 indicate financial development depth proxy , financial development depth and efficiency proxy, and the comprehensive financial development proxy respectively. INV: gross capital formation ;OPN: trade openness

Table 13.Model Diagnostic Tests for All Four Estimated Models

Model 1	
A: Serial correlation	0.663 (0.521)
C: Normality	3.700 (0.157)
D: Heteroscedasticity	18.84 (0.028)
Model 2	
A: Serial correlation	1.034 (0.367)
C: Normality	0.535 (0.764)
D: Heteroscedasticity	24.37 (0.00)
Model 3	
A: Serial correlation	0.451 (0.640)
C: Normality	0.353 (0.838)
D: Heteroscedasticity	22.22 (0.014)
Model 4	
A: Serial correlation	1.855 (0.173)
C: Normality	0.608 (0.737)
D: Heteroscedasticity	14.38 (0.109)

5.7 Concluding Remarks

This chapter investigated the relationship between financial development and economic growth in the Kingdom of Saudi Arabia. An ARDL bound model was used due to the differences in the stationary levels. In the model described earlier, the real GDP (Y) was used as a proxy for economic growth, and three alternative proxies were used for financial development. The first one (FD_1) reflects only the financial depth or size in the country. The second (FD_2) reflects both financial depth and efficiency, and the third proxy (FD_3) is the most comprehensive and considers capital market development along with efficiency and depth.

The results of this chapter contribute to the literature on the finance-growth nexus by focusing on how the measurement of financial development matters in this relationship. Moreover, the findings also contribute by underlining the fact that financial development is a multidimensional concept and by illustrating a variety of measures used by different authors to assess whether the effect of financial development on economic growth varies between measures. Because the number of papers investigating the finance-growth nexus in developed countries outnumbers those investigating developing countries, this chapter assesses the financial development and growth nexus in the context of Saudi Arabia as a case study of a developing country.

The ARDL results suggest the existence of a long-term equilibrium in the relationship between financial development and economic growth. The results of the estimated coefficients of the long-term relationship confirmed that all the financial development proxies are statistically significant in promoting economic growth. The

effect of financial development is around 0.43% for financial depth and efficiency. An increase in financial development enhances the ability of households and consumers to borrow from the banking sector, which allows them to boost their consumption and investment, respectively, explaining this result. Consumption and investment are components of aggregate demand, implying that the increase in consumption and investment increases the aggregate demand and, consequently, economic growth within the developing economies.

However, a more comprehensive proxy causes a smaller effect. In this chapter, the effect of FD_3 reached only 0.25% in the long term. This slight decline in implications occurred after the addition of capital market performance indicators into the financial development proxy. This finding is attributed to the late establishment of the capital market and to the need for more reform and time to allow the capital market to have an optimal influence. These differences in the effect of financial development allow us to understand why the results of previous studies have differed. We attribute this difference partially to the proxy measure used.

The results of the error correction estimations for the four models indicate that the speed of adjustment to long-term equilibrium is statistically significant, between -0.12% and -0.21%. For the short-term effect, the empirical results of this research have shown that financial development (FD_1, FD_2, and FD_3) has a statistically significant negative effect on economic growth: -0.14%, -0.04%, and -0.03%, respectively. This finding supports the results discovered earlier by Abdel-Gadir, (2012), Lenka (2015a), and Samargandi et al. (2014).

Regarding the effect of economic growth on financial development, the empirical tests suggest that the financial-growth relationship is monotonic in Saudi Arabia, where economic growth effect on financial development is positive and significant in the long term. However, economic growth presents an insignificant effect on financial development in the short term. Economic growth has a much higher effect on financial development than vice versa, which signifies that an increase in economic growth has encouraged policymakers to continue with the financial liberalisation policies and pursue greater financial development. Policymakers are recommended by the results of this chapter to pursue financial development with a focus on capital market reforms to promote and enhance the impact of financial development upon Saudi Arabian economy. Moreover, retaining some policies are suggested as well like policies that aiming to promote financial institutions' size and efficiency in the country and this is because the results revealed that these two elements promote economic growth. However, more reforms are suggested for capital market performance and further investigations why the impact is considerably low is recommended.

Chapter Six: Financial Development and Economic Growth: A Static and Dynamic Panel Data Analysis

6.1 Overview

As mentioned, despite the high importance of the finance-growth nexus and the abundance of empirical literature studying and analysing this relationship, contradictory results were still found between countries and panel groups. Chapter 5 focused on the financial development concept and its multidimensionality, especially that the financial development indicators reached 38 indices and are still expanding as a result of the significant development in the sector. From my viewpoint, the multiplicity of indicators and their differences in terms of the scope they focus on is a key factor behind these contradictory results in the current literature. As the multiplicity of indicators are thoroughly discussed and examined in Chapter 5 using a time-series analysis, this chapter reinvestigates the finance-growth nexus using a panel data analysis and examines the effect of other important factors upon this nexus, such as informal institutions, formal institutions, geographic locations, and income levels of the country.

This chapter investigates the effect of financial development on the economy and adds further evidence of the positive effect of the financial sector from the literature. Additionally, from my perspective, this extra evidence has many advantages that affect the connotation of the results. First, the analysis in this chapter, Chapter 6, relied firmly on the extensive review done in the previous chapter, Chapter 5, regarding which indicator is better to use in a panel data analysis among the current 38 indicators

that represent the size, depth, efficacy, and capital market performance of the financial sector, and not like most of the researchers in the literature who chose an index and backed this decision with other literature that has done the same. Second, in this chapter, the investigated factors were chosen cautiously to maximise the contribution of the results after reviewing all the relevant literature available. The number of credible and persuasive studies addressing the factors that might affect this finance-growth nexus is relatively low, especially considering its essential role in justifying why this effect varies between countries.

Therefore, a separate section of the literature review presented in Chapter 4 was dedicated to discussing all the available literature that searched for factors that might erode or mitigate the finance-growth nexus. Some factors can be classified as extensively examined, such as the country's level of development (developed, developing, and emerging) or as less extensively than the first class, which creates room for addition, such as the level of income, geographic location, and the rule of law. Thus, choosing the four factors was done cautiously to include a factor that had not been discussed before to my knowledge (informal institutions), factors that have been discussed but not extensively (i.e. formal institutions), and factors that have been discussed several times (i.e. income level) to assess whether the result aligns with the literature.

The rationale for this chapter is primarily based on adding further evidence for the positive effect of financial development and providing explanations by examining the selected factors regarding why this effect varies from country to country. The objective of this chapter is first to assess the long-term relationship between financial

development and economic growth in as many countries as possible using the most efficient methodology, considering the results of the diagnostic tests of the available data. The second objective is to investigate some selected internal and external factors that may erode or mitigate this vital nexus.

The chapter follows the same order as the first model specifications and results presented in Chapter 5. In more detail, this chapter starts with the research methodology explanation and the estimators and followed by illustrating all data used as a source of information. The chapter discusses the preliminary results that support using the selected methodology and demonstrates the main characteristics of the chosen variables. By the end of this chapter, the empirically estimated results are illustrated comprehensively, followed by concluding remarks and recommendations.

6.2 Research Methodology and Model Specification

6.2.1 Introduction of Model Specification

This chapter focuses on two primary goals: first, reinvestigating the finance-growth nexus in 107 countries in the period from 1986 to 2016, and second, examining whether the level of this effect is a product of various selected factors and identifying factors that might influence the underlying relationship between financial development and economic growth. The main two factors examined in this chapter are informal institutions (culture) and formal institutions (judicial effectiveness) along with two common factors that been investigated extensively in the literature, which are country income and geographic locations. This further examination of the selected factors contributes to the existing literature by adding additional empirical evidence regarding the question raised in the literature regarding why the effect of financial development

on economic growth varies from one country to another. Moreover, this additional empirical evidence provides useful insight for policymakers to maximise the effect of financial development by promoting these related internal factors for financial sector development.

This chapter examines a panel dataset that consists of a sample of 107 countries over 31 years, which is also called longitudinal data, combining both cross-sectional and time-series data. A panel dataset has various countries or regions, each of which has repeated amounts at several periods and can have individual (group) effect, time effect, or both, which are investigated using the OLS, fixed effect (FE) and random effect (RE) models. Panel data modelling is not simple because models cannot be employed in haste without consideration of the model assumptions and other suitable models that can be used, even if the dataset is in a panel data format.

Panel data modelling and diagnostic problems are illustrated and discussed in detail in this chapter. The outputs of this process of finding the right model found that the dataset of this model has groupwise heteroscedasticity, autocorrelation, and cross-sectional dependence. In this case of panel data modelling, the most commonly suggested three estimators are feasible generalised least squares (FGLS), linear regression with panel-corrected standard errors (PSCE), and the GMM (Reed & Ye, 2011, Moundigbaya, Rea, & Reed, 2018). Choosing between these estimators relies on the nature of the dataset. This chapter employed linear regression with the PSCE estimator. The two main dataset issues were considered in the process of employing the PSCE estimator in this chapter analysis.

The first issue was that FGLS required the number of years (T) be more than the number of countries (N). If there are fewer observations per dataset compared to the number of countries, FGLS cannot be estimated (Moundigbaye et al., 2018). In this case, expanding the number of years to outnumber the 107 selected countries is impossible.

The second issue was that GMM tends to be more efficient in short panels, and this requires converting the dataset to 5-year averaged data where the number of periods (T) is 7. The GMM is employed later as an alternative method as well after converting the dataset into a 5-year average, which adds to the robustness of this chapter's results.

Before presenting the model specifications and methodological framework, like most of the literature discussed, the effect of financial development on the economy is examined in this chapter using the endogenous growth model $Y = Akt$, where the real aggregate output growth is driven by the total factor productivity A and the capital K. It employs financial development along with the majority of essential growth determinants as employed in previous studies (e.g. Durlauf et al., 2004).

Quantitative variables can be continuously 'changing over time' or discrete 'persistent over time', and all the dependent and independent variables in these models are continuous for the period from 1986 to 2016. However, internal factors, such as formal and informal institutions, income level, and geographic location, are highly persistent over time and usually take decades to exhibit a change.

Two models are proposed in this chapter. The first is called 'the baseline model', which includes all the selected macro variables affecting economic growth along with financial development as dependent continuous variables. The second model is 'the

extended model', which includes all the variables from the first model along with the four factors investigated in this chapter.

The baseline model investigates the effect of financial development along with trade openness, government expenditure, investment, and inflation on economic growth. This model provides the coefficients of every explanatory variables' effect on economic growth and demonstrates how significant this effect is in a long-term relationship. This model is used extensively in previous studies, but it yields significant results with different estimators, indicating that financial development promotes economic growth in most of the country samples (Thornton, 1996; Jung, 1986; Jung, 2017; Nkoro & Uko, 2013). However, few credible studies (Gries et al., 2011; Zang & Kim, 2007) have found that no relationship exists in the country samples. This difference in results may be attributed to the econometrics methods and estimators they used, the countries' internal specifications, and the proxy used to capture financial development.

The second model, 'the extended model', reinvestigates the effect of financial development on economic growth and explores the effect of the selected factors. These factors were employed in this model using the interaction terms to assess whether and how these internal factors exert influence on economic growth. The extended model coefficients only show whether these selected internal factors favourably or negatively affect this finance-growth nexus and do not precisely give the coefficients of this effect.

Knowing what factors can amplify or erode the effect of financial development on economic growth offers useful insight for policymakers because promoting financial development is one of the critical goals of most countries. It also offers useful insight

for researchers by giving an empirical explanation of why this effect varies from one country to another.

6.2.2 Model Specifications

An elementary question and problem must be resolved to run an empirical study about economic growth. The problem is how to include all silent growth determinants in the model to reflect the real-world growth of the economy. This point was discussed by Durlauf et al. (2004) in their book analysing all four main endogenous growth models: the AK model, Lucas model, R/AH/GH model, and fertility model. According to Durlauf et al. (2004), the number of silent growth determinants or explanatory variables that can be added to the growth model can reach 145 variables. It is impractical to employ them all in one model. However, it is essential to choose the key macroeconomic variables carefully to increase the level of credibility of an empirical specification.

Before explaining the underlying models (the baseline and extended models), it is important to confirm that several main macroeconomic variables were employed in the growth model initially and were omitted due to their statistically insignificant effect, which leads to the final model below:

$$GROWTH_{it} = \ \beta_0 \ + \ \beta_1 \ FD_{\ it} + \ \beta_2 \ OPN_{it} + \beta_3 \ Gov_{it} \ + \beta_4 \ Inv_{it} \ +$$

$$\beta_5 \ INF_{it} + \beta_6 \ intial \ GDP_{it} + + \ \beta_7 Initial \ EDUC_{it} + \epsilon_t. \qquad (10)$$

The baseline model in this chapter is presented in Equation (10) and includes five macroeconomic variables. This model does not control for the selected factors.

Following the estimations of this baseline model, the extended model explained in Equation (11) was estimated. The extended model includes the same macroeconomic

variables used in the first model, along with the interaction terms of each investigated factor:

$$Y_t = \beta_8 + \beta_9\, FD_{it} + \beta_{10}\, OPN_{it} + \beta_{11}\, Gov_{it} + \beta_{12}INF_{it} + \beta_{13}INV_{it} +$$

$$\beta_{14}intial\, GDP_{it} + \beta_{15}\, Initial\, EDU_{it} + \rho[\, FD(1) \times F_{it}] +$$

$$\Delta\epsilon_{it}. \hspace{6cm} (11)$$

For both models, all symbols and variables are detailed below:

$i = 1\,,\ ...,\ N$, where N is the number of countries (107 countries),

$t = 1\,,\ ...,\ T$, where T is the sample period from 1986 to 2016,

$F = 1,\ ...\ ,\ M$, where M is the number of variables that reflect the four selected factors.

The dependent variable economic growth (*growth*) was proxied using the real GDP per capita growth. The explanatory variable is the financial development (*FD*) proxied by the logarithm of broad money as a percentage of the GDP. The remaining control variables in this model are based on the existing literature. The available data are *TRADE, GOV, INF, INV,* and *EDU*. These are proxied as follows: by the sum of exports and imports of goods and services measured as a share of the GDP for *TRADE*, by the general government final consumption expenditure as a share of GDP for *GOV*, by the CPI (2010 = 100) for *INF*, and by school enrolment for a secondary school in 1986 for the initial *EDU*. The last variable in Equation (1) is *INTIALGDP*, which was added to cover any convergence effect and was proxied by the logarithm of the initial real GDP per capita.

Equation (10) above represents the baseline model, which examines the effect of financial development along with other macro variables on economic growth. The

outcome from Equation (10) is collected from the following coefficients: $\beta_1, \beta_2, \beta_3,$ and β_7.

The second model in Equation (11) is added to examine how the selected factors may erode or promote this relationship between financial development and economic growth. The outcome is primarily from comparing the parameter ρ in Equation (11) for each factor investigated with the parameter β_1 in Equation (10). As mentioned, four factors are investigated in this model by taking the interaction terms. In more detail, the outcome of the extended model is extracted by comparing the coefficients $\rho_{culture}$, $\rho_{judical}$, ρ_{income}, and $\rho_{geopraghy}$ for each factor using Equation (11) with both β_1 in Equation (10) and β_9 in Equation (11). The following four scenarios might be found:

- If $\beta_1 > 0$, and $\rho > 0$ for a specific factor, then these coefficients indicate that financial development has a positive effect on economic growth, and this internal factor enhances this relationship.

- If $\beta_1 > 0$, and $\rho < 0$ for a specific factor, then these coefficients indicate that financial development has a positive effect on economic growth, and the selected factor mitigates this relationship.

- If $\beta_1 < 0$, and $\rho > 0$ for a specific factor, then these coefficients indicate that financial development has a negative effect on economic growth, and this selected factor reduces or obstructs this negative relationship.

- If $\beta_1 < 0$, and $\rho < 0$ for a specific factor, then these coefficients indicate that financial development has a negative effect on economic growth, and the selected factor promotes this negative relationship.

Before ending this section on model specification, it is crucial to illustrate that the number of factors examined in these models is four, and the abbreviation (F) represents these factors. However, the number of variables used to reflect these four factors reached 13. The abbreviation M reflects these variables 'for instance, level of income factor includes three variables high, medium and low-income countries'.

The four factors are as follows:

1. The informal institution (culture) is proxied by the UAI by Hofstede.

2. The formal institutions (rule of law) are proxied by two alternative indices: the JEI and PRI from the Heritage Organisation dataset of the economic freedom index.

3. The income level is proxied by the gross national income (GNI) World Bank classification and includes three groups: HICs, MICs, and LICs.

4. The geography location from the World Bank classification includes six regions: East, South Asia and Pacific (EASIA), Europe and Central Asia (EUR), Latin America and the Caribbean (LATIN), the Middle East and North Africa (MENA), South Asia (SASIA), and sub-Saharan Africa (SUBS).

Therefore, M represents the variable to reflect the four factors, as follows:

M = (*UAI, JEI, PRI, HIC, MIC, LIC, EASIA, EUR, LATIN, MENA, SASIA, SUBS*)

(12)

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Before illustrating the methodology framework, it is imperative to define the steps for each model. For the baseline model presented in Equation (10), the defined steps were as follows:

a) Identify whether the collected data have any trends by making a line graph.

b) Perform a serial correlation test for linear panel data (Wooldridge test).

c) Perform the first pooled OLS, followed by the RE and FE tests.

d) Perform the Housman test and Breusch–Pagan LM to identify whether random or fixed effects is appropriate for these models.

e) Assess the selected model to determine whether serial correlations, cross dependence, or heteroscedasticity exist. To identify this, many tests are performed.

f) Based on the results of the diagnostic tests, choose the most appropriate estimator following the method in the article 'Which Panel Data Estimator Should I Use?' (Reed & Ye, 2011).

In the extended model, the following defined steps were followed:

a) Add the interaction between financial development and the 13 variables (*M*) as explanatory variables.

b) Perform the selected specific model for the first baseline model along with the extended model for each factor *M*.

c) Discuss the estimated results for each factor and compare the coefficients with the baseline model estimated coefficients.

In this section, all estimation techniques employed to compute the estimate parameters of the economic models are described in detail: the linear panel models, common coefficient model pooled OLS, FE method, RE method, and PCSE estimator. Furthermore, all the diagnostic tests used for panel data methods are illustrated, such as the Hausman test, correlation analysis, multicollinearity test, cross-sectional dependence tests, and stationarity tests.

Linear panel models. All panel data are formulated from a sample that includes several cross-sectional units (N) that have been observed at several periods (T). Panel data, known as longitudinal data or cross-sectional time-series data, have observations on consistent units in numerous time periods (Kennedy, 2008). Panel data possibly have individual (group) effects, time effects, or both, which are examined using the OLS, FE, and RE models.

Panel data could be long or short, balanced or unbalanced, and fixed or rotating. When the number of individuals (N) is large and the time period (T) is short, panel data are called short panel data. In contrast, long panel data hold many time periods but few individuals. Either too-long or too-short panel data may cause an inaccurate rejection of a true null hypothesis. The linear panel model with only one explanatory variable as an example is presented in Equation (13):

$$Y_{it} = \alpha + \beta X_{it} + u_{it}, \tag{13}$$

Where Y is the dependent variable, and X is the explanatory variable that has both i and t subscripts for $i = 1, \ldots, N$ and $t = 1, \ldots, T$. However, the constant α and the coefficient β of the explanatory variable do not have subscripts, which means that they are the same across all units for all years. Changing the assumptions about the constant

being identical for all units for all years generates different methods of panel data model estimation. Generally, linear panel data models can be estimated using three methods: OLS, FE, and RE methods.

Ordinary Least Squares, Fixed Effect, and Random Effect. As explained, changing the assumptions about whether the constant is identical for all units for all years or has subscripts for i and t is the main difference between the three estimators. The pooled OLS, which is also called the common coefficient model, implies that the constant is common for all cross-sections based on the assumption that the dataset of the panel is a priori homogenous. The equation of the estimated OLS model is explained in Equation (14):

$$Y_{it} = \alpha + \beta'X_{it} + u_{it} \qquad\qquad (14)$$

The OLS has five main assumptions to produce effective coefficients:

1. Assumption 1: linearity: The regression model is linear where each independent variable is multiplied by a coefficient and summed to predict the dependent variable value. If a linear model is employed in data that are nonlinearly related, the model is incorrect and unreliable, leading to erroneous results.

2. Assumption 2: no endogeneity: The error term has a mean of zero.

3. Assumption 3: normality and homoscedasticity. Normality exists when the error term is normally distributed, and homoscedasticity exists when error terms have equal variance one with another. If a pattern in the variance exists, then the linear regression model has heteroscedastic errors and is likely to provide incorrect estimates.

4. Assumption 4: no autocorrelation: All observations of the error term must be uncorrelated, and each observation of the error term should not predict the next observation. Assess this assumption by graphing the residuals in the order that the data were collected.

5. Assumption 5: no multicollinearity: Multicollinearity happens when two or more variables have a high correlation.

The FE method, which is also called the least squares dummy variable, presented in Equations (15) and (16) treats the constant as group-specific and allows it to change for each unit (n) by adding a dummy variable for each unit:

$$Y_{it} = \alpha_i + \beta' X_{it} + u_{it}, \qquad\qquad (15)$$

$$Y_{it} = \beta' X_{it} + V_{it}. \qquad\qquad (16)$$

The error term becomes V_{it} in the FE method, which is a composite error term that includes the unobserved individual-specific time irrelevant effect (α_i) and time-varying random component effect, which are not constant over the time unit. The RE method differs from the FE method in that the constant is changing for each unit, but as a random parameter, which is represented in Equation (17):

$$\alpha_i = \alpha + m_i. \qquad\qquad (17)$$

Thus, the equation representing this method is illustrated in Equation (18):

$$Y_{it} = (\alpha + m_i) + \beta' X_{it} + u_{it}. \qquad\qquad (18)$$

The constant is still a composite error term, but no dummy variable captures the variation in the cross-sectional dimension.

Returning to the five assumptions, to avoid any biased results, all five assumptions must be assessed prudently. To assess linearity, a graph of observed

predicted values should be plotted. If this graph is symmetrically distributed along the 45° line, then this confirms that the linearity assumption holds. Another approach is to add the squares of the financial development variables and re-estimate the same model as Shen and Lee (2006) did. If the coefficient sign changes, the model is nonlinear. Graphs 1, 2, and 3 plot the residual, showing that the data are linear in parameters and are asymptotic. The second assumption is irrelevant because including a constant in the regression model forces the mean of the residuals to be zero. For the third assumption, the three commonly used assessing tools are the Breusch–Pagan/Cook–Weisberg test, modified Wald test for groupwise heteroscedasticity, and White's test for heteroscedasticity. For the autocorrelation and multicollinearity assumptions, the autocorrelation table between variables lists the level of correlation between variables in the panel data, while Pesaran (2015) showed the cross-section dependence of each variable between countries. Hence, if any of the five assumptions above are not clearly examined as a preliminary analysis, the OLS estimator is no longer the top unbiased linear estimator for the model. There are several estimators suggested for the model.

Panel-corrected Standard Error Estimator. Several econometric attempts have been made to find an efficient estimator when the preliminary analysis of a panel dataset fails the five main OLS assumptions. The most common problems are heteroscedastic difficulties and contemporaneous correlations in the residuals.

The FGLS technique estimates the unknown parameters in a linear regression model when a certain degree of heterogeneity and correlation exists between the residuals in a regression model. The FGLS was first described by Parks (1967) and was made popular by Kmenta (1986). However, FGLS adoption remains limited in part

because the form of heteroscedasticity may be misspecified (Miller & Startz, 2018) and because FGLS cannot be applied on an infinite panel dataset where the number of units (N) is higher than the number of time periods (T). Following that, Beck and Katz (1995) anticipated an adjustment of the full GLS-Parks estimator, called the PCSE. The PCSE conserves the observation weighting for autocorrelation but employs a sandwich estimator to combine the cross-sectional dependence when determining standard errors. The PCSE estimator is exceptionally popular, as confirmed by more than 2000 references on the Web of Science. (Moundigbaye et al., 2018). This estimator has packages in popular software, such as Stata, G, and EViews. and been employed in many recent articles (Dwumfour, 2019; Li et al., 2019; Barako et al., 2006; Moutinho et al., 2017; Le & Nguyen, 2019; Nguyen et al., 2020; Saygılı, 2020; Neves, Marques, & Fuinhas, 2019).

According to Moutinho et al. (2017), PCSE corrects heteroscedasticity by dealing with the one-term variance of observations because there are T observations of estimations in each cross-section unit. Therefore, any increase by 1 in the time dimension increases the performance of the PCSE estimates. Moreover, the PCSE estimation is considered robust to correlation among cross-sections, provided it estimates the between-unit covariance. Nevertheless, it is still a restrictive model by assuming that the diagonal elements of each cross-section variance matrix are constant and that the off-diagonal elements are always 0.

Paul Johnso (2004) simplified the PCSE and FGLS estimators by supposing that only three observations exist per unit. Because GLS typically assumes the error variance matrix Ω is known or can be approximated, the matrix is as follows:

$$Var(e) = \Omega = \begin{bmatrix}
\sigma_1^2 & 0 & 0 & \sigma_{12} & 0 & 0 & \cdots & \sigma_{1N} & 0 & 0 \\
0 & \sigma_1^2 & 0 & 0 & \sigma_{12} & 0 & \cdots & 0 & \sigma_{1N} & 0 \\
0 & 0 & \sigma_1^2 & 0 & 0 & \sigma_{12} & \cdots & 0 & 0 & \sigma_{1N} \\
\sigma_{12} & 0 & 0 & \sigma_1^2 & 0 & 0 & \cdots & \sigma_{2N} & 0 & 0 \\
0 & \sigma_{12} & 0 & 0 & \sigma_1^2 & 0 & \cdots & 0 & \sigma_{2N} & 0 \\
0 & 0 & \sigma_{12} & 0 & 0 & \sigma_1^2 & \cdots & 0 & 0 & \sigma_{2N} \\
 & & & & & & \ddots & 0 & 0 & 0 \\
\vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \cdots & \sigma_N^2 & 0 & 0 \\
\sigma_{1N} & 0 & 0 & \sigma_{2N} & 0 & 0 & \cdots & 0 & \sigma_N^2 & 0 \\
0 & \sigma_{1N} & 0 & 0 & \sigma_{2N} & 0 & \cdots & 0 & 0 & \sigma_N^2 \\
0 & 0 & \sigma_{1N} & 0 & 0 & \sigma_{2N} & \cdots & & &
\end{bmatrix}$$

As presented in the Ω matrix, the autocorrelation is assumed to be eliminated from the data, but Beck and Katz (1995) supposed that the autocorrelated errors follow an *AR* (1) pattern as follows:

$$e_{it} = pe_{i,t-1} + v_{it},$$

where v_{it} are the normal error terms with a mean of 0 and a fixed variance. This *AR* (1) pattern is not the primary focus of the analysis.

Paul Johnso (2004) illustrated that FGLS can be estimated using the residuals of the OLS estimations to estimate the AR(1). Then, AR (1) adjusts the data and re-estimates and reuses the residuals to estimate the cross-correlation across the units. Finally, the results fill in more values of Ω and estimate the GLS model.

According to Paul Johnso (2004), the elementary argument is that the procedure of repeatedly estimating residuals and Ω can 'compound' the inaccuracy in the estimates of the standard error of residuals. The estimates of the standard errors do not consider the uncertainty of the Ω estimates, but take the estimates and insert them. However, the PCSE estimator also uses OLS estimation to generate the residuals but then corrects the estimate using 'panel corrected standard errors'. After this correction

is applied, the error should follow the pattern assumed in the Ω matrix, and the PCSE can be calculated from the residuals.

6.3 Sources of Data and Variable Abbreviations

6.3.1 Dependent Variable

The dependent variable, economic growth, is captured by the growth of real GDP per capita. The GDP per capita as a measure is argued to be a better indicator of any shift or trend in a nation's living standards over time because it considers the population differences between countries (Levine & Zervos, 1998). For instance, if two countries experience the same growth rate in the GDP but one country experiences faster population growth than the other, the country with the lower population growth has a superior GDP per capita growth (Henderson et al., 2011).

The GDP is defined as the sum of gross value from all resident producers in the economy plus any product taxes minus any subsidies not included in the value of the products (WDI, 2009). It is calculated without deducting the depreciation of fabricated assets or the depletion and degradation of natural resources. The GDP per capita is most extensively used as an indicator of a country's economic activity and growth (Law & Singh, 2014).

The GDP per capita growth refers to a percentage change in the GDP per capita (i.e., GDP divided by the population) in the current year compared to the prior year (Hassan et al., 2011). As the GDP per capita growth has been extensively used in the literature as a measure of economic growth (e.g. Saci et al., 2009; Hassan et al., 2011; dAlvarado et al., 2017), this indicates the suitability of the GDP per capita growth as a variable to measure economic growth in this study.

6.3.2 Explanatory Variables

Financial development is the first explanatory variable in this model, which is defined as any process that leads to development in the quality, quantity, and efficiency of financial intermediary services. Because financial development is a multidimensional concept, different measures of financial development have been used in studies over the years. For instance, Almalki and Batayneh (2015) used a single variable to represent financial development. Lawal et al. (2016) used three single variables in their model for financial development. The number of indices that can represent financial development reached 15 (Lenka, 2015b).

However, the use of more than one index for financial development in the single model may cause multicollinearity problems because all the variables reflect one factor. Therefore, some studies have used PCA to conduct a new index for financial development. The PCA aims to convert a set of original variables that show linear correlation into one variable. Each original variable is weighted by its contribution in explaining the variance in a particular orthogonal dimension.

In this model, financial development is measured by the most widely used indicator in the finance-growth nexus studies, the M3 as a percentage of the GDP, which reflects the size and depth of financial development and is widely known as 'liquid liabilities'. This indicator constitutes one of the traditional measures of financial development, which is calculated by adding currency and deposits in the central bank (M0), transferable deposits and electronic currency (M1), time and savings deposits, foreign currency transferable deposits, certificates of deposit, securities repurchase agreements (M2), traveller's cheques, foreign currency time deposits, commercial

paper, and shares of mutual funds or market funds held by residents. Liquid liabilities has been used extensively to measure the size of financial development in the finance-growth literature (Campos et al., 2008; King & Levine, 1993a, 1993b).

The second explanatory variable in this model is trade openness, defined as the sum of exports and imports of goods and services. Trade is treated as one of the key tools to boost economic growth through many channels. Rashid and Azeem (2015) summarised these channels and restricted them to four functions: capital accumulation, equality of factor prices among countries, knowledge transfers, and technology transfers. Due to the importance of trade openness as a share of the GDP, it is used extensively as a growth determinant in many papers. Moreover, this variable is also used as a control variable (Samargandi et al., 2015; Sanogo & Moussa, 2017) to assess the effect of financial development on economic growth.

The third explanatory variable is government spending (formerly general government consumption), which includes all current government expenditures for purchases of goods and services, which include employee compensation and expenditures on national defence and security but exclude government military expenditures that are part of government capital formation. Macroeconomically, government spending is one of the determinants that accelerates economic growth, especially in the Keynesian school of thought, which is discussed in Chapter 2. Most of the literature that has examined the effect of financial development on the economy, which is discussed in Chapter 3, used government expenditure as a control variable in the model (Hassan et al., 2011; Samargandi et al., 2015; De Gregorio & Guidotti, 1995).

The fourth variable is investment, which is calculated using the gross capital formation as a percentage of the nominal GDP. Investment is treated as one of the critical tools to boost economic growth through many channels and has been used as a control variable by several researchers in the literature review in Chapter 4 (Samargandi et al., 2015; Sanogo & Moussa, 2017)

The last variable is inflation, which refers to any sustained increase in the general price level in the economy (Keho, 2010). Inflation is measured through the CPI, which indicates the annual percentage change in the cost incurred by a consumer to purchase a basket of goods and services that might either be fixed or changed at specific intervals, such as quarterly or annually (Bittencourt, 2011; Rousseau & Wachtel, 2011).

Inflation has been used as a control variable in the literature (e.g. King & Levine, 1993a; Keho, 2010) when investigating the effect of financial development on economic growth. Inflation is used as a control variable because keeping inflation constant enables the testing of the relationship between financial development (independent variable) and economic growth (dependent variable). If inflation were allowed to change, this would reduce the relevance of the correlation between financial development and economic growth. Therefore, inflation is used as a control variable.

6.3.3 Four Selected Factors

Based on the common norm that no single development plan is suitable for all countries at any given time, many studies have tried to explain these differences between countries and regions (Harzing, 2003; Majocchi & Presutti, 2009). They agree that the reason behind these differences is the variation in social, economic, geographical, and political characteristics. The internal factors chosen in the extended

model represented in Equation (11) aim to reflect most of these reasons. The four investigated factors are informal institutions (i.e., culture), formal institutions (i.e., judicial effectiveness), income level, and geographic location.

Three more possible factors are omitted because they were extensively examined and discussed in previous studies: the economic development level, innovation level and democracy level. The results of these previous papers provide empirical evidence that the innovation and economic development levels promote the finance-growth nexus. In contrast, the democracy level does not have a significant effect. In this section, all four selected factors used in this chapter are defined generically. The indicators used to capture it are illustrated and justified.

The first factor is informal institutions (culture). The cultural and social characteristics are complex phenomena because it is difficult to describe them neutrally and measure them accurately. Therefore, any process of comparison between countries based on personal and descriptive assumptions is ineffective. Culture is defined as the social behaviour and norms found in human societies. In this field, Professor Geert Hofstede is one of the specialists who had succeeded in interpreting these social characteristics and transformed them into five dimensions ranging from 0 to 100. From 1967 to 1973, he surveyed 116,000 participants in 72 countries. Hofstede's (2001) survey aimed to illustrate how cultural differences between countries can be explained. Among the selected 107 countries in the dataset, Hofstede's UAI is available only for 62 countries.

Regarding the finance-growth nexus, this model focuses on the cultural dimension that might affect savings and investing activities. Therefore, the dimension

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used is the UAI by Hofstede. The definition of the cross-national concept of uncertainty avoidance means the degree to which a country's residents feel comfortable dealing with uncertainty regarding a future environment (De Bellis et al., 2015). The model describes to what extent people feel intimidated by ambiguity and uncertainty, which makes them try to avoid such situations. The lower this index is, the more flexible the residents are. This flexibility can be observed in their willingness to take conscious risks, their acceptance of conflict, and their tolerance (De Mooij & Hofstede, 2010).

The second institutional factor is formal institutions. The rule of law is clearly a multidimensional concept, encompassing a variety of discrete components from the security of person and property rights to checks on government and control of corruption. It is widely assumed that the rule of law is essential for economic growth. Developing countries are already making the rule of law part of their efforts, mainly to follow the thriving market economies and attract foreign investment. As mentioned, it is a multidimensional concept, but this model is focusing on the parts that might affect the key role of financial development, which is to optimally use the savings to finance investment activities, thus boosting overall growth. Therefore, the JEI is used as an indicator that captures how well legal frameworks function in protecting the rights of all citizens against the infringement of the law by others, including by governments and dominant parties. This also includes how fair judicial systems are to ensure that laws are fully respected, with appropriate legal actions taken against violations. The data on the JEI are reported in the Heritage Organisation dataset of the economic freedom index. Among the selected 107 countries in the dataset, the JEI is available for 104 countries.

The third factor investigated in this model is the income level. Based on the literature review, the economic characteristic affects the relationship between financial development and economic growth. Many studies have investigated the effect of financial development on economic growth and compared the results between developing and developed countries. Few studies have compared industrial economies and oil economies. Regarding the economic characteristics, this model uses the income level to assess the effect on the finance-growth nexus.

The World Bank defines low-income economies as those with a GNI per capita calculated using the World Bank Atlas method of $995 or less. Lower- to middle-income economies are those with a GNI per capita of between $996 and $3,895. Middle- to upper-income economies are those with a GNI per capita of between $3,896 and $12,055. High-income economies are those with a GNI per capita of $12,056 or more.

The fourth factor is geographic location, extracted from the Atlas World Bank classification. The 107 countries were divided into seven regions: EASIA, EUR, LATIN, MENA, North America (NAMERICA), SASIA, and SUBS.

6.4 Preliminary Analysis

6.4.1 Sources of Data and Variable Abbreviations

The time period covered for the data in this study is the 31 years from 1986 to 2016, and a total of 107 countries were used. Since this model examines the finance-growth nexus and the factors that can erode and promote it, it is very important to include as many countries as possible to ensure that the sample covers up different characteristics. Originally, all 208 countries datasets were extracted from the World

Bank and included in the analysis, but then the sample size was reduced to 107 based on the availability of data on economic growth (measured by the GDP per capita growth) and financial development (measured by the money supply as a percentage of the GDP) and therefore balancing the panel .As a result of that , the panel data set includes three variables (economic growth, financial development , and trade openness) that are observed every year of the model Period (N=107) as well as three variables that have very few missing data such as Government expenditure (101) Inflation (N-106) , and Investment (N=100). More balancing of the panel set will decrease the number of countries.

Table 14 provides a summary of the variables, including the description of each variable and the sources from which the data were collected. The dependent variable economic growth and macro variables government expenditure, trade, inflation, initial GDP, and initial education level were taken from the WDIs published by the World Bank. The independent variable, financial development, was taken from the WDI and global financial development, as published by the World Bank.

The four internal factors include informal institutions (measured using the UAI), judicial status (measured using the JEI and PRI), income level (HIC, MIC, and LIC) and geographic location. The information on informal institutions was obtained through Hofstede Organisation, judicial status through the Heritage Organisation, and income level and geographical location through the World Bank Atlas.

Table 14.Descriptive Statistics of Variables and Data Sources

Classification	Abbr	Description	Obs.	N	Mean	SD	Min	Max	Source
Dependent variable									
Economic growth	Y	GDP per capita growth (annual %).	3317	107	2.057	5.237	-47.806	140.501	World Development Indicators from the World Bank
Independent variable									
Financial development	FD	Broad money as a percentage of the GDP	3317	107	55.005	38.134	5.735	242.42	World Development Indicators and global financial development from the World Bank
Macro variables									
Government expenditure	GGFC	GGFC as a percentage of the GDP	2916	101	14.879	5.655	.911	47.192	World Development Indicators from the World Bank
Trade	TRD	Trade openness as a percentage of the GDP	3157	106	76.701	49.207	.167	441.604	
Inflation	INF	Inflation in consumer prices in annual %	3107	105	15.471	168.993	-18.109	7481.66	
Investment	GFCF	Gross fixed capital formation as a percentage of the GDP	2898	100	22.213	7.476	-2.424	68.023	
Initial GDP	Y86	Real GDP per capita in 1986	3317	107	8226.86	12913.35	228	64972	
Initial education level	Edu86	Secondary school enrolment in 1986	3131	101	48.126	28.676	3.827	110.483	
Informal institutions									
Uncertainty Avoidance Index	UAI	Level of uncertainty avoidance on a scale from 1 to 100	1922	62	61.839	22.892	8	100	Hofstede Organisation
Formal institutions									
Juridical Effectiveness Index	JEI	Level of JEI on a scale from 1 to 100	3224	104	46.542	20.013	12.9	93	Heritage Organisation
Property Rights Index	PRI	Level of PRI as a scale from 1 to 100	2073	102	49.998	23.207	5	95	Heritage Organisation
Income level:									
High-income countries	HIC	HIC = 1, otherwise = 0.	3317	107	.299	.458	0	1	
Med-income countries	MIC	MIC =1, otherwise = 0.	3317	107	.533	.499	0	1	World Bank Atlas
Low-income countries	LIC	LIC =1, otherwise = 0.	3317	107	.168	.374	0	1	
Geographic location									
East Asia and Pacific	EASIA	EASIA =1, otherwise = 0.	3317	107	.14	.347	0	1	
Europe and Central Asia	EUR	EUR =1, otherwise = 0.	3317	107	.131	.337	0	1	
Latin America/Caribbean	LATIN	LATIN =1, otherwise = 0.	3317	107	.28	.449	0	1	World Bank Atlas
Middle East and North Africa	MENA	MENA = 1, otherwise = 0.	3317	107	.103	.304	0	1	
South Asia	SASIA	SASIA =1, otherwise = 0.	3317	107	.056	.23	0	1	

Classification	Abbr	Description	Obs.	N	Mean	SD	Min	Max	Source
Sub-Saharan Africa	*SUB*	SUB =1, otherwise = 0.	*3317*	*107*	*.29*	*.454*	*0*	*1*	

Notes: The annual percentage growth rate of the gross domestic product (GDP) per capita based on the constant local currency. Aggregates are based on constant 2010 USD. The GDP per capita is the GDP divided by the midyear population. The GDP at purchaser's prices is the sum of the gross value from all resident producers in the economy plus any product taxes minus any subsidies not included in the value of the products. It is calculated without deducting depreciation of fabricated assets or depletion and degradation of natural resources.

Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveller's cheques; and other securities, such as certificates of deposit and commercial paper.

GGFC (formerly general government consumption) includes all current government expenditures for purchases of goods and services (including employee compensation). It also includes most expenditures on national defence and security. However, it excludes government military expenditures that are part of government capital formation.

Trade is the sum of exports and imports of goods and services measured as a share of the GDP.

Inflation, as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.

6.4.1 Descriptive Statistics

Table 14 presents the descriptive statistics, namely the number of observations, number of countries in the sample, mean for each variable, standard deviation, and minimum and maximum values for each variable. Table 15 lists the average statistics by country for each of the 84 countries between the period 1986 and 2016. The average statistics include information on economic growth, trade, government expenditure, inflation, investment, initial GDP per capita, and initial education.

The number of observations for GDP growth per capita is 2,604 based on 84 countries, which indicates that each country has 31 observations (based on the annual frequency of the data over 31 years). The mean GDP per capita growth rate is 2.004%. The standard deviation of GDP per capita growth is 4.15%, which indicates that, 50% of the time, the GDP per capita growth for a sample of countries over the 31 years would be within one standard deviation of the mean growth (i.e. within +/- 4.151% of the 2.004% growth rate). The minimum growth rate for the GDP per capita growth is -47.81%, whereas the maximum growth rate per capita is 36.981%.

China enjoys the highest GDP per capita growth rate (8.6%), followed by Bhutan (5.8%), Republic of Korea (5.2%), Ireland (4.5%), India (4.4%), Mauritius (4.3%), and Thailand (4.2%) over the 1986 to 2016 period. In contrast, the lowest GDP per capita growth rates over this period occurred in the Central African Republic (-1.17%), Burundi (-1.1%), Gabon (-0.6%), Madagascar (-0.48%), Cameron (-0.45%), Republic of Congo (-0.36%), Comoros (-0.28%) and Cote d'Ivoire (-0.12%).

The *FD* variable measures financial development through broad money as a proportion of the GDP. There are 2,604 observations for 84 countries. The mean

financial development over the 31 years is 55.57% with a standard deviation of 40.65%. The lowest money supply as a proportion of the GDP value was 6.54%, and the maximum at 242.4%. The highest financial development occurred in Japan (206.5%), Cyprus (160.9%), Malta (138.3%), Switzerland (133.1%), China (132.5%), Macao (129%), Malaysia (123.7%), Jordan (118.2%), Singapore (105%) and the United Kingdom (104.8%). In contrast, the lowest financial development occurred in Chad (12.9%), Nigeria (15.2%), Comoros (15.6%), Niger (16.2%), Uganda (16.5%), Cameron (16.8%), Rwanda (17.2%), and Sudan (18.1%).

The *TRADE* variable measures trade openness, which is calculated using the sum of exports and imports as a proportion of the GDP. Based on the 2,604 observations for 84 countries, the mean sum of exports and imports as a proportion of the GDP was 73.09% with a standard deviation of 51.17%. The lowest value of the sum of exports and imports as a proportion of the GDP was 0.9%. In contrast, the maximum value of the sum of trade as a proportion of the GDP was 441.6%. The highest trade openness was found in Singapore (355%), followed by Malta (230%), Guyana (170%), Malaysia (169%), Ireland (152%), Macau (143%), and Eswatini (133%). In contrast, the lowest trade openness, in ascending order, was found in Brazil (22%), Japan (23.6%), the US (24%), Sudan (25.2%), Argentina (26.6%), Bangladesh (30.8%), India (31.9%), Pakistan (33.7%), and Burundi (34%).

The GGFC measures government spending as a proportion of the GDP. The data on government spending as a proportion of the GDP are based on 2,597 observations across 84 countries. The mean government spending as a proportion of the GDP is 14.44%. The standard deviation is 5.02%. The lowest value of government

spending as a proportion of the GDP was 0.911%, whereas the highest value during the period was 35.2%. The highest government spending as a proportion of the GDP occurred in Saudi Arabia (26%), Sweden (25.4%), Denmark (24.8%), Botswana (23%), Jordan (22.3%), and Finland (22%). In contrast, the lowest government spending as a proportion of the GDP occurred in Nigeria (3.9%), Bangladesh (4.9%), Dominican Republic (7.6%), Chad (7.9%), Guatemala (8.1%), Indonesia (8.5%), Paraguay (8.8%), Sudan (8.9%), and Madagascar (9%).

The INF measures inflation using the CPI. Based on 2,481 observations for 82 countries using the data available through the World Bank database, the mean CPI is 17.53, and the standard deviation is 188.7. The minimum CPI value was -18.11 (indicating negative inflation), whereas the highest CPI index value was 7,482. The highest inflation index over the period was recorded in Peru (398.5), followed by Brazil (354), Sudan (41), Turkey (40.8), Uruguay (29.5), Ecuador (25.1), Ghana (21.6), Malawi (21.5), Mexico (20.4), and Nigeria (20.3). In contrast, the lowest inflation was recorded in Japan (0.5), Switzerland (1.2), Singapore (1.7), Saudi Arabia (1.74), Germany (1.75), Panama (1.9), Niger (2.04), and Finland (2.2).

The initial education level measures secondary school enrolment as a proportion of the total children within the age that should be enrolled in a secondary school in the year 1986. Based on 2,418 observations for 78 countries, the mean secondary enrolment was 47.7%, and the standard deviation is 28.02%. The minimum school enrolment is 3.82%, and the maximum is 105.6%. The highest school enrolment over the period was recorded in Finland (105.6%), followed by Denmark (105.3%), Ireland (99.5%), Spain (98.2%), Norway (97.3%), the US (94.9%), Switzerland

(94.6%), Korea Republic (92.2%), and Sweden (89.6%). In contrast, the lowest secondary school enrolment, in ascending order, was found in Burundi (3.82%), Burkina Faso (4.51%), Niger (4.78%), Chad (6.24%), Mali (6.80%), Uganda (10.6%), Guinea-Bissau (10.9%), and Bhutan (11.5%). Formal institutions have a Judicial Effectiveness Index of highest in Europe as shown in Figure 9-11 whereas informal institutions have Uncertainty Avoidance Index of lowest in the Middle East and Middle Africa.

Table 15.Average Statistics by Country from 1986 to 2016

|	Country	Economic growth	Financial development	Trade openness	Government expenditure	Investment	Inflation	Initial education level	Initial GDP
1	Algeria	0.70	60.29	57.15	16.71	28.75	9.27	49.66	3848.00
2	Antigua and Barbuda	2.09	76.99	126.15			1.81	75.60	9217.00
3	Argentina	1.45	24.40	26.56	12.03	16.91		70.09	7214.00
4	Australia	1.81	75.55	38.77	17.92	26.14	3.38	81.09	32796.00
5	Bahamas, The	-0.23	48.14	89.36	11.78	26.12	2.66	86.31	28759.00
6	Bangladesh	3.29	39.94	30.79	4.90	22.81	6.34	20.22	394.00
7	Belize	2.57	57.01	110.98	14.71	21.07		57.83	2039.00
8	Benin	0.88	27.46	54.69	14.55	19.72	4.69	16.34	638.00
9	Bhutan	5.77	45.78	86.41	18.58	47.32	6.65	11.59	550.00
10	Bolivia	1.98	53.29	58.67	13.98	16.23	16.55	38.39	1288.00
11	Botswana	3.62	35.35	99.07	23.04	29.00	8.84	31.00	2967.00
12	Brazil	1.10	60.04	21.77	18.19	19.33	354.33		8316.00
13	Burkina Faso	2.25	23.76	39.42	21.78	21.64	2.61	4.51	353.00
14	Burundi	-1.11	21.13	33.89	17.58	11.83	10.59	3.83	314.00
15	Cabo Verde	4.78	66.52	90.70	17.88	39.63	3.76	11.08	864.00
16	Cameroon	-0.45	16.77	46.42	11.64	21.30	3.77	22.43	1829.00
17	Central African Republic	-1.17	18.65	42.01	12.01	11.10	4.61	15.47	546.00
18	Chad	1.79	12.85	65.18	7.92	20.72	3.43	6.25	518.00
19	Chile	3.82	59.99	62.24	11.27	22.94	7.90	77.02	4875.00
20	China	8.60	132.46	40.61	13.97	36.82	5.33	32.63	576.00
21	Comoros	-0.29	15.60	36.48	10.87	16.88	3.19	38.26	1482.00
22	Congo, Republic of	-0.36	20.30	122.25	17.46	25.52	4.07	66.50	832.00
23	Costa Rica	2.52	41.12	77.24	14.78	20.04	11.91	41.85	4572.00
24	Cote d'Ivoire	-0.12	27.49	75.70	13.90	11.91	4.09	19.66	1679.00
25	Cyprus	2.08	160.93	115.81	16.58	21.57	2.58	68.93	16030.00
26	Denmark	1.27	57.35	82.27	24.87	20.45	2.22	105.37	43708.00
27	Dominica	2.40	68.55	94.52			2.10	83.58	3633.00
28	Dominican Republic	3.29	30.55	66.00	7.56	22.21	13.49	51.11	3633.00
29	Ecuador	1.17	25.02	50.05	12.16	20.91	25.17	57.40	3699.00
30	Egypt, Arab Rep.	2.26	84.30	48.22	11.73	20.96	10.80	59.58	1422.00
31	El Salvador	1.61	48.47	63.55	13.26	16.30	7.92	36.53	2042.00
32	Equatorial Guinea	12.97	13.32	117.73	12.46	33.72	4.11	10.15	564.00
33	Eswatini	2.70	23.60	133.70	17.91	16.77	8.82	37.62	1940.00
34	Fiji	1.62	56.40	116.49	17.44	17.36	4.00	71.45	2768.00
35	Finland	1.61	58.15	66.93	22.03	22.97	2.18	105.60	29478.00
36	Gabon	-0.60	18.35	86.76	14.72	27.03	2.34	37.85	11665.00
37	Germany	1.63	72.24	61.83	19.00	21.59	1.75		28738.00
38	Ghana	2.62	24.16	71.32	10.74	19.73	21.62	35.69	761.00
39	Greece	0.69	74.22	48.97	18.95	20.91	6.90	88.55	18741.00
40	Grenada	3.04	75.60	87.63			2.30	80.05	3782.00
41	Guatemala	1.29	33.46	52.37	8.10	15.43	10.25	19.48	2044.00

	Country	Economic growth	Financial development	Trade openness	Government expenditure	Investment	Inflation	Initial education level	Initial GDP
42	Guinea-Bissau	0.27	25.15	50.07	10.68	18.18	19.29	10.95	574.00
43	Guyana	2.81	76.49	169.64	19.20	27.39	5.01	74.98	1625.00
44	Haiti	-1.11	38.55	53.22	9.26		13.62	17.92	1038.00
45	Honduras	1.20	39.40	104.75	15.69	23.80	10.80	34.61	1520.00
46	India	4.47	59.14	31.91	10.97	27.90	7.84	37.35	496.00
47	Indonesia	3.52	43.10	54.48	8.54	27.02	9.58	41.90	1438.00
48	Iran, Islamic Republic of	1.27	49.82	40.35	11.93	28.88	20.06	44.09	4119.00
49	Ireland	4.48	84.05	151.75	16.92	21.74	2.32	99.59	19043.00
50	Italy	0.87	65.97	46.48	18.96	19.97	3.06	74.95	27261.00
51	Jamaica	1.09	55.99	92.03	13.84	23.60	15.60	59.99	3504.00
52	Japan	1.46	206.56	23.68	16.97	27.09	0.52		31473.00
53	Jordan	0.20	118.15	120.20	22.39	24.80	4.65	75.27	3280.00
54	Kenya	1.02	36.63	55.30	15.82	18.68	12.05	38.40	859.00
55	Korea, Republic of	5.19	84.51	70.85	12.53	32.34	3.89	92.18	5952.00
56	Lesotho	2.83	33.68	138.76	36.22	26.45	9.10	21.44	564.00
57	Macao SAR, China	3.96	129.32	142.68	9.71	20.85	4.00	46.60	17928.00
58	Madagascar	-0.48	21.83	58.19	8.99	17.07	12.75	34.19	491.00
59	Malawi	0.85	19.30	60.60	14.76	15.05	21.59	17.04	362.00
60	Malaysia	3.59	123.66	168.69	12.65	27.92	2.61	66.25	3708.00
61	Mali	1.60	22.37	54.72	15.20	19.14	2.75	6.81	470.00
62	Malta	3.37	138.33	229.76	18.20	21.55	2.22	78.11	9592.00
63	Mauritius	4.29	83.72	121.01	13.72	23.82	5.87	44.10	3008.00
64	Mexico	0.83	26.68	50.44	10.07	20.41	20.43	58.07	7470.00
65	Morocco	2.62	78.89	62.61	17.75	27.12	2.88	33.55	1571.00
66	Myanmar	6.04	28.95	11.31	16.78	27.25	19.33	23.21	228.00
67	Nepal	2.50	54.58	46.38	9.29	20.95	8.38	28.12	324.00
68	Nicaragua	0.92	33.40	74.48	15.63	23.68	7.38	31.00	1440.00
69	Niger	0.08	16.26	47.31	14.90	19.07	2.04	4.78	403.00
70	Nigeria	1.98	15.24	35.64	3.88	31.81	20.28	27.22	1332.00
71	Norway	1.54	56.29	69.84	20.81	22.86	2.80	97.26	58682.00
72	Oman	0.34	34.93	90.25	23.51	21.35	2.52	27.61	15147.00
73	Pakistan	1.94	47.42	33.66	11.27	16.01	8.33	19.84	667.00
74	Panama	2.94	62.35	132.44	14.21	23.92	1.92	59.23	4737.00
75	Papua New Guinea	1.45	33.62	103.89	19.80	19.84	7.11	10.42	1519.00
76	Paraguay	1.72	26.49	83.59	8.81	18.64	12.28	30.51	3121.00
77	Peru	2.14	30.80	39.19	10.60	20.37	398.59	61.74	3492.00
78	Philippines	2.28	53.41	77.57	10.33	20.86	6.12	63.65	1391.00
79	Portugal	1.92	87.60	65.44	18.16	22.91	4.56	57.84	13124.00
80	Rwanda	2.88	17.24	35.95	14.40	17.27	6.60	16.08	397.00
81	Samoa	1.69	36.58	79.55			4.58	81.52	2411.00
82	Saudi Arabia	1.13	51.10	73.13	25.79	21.07	1.74	27.42	17604.00
83	Senegal	0.76	21.90	59.88	14.84	20.67	2.36	13.41	1108.00
84	Seychelles	2.69	68.00	133.25	32.44	29.55	4.42	110.48	6099.00
85	Sierra Leone	0.40	16.72	52.74	9.91	11.50	7.56	16.63	441.00
86	Singapore	3.97	105.16	354.85	10.03	30.22	1.68		16872.00
87	South Africa	0.71	61.14	52.53	19.09	18.67	8.17		6130.00
88	Spain	1.81	83.56	50.11	17.70	24.11	3.40	98.22	18752.00
89	Sri Lanka	4.15	37.91	67.37	10.77	24.52	9.66	63.65	1107.00

	Country	Economic growth	Financial development	Trade openness	Government expenditure	Investment	Inflation	Initial education level	Initial GDP
90	St. Kitts and Nevis	3.08	94.63	91.64			2.65	69.88	7429.00
91	St. Lucia	2.17	68.66	104.01	15.05	20.52	2.70	41.68	5029.00
92	St. Vincent and the Grenadines	2.87	67.15	98.62	21.17	25.83	2.42	35.93	2959.00
93	Sudan	3.36	18.09	25.22	8.97	15.68	40.81		732.00
94	Suriname	0.73	60.55	97.52	12.04	42.08	42.88	63.04	6550.00
95	Sweden	1.65	51.18	74.97	25.45	22.87	2.39	89.62	35037.00
96	Switzerland	0.94	133.08	97.41	11.73	25.52	1.24	94.62	58542.00
97	Thailand	4.25	100.28	106.07	13.20	28.97	3.26	30.16	1727.00
98	Togo	0.49	33.50	83.36	12.11	16.65	3.83	18.98	562.00
99	Trinidad and Tobago	2.49	48.39				6.65	82.81	6510.00
100	Tunisia	2.24	54.93	90.40	17.05	23.40	4.50	39.51	2079.00
101	Turkey	3.09	38.45	43.39	12.33	24.67	40.69	44.56	5936.00
102	Uganda	2.83	16.49	37.80	11.14	19.15	6.72	10.60	274.00
103	United Arab Emirates	-1.87	49.43	138.97	9.64	21.57	2.82	67.42	64972.00
104	United Kingdom, The	1.79	104.75	52.07	18.66	18.30	2.81	83.99	25061.00
105	United States, The	1.59	74.90	23.97	15.26	21.15	2.63	94.97	32925.00
106	Uruguay	2.93	45.31	45.88	12.38	15.95	29.54	73.62	6350.00
107	Vanuatu	0.29	98.35	97.81	22.32	24.72	3.52	14.69	2612.00

Figure 9. Formal and Informal Institutions Proxy by Regions
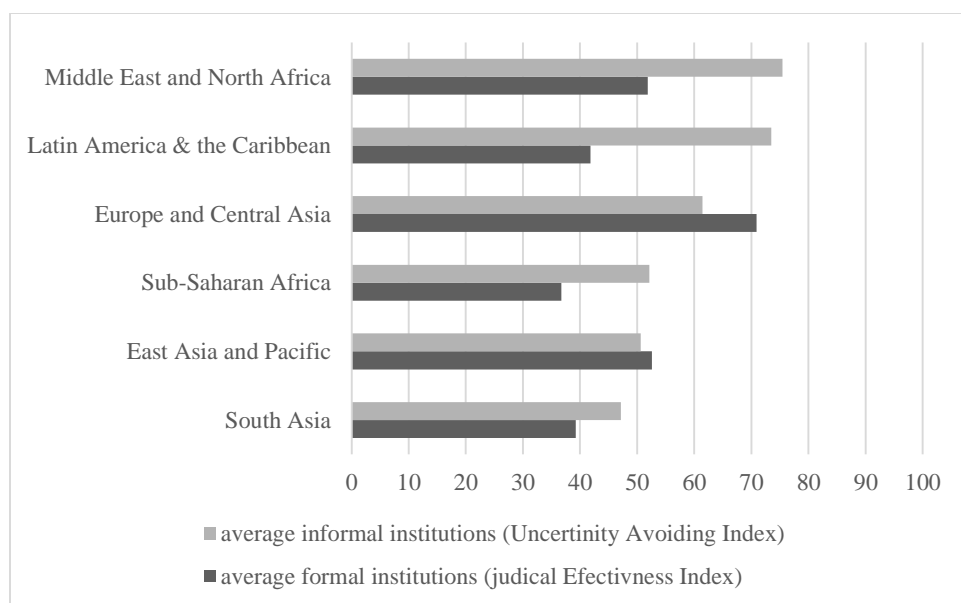
Figure 10. Formal Institutions Proxy by Country
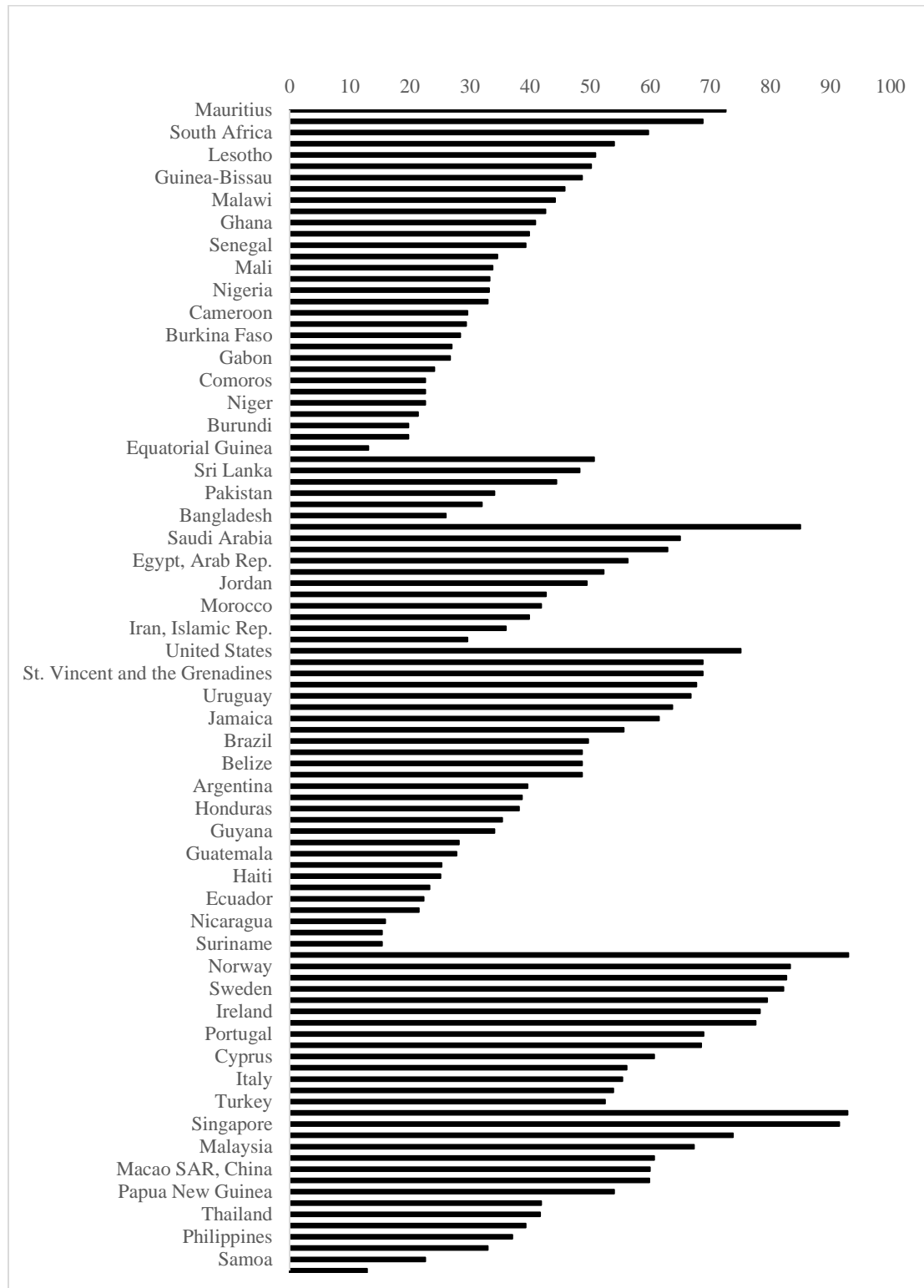
Figure 11. Informal Institutions Proxy by Country
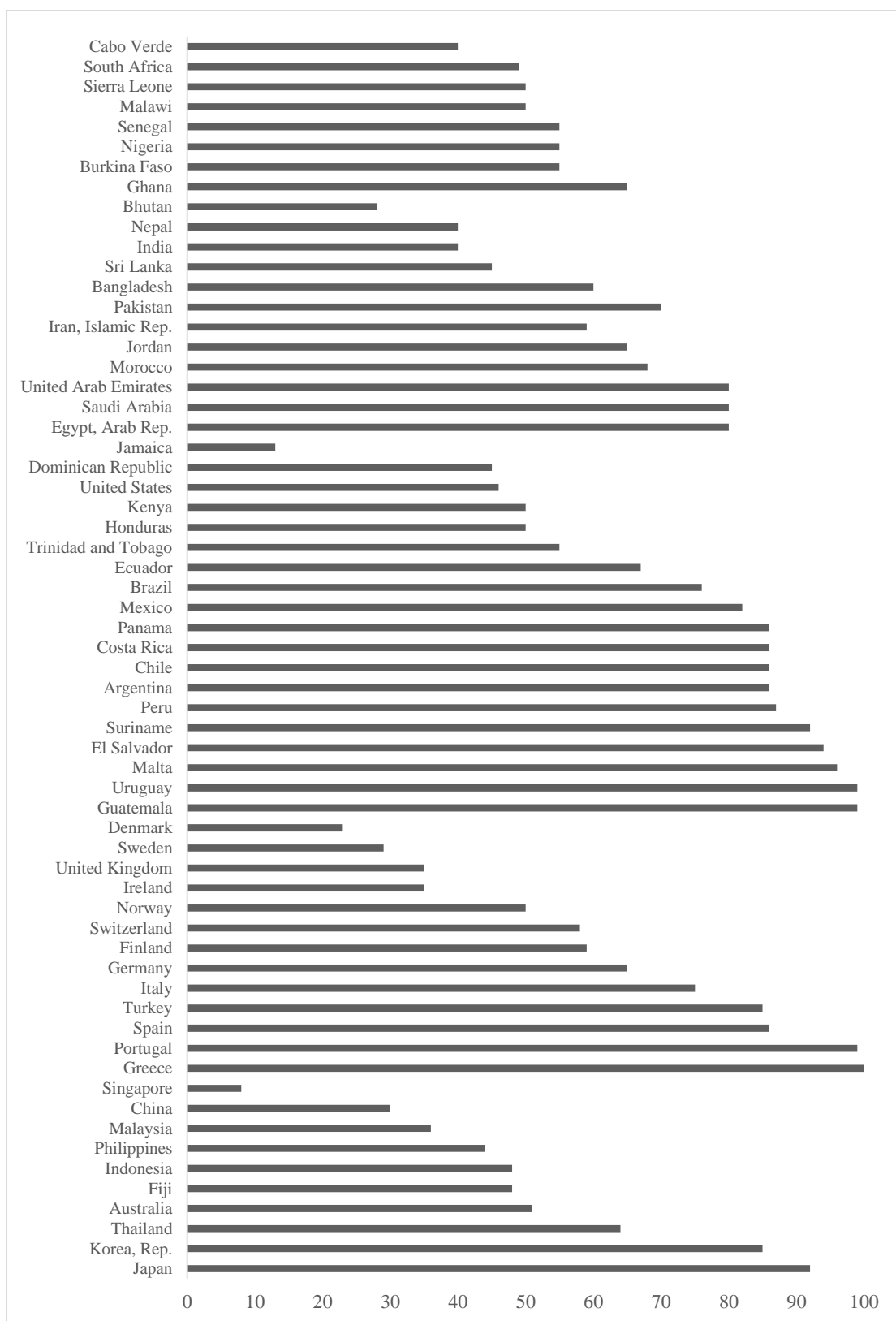
6.4.3 Correlation Analysis

The correlation analysis was conducted (see the correlation matrix in Table 16 to understand whether a high correlation exists between any two variables. As observed in Table 16, economic growth has a significant correlation with all the variables. However, all the correlation associations are small or medium based on Cohen's *d* (1988) where any significant correlation less than 0.3 describes a small correlation, and a moderate correlation is any coefficient between 0.3 and 0.6. Therefore, based on Pearson's product-moment correlation to assess the relationship between economic growth and the explanatory variables in 84 countries, a small positive correlation exists between economic growth and financial development, trade, and investment at 0.11, 0.11, and 0.26, respectively. For inflation and government spending, the correlation is significant and negative but is still classified as a small correlation.

The existence of a large or strong correlation where the coefficient is higher than 0.6 tends to occur in studies where the errors that are associated in a particular time period can carry over into future time periods (Harvey, 1990). The correlation can introduce bias in the OLS estimators (e.g. the OLS estimates of the standard errors are lower than the actual standard error in positive serial correlations). The review of the correlation matrix indicates that no two variables are highly correlated because no two variables correlate in excess of 0.6.

Table 16.Correction matrix

Variables	Growth	Financial development	Trade	Government expenditure	Investment	Inflation	Initial GDP	Initial education
Growth	1.000							
Financial development	0.016	1.000						
Trade	0.034*	0.354***	1.000					
Government expenditure	-0.083***	0.355***	0.235***	1.000				
Investment	0.240***	0.347***	0.250***	0.054***	1.000			
Inflation	-0.063***	-0.039**	-0.09***	-0.045**	-0.024	1.000		
Initial GDP	-0.060***	0.533***	0.239***	0.310***	0.195***	0.006	1.000	
Initial education	-0.001	0.533***	0.239***	0.263***	0.214***	0.005	0.778***	1.000

*Notes: *** $p < .01$, ** $p < .05$, * $p < .1$*

6.4.4 Diagnostic Tests

As explained earlier, several diagnostic tests were conducted to test the assumption discussed in this section, leading to adopting the linear regression with PSCE as the most suitable estimator for the dataset. This section briefly examines the results of all conducted diagnostic tests. Table 17 presents the results of the cross-sectional dependence test and unit-root test. The sample of this model has a large number of cross-sections. Therefore, the Pesaran (2015) test for weak cross-sectional dependence was conducted, and the results exhibited the existence in all variables. The Fisher panel unit-root test based on the ADF tests, modified INV, and chi-squared tests were also used as a cross-check, and the results indicated that the majority of the variables are stationary in the first difference at the 1% level.

Table 17.Results of Cross-sectional Dependence (CD) Tests and Fisher Panel Unit-Root Test

Variable	CD test	*P*-value	Fisher-type unit-root test (level)	*P*-value	Fisher-type unit-root test (first difference)	*P*-value
GDPG	21.100	0.000	79.3434	0.000	253.989	0.000
LNFD	114.14	0.000	-0.5944	0.723	122.898	0.000
LNTRADE	82.878	0.000	4.6233	0.000	129.867	0.000
LNGGFC	25.487	0.000	8.6130	0.000	104.690	0.000
LNGFCF	15.926	0.000	4.9740	0.000	96.1649	0.000
Inflation	53.859	0.000	38.951	0.000	191.641	0.000

Notes: For CD test: H_0: errors are weakly cross-sectionally dependent, a *p*-value close to 0 indicates data are correlated across panel groups. For the Fisher-type unit-root test, Fisher-type test (based on augmented Dickey–Fuller tests, modified INV., and chi-squared tests) H_0: All panels contain unit roots, H_a: At least one panel is stationary. *, **, *** denote statistical significance at the 10%,5%, and 1% levels, respectively.

For the homogeneity check, the first conducted test was the Breusch–Pagan/Cook–Weisberg test for heteroscedasticity, where the null hypothesis is a constant variance, which means that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. The chi-squared value was 19.81 (0.000), indicating heteroscedasticity. The modified Wald test for groupwise heteroscedasticity and White test for homoscedasticity were also conducted, and the conclusions from these alternate tests are the same.

To assess the linearity, a graph of observed predicted values should be plotted. If this graph is symmetrically distributed along the 45° line, then this confirms the

linearity assumption. Graphs 1, 2, and 3 plotted the residual, showing that the data are linear in parameters as are asymptotic.

6.5 Empirical Estimated Results and Interpretations

6.5.1 Baseline Model Regression Results

Table 18 lists the estimated results of the baseline model presented in Equation (10) by applying the OLS along with FE and RE regression in the first three columns. Column 4 lists the estimated results of the baseline model presented in Equation (10) by applying a linear regression with the PSCE estimator, chosen after further diagnostic tests were conducted to test for the presence of serial and cross-sectional correlations (heteroscedasticity). These correlations could lead to inconsistent estimates using OLS with FE and RE regression. Column 5 reapplied linear regression with the PSCE estimator, adding a year dummy.

The coefficients of financial development (*FD*) were significantly positive when applying the OLS and linear regression with the PCSE estimator, which confirmed the existence of the finance-growth nexus. For the PSCE estimator, all parameters of Equation (10) for all the explanatory variables were significant at the 1% level of confidence, except trade openness, and were aligned with the assumptions. In more detail, financial development as an explanatory variable remains significantly positive along with investment. Any increase in financial development and investment by 1% boosts economic growth by around 0.39% and 2.5%, respectively. However, government expenditure and inflation exhibit a significant negative effect on economic growth. Any increase by 1% in inflation and government spending reduces economic growth by 0.01% and 1.47%, respectively.

Table 18. Baseline Model Results Using Ordinary Least Squares, Fixed and Random Effects, and Panel-Corrected Standard Error Estimators

Variables	(1) OLS	(2) FE	(3) RE	(4) PSCE	(5) PSCE
Constant	-5.653***	-1.128	-3.670***	-4.861***	-4.777***
	(0.951)	(1.862)	(1.311)	(1.461)	(1.540)
LNFD	0.524***	-1.877***	-0.231	0.396*	0.465*
	(0.150)	(0.322)	(0.220)	(0.228)	(0.238)
LNTRADE	0.149	2.444***	0.728***	0.314	0.188
	(0.167)	(0.371)	(0.243)	(0.226)	(0.228)
LNGGFC	-1.186***	-2.213***	-1.697***	-1.473***	-1.344***
	(0.206)	(0.417)	(0.295)	(0.312)	(0.311)
LNGFCF	2.635***	1.896***	2.413***	2.527***	2.529***
	(0.243)	(0.337)	(0.293)	(0.407)	(0.412)
INFLATION_CPI	-0.00201***	-0.00226***	-0.00219***	-0.00146**	-0.00148***
	(0.000476)	(0.000463)	(0.000466)	(0.000572)	(0.000565)
RY86	-4.14e-05***		-4.21e-05***	-3.89e-05***	-3.92e-05***
	(8.11e-06)		(1.41e-05)	(1.04e-05)	(9.99e-06)
EDU86	0.00955**		0.0191***	0.0108*	0.0100*
	(0.00399)		(0.00687)	(0.00580)	(0.00588)
Year dummy	NO	NO	NO	NO	YES
Observations	2,526	2,526	2,526	2,526	2,526
R^2	0.094	0.075		0.058	0.106
Number of countries		92	92	92	92

Notes: Standard errors in parentheses; *** $p < .01$, ** $p < .05$, * $p < .1$.

6.5.2 Extended Model Regression Results

Tables 19 and 20 report on the effect of the four selected factors investigated in the extended model:

- informal institutions (culture) represented by the UAI,

- formal institutions represented by both JEI and PRI,

- income level represented by three groups (LICs, MICs, and HICs), and

- geographic location by six groups based on the current classification of geographic locations by the World Bank.

Table 19 illustrates the results of the regression without using a year dummy, whereas Table 20 uses a regression with time effect dummy. The decision of adding a year dummy was based on the results of testparm, which primarily tests how much these dummies are needed (*year* and *country*). The country effect has not been used, whereas the year dummy is added in separate regressions where the R^2 increased, but the results remained the same inTables 19 and 20 which demonstrated that the results of all explanatory variables remained significant compared to the baseline regression results, except the inflation level and initial education level, which indicated an insignificant effect after adding some factors in the equation.

Table 19.Results of both baseline the Extended Models Using Panel-Corrected Standard Error Estimators

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Constant	-4.86***	-7.295***	-3.143**	-2.45	-4.584***	-5.062***	-4.566***	-4.275***	-4.840***	-4.741***	-5.570***	-4.413***	-5.096***
LNFD	0.396*	0.725**	-0.532**	0.17	0.30	0.453*	0.38	0.21	0.37	0.394*	0.532**	0.20	0.30
LNTRADE	0.31	0.41	0.37	-0.16	0.32	0.33	0.30	0.31	0.35	0.32	0.32	0.403*	0.436*
LNGGFC	-1.473***	-0.794**	-1.613***	-1.32***	-1.510***	-1.506***	-1.456***	-1.406***	-1.517***	-1.500***	-1.375***	-1.354***	-1.370***
LNGFCF	2.527***	2.531***	2.566***	2.611***	2.604***	2.595***	2.489***	2.465***	2.561***	2.509***	2.565***	2.492***	2.412***
Inflation	-0.0014**	-0.00143**	-0.0014**	-0.02	-0.0014**	-0.0014**	-0.0014**	-0.0014**	-0.0014**	-0.0014**	-0.0014**	-0.0014***	-0.0014**
Initial GDP	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
Initial EDU	0.0108*	0.01	0.01	0.0115*	0.01	0.0106*	0.01	0.0119**	0.00951*	0.0116**	0.00970*	0.01	0.0125**
*Culture*FD*		-0.00020***											
*JEI *FD*			0.012***										
*PRI *FD*				0.00									
High Income *FD					0.185*								
Med Income *FD						-0.07							
Low Income *FD							-0.07						
EASIA *FD								0.190**					
*EUR *FD*									0.13				
*LATIN *FD*										-0.04			
*MENA *FD*											-0.240***		
*SUB *FD*												-0.182*	
*SASIA *FD*													0.281***
Year Dummy	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Observations	2526.00	1592.00	2526.00	1722.00	2526.00	2526.00	2526.00	2526.00	2526.00	2526.00	2526.00	2526.00	2526.00
R2	0.06	0.06	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Countries	92.00	55.00	92.00	90.00	92.00	92.00	92.00	92.00	92.00	92.00	92.00	92.00	92.00

Table 20. Results of both baseline the Extended Models Using Panel-Corrected Standard Error Estimators (continued)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Constant	-4.77***	-6.717***	-2.962*	-2.102	-4.49***	-4.972***	-4.469***	-4.166***	-4.755***	-4.680***	-5.527***	-4.336***	-5.003***
LNFD	0.465*	0.850**	-0.488*	0.358	0.375	0.523**	0.439*	0.265	0.438*	0.462*	0.613**	0.276	0.368
LNTRADE	0.188	0.3	0.231	-0.291	0.19	0.204	0.174	0.17	0.219	0.191	0.197	0.264	0.307
LNGGFC	-1.34***	-0.715**	-1.482***	-1.09***	-1.38***	-1.377***	-1.326***	-1.275***	-1.383***	-1.365***	-1.244***	-1.237***	-1.246***
LNGFCF	2.52***	2.38***	2.555***	2.664***	2.604***	2.595***	2.489***	2.463***	2.559***	2.515***	2.570***	2.491***	2.418***
Inflation	-0.00***	-0.001***	-0.001**	-0.0294*	-0.001**	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
Initial GDP	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
Initial EDU	0.0100*	0.00898	0.00749	0.0093	0.00596	0.00974	0.00876	0.0114*	0.00887	0.0107*	0.00872	0.00811	0.0117**
Culture*FD		-0.0020***											
JEI *FD			0.012***										
PRI *FD				-0.00079									
High Income *FD					0.181*								
Med Income *FD						-0.0673							
Low Income *FD						-0.0682							
EASIA *FD								0.186**					
EUR *FD									0.116				
LATIN *FD										-0.0334			
MENA *FD											-0.247***		
SUB *FD												-0.164*	
SASIA *FD													0.271***
Year Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,526	1,592	2,526	1,722	2,526	2,526	2,526	2,526	2,526	2,526	2,526	2,526	2,526
R^2	0.106	0.132	0.117	0.136	0.107	0.106	0.106	0.107	0.106	0.106	0.109	0.107	0.108
Countries	92	55	92	90	92	92	92	92	92	92	92	92	92

Note: ***,** and * indicate significance at the 1%, 5%, and 10%, respectively

Results of the Effect Of Informal Institutions. For the extended model results, the estimated results regarding the financial development effect on economic growth when considering culture to be an internal factor are presented in Table 19 in Columns 2. The coefficient of the interaction term is significant and negative at the 99% level of confidence, suggesting that the culture index mitigates the positive effect of financial development on economic growth. The culture index is the UAI, one of the five cultural dimensions by Hofstede et al., which describes the extent people feel intimidated by ambiguity and uncertainty, which causes them to try to avoid these situations. A lower index value indicates more flexible residents. This flexibility can be observed in their willingness to take conscious risks, their conflict acceptance, and their tolerance (De Mooij and Hofstede, 2010). A negative effect of this indicator was expected on the finance-growth nexus because a higher index indicates a lower likelihood that residents take loans and open businesses.

Results of the Effect of Formal Institutions. For the rule of law factor, two indicators were used alternatively. The judicial effectiveness JEI results are presented in the same table, Table 19, but Column 3 while property rights PRI in Column 4. The coefficient of the interaction term between judicial effectiveness and financial development was significant and positive at the 99% confidence level, and the coefficient for the interaction term between PRI and financial development was also positive. These results for the JEI suggest that any increase in juridical effectiveness favourably promotes the effect of financial development on economic growth. Judicial effectiveness is an index scaled from 0 to 10 provided by the Heritage Organisation, which measures how well the legal frameworks function in protecting the rights of all

citizens against infringement of the law by others, including by governments and powerful parties and how efficient and fair judicial systems are to ensure that laws are fully respected, with appropriate legal actions taken against violations. In contrast, the coefficient of the interaction term between the PRI and financial development was insignificant and positive, which suggests that the PRI performance does not affect the finance-growth nexus.

Results of the Effect of Income Level. The empirical results of some existing literature provide evidence that the effect of financial development is different from one country to another based on the income level. Samargandi, Fidrmuc, and Ghosh (2014) concluded that MICs face a threshold point, and following that, financial development no longer promotes growth. In this section, we reinvestigate this issue by dividing countries into LICs, MICs, and HICs and count them as an internal factor variable. Columns 5 to 7 in Table 19 present the estimated results for the extended model using the income level as an internal variable. The coefficients of the interaction term are significant for only the HIC group. For HICs, the effect is positive and significant, which clearly confirms the previous studies that agreed that the effect of financial development on growth is more positive and significant compared to the others.

Results of the Effect of Geographic Region. As mentioned, the countries were divided into seven groups based on the geographic regions: EASIA, EUR, LATIN, MENA, SASIA, and SUB. The estimated result after adding these geographic regions as an internal factor is presented in Table 19 in Columns 8 to 13. All coefficients were significant except for that for EUR and LATIN. The three regions that show a

significant and positive effect, indicating that it promotes the finance-growth nexus, are EASIA, EUR, and SASIA. In contrast, the three regions that demonstrate a significant and negative effect are LATIN, MENA, and SUB. Generally, the results are justified and in line with our projections. This is due to the fact that the country location affects mainly the climate, which has a significant impact on income levels, economic growth, and the availability of natural resources. Geography matters directly for growth and indirectly for economic policy and institutions

These results are compatible with the previous results, where most of the regions that promote the finance-growth nexus are developed and are HICs. For example, SUB, which demonstrated a significant negative effect on the finance-growth nexus, includes 31 countries. Only one country among this region is classified as a HIC. Likewise, MENA exhibits a negative effect, and only four countries among this region are classified as HICs. However, the region that demonstrated positive effects, such as EUR, consists of 13 HICs and only one MIC.

6.5.3 Summary for All Regression Results

The empirical results of this chapter confirm the existence of the finance-growth nexus. Thus, financial development measured as broad money to GDP has a significant and positive effect on economic growth within the countries selected in this study. Moreover, using an additional regression, this includes the interaction term between several internal factors and financial development, which confirmed that most of these selected internal factors affect the finance-growth nexus.

Informal institutions (culture) as an internal factor or, precisely, the uncertainty avoidance level of country residents mitigates the effect of financial development on

economic growth. These results suggest that any increase in the uncertainty avoidance level weakens the effect of financial development on economic growth. This result is vital for policymakers, where many efforts are conducted to promote financial institutions. The effect is not that high because the residents tend to avoid any risks, such as taking loans and starting new businesses.

Judicial effectiveness as an internal factor, nevertheless, amplifies the effect of financial development on economic growth, which suggests that any improvement in the rule of law enhances the positive effect of financial development on economic growth. For HICs, the effect is positive and significant. This finding confirmed that of previous studies that stated that the effect of financial development on growth is more positive and significant in HICs compared to others.

The last internal factor investigated is the geographic location. The empirical results reveal that the regional location affects the finance-growth nexus. This result is compatible with the previous results on income level as a factor. Most of the regions that promote the finance-growth nexus tend to be developed and are HICs. For example, within the SUB regions, which demonstrated a significant negative effect on the finance-growth nexus and include 31 countries, only one country in this region is classified as an HIC. Nonetheless, the region that had a significant positive effect, EUR, includes 13 HICs and only one MIC.

6.6 Concluding Remarks

This chapter reinvestigates the finance-growth nexus in a large panel of 107 economies over the period from 1986 to 2016 and analyses how financial development affects the growth of the real GDP per capita. This chapter contributes to the previous

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literature by inspecting whether this nexus is affected by social and economic internal factors. Our selected factors consist of informal institutions (culture), formal institutions (judicial effectiveness), country income level, and geographic locations.

Two models were estimated using the linear regression with PSCE. The first model is 'the baseline model', which primarily assessed the relationship between financial development and economic growth. The second is 'the extended model', which considered the effect of the selected factors by adding the interaction term between these factors and financial development.

The baseline outcomes demonstrate that financial development has a positive and significant effect on economic growth. Meanwhile, the effect of other macroeconomic variables, such as trade openness, government expenditure, and inflation, are significant. The extended model indicated reliable evidence that these selected factors play a crucial role in the finance-growth nexus.

The results revealed that the rule of law, HICs, EASIA, SASIA, and EUR strengthen the positive effect of financial development on economic growth. However, informal institutions, LICs, LATIN, MENA, and SUB mitigated the positive effect of financial development on economic growth. Based on this finding, this study conjectures that financial development has a positive effect on economic growth and is capable of promoting it by improving social and economic internal factors.

Last, the relationship between financial development and economic growth has been claimed to be nonlinear; therefore, using a linear model may introduce bias. In this chapter, we estimated a linear regression model after plotting this relationship and found it was a linear relationship. However, another attempt was made at this regard.

This chapter adds the squares of the financial development variable to re-estimate the relationship and determine whether the result is different. The results of the squared financial development effect exhibit the same signs, which confirms linearity.

6.7 Alternative method for robustness check

This section empirically re-investigates the relationship between financial development and economic growth using a dynamic method to add robustness to the results found in this chapter. Among all the factors selected in the previous method, informal institutions followed by formal institutions will be examined here in this section to confirm the result found that they are important driving force behind finance-growth nexus and can justify and explain persistent country differences in this impact. This model is implemented for robustness and to extends and complements the work of the previous model within a dynamic econometric setting and by comparing the results of several sub-groups of the sample. This Model employed GMM instrumental techniques and used the same sample of countries as well as the variables of the previous model.

General Method of Moments (GMM) is first introduced by Arellano and Bond (1991) and further developed by Arellano and Bover (1995) and Blundell and Bond (1998). It is very well-known for its dynamic setting in which all existing lags of the dependent variable in addition to those of the exogenous regressors employed as instruments. The following initial model can explain in details the characteristics of this method :

$$GDP_{it} = \phi GDP_{i,i-1} + X'_{it}\beta + \delta_t + \mu_{jt}$$

Where GDP_{it} and $GDP_{i'i-1}$ refer to current and lagged Gross demostic production per capita GDP. X'_{it} is the set of relevant regressors. GMM model is transforming this regressor through the first differencing the fixed effect is removed, as it does not vary with time. δ_t is a set of time effects, and $\mu_{it} \sim$ N $(0,\sigma^2)$ is a random disturbance and is uncorrelated; i = 1,...,N represent countries and t = 1,...,T represent years.

The following assumptions hold: $E(x_{it}, \mu_{jt}) = 0$ for all i , j , t , s; $E(\mu_{it}, \mu_{js}) = 0$ for I $\neq$ j and t $\neq$ s ; $E(\propto_i, \mu_{it}) = 0$ for all I , j, t and $\sigma^2_\mu \geq 0$. It is expected that $\partial > 0$, while $\partial > 0$. X'_{it} relevant regressors or determinants of economic growth include the variable of interest financial development, as well as Trade openness, government expenditure, and inflation.

In terms of the variables datasets and sample used, the countries investigated in this model are the same as the 107 investigated in the previous model and the same period from 1986 to 2016. The all explanatory variables are the same except the dependent variable which was GDP per capita growth which been replaced by GDP per capita due to the dynamic Model. This model still uses the same period from 1986 to 2016, but the data sample been divided into an average of five years to lower the (T) to reach this 7 in this robustness model. The first regression in column (1) represents the entire sample countries, while the second and third regression represented in columns 2 and 3 represent the sub-groups of countries based on the informal institutions' criteria. This model expects the impact of financial development in the group of countries with a low level of uncertainty avoidance will be higher than the remaining countries. The same with the level of formal institutions, column (4) and (5) represent

the sub-groups and it is expected that financial development impact in countries with a high level of formal institutions will be higher than the remaining countries. The median is used to divide the group of countries into sub-groups. The median level for uncertainty avoidance and juridical effectiveness is 64 and 46, respectively.

Linearity, the endogeneity of explanatory variables, the omitted variable bias, and the incorrect treatment of fixed effects are attempted to be overcome by using two general methods of moments (difference GMM and level or system GMM). To choose between system or difference GMM, Bond 2001 role if thumb is used where the OLS and fixed effect regressions are being employed for the following equation:

The upper-bound and lower bound are, the lagged GDP growth coefficient using pooled OLS and fixed effect, respectively. Bond 2001 role of thumb states that if the lagged GDP growth coefficient obtained using the difference-GMM is close or below upper-bound estimates, the system-GMM estimator should be preferred and the difference-GMM is downward biased.

Table 21: Result of two-step difference GMM model

Variables	(1) All countries	(2) Countries with high level of uncertainty	(3) Countries with low Uncertainty avoidance	(4) Countries with high JEI	(5) Countries with low JEI
GDP(-1)	-0.81***	0.40***	-0.367***	-0.22***	0.01***
	(0.057)	(0.106)	(0.110)	(0.049)	(0.017)
LNFD	0.84***	-1.06	2.355**	0.57**	-0.46**
	(0.292)	(0.726)	(1.022)	(0.250)	(0.248)
LNTRADE	-0.83*	1.017	-3.315*	-1.70***	0.41**
	(0.456)	(1.515)	(1.974)	(0.582)	(0.186)
LNGGFC	-0.43*	-1.99	-0.804	-1.27***	0.22
	(0.237)	(1.26)	(0.250)	(0.303)	(0.230)
INFLATION_CPI	-0.00	-0.00	0.042	-0.00**	-0.00***
	(0.003)	(0.003)	(0.052)	(0.003)	(0.001)
Year	*0.04**	*-0.10*	0.063	*0.074***	*0.064***
	(0.028)	*(0.085)*	(0.075)	*(0.035)*	*(0.030)*
AR2	0.204	0.23	0.765	0.06	0.76
Hansen test	0.06	0.17	0.31	0.20	0.25
Number of instruments	33	17	19	33	33
Number of groups	71	19	26	34	37

Note: ***, **, and * are statistical significance at the level 1%,5%, and 10%
level respectively; P-value for AR (2) and Hansen statistic are reported.

As shown in Table 21, the results confirmed the same relationships found using

the PSCE model. In column (1), which represent all the countries in the sample, the

financial development impact is positive and significant, and any change by 1% in

financial development promote growth by 0.89%. On the other hand, the impact of

Trade, government expenditure, and inflation are negative and significant. Comparing

between the two sup-groups as can see in column (2) and (3), it is clear that the impact

financial development is higher and more significant in the group of countries that do

not avoid uncertainty and this stress the importance of such a vital internal factor called

"informal institutions". For formal institutions, the results of GMM method added

robustness for PCSE model by reaching the same results that the impact of financial

development is higher in the countries that have a high level of effective and efficient

juridical.

Chapter Seven: Conclusions, Policy Recommendations

and Future Research

7.1 Overview

This thesis explores three broad issues in modern financial economies and economic growth. The first is to review the various schools of thought and general theories and empirical findings related to the topic of the finance-growth nexus by providing an in-depth assessment and explaining how these theories relate to the role of the financial sector in the economy to illustrates the channels that allow financial development to promote growth. The fact that Financial development is a multidimensional concept Imposed me to dedicate a whole chapter to go through each proxy used in this matter and the three aspects of financial development: depth, efficiency, and capital market performance.

The second and third issues are the core of this thesis and present the empirical analysis using the available datasets, and the most suitable and efficient method suggested based on the diagnostic tests conducted in the process of verifying the data and models. The second issue is to examine the effect of financial development on economic growth within the context of Saudi Arabia using time series data collected from 1970 to 2015, a method that focuses on a single individual at multiple time intervals. This issue was investigated in chapter five and conducted by employing an autoregressive distributed lag (ARDL) approach. The chapter discusses the mathematical process used to construct the financial development index known as the PCA, which aims to convert a set of time series variables that demonstrate a linear correlation with one another into a set of variables with no such correlation and uses

ten proxies for financial development to cover all financial dimensions (i.e. depth, efficiency, and capital market performance). Thus, the chapter investigates whether the finance-growth nexus in Saudi Arabia is monotonic and how the measure chosen to proxy financial development matters in this relationship.

The third and final issue is to examine the finance-growth nexus using a panel dataset from 107 countries over the period from 1986 to 2016 and explore and illustrate the factors that play a crucial role in finance-growth nexus. The chapter examines this issue is Chapter six, and it employs a linear regression with a panel-corrected standard error (PSCE) estimator to assess long- and short-term effects. Furthermore, the chapter uses additional regression equations to determine whether the level of the influence of financial development on an economy can be linked to four specific internal factors: informal institutions (culture), formal institutions (judicial effectiveness and role of law), geographic-location, and income-level.

7.2 Main Findings of the Thesis

This thesis's over-all objectives were to examine intensely the relationship between finance and growth in the set of countries with a particular focus of the factors that might erode or mitigate this nexus. Each of the thesis's chapters explored one aspect of this relationship. Hence, the following sections report the key findings of the empirical models.

7.2.1 Finance-growth nexus results

An ARDL bound model was used due to the differences in the stationary levels in the first model which investigate the nexus within the context of Saudi Arabia using time series data collected from 1970 to 2015. The model focused on how the

measurement of financial development matters in this relationship and employed ten different proxies of financial development that cover most of the financial dimensions such as depth, efficiency, access, and capital market development. The interesting results revealed from using ARDL are: the existence of a long-term equilibrium in the relationship between financial development and economic growth in Saudi Arabia. In more details, the effect of financial development is around 0.43% for financial depth and efficiency and 0.25% for the comprehensive proxy of financial development. These results are consistent with the assumptions that an increase in financial development enhances the ability of households and consumers to borrow from the banking sector, which allows them to boost their consumption and investment, respectively. Consumption and investment are components of aggregate demand, implying that the increase in consumption and investment increases the aggregate demand and, consequently, economic growth within the developing economies. The interesting results show that the impact is negative in the short-term, which indicate that financial development takes a long time to promote growth.

The second model re-examines the same finance-growth nexus but using a panel dataset from 107 countries over the period from 1986 to 2016. It employs a linear regression with a panel-corrected standard error (PSCE) estimator to assess long-term effects. Furthermore, the model uses additional regression equations to determine whether the level of the influence of financial development now measured as the ratio of broad money to GDP on an economy can be linked to four specific internal factors: informal institutions (culture), formal institutions (judicial effectiveness and role of law), level of country income, and geographic locations. The results also show the

existence of a long-term equilibrium in the relationship between financial development and economic growth and empirically giving a significant positive impact. In more detail, the effect of financial development is around 0.39% which is similar to the result of the first model.

7.2.2 Finance- growth nexus factors

Since financial development measured as the ratio of broad money to GDP has a significant and positive effect on economic growth within the countries selected in this study, the second empirical model represented in chapter 6 employs an additional regression which includes the interaction term between four factors and financial development, which confirmed that most of these selected internal factors affect the finance-growth nexus. This is mainly to answer the question of why the impact varies from one country to another.

Informal institutions (culture) as an internal factor or, precisely, the uncertainty avoidance level of country residents mitigates the effect of financial development on economic growth. These results suggest that any increase in the uncertainty avoidance level weakens the effect of financial development on economic growth. This result is vital for policymakers, where many efforts are conducted to promote financial institutions. The effect is not that high because the residents tend to avoid risks, such as taking loans and starting new businesses.

Judicial effectiveness as an internal factor, nevertheless, amplifies the effect of financial development on economic growth, which suggests that any improvement in the rule of law enhances the positive effect of financial development on economic growth. For HICs, the effect is positive and significant. This finding confirmed that of

previous studies that stated that the effect of financial development on growth is more positive and significant in HICs compared to others.

The last internal factor investigated is the geographic location. The empirical results reveal that the regional location affects the finance-growth nexus. This result is compatible with the previous results on income level as a factor. Most of the regions that promote the finance-growth nexus tend to be developed and are HICs. For example, within the SUB regions, which demonstrated a significant adverse effect on the finance-growth nexus and included 31 countries, only one country in this region is classified as a HIC. Nonetheless, the region that had a significant positive effect, EUR, includes 13 HICs and only one MIC.

7.3 Contributions to the Existing Literature

This thesis contributes to the empirical literature on finance-growth nexus by identifying and filling the literature gap as the time and data allowed. Contributions could be listed in the following arguments:

The re-investigation of the influence of financial development on the economy added further new evidence of the existence of positive impact of financial development in the context of Saudi Arabia, with financial development measured differently, and in the context of panel data of 107 countries.

Treating the financial development as a multidimensional concept by investigating whether the index chosen matters in a crucial nexus such as finance-growth nexus in the context of Saudi Arabia in chapter Five is also a key contributor in the field especially that this thesis go through each variable in a thorough matter and not like most of the literature that backing there selected proxies with all the reliable

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studies that used the same proxy without discussing the remaining proxies available. It provided a broader and more in-depth understanding of the nature of financial development, proxies and the mechanism of its impact affecting growth and to find vital related factors. Moreover, the thesis comes together on how the measurement of financial development matters in this relationship in the context of Saudi Arabia and the findings also contribute by underlining the fact that financial development is a multidimensional concept and by illustrating a variety of measures used by different authors to assess whether the effect of financial development on economic growth varies between measures. Because the number of papers investigating the finance-growth nexus in developed countries outnumbers those investigating developing countries, chapter Five assesses the financial development and growth nexus in the context of Saudi Arabia as a case study of a developing country.

Another contribution to the field is highly apparent concerning the first factor investigated "informal institution factor" that reflect the cultural and social characteristics found in human societies. This novel factor is an internal factor and not been investigated in regard the finance-growth nexus. This factor has been researched previously (e.g. Aggarwal & Goodell, 2016; Dutta & Mukherjee, 2012; Kwok, 2006,), but such investigations have focused on the cultural influence on financial structure or financial development, not financial growth nexus and provided evidence that countries characterised with higher uncertainty avoidance are likely to have a bank-based rather than market-based system. On the other hand, several papers have investigated whether, how, and why the structure of the financial system (i.e. bank-based or market-based systems) influences economic growth, and the results were conflicting, as many

countries from both categories were demonstrated to be successful in achieving sustainable economic growth. For example, of the 13 highest growth economies in the post-war period, Germany and Japan are classified as bank-based systems, whereas the United States and the United Kingdom have market-based systems. This thesis attempted to fill a gap in the existing literature, by examining a new factor, the informal institution represented by 'uncertainty avoidance', and discussing how this factor affects savings and investment decisions and, by extension, the finance-growth nexus, regardless of whether the financial structure in question is a bank-based or market-based system. This question is still intriguing whether the market base or bank base is better leaving room for substantial further contributions, and this what this thesis results participated.

7.4 Policy Implications

A variety of policy implications that can be taken from this thesis results will be discussed in this section. Empirical results indicate some of the legislative consequences for the relation between financial development and economic growth

These results showed that the positive impact of financial development upon the economy appeared to be stronger and more pronounced than before. Hence, government agencies and policymakers need to focus and pay more attention to strengthening financial institutions and devote more effort to promote financial development in all aspects, whether depth, efficiency or capital markets performance. Since the global financial industry has evolved significantly and the financial system is now highly complex and multifaceted and still evolving, it is suggested for authorities to follow this evolving and seek to promote and encourage well-developed

financial institutions that can provide a wide range of financial instruments and facilitate the difficulties faced them with competing with the banks. Generally, the government ought to adopt comprehensive changes that aim to boost the financial sector by providing a sturdy institutional framework that acquiring subtle financial instruments.

As the impact of financial development varies from one country to another, such studies that investigate the factors that might erode or mitigate finance-growth nexus like this thesis provides useful insight for policymakers to maximise the effect of financial development. The local evaluations of such factors can give the country insights on how the positive impact can be and how to enhance it. However, Factors can be classified into three categories: (1) invariable factors that are not easily changing over time like, level of development, geographic location. (2) factors that can take decades to see changes in it such as level of income and informal institution. (3) factors can be enhanced immediately, such as formal institutions. Policy makers are suggested to go through these factors before implementing national development plans, mainly to stimulate economic growth.

7.5 Limitations of the Thesis

While this thesis has made a number of valuable contributions to the literature, it must also be remembered that it has a few shortcomings and limitations.

As pointed out in chapter three, financial development is a very multidimensional concept, and the number of proxies is still expanding, reaching 38 proxies, due to the rapid advancement in financial products and institution types. However, using more than one index for financial development in the single model can

cause multicollinearity problems. As a result of that, it is noted that most of the literature related faced a challenge to choose between depth, efficiency and capital market performance proxies and this decision can lead to only covering the partial role of financial development. In this thesis and to overcome this limitation, the first model adopts the PCA to conduct three financial variables indices that covers all the three aspects: depth, efficiency and capital market performance. On the other hand, the second model used the ratio of broad money over GDP as the single proxy covering the depth and size of financial institutions. This was justified by the fact that size and depth is a prerequisite for the other two categories because, in the absence of financial institutions and capital markets, the efficiency of the financial system and capital markets is irrelevant. Therefore, size as a financial development category serves as a bridge for efficiency and capital market performance.

The second limitation is about the lack of data and more precisely regarding the informal institutions factor which reflects the cultural and social characteristics found in human societies. As pointed out in chapter three, culture and other social characteristics are incredibly complex phenomena because they are difficult both to describe neutrally and to measure accurately because any process of comparison between countries based on personal and descriptive assumptions is mostly ineffective. The available popular models that proxy culture are: Hofstede model, World Value Survey (WVS), European Value Survey, and the recent Global Preference Survey which been created by Falk et al. (2018). For Hofstede, it is not available for all the countries and WVS, their proxies are published every four years and the question that

reflects the risk-taking ability started recently and available only for the periods 2005–2009, and 2010–2014. The European Value Survey is limited geographic coverage.

7.6 Avenues for Further Research

This thesis is one of the few studies investigating the finance-growth nexus and the factors that may promote or mitigate this relationship. Although these factors were chosen carefully after a thorough analysis of the existing literature and theories, this research can be expanded based on some of the questions resulting from this empirical thesis analysis. This provides a potential avenue for future research. One of the limitations allied with my empirical investigation of the factors affecting finance growth nexus and more precisely the informal institutions factor is the availability of data and the other measures that become available recently such as the World Value Survey and new Global Preference Survey dataset. Future research could investigate the same research questions by using other measures and reflect different aspects, then, compare the results in order to find out whether or not the results remain the same. Another remarkable extension of the study can be to comprise other new factors to address the question raised why the impact of financial development varies from country to another.

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