Empirical Essays on Islamic Finance and Sustainable Development Nexus: Sources of Growth, Socio-Economic Development, and Degrowth

HENDRANASTITI, NUR,DHANI

Durham University
Business School

Empirical Essays on Islamic Finance and Sustainable Development Nexus: Sources of Growth, Socio-Economic Development, and Degrowth

Nur Dhani Hendranastiti

A Doctoral Thesis Submitted in Fulfilment of the Requirements for the Award of the Degree of Doctor of Philosophy at Durham University

Durham Centre for Islamic Economics and Finance
Durham University Business School
Department of Economic and Finance
Durham University

November 2019

Abstract

Empirical Essays on Islamic Finance and Sustainable Development Nexus: Sources of Growth, Socio-Economic Development, and Degrowth

Nur Dhani Hendranastiti

Growth and development have been the central objective of economic policy making all over the world, for which the financial sector has been an essential instrument. However, with the emergence of 'financialisation', the focus has shifted to financial resources as the source of economic growth and their gain at the expense of other stakeholders. Consequently, among other things, social welfare and environmental health have been negated, which has created pervasive economic and social inequality.

To moderate the consequences of neo-liberal economic policy, since the 1970s a number of alternative positions have emerged. The Islamic economics movement, as one of such movements, emerged as a counter-hegemonic movement, aimed at rescuing 'human, land, labour and capital' so that extended stake-holding governance can be achieved. Within this paradigm, Islamic finance is expected to essentialise justice and beneficence and equalize development opportunities for all stakeholders so that they can fulfil their development path towards perfection. Islamic finance is expected to operate and produce consequences according to the substantive morality of Islam and its principles, as opposed to the institutional logic of conventional finance. In order to assess the performance of Islamic finance in relation to the Islamic moral economy, this essay-based research, hence, aims to explore the relationship between Islamic financial development and sources of growth, socio-economic indicators, and environmental degradation.

The first essay in this research aims at examining the contribution of Islamic financial development on the sources of growth in the form of capital accumulation and total factor productivity growth in a number of sampled countries for the period 1989-2014. The variables of Islamic financial development explored include: the operational activities of Islamic banks, sectoral financing provided by Islamic banks, the mode of financing employed by Islamic banks, and the volume of *sukuk* issuance. Following the theoretical finance-growth nexus, this essay employs the ordinary least squares (OLS) method, comprising static and dynamic panel estimation for countries having Islamic banks and issuing *sukuk*. The results show that Islamic banks with higher capital adequacy ratio and lower non-performing loans display a positive relationship with capital accumulation growth. On the other hand, Islamic banks with higher operational costs have higher capital accumulation and total factor productivity growth. In relation to sectoral financing and types of contract used for financing, it seems that Islamic banks still focus on profitability, rather than productivity. The results from the *sukuk* market is not much different, showing that *sukuk* has lower impact to the 'real' economy.

The second essay explores and examines the contribution of Islamic finance to socio-economic development as measured by various indices related to social, economic, governance, and environmental development for a sample of countries during the period 1989-2014. In the analysis, social indicators, such as health, education, technology, and life expectancy, are included in measuring development. In order to support socio-economic development, it is believed that financing is necessary to provide funds for building the necessary infrastructure, or through supporting economic growth to increase individual purchasing power. Employing linear and non-linear empirical models, the results show that the volume of *sukuk* issuance has not been able to support socio-economic development, which needs to reach a certain threshold to be able to support the gender development index and the gender inequality index. Additionally, the intermediating Islamic banking variable through financial inclusion index shows that Islamic banks can support socio-economic development by serving more consumers in their operational activities.

The third essay examines the impact of Islamic finance on the fulfilment of the Islamic moral economic objective of sustainability in terms of de-materiality and degrowth by analysing the relationship between Islamic financial development and its impact on carbon emissions for a sample of countries during the period 1989-2014. This essay aims to identify the sustainable development impact of Islamic finance by considering CO_2 emissions as the initial benchmark and an environmental health indicator. In addition, this essay considers financing provided by Islamic banks for different sectors, its types of contracts, and also the volume of *sukuk* issuance and their relationship with carbon emissions. The OLS method-based results show that the degrowth and 'Islamic moral economy' is located in the positive relationship between financing of the consumer durables sector and the volume of CO_2 emissions from fossil fuels. This should, however, be considered as an evidence for Islamic bank operations taking place under the linear growth model and mainstream economic framework, although Islamic banks still may provide financing for productive activities through profit-loss sharing. Therefore, this essay suggests that Islamic banks and financial institutions are embedded in the institutional logic of capitalism rather than fulfilling the aspirations of Islamic moral economy.

Keywords: Islamic moral economy; Islamic finance; Sources of growth; Socio-economic development; Degrowth and de-materiality

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AAOIFI	: The Accounting and Auditing Organization for Islamic Financial Institutions
ARDL	: Autoregressive Distributed Lag
CAR	: Capital Adequacy Ratio
CO_2	: Carbon Dioxide
CSR	: Corporate Social Responsibility
DCs	: Developed Countries
DEA	: Data Envelope Analysis
EKC	: Environmental Kuznet's Curve
EPI	: Environmental Performance Index
FTSE	: Financial Times Stock Exchange
GCC	: Gulf Cooperation Council
GDI	: Gender Development Index
GDP	: Gross Domestic Product
GII	: Gender Inequality Index
GMM	: Generalized Method of Moments
GNI	: Gross National Income
GNP	: Gross National Product
HCI	: Human Capital Index
HDI	: Human Development Index
HDIF	: Human Development Index with Factor Loadings
HDR	: Human Development Report
IBF	: Islamic Banking and Finance
ICT	: Information, Communication, and Technology
IFIs	: Islamic Financial Institutions
IFSB	: Islamic Financial Services Board
IIFM	: International Islamic Financial Market
IME	: Islamic Moral Economy
IV	: Intermediary Variable
KBAs	: Key Biodiversity Areas
LDCs	: Less Developed Countries
LDR	: Loan-to-deposit Ratio
LSE	: London Stock Exchange
MDGs	: Millennium Development Goals
MENA	: Middle East and North Africa
MHDI	: Modified Human Development Index
MHDIF	: Modified Human Development Index with Factor Loadings
NGOs	: Non-governmental Organizations
NIM	: Net Interest Margin
NPL	: Non-Performing Loan
ODA	: Official Development Assistance
OLS	: Ordinary Least Square
PEBs	: Pro Ecological Behaviors
PLS	: Profit Loss Sharing
PLS-*statistics*	: Pooled Least Square
PPP	: Purchasing Power Parity

PQLI : Physical Quality of Life Index
PWT : Penn World Table
ROA : Return on Assets
SDGs : Sustainable Development Goals
SRI : Socially Responsible Investment
SSA : Sub-Saharan Africa
SSB : *Shari'ah* Supervisory Board
TEU : Twenty-foot Equivalent Units
UAE : United Arab Emirates
UK : United Kingdom
UN : United Nations
UNDP : United Nations Development Program
USA : United States of America
VECM : Vector Error Correction Model
VOC : *Vereenigde Oostindische Compagnie*
WEF : World Economic Forum

DECLARATION

I hereby declare that none of the materials in this thesis have been submitted in support of an application of another degree qualification in this or any other university. This thesis is the result of my own original work, conducted under the supervision of Professor Mehmet Asutay of Durham University Business School, Durham University.

STATEMENT OF COPYRIGHT

ACKNOWLEDGEMENTS

The first and foremost, this thesis has been possible to be conducted due to the permission from Allah, who has been providing His guidance from the start, throughout, and until the end of the work in the thesis.

I would like to convey my deepest gratitude towards my main supervisor, Professor Mehmet Asutay for his guidance, support, and motivation from very beginning until the end of my study. I would also like to thank my second supervisor, Dr Ahmed Elsayed for his support throughout my study.

An important acknowledgement has to be expressed towards Lembaga Pengelola Dana Pendidikan (LPDP) who has been funding this study for four years.

There are also numerous supports from colleagues in Universitas Indonesia who have been providing suggestions and technical helps during my study, and I am grateful for that. I would also like to express my gratitude to respondents for my initial survey and people who have been helping in conducting the survey. I am also grateful for fellow PhD students in Durham University Business School, particularly Adilah, Hakim, and Isra, that we have shared the joy of PhD journey together.

I would also like to express my appreciation for my friends in Indonesia, Citra, Dea, Fadel, Isni, Nisa, and Panggah for their various ways of support. I am also thankful for Indonesian community in Durham, particularly Banjaran, Dzulfian, Ebi, Harisma, Lukman, Tevy, Wahyu, and their family, for their kindness in having discussion for thesis and everydayness, and also Meg for supporting me to finish my thesis.

Most of all, I am most indebted to my mother, Tina Hendrawati, and my sister, Nur Meidiafni Hendranastiti, for their unending mental and technical support, prayers, patience and understanding over the period of my study. I am also grateful for my late father, M Nasir, who has put the moral foundation in the early years of my life.

Nur Dhani Hendranastiti
November 2019, Durham

DEDICATION

For Bapak, Eyang, Ibu, Dhea

Chapter 1

INTRODUCTION

1.1. BACKGROUND

The economic and financial world has always experienced good and bad times: from the ancient times of the tulip bubble, through the change in gold standards, the dotcom bubble, and most recently the global financial crisis. The 2008 global financial crisis started from the default of subprime mortgages sold by investment banks in the USA, which had an effect throughout the world due to the interconnectedness of financial systems around the world. As the experiences throughout the centuries demonstrate, each crisis leads towards the development and establishment of more prudent regulation in order to avoid or minimize the impact of any upcoming crisis in the future. However, policy prescriptions from regulators are more about correcting the established system rather than looking into the fundamental aspects that are at the root of any crisis (Jackson, 2009).

The most recent issue that is being discussed globally is the climate change, which can have possibility of causing the next financial crisis (Pavoni, 2017). This article explains that the use of energy and environment as the underlying assets of financial products will lead towards the brink of another collapse in the financial sector if any unfavourable developments occur in the environmental sphere. In addition, it is argued that providing financing for businesses that are not environmental-friendly can be considered as supporting environmental degradation: if the environmental conditions worsen, then business in other sectors that receive funding from financial institutions will be affected resulting in lower income for the financial institutions (Pavoni, 2017).

The domination of news coverage and discussion, however, is led by the issues within the financial sectors without covering its interrelation with environmental issues and other important issues, such as inequality and underdevelopment, implying that financial world is considered as a separate reality from the everyday life. This is an indication of the

disembeddedness that Polanyi (1944) lamented, as financial capitalism is disembedded from the realities of the societies in which it is operating, while the financial sector impacts on every sphere of larger life. Thus, due to the hegemonic nature of financial capitalism and the financial crises, important socio-economic issues such as global inequality and the nature of underdevelopment in many countries have worsened over the years as finance is prioritised at the expense of other sectors.

In responding to inequality and development issues, Millennium Development Goals (MDGs), followed by Sustainable Development Goals (SDGs) were formulated and promogulated by the United Nations (UN) to be implemented by every nation. Examining the goals and programs set in the MDGs and SDGs, it seems that every action taken is essentially a correction mechanism for moderating the consequences of the global economic and financial system to make this world a better place in which to live: this is similar to the approach pursued by the financial regulators in overcoming any crisis that has happened or is predicted to happen in the future.

Despite the fact that responses and policies have been designed to overcome the essential issues through moderating the observed consequences of the financial capitalism, it seems that there is an underlying cause for all these phenomenon (Jackson, 2009). The theoretical framework of capitalism, which is based on capital accumulation, requiring that there should always be an investment from any profit generated in the business so that the business continuously grows, leading to positive or linear economic growth, that is measured by the value of Gross Domestic Product (GDP). It is claimed that linear economic growth becomes a prerequisite for any state or country allowing it to cope with the rising population within the country and globally: more people require more food, clothing and other commodities (D'Alisa *et al.*, 2015). In other words, the performing and progressive framework of growth needs to be supported by an increasing level of production and consumption to provide basic necessities, it then moves towards the secondary and tertiary needs and beyond to luxury goods and services.

The framework of capitalism is built on the maximization of individual utility, unconsciously promoting self-interest whereby it is expected that maximised individual utilities will deliver social interest which is measured by the aggregate of individual utility. This assumption eventually nurtures competitiveness within each individual, resulting in the drive to be better and have more, which also forces ambitions for indefinite growth on the supply side (Spratt,

2008). This leads to the extensive use of commercialization and commodification in various goods and services, including financial products and environmental-related issues, since the products from industrialisation have been saturated to induce further positive material growth.

As financial capitalism is based on capital accumulation, capital becomes the superior factor in production over other factors such as labour, land, technology, and material resources. Consequently, capital becomes the essential source for improving and developing innovation and efficiency in firms, and this role becomes more prominent when everything is solely measured by the value of money that has abstract nature in its value (Daly, 1972). This is supported by the charging of interest on money, implying that money in the future period has higher value due to its superiority and its nature: it does not have physical limits, suggesting that it can continuously grow unlimited by time. The positive interest rate charged on money eventually leads towards the necessity of creating linear growth in the economy so that it can cover the increase in money circulating in the economy.

In responding to the hegemonic nature of capitalism, Islamic economics emerged as a counter-hegemony through its own ontological and epistemological framework to propose an Islamically authenticated economic and financial paradigm with its unique modes of production resulting in an Islamic moral economy that allows a human-centred development process to be achieved (Asutay, 2018a). Considering that Islam promotes equality and justice for all the stakeholders on the earth with human beings as the representatives of God on earth, such qualities have to be reflected in the implementation of Islamic finance. Additionally, within Islamic moral economy, Islamic finance is expected to develop profit-and-loss sharing and risk sharing business practices in line with Islamic modes of production within an extended-stakeholder paradigm as opposed to share-holder value (Asutay, 2018a).

A close examination of the operation of Islamic financial institutions (IFIs), however, demonstrates that they follow the institutional logic of mainstream economic system, which is based on the maximisation of share-holder value, consequently leading towards the commercialisation of IFIs. On the other hand, IFIs have been successfully providing an alternative financing and saving method for individuals who are excluded from the financial system due to religious reasons and/or the inability to meet the requirements of the conventional financial institutions. It raises an issue of profitability versus outreach within the IFIs, which has not so far been resolved.

Having Islamic banking and finance (IBF) institutions operating under the mainstream economic framework and institutional logic has several implications. For example, it is essential to examine the contribution of Islamic finance on the sources of growth, measured by the capital accumulation and total factor productivity. On the other hand, carrying the distinctive feature of economic system, IBF institutions need to be further explored in terms of its relationship with socio-economic development which is a more comprehensive indicator than economic growth. The second implication is that there is a necessity to consider the current condition of the planet and sustainability related consequences, leading to the need to develop demand reduction policies. As the foundation of Islamic economics has the aim of moving all stakeholders towards perfection as necessitated by *fitrah* or original design by realising sustainability and justice, IBF institutions are expected to contribute to such larger social objective by definition as part of their own objective function. Therefore, IBF should develop the necessary strategies to work towards such inherited Islamic moral economy (IME) objectives along with the current global discourse on SDGs. For example, IBF institutions can be examined as to whether their financing has any impact on the global objective of alleviating carbon emissions. In addition, IME's objectives under the current socio-economic regimes relates to de-materiality and degrowth, as sustainability cannot be possible with linear growth strategies which are currently hegemonic. Therefore, examining de-materiality and degrowth as the emerging theoretical frames which have close proximity to IME can provide further insight into IBF and the sustainability debate and consequent practice. These, hence, constitute the main theoretical frame of this research.

1.2. PROBLEM STATEMENT

The mainstream economic framework rests its assumption on efficiency and maximisation, which leads towards profit maximization for firms and utility maximisation for individuals. The profits generated are expected to be used to finance further innovation in the firms to enhance their competitive edge. In the institutional logic of neo-classical economics, the output of the production system is consumed by households, who provide funds for firms to operate their business in the form of the prices they pay for commodities. Considering that the funding provided by households is channelled through financial institutions and there is an expectation of fixed return from the interest, it forces continuous production to cover the return for the capital. The monetary value of production, consumption, and capital is accounted as Gross Domestic Products (GDP) that is then used as the measurement of economic activities.

Following the use of GDP as a measurement for economic activities, GDP growth has been employed extensively as the value of economic growth of a country. Therefore, over the decades, a number of contenders (*such as*: Arrow, 1962; Lucas, 1988; Romer, 1986; Solow, 1956) have contributed to the development of the theory of growth, which considers labour and capital as the prominent sources of growth. Other factors affecting growth are considered as residual, such as advancement in technology, although there is further argument that technology can already be reflected in the capital, represented by more advanced machinery and equipment, and labour, shown by higher productivity (Barro & Sala-i-Martin, 2004).

Although seen to be the most powerful way of measuring economic growth, there have been some critics of the use of GDP as the only tool to measure economic growth within a country (*see*, among others, D'Alisa *et al.*, 2015). It is argued that GDP only reflects the production and consumption within a country that has monetary and commercial value, hence, limiting the contribution from the informal sector which also has significant impact on everyday life. It leads towards an unwillingness to perform any non-monetary value activities, including taking care of the elderly, voluntary work on environmental-related issues which can reduce the effect of climate change, and socialising. Hence, such economic logic leads to further commodification and commercialisation of everyday services in the society.

Furthermore, under the mainstream economic framework, human beings are instrumentalised for an economic objective in terms of being the tools of achieving economic growth rather than the end objective of it (Mirakhor & Askari, 2010). Consequently, human beings are considered as one of the factors of production or input in the modes of production, along with capital and land which can be utilised to its maximum to reach the targeted profit through efficiency. Such an economic mentality shapes the way human beings are treated by the system so that they need to perform as efficiently and productively as possible to meet the required objective, resulting in directly and indirectly neglecting the fulfilment of human qualities, human rights and the awareness of human well-being. On the other hand, recalling that GDP is the measure of economic growth, the employment of human beings as labour is seen to have a monetary value which contributes towards an increase in the value of GDP: this implies the commodification of labour, while they should be considered as 'labourer'.

The realisation that GDP as a construct does not reflect state of human well-being and the related qualities, many researchers suggest the need for a more comprehensive view of

measuring human well-being. The ongoing debate over the years has led to the establishment of the Human Development Index (HDI) that does not only consist of GDP, but also school enrolment and life expectancy as measures of educational attainment and health respectively. However, it is further argued that HDI is still not able to capture the level of human well-being, which necessitates the development of more comprehensive social indicators, including unemployment, crime rates, voting rights, and other factors by considering the historical, institutional, cultural, demographic, political, social and ecological aspects (among others, *see*: Frey & Stutzer, 2000; Noorbakhsh, 1998; Rodrik, 1999; Sagar & Najam, 1998).

In order to establish more comprehensive socio-economic indicators, this study refers to the components being developed by the United Nations, namely the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs): they are developed to incorporate the dignity, peace and prosperity of human beings along with other stakeholders of the Earth. MDGs had several targets to be achieved during the period of 2000 - 2015, and the results look quite positive: these include the decrease in the numbers living in extreme poverty in developing countries which has fallen from 47% in 1990 to 14% in 2015; a decrease in the global number of out-of-school primary aged children from 100 million in 2000 to 57 million in 2015, an increase in number of people gaining access to piped drinking water from 2.3 billion in 1990 to 4.2 billion in 2015 (United Nations, 2015). To continue the MDGs, SDGs were formulated in 2015 with more comprehensive and detailed targets to be achieved by 2030.

Despite the positive attitude towards MDGs and SDGs, they are claimed to be structurally flawed due to the methodological problem in establishing the goals: they do not consider the characteristics and specific problems of each country, shown by the fact that the goals and specific targets are developed globally, while there are various differences in the social, cultural and economic background in every country (Vandemoortele, 2002). For example, countries in Asia have more problems related with poverty, while countries in Africa have more pressing problems related to life expectancy. Despite such differences in the priorities in each country, all the countries need to achieve the same targets set by the UN, regardless of their main problems and the starting point they are at that time (Vandemoortele, 2002).

Moreover, SDGs have been set in quantitative measurements after taking the average of what is happening in each country and globally. For instance, Burkina Faso has a greater increase in school enrolment, within ten years, than other countries, although it is still below the target set

by the UN (Clemens *et al*., 2007). There is a need to still acknowledge Burkina Faso's achievement, but since it does not reach the target there is an implication of failure.

Another problem is related with the necessary cost, its funding, and the fact that its calculation is based on a weak methodology (Clemens *et al.*, 2007; Liverman, 2018; Vandemoortele, 2002). Realizing that many developing countries are the ones having to achieve those goals, it is known that they need to have some aid from developed countries in financing such development. However, developing countries are known to have low levels of governance which creates trust issues between the donor and recipient countries leading to higher political costs.

As has been mentioned, it is argued that MDGs and SDGs were established as a correction mechanism in terms of moderating the adverse consequences of the current mainstream system (Asutay, 2018a), as this system has, directly or indirectly, led to the emergence of problems faced by human beings and the earth, such as poverty, inequality and environmental deprivation leading towards unbalanced social metabolism. With all the disparate activity in the world, shown by the rapidity of each component in life, and the need to have infinite growth to keep the economy stable and trusted, it becomes essential to slow down human needs and wants so that the resource availability can be maintained for future generations. This is the core position of the newly emerging de-materiality and degrowth paradigm, which offers an alternative perspective to the mainstream system

The concept of de-materiality and degrowth is based on the perception that material well-being is not the only component that needs to be pursued; this takes into account that there is a quantitative limitation on the material resources that can be utilised for present and future generations. However, based on the assumptions of the market system, the supply-demand process will correct the utilisation of material resources, since low supply creates high prices affecting low demand (Beckerman, 2003). Furthermore, there should be faith in technological advancement which will create efficiency in the material resources allowing the same output with lesser input. Consequently, it is not necessary to put much effort into the sustainability and degrowth issues in the development agenda.

Further, it has been acknowledged that finance also has responsibility in creating these problems, since it makes a contribution towards growth shown by the finance-growth nexus and it also has particular role in the environmental issues demonstrated by the finance-

environment nexus. It implies that Islamic finance, whose emergence is very recent compared to conventional finance, can also have a certain impact on the growth, underdevelopment, and sustainability issues due to the observed divergence in its operations from the aspirational level.

Islamic finance, as the accentuation of Islamic economics, needs to reflect the aspirations of Islamic economics which aims for excellence (*ahsan*) by achieving *ihsan* (beneficence) at individual and societal level. It means that all the stakeholders are considered to have equal rights in the production, consumption and distribution process due to *tawhid*, namely complementarity and unitarity, which results in the implementation of social justice (*adalah*) (Asutay, 2018b). Since social justice may not overcome the resource accessibility, equal access to the resources is achieved by *ihsan* or equilibrium in the society. Islamic economics also suggests that growth has to be in harmony (*tazkiyah*) without neglecting or trading-off one stakeholder against another, as every stakeholder is created with a development path as suggested by *rububiyah* (Asutay, 2018b). It is equally important that human beings are regarded as the *kalifah* (vicegerent of Allah) on earth, which consequently implies that human development is an essential element to initiate and become the basic structure for further development, such as physical-material development of the earth and development of society as a whole with human-centred development paradigm. All these suggest that the Islamic moral economy or IME paradigm suggests an equal opportunity based on expanded stake-holding system relying on sustainable development of individuals, society and the environment.

As such a paradigm suggests, the IME has a different framework from the mainstream economic system, as the former envisages growth and development, not only in terms of material objectives but also human well-being and the sustainability of the environment and society. Thus, it is important to examine the relationship between Islamic financial development and growth, development and sustainability issues. To be more precise, the relationship with sources of growth: to which part of has Islamic finance been contributing, and what is its relationship with socio-economic development measured by several development-oriented indices. It is also important to consider the relationship of Islamic financial expansion with carbon emissions as a proxy of environmental issues that can also reflect the existence of a demand reduction, de-materiality and degrowth conceptual framework.

1.3. AIMS, OBJECTIVES, RESEARCH QUESTIONS, AND METHODOLOGY

This research, hence, aims to examine the relationship between Islamic financial development and economic growth, socio-economic development and the IFI's ability to contribute towards carbon emission performance. In order to fulfil the aim of this study, the research is structured into three empirical chapters along with the introduction and conclusion chapters. The respective aims, objectives, research questions, and methodology in relation to each of the essays are developed as follows:

Essay 1: Islamic Finance and the Sources of Growth: An Empirical Exploration

Aims, Objectives, and Research questions:

This essay aims to examine the contribution of Islamic financial development on economic growth through its sources of growth, in the form of capital accumulation and total factor productivity growth by following the Solow Growth Theory and Finance-Growth Nexus. Further, it examines whether the financing provided for different purposes results in different relationships with the sources of growth. In order to answer the aims and objectives, the following research questions are developed:

(i) What is the relationship between the development of Islamic finance and capital accumulation growth?

(ii) What is the relationship between the development of Islamic finance and total factor productivity growth?

(iii) Is there any significant difference between the sectoral financing provided by Islamic banks on capital accumulation growth and total factor productivity growth?

(iv) Is there any significant difference between the types of structure or contract utilized by Islamic banks on capital accumulation and total factor productivity growth?

Theoretical Framework:

The Solow growth model explains that economic activity is a function of capital accumulation, labour force and any residual (Solow, 1956). In the model, the residual is an exogenous factor affecting the increase of output productivity other than that coming from capital and labour,

such as technological advancement: this is called total factor productivity. These two factors, namely: capital accumulation and total factor productivity, are known as the sources of growth, since they are the factors that are able in increasing growth, measured by GDP growth.

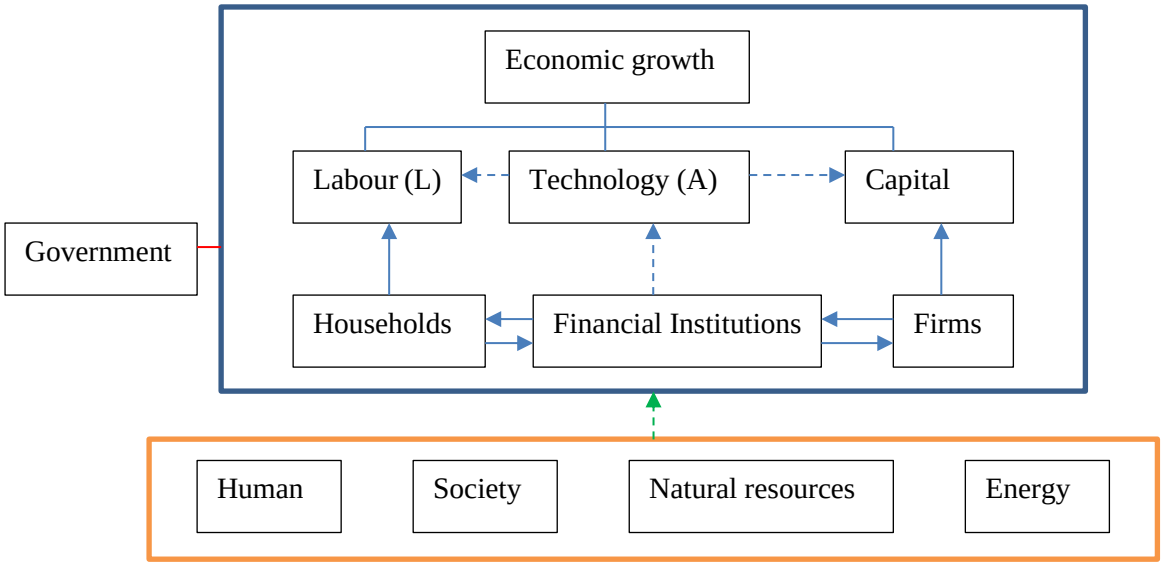
To be able to increase productivity, it is believed that innovation needs to be encouraged by the utilisation of capital, which is extended by financial institutions, since they act as the intermediation between the capital provider and those who need capital (Schumpeter *et al.*, 2005). There has been a large amount of empirical evidence demonstrating that financial institutions contribute directly and indirectly to economic growth (among others *see:* Aghion *et al.*, 2005; Christopoulos & Tsionas, 2004; Greenwood & Jovanovic, 1990; King & Levine, 1993; Naceur *et al.*, 2017). Another aspect of the finance-growth nexus relates to the supply-leading and demand-following mechanism (Patrick, 1966).

Islamic finance, as part of financial institutions, can be said to also contribute towards growth, which makes it necessary to examine the contribution it makes on the sources of growth. Moreover, considering the distinguished principles of IME and how it has been accentuated in Islamic financial institutions, it is necessary to observe how Islamic banks and Islamic capital markets have played their role on sources of growth.

The theoretical framework of Islamic financial development and sources of growth is depicted in Figure 1.1, explaining that economic growth is the ultimate end or final objective of economic activities. The growth can be segregated into three common factors, namely labour (L), capital (K), and technology that is acknowledged as the exogenous or residual factor. The factors of production are supplied and conducted by the actors, namely households and firms, then the financial institutions are developed to bridge excess capital from households and returns from the firms.

The capital accumulated by firms and provided by financial institutions will be able to support any innovation usually represented in the form of technological advancement. Government has the role of providing regulations and policy for the economic activities ensuring they operate correctly. However, economic activities only consider the factors of production, the factors shown at the bottom part of Figure 1.1, as factors that can be substituted and utilized to the maximum level without considering that those factors should also be available for the other activities to be well-operated.

Figure 1.1: Theoretical Framework for Essay 1



Data and Methodology:

This study employs panel data using Ordinary Least Squares (OLS) methodology comprising of static and dynamic panel estimation. As for the dataset, data for sources of growth as the dependent variable are generated from Pennsylvania World Table 9.0 ranging from 1961 to 2014. Data for Islamic banks is generated from ORBIS Bankscope database with a period ranging from 1989 until 2016, while data for *sukuk* market covers the 1991-2018 period generated from Bloomberg terminal. As for the control variables, such as macroeconomic variables and institutional variables, these are generated from the World Bank Database.

Essay 2: Islamic Finance and Socio-Economic Development: Conceptual and Empirical Explorations

Aims, Objectives, and Research questions:

This essay explores and examines the contribution of Islamic finance to development in the form of socio-economic development indicators, measured by various indices as proxies of economic development, rather than simple economic growth as measured by GDP. The following research questions are developed to answer the objectives:

(i) What concepts and measurements have been advanced to embed socio-economic development?

(ii) What is the development paradigm of Islamic economics and where are Islamic finance institutions located within such a paradigm?

(iii) What is the relationship of Islamic financial development (in the form of Islamic banking and *sukuk* markets) with socio-economic development?

Theoretical Framework:

Socio-economic development is defined as development that does not only consider economic dimensions, but also human, social, cultural, political, historical, institutional and ecological factors (Szirmai, 2005). Therefore, in conceptualising development, social indicators, such as health, education, technology or life expectancy should be considered beyond economic factors, even though they affect the latter directly or indirectly.

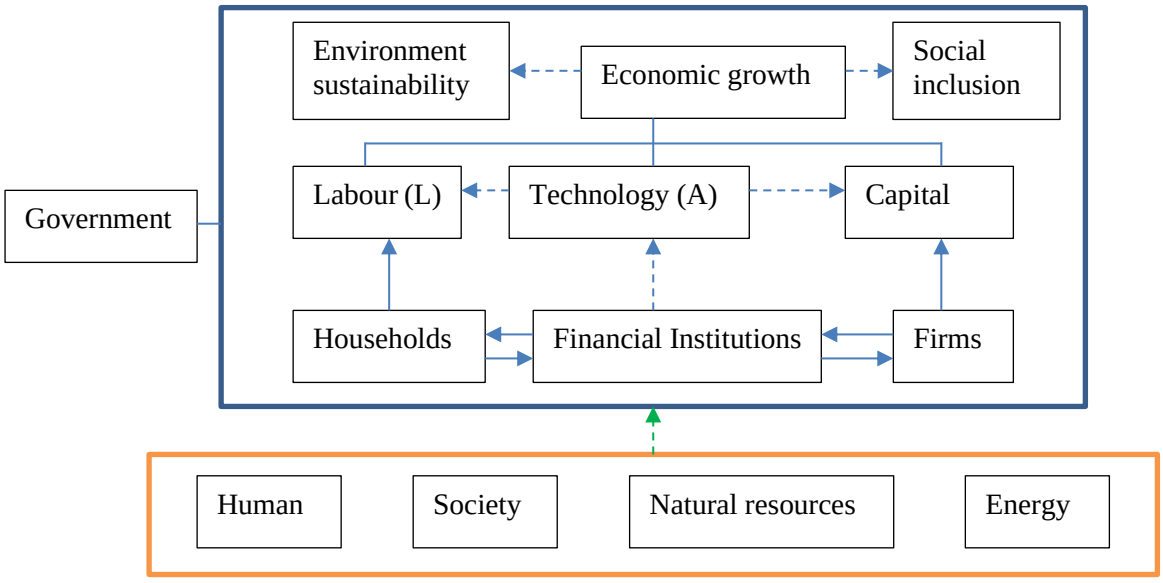
The first established index being developed by the United Nations (UN) to incorporate broader components is the Human Development Index (HDI), which does not only consider material well-being, but also education and health represented by school enrolment and life expectancy (M. ul Haq, 1995). Considering there is argument that the HDI does not adequately capture socio-economic development, various indices have been developed to incorporate broader level of development (*see*: Frey & Stutzer, 2000; Noorbakhsh, 1998; Sagar & Najam, 1998). Furthermore, the UN initiated MDGs and SDGs to provide specific targets in relation to the development to be achieved globally.

To achieve the targeted development, it is necessary for the economic activities to grow so that there is a spill over effect on the social and environmental issues, as depicted in figure 1.2. Accordingly, financing is required to achieve the expected socio-economic development, which can be directly through building the necessary infrastructure with various indicators such as education, health, and environment, or indirectly through supporting economic growth which can positively affect such indicators through the spillover impact. The financing can come from countries' internal financing and also from external financing from private entities, financial aid from other countries, or multilateral institutions.

It then becomes important to examine the role of Islamic finance in supporting socio-economic development, since the principles of IME emphasise social, moral and spiritual factors in its development through financial activities.

The summary of theoretical framework in the second essay is presented in figure 1.2, which it has additional objectives compared to figure 1.1 by including environmental sustainability and social inclusion alongside the mainstream objective of economic growth. However, it still has the same factors of production and actors for the economic activities as Figure 1.1 consisting of labour, technology, and capital in which the theoretical model in Figure 1.1 has not incorporated these factors of production as 'ultimate means' by treating it according to their rights. Rather, these 'ultimate means', namely human, society, natural resources and energy, are still seen as mere input factors, being placed at the bottom of its endogenized objectives and operational activities. In other words, these factors are treated as exogenous factors, meaning that these factors can be utilized optimally and can be substituted by other factors when they are no longer available.

Figure 1.2: Theoretical Framework for Essay 2



The operational activities of the economic transactions are conducted by household, financial institutions, and firms: each institution has its own role. For example, households provide the labour, excess capital, and also act as consumers who purchase the goods and services produced by the firms. Alongside that, financial institutions act as intermediaries between households and firms to channel and manage excess capital from households to be utilized by firms in their

production activities. As the activities are conducted within a country, there is a role for government in regulating the economic and financial activities to ensure the smooth running of those activities.

Data and Methodology:

This study employs pooled and panel data econometric modelling with Ordinary Least Squares (OLS) methodology to answer the research questions. The data being used in this essay is the volume of *sukuk* issuance generated from Bloomberg Terminal ranging from 1997 until 2018, including 31 countries who have issued *sukuk.* The empirical modelling also includes data on Islamic banking variables as the independent variables. The dependent variable consists of various indices developed in order to capture the MDGs and SDGs as the representative of socio-economic development indicators, such as Human Development Index, Education Index, Gender Development Index, Gender Inequality Index, Gini coefficient, Governance Index, Infrastructure Index, and Environmental Performance Index (EPI), the raw data for which is generated from several resources, such as the World Bank Database and EPI committee.

Essay 3: An Empirical Analysis on the Contribution of Islamic Finance on Sustainable Development Through Co_2 Emission Reduction: Demand Reduction, De-Materiality and Degrowth Frames

Aims, Objectives, and Research questions:

This paper examines the impact of Islamic finance on the fulfilment of the Islamic moral economy objective of sustainability in terms of de-materiality and degrowth by analysing relationship between the Islamic financial development and its impact on carbon emission. This study assumes that as part of its endogenized emphasis on moral economy, the operations of IBF institutions should alleviate or at least moderate negative environmental impact. The following research questions are developed to answer the research aim in line with the identified objective:

(i) What is the rationale for de-materiality and degrowth in Islamic economics?

(ii) What is the relationship between expansion and development of Islamic finance and CO_2 emissions?

(iii) Is there a significant difference in the CO_2 emission reduction produced by the sectors being financed by Islamic banks?

(iv) Is there a significant difference between the different modes of financing used by Islamic banks on CO_2 emissions?

Theoretical Framework:

The unsustainable nature of growth economics has led to the emergence of environmental issues, such as deflating material resources, an increase in air and water pollution, carbon emissions, climate change and soil degradation, to name a few (D'Alisa *et al*., 2015). The concept of de-materiality and degrowth is based on the argument that in order to sustain environmental quality, there is a need to pull back and reduce material intensity and further to decrease global consumption and production. The ultimate aim of degrowth is to achieve human well-being, which can be conducted by decreasing social metabolism to a sustainable steady state level under the principles of sufficiency, participation, opposition to class creation and anti-utilitarianism.

The concept of degrowth does not necessarily mean negative growth in GDP, but it does not put economic growth as an ultimate or even intermediate aim, rather it incorporates other indicators such as biophysical and social indicators as shown in Figure 1.3. However, this conception will not necessarily lead towards higher satisfaction compared to satisfaction obtained from high consumption, but it will, at least, not decrease happiness considering that it could lead to a decrease in income inequality, increase mobility, work sharing (freedom, reciprocal, and communal), and increase environmental aspects (natural space).

Regarding environmental problems, it is believed that financial institutions have certain roles in environmental degradation, since the financial sector provides the financing needed for economic activities to grow and develop: it had been the main motivator behind the growth paradigm. In particular, aggressive greed and private profit maximisation in the financial sector is considered as one of the fundamental causes of the exploitation of the environment.

Borrowing from the argument developed by Kuznets (1955) that GNP growth and inequality have inverse U-shaped relationship, Grossman & Krueger (1991) argued that GNP growth and environmental degradation have a similar relationship, resulting in Environmental Kuznets

Curve (EKC). This demonstrates that there is a non-linear, inverse U-shaped relationship between economic growth and environmental degradation. This implies that in the initial growth phase there will be higher carbon emissions that will decrease at a certain level of growth.

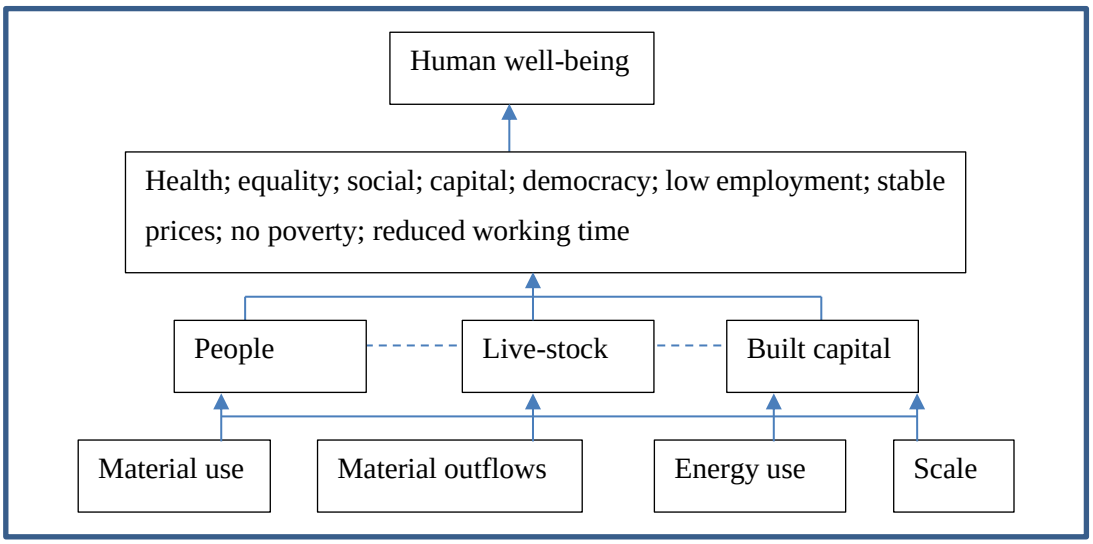
Considering that Islamic finance is part of the financial system and the objective of IME is to ensure that the right of the ecology should be considered in the financial decision making and the financial activities, it is essential to examine the contribution of Islamic finance in the form of Islamic banks and *sukuk* market on environmental issues. We need to know whether it has been supporting continuous or linear growth as predicated by mainstream economics, reflected in the volume of carbon emissions, or whether it has demonstrated an ability to act as a moral compass in endogenizing the physical limit of the earth by de-centring the prominent role of capital.

To summarize the theoretical framework for Essay 3, figure 1.3 provides a different mechanism from figure 1.1 and figure 1.2. In this case the ultimate means (material use, material outflows, energy use, and scale) and intermediate means (people, live-stock, and built capital) are incorporated into the economic and financial activities, realizing that these means are the foundations for further economic activities to run properly. The difference from figure 1.2 is that as the concept of degrowth incorporates material resources and human beings as the foundation of economic activities, it will, by definition, consider and maintain the characteristics and metabolism of those means and achieve environmental sustainability and social inclusion in the process.

Figure 1.3 also depicts that the ultimate aim of economic activities should be to achieve human well-being rather than economic growth as presented in figure 1.1. The concept of degrowth treats economic growth as an intermediate aim alongside health, equality, social balance, capital, democracy, low employment, stable prices, an end to poverty, and reduced working time, which can be seen in figure 1.3. Further, it presents that people, live-stock, and built capital are of the same level of importance without any domination between one and another since these intermediate means have equal opportunities to develop and maintain their metabolism. This idea of equal opportunities is not reflected in the Figure 1.1 and 1.2 since there has been domination between capital-human relationship and human-natural resources relationship in which capital has been overruling the role of humans implying that humans have

been treated as sources of serving the capital, and humans have been treating natural resources as a mere facility of satisfying their needs without considering the rights of natural resources.

Figure 1.3: Theoretical Framework for Essay 3



Data and Methodology:

This study employs static panel data estimation with Ordinary Least Square (OLS) methodology, since it is comprised of many Islamic banks and *sukuk* issuance globally within many periods. The IFSB database ranges from 1989 to 2014 presented in the form of annual bank-level, while the *sukuk* market data ranges from 1991 to 2018. For the dependent variables, it employs the carbon emissions data generated from the World Bank Database presented in country-level data annually ranging from 1961 to 2014. In addition, several control variables, such as GDP per capita, country population, ratio of government expense to GDP, and oil price, are included in this study. The data is generated from the World Bank Database, ranging from 1961 to 2016, presented at country level annually.

1.4. RESEARCH RATIONALE

This study examines the contribution of IBF institutions, as the accentuation of IME, towards economic growth under the mainstream framework followed by the ability of IBF institution to participate in the socio-economic development and sustainability issues. Rather than examining economic growth directly, this study observes the contribution of Islamic financial development on the sources of growth, namely capital accumulation and total factor productivity growth: this has not been widely explored. In addition, this study aims to examine

the channel through which Islamic financial development has been contributing to capital accumulation and/or total factor productivity growth.

In relation to economic development, this study undertakes the contribution of Islamic financial products on the socio-economic development that is represented by targets in the MDGs and SDGs established by the UN as an effort to provide better world to live in for the society and its stakeholders. The attempts to examine the socio-economic development role of Islamic finance through empirical methodology is rather new and hence this study will further contribute to such efforts through the particular benchmark created and utilised by this study.

Since development also needs to consider sustainability issues, this study also investigates the contribution of Islamic finance on the environmental issues by measuring its impact on carbon emissions. In doing so, the theoretical framework of de-materiality and degrowth is being utilised, rather than the widely explained sustainability concept under the mainstream economics framework. The objective is to provide a comprehensive view and an alignment with the framework of Islamic economics. This empirical study focuses on examining the financing provided by Islamic banks and *sukuk* markets and their ability to reduce CO_2 emissions, which makes it a novel study as there is no other studies in the existing literature.

In the mainstream economic framework and the practices of the financial sector there is an assumed element of superiority: every economic activity has to be fit within this framework, and as a result both society and the natural environment have to serve the needs of economics. It cannot be ignored that the mainstream economics framework has led to a better life for the society. Instances would include longer life expectancy, higher school enrolment, amongst others. On the other hand, it should also be taken into account that problem in society, such as income inequality, gender inequality, sustained poverty and issues with environment have become sustained consequences of capitalism's framework: it has essentialised the maximization of shareholders value rather than optimising the interest of stakeholders.

While the economy still operates under this mainstream framework it may be difficult to resolve these issues. The social and environmental issues are less likely to be overcome if the concept of material well-being and self-interest is still the foundation in developing the solution: the earth will not be able to accommodate the expectations and social interest can not only be formed from the aggregation of individual interest. The proposition of steady state economic growth that can be achieved through degrowth is seen to be utopian under the mainstream

economics framework as it violates the principals and assumptions of capitalism and neo-liberalism.

In relation to these wide and deep issues, Islamic finance can be seen to offer fresh solutions resulting from its very different foundational objectives. Islamic finance has been experiencing great development to catch up with its conventional counterparts: however, it is argued that it has been emphasizing what may be classified as *shari'ah*-compliant instruments rather than attempting to move towards the *shari'ah*-based institutions (Asutay, 2007b, 2012). Therefore, the three essays can demonstrate in which direction the implementation of Islamic finance has been operating: whether it has only been trying to fit into the mainstream economics framework or whether it has attempted to accentuate its foundational objectives. Alongside raising concern of social and environmental issues, also the proposition of degrowth from the ecological position, Islamic finance can pursue its own path towards economic and financial activities by substantiating its products and instruments to complement the importance of *shari'ah*-compliant forms.

1.5. SIGNIFICANCE OF THE RESEARCH

The relationship between IBF institutions and the economy, particularly economic growth and economic development, must be examined to identify its ability to conform with the foundational objectives of Islamic economics. It is also essential to incorporate the possible idea of degrowth and de-materiality into the Islamic economic framework in order to manage the sustainability and environmental issues, since Islamic economics aims to perfect the interest of all the stakeholders, including human beings, natural resources, and the environment as well as capital. Thus, this research has adopted some novel approaches and theoretical and empirical frames to examine the developments in Islamic finance and the consequences it generates in the form of growth and sustainable development. Therefore, the research presented in this thesis should be considered as novel in certain aspects by expanding the empirical conceptualisation along with theoretical frames used.

This study provides comprehensive empirical evidence, which can be used further for developing policies in improving IBF institutions that can contribute to its stakeholders' well-being: IME aims to go beyond the interests of the shareholders as essentialised by the market economy. It will also suggest that Islamic economics does not stand by itself when it comes to the environmental discussion since the degrowth paradigm provides a possible mechanism

outside the market mechanism. Thus, it will be logical for the policy regulators and also society to implement demand reduction to support each stakeholder in providing a better social metabolism and environment to live in. Such debates and narratives within such paradigmatic frameworks are entirely new for Islamic finance related studies and should be considered as a significant contribution for the existing body of knowledge by this research.

1.6. OVERVIEW OF THE RESEARCH

This research consists of five chapters, including an introductory chapter, which provides the background of the research, the aims, objectives, research questions, and research methodology of each essay, the rationale of the research, and the significance of the research.

Chapter 2, being the first essay, aims at empirically studying the contribution of Islamic financial development on the sources of growth, namely capital accumulation and total factor productivity growth. It elaborates on the basic of the Solow growth model and finance-growth nexus, in which financial institutions are needed in order for the economy to grow, either through capital accumulation or total factor productivity. Further, it explores the role of financing provided by banks for different sectors, using different types of contract and also the volume of *sukuk* issuance on the sources of growth.

The empirical analysis in the first essay concludes that Islamic banks' stability has a positive relationship with sources of growth, while Islamic banks' efficiency has a negative relationship with them. Further, financing extended by Islamic banks for consumer durables and real estate sectors have negative and positive relationships with capital accumulation growth respectively. In addition, financing agriculture and real estate has positive relationship with total factor productivity growth, while financing transportation and banking-finance sectors have negative relationships with productivity growth. As regards to the types of contract, financing through profit-loss sharing has negative and positive relationship with capital accumulation growth and total factor productivity growth respectively, while financing through fixed instrument has positive relationship with capital accumulation growth. As for *sukuk* market, it has positive and negative relationship with capital accumulation and total factor productivity growth, respectively.

Chapter 3 provides the second empirical study on the relationship between Islamic financial development and socio-economic development by incorporating several indices which reflect

the MDGs and SDGs, incorporating broad factors of development. It examines the contribution of Islamic banking variables and *sukuk* volume issuance on the various socio-economic indices to examine whether Islamic banking expansion and *sukuk* have been supporting socio-economic development.

The empirical analysis in the second essay finds that the *sukuk* market has a negative relationship with HDI, the education index, the gender inequality index, and the infrastructure index. Regarding the quadratic relationship, the volume of *sukuk* issuance is found to hamper the gender development index and environment performance index before it has the reverse effect when reaching a certain volume of issuance. As for the Islamic banking variables, intermediating through the financial inclusion index, the empirical analysis finds support for Islamic financial development having a positive impact on HDI, the education index, gender development index, gender inequality index, gini coefficient, and infrastructure index through financial inclusion.

Chapter 4, being the third empirical essay, examines the role of Islamic financial development on supporting the sustainability of the economy and society measured by the financing provided by Islamic banks and types of *sukuk* issued towards carbon emissions. It incorporates de-materiality and degrowth paradigms as the theoretical framework: this is aligned with IME's foundational axioms in supporting the sustainability issue in an attempt to create a better environment by reducing carbon emissions as one of the approaches, which also utilizes the theoretical framework of finance-growth-carbon emissions in the explanation.

Through the empirical analysis, the third essay concludes that the financing provided for the transportation sector by Islamic banks has a positive relationship with the total volume of carbon emissions and emissions coming from liquid fuel, while financing consumer durables, agriculture, and trade sectors have negative relationships. However, financing consumer durables and manufacturing sectors has a positive relationship with the volume of carbon emissions coming from gaseous fuel. Examining the types of contract used by Islamic banks in their financing, financing through profit-loss sharing has a negative relationship with the volume of carbon emissions coming from gaseous fuel consumption although it has positive relationship with the total volume of carbon emission and emissions coming from solid fuel consumption. The financing through fixed instruments has negative relationship. As for *sukuk*

market, it has a negative relationship with the volume of carbon emissions in total and for different sources of fuel.

Chapter 5 concludes the study by providing the summary of findings from previous chapters as well as presenting an interpretative discussion, which also presents a discussion on the essential implications of the empirical findings, potential policy recommendation, and prospects for the future research.

Chapter 2

ISLAMIC FINANCE AND THE SOURCES OF GROWTH: AN EMPIRICAL EXPLORATION

2.1. INTRODUCTION

The expansion and diffusion of Islamic financial institutions have demonstrated unprecedented growth in the new millennium in terms of the number of institutions and the volume of their activities. One of the most profound developments has been the visible performance of Islamic banks, along with bourgeoning Islamic capital markets; Islamic financial and money markets; *takaful*; and Islamic social finance. The emergence of Islamic banks began with the establishment of *Mit Ghamr* Bank in Egypt in 1963 as a social bank, followed by the formation of Islamic commercial banks in other countries since 1975, when the first Islamic bank—the Dubai Islamic Bank—was established (Asutay, 2015). By the end of 2017, the value of assets of Islamic financial institutions (IFIs) had reached USD 1,624 billion from 394 IFIs in 42 countries (The Banker, 2018).

There are certain factors that have played an important role in the expansion and diffusion of Islamic financial institutions. For instance, increasing awareness in Muslim societies all over the world regarding issues of *shari'ah*-compliancy for financial products has resulted in increasing demand for Islamic financial products (*see:* Asutay, 2015; Pepinsky, 2010; Wilson, 2007). While this constitutes a demand-push factor, supply-push factors, in the form of public policies and regulatory facilitation in the Muslim world, has resulted in the provision of alternative financial transactions (Abduh & Omar, 2012; Rudnyckyj, 2019). In terms of political economy of emergence, these two methods of developments are known as bottom-up and top-down approaches for the former and latter cases respectively. While in the case of some countries, these factors have occurred independently, in others they have worked in conjunction with regulatory bodies making an effort to accommodate the aspirations of society.

Islamic economics in general, and Islamic finance in particular, involves the application of Islamic knowledge in everyday practice in relation to financial matters, and, therefore, its

emergence has been possible through Islamic ontological and epistemological knowledge and methods, drawing on the Quran and *Sunnah*, or the tradition of the Prophet Muhammad. This distinguishes Islamic economics from mainstream economics, as within such a knowledge base, economic and financial matters are embedded in the social relations determined by Islamic norms. In terms of shaping financial activities, in addition to its embeddedness, Islamic ontology, as articulated in *fiqh* or codified Islamic law, results in shaping financial activity and individual economic and financial behaviour through certain regulations, such as the prohibition of *riba* (interest), *gharar* (uncertainty), and *maysir* (gambling). In addition to such prohibitions, Islamic economics also has its own definition of the nature of economic activity, for instance the meaning and role of money; the shared and participative nature of the economy within Islamic modes of production; and profit-loss and risk sharing financing (Asutay, 2015).

Islamic economics recognises money as medium of exchange, rather than as a commodity which can be traded in to gain benefits—this is the foundation of the articulation of the prohibition of *riba* (Chapra, 1985). This implies that Islam redefines capital and money in suggesting that money cannot be a source of wealth creation as it does not have an inherent value in itself. However, Islamic economics is not opposed to capital accumulation provided it does not lead to the dominance of capital over other factors of production. The *tawhidi*, meaning unitarity and complementarity, is the axiom of Islamic economics that suggests that no stakeholder can stand in dominance over the others (Asutay, 2018b). Therefore, to bring capital to the same level in terms of the interests of other stakeholders, *riba* is prohibited so that the dominance of capital can be avoided.

An important implication of Islamic economics is its consideration of justice, in the form of intra and inter-generational justice, as well as its consideration of the two dimensionalities of time by its acknowledgement of the hereafter (Naqvi, 1994). As part of this intergenerational justice, Islamic economics essentialises the sustainability of the world in general, and its resources in particular, for the future, as well as articulating that the maximization of utility is not only about the individual's objective function, as *falah* (salvation or happiness) should be essentialised through the expansion of *ihsan* (beneficence) by considering the hereafter.

The nature and principles of Islamic economics consequently imply that the activities of Islamic finance should be seen to be adjacent to the real economy sector, rather than the financial sector or other sectors that have no real contribution to society. The real economy is

often represented by Gross Domestic Product (GDP)—the calculation of a country's output from economic activities. A number of factors, directly and indirectly, affect the growth of GDP, which is seen as the economic growth of a country, including the financial sector. The direct effect of the financial sector on economic growth can result from the values of the activities of the financial sector itself, which are counted as part of a country's overall output. Additionally, the financial sector has an indirect effect by providing financial services, including credit, for other sectors. By supplying credit, it may be claimed that these services support the positive growth of the economy, ensuring the ability of other sectors to expand and contribute towards economic growth and development.

When discussing the economic growth of a country, it is necessary to look at the components constituting the growth function. The Solow-Swan model of economic growth, set within the framework of neoclassical economics, explains that the growth of output is a function of capital accumulation, changes in the labour force, and technological advancement. Technological advancement is treated as an exogenous factor contributing to the output of production (Barro & Sala-i-Martin, 2004).

By redefining capital, through the prohibition of *riba*, Islamic financial institutions are expected to contribute towards the economic growth of a country through their financing of real economic activity and considering the characteristics of Islamic finance principles, especially in relation to the real economy sector. This study, therefore, aims to explore the role of Islamic banks and Islamic capital markets play in economic growth, particularly capital accumulation and total factor productivity growth, since they act as financial intermediaries. As such, this study particularly aims to examine the impact of Islamic banking and *sukuk* market development on productive and real economy-related capacity building through capital accumulation and total factor productivity and where the impact of financialization is reduced in relation to the aspirational expectations of Islamic economics.

In order to fulfil such an aim, the following research questions are developed:

(i) What is the relationship between the development of Islamic finance and capital accumulation growth?

(ii) What is the relationship between the development of Islamic finance and total factor productivity growth?

(iii) Is there any significant difference between the sectoral financing provided by Islamic banks on capital accumulation growth and total factor productivity growth?

(iv) Is there any significant difference between the types of structure or contract utilized by Islamic banks on capital accumulation and total factor productivity growth?

This study is significant because it is necessary to explore the contribution to economic growth expected of Islamic finance. It also examines the role of Islamic financial institutions, along with the progress they have demonstrated over the years, so that the direction of Islamic financial institutions can be ensured to be aligned with the objectives of Islamic economics. In addition, this study looks at sources of growth, rather than growth itself. This is in order to better observe the proximity of Islamic finance's contribution towards capital accumulation and total factor productivity, which relates to the real economy—a sector that has an important position under the Islamic economics framework.

The rest of the paper is organised as follows: Section 2 explains the theoretical framework of sources of growth and components of financial development, while Section 3 presents the conceptual issues of Islamic finance development and sources of growth. This is followed by empirical studies on financial development and sources of growth in Section 4. Section 5 explains the research method and data and Section 6 explains the results and discusses them. Conclusions are presented in Section 7.

2.2. THEORETICAL FRAMEWORK OF FINANCIAL DEVELOPMENT AND SOURCES OF GROWTH

This section presents a survey of the theoretical body of knowledge in relation to financial development and the economic growth nexus.

2.2.1. The Sources of Growth

Growth is often presented as the increase (or decrease) in the outputs of economic activity and measured by GDP. The neoclassical production function of the Solow-Swan growth model considers economic activity to be a function of capital accumulation, the labour force, and technological advancement, which constitutes the mode of production (Barro & Sala-i-Martin, 2004; Nelson, 2000; Spratt, 2008). Under the Solow-Swan growth model, there are three properties that need to be fulfilled in order for the equation to function. These are: constant

returns to scale; positive and diminishing returns to private inputs; and Inada conditions. The second property leads towards a zero rate of growth since the additional capital and labour will result in a constant output.

The idea of constituting capital and labour as the mode of production is based on production and consumption processes within a country, which are operated by firms and households, as developed by Ramsey (1928). It explains that there are two actors in economy, firms and households, in which the former is supplier of goods and the latter provides labour and capital for the firms as inputs for the production process. As a consequence, the volume of output within a country depends on the proportion of income used as savings by a household, who is maximizing their utility function, and also population growth as the supplier of labour. However, the saving rate and population growth rate are treated as given in this model. Moreover, the influence of technology is taken as an exogenous factor, which can affect the output without having any contribution towards capital and labour.

This understanding has been further refined to include other factors in the equation, including: government spending as one of the economics actors; human capital as part of capital; endogenizing technological advancement by including research and development and the role of competition in the growth process. The additional variables introduced into the model, by definition, will have different effects on the assumption being determined in the neoclassical growth model. For example, by introducing human capital as part of capital, growth might continue indefinitely because it will make capital not to have a feature of diminishing due to the existence of human capital spill-over. This is due to the nature that there is no diminishing return of human capital.

The position of technological advancement is also part of the debate, since neoclassical theory assumes that technology directly affects output without having any influence on capital and labour, while there is the possibility that technology will affect labour shown by better quality of the labour due to better education, called ‘labour augmenting’ (Acemoglu, 2002). Acemoglu (2002) also explains that the effect of technology can also be observed from having a better quality of capital—capital augmenting—or it can be introduced into the equation by including the value of research and development.

Despite recent developments in the production equation, the basic model using the Cobb-Douglas function is presented in equation 2.1, which presents Y_t as the output at time t as a

function of capital stock (*K*) in the proportion of α and population size or labour supply (*N*) in the proportion of $(1-\alpha)$ with the influence of total factor productivity or residual (*A*).

$$Y_t = AK_t^{\alpha} N_t^{1-\alpha} \qquad (2.1)$$

It should be noted that capital stock is often known as capital accumulation, referring to physical capital being aggregated from economic activity and also the additional investment incurred from the portion of income that is not being saved in every period of time. However, it does not account for any technological advancement being introduced on the fixed assets that are utilized in the production process. Instead, it takes human capital into account for the expanded function of economic output. As for the residual, technology is claimed to be the residual that determines the value of output exogenously without having any effect on labour and capital. In its development, this residual is called the total factor productivity as it contributes towards the increase in productivity, which is accounted other than an increase of the quality and quantity of capital and labour (Barro & Sala-i-Martin, 2004).

Equation 2.1 explains that the growth of output volume is determined by growth from capital, labour supply, and technology. This decomposition of output growth is referred to as growth accounting. On the other hand, sources of growth explain that growth has to be induced by technological advancement, either directly or indirectly, through capital advancement, implying that the factor being claimed as residual is no longer technology, but other factors that have not been captured by the increase of quality in the inputs (Barro & Sala-i-Martin, 2004). Having said that, sources of growth does not undermine the contribution of growth accounting, in that it provides an explanation for the economic theory of growth, although it has not touched upon explaining the relation of other elements to the change in inputs and total factor productivity.

The Cobb-Douglas growth model implies that growth can be achieved by expanding capital accumulation, volume of labour, and advancement in technology. This is aligned with Islamic economics since it promotes the capacity expansion of every sector in the economy to be able to achieve the ultimate objective, which, as referred to by Ibn Khaldun, is *imar* or development (*see:* Chapra, 2000). Having higher output and positive growth of output indicates higher production and consumption in the economy, illustrating that households and firms are expanding, which can be claimed to be a process of self and societal development.

As previously identified, Islam does not oppose the creation of capital, although it does not encourage capital accumulation in the process of achieving the objectives of Islamic economics, which is the use of resources for the development of the individual, society, and the environment (*see:* Ahmad, 1979; Chapra, 2000). Islam considers capital to be necessary for households and firms to expand and increase their capacity in production and consumption. Capital, however, should not be the ultimate factor in running economic activities, nor should its accumulation be the main objective (*see:* Chapra, 2008; Tag el-Din, 2013; Asutay, 2018).

In relation to labour, Islam encourages Muslims to work and have jobs that they are suitable for, considering that they need to fulfil their responsibilities to themselves and their families, as well as contributing to society (Azid, 2005). In Islamic perspective, labour has a higher role compared to capital in producing output, since human beings are the ones who engage in activity and capital being the supporting factor in production (*see:* Akiyama, 1988; Azid, 2005; Tag el-Din, 2013). This aligns with the development of growth model, explaining that human capital should replace labour and be separated from physical capital, since different human beings will provide different contributions compared to physical capital, which has a uniform contribution despite different conditions in output production.

Discussing technology, Islam does not have any negative position with technological advancement as long as it fulfils the concept of *tawhid* (unity in the form of unitarity and complementarity), implying that it has to consider the equilibrium between the needs of both humans and nature (Akiyama, 1988). Technological development should reflect the actual needs of humans requiring assistance from technological development, which has to be in harmony with other stakeholders, including the environment. One stakeholder is a society and its culture where technology is being developed, since different social arrangements have different theoretical ideas and types of knowledge. This is shown, for example, by the failure of the attempted implementation of Japanese technology in the Philippines (Akiyama, 1988). As such, it is essential to develop technological ideas at the community level in order for society to understand the technology being developed, participate in its activity, and have control over the development process (Sardar, 1985). Explaining this in more detail, Todd & Todd (1984: 19-79) elaborated the balance between nature and technology describing it through nine precepts:

> the living world is the matrix for all design; design should follow the laws of life; biological equity must determine the design; design must reflect bio-regionality; projects should be based on renewable energy sources; design should be sustainable through the integration of

> living systems; design should be co-evolutionary with the natural world; building and design should help healing the planet; design should follow sacred ecology.

The Islamic view on capital, labour, and technology shows that Islamic teaching does not oppose the use of capital, labour, and technology in conducting economic activities, as long as they follow the requirements stipulated in the Islamic sources of knowledge. However, as mentioned, according to the neoclassical model, capital, labour, and technology are the main constituents for an economy to run and grow from the supply side. On the other end, on the demand side, households are expected to provide financing so that firms are able to operate. This financing can be channelled through financial institutions, including Islamic financial institutions. A number of empirical studies are discussed in the following sections that have evidenced the relationship between financial institutions, measured by the volume and performance of financial institutions, and economic growth.

This study, however, emphasizes the relationship between the development of Islamic financial institutions and sources of growth, rather than economic growth itself. A number of studies, as discussed below, provide evidence that financial development affects economic growth through capital accumulation and total factor productivity growth. To capture the nature of capital accumulation growth, it is calculated from the initial value of capital stock being available in the country increased by capital investment, which can be acknowledged as the representation of real assets being present in a country.

In addition to capital accumulation growth, this study also examines total factor productivity growth, since it is central to accounting other factors that have not been reflected by the increased value of capital and labour, such as the quality of capital and labour. Considering that technological advancement is seen as an exogenous factor, regardless of the fact that it affects the development of more advanced and sophisticated capital, total factor productivity will also be able to portray the inducement of technology on capital. Moreover, examining total factor productivity growth is important because the Solow-Swan growth model only accounts for the input of labour, regardless of background factors such as education that can also affect the output volume.

2.2.2. Financial Sector Development

Since capital is considered to be one of the main factors of production for economic growth, financial markets have developed in many parts of the world to facilitate the movement of

capital. To understand the necessity of financial intermediation in a market-based economy, it is important to recall two important costs determining the running process of the economy, namely information costs and transaction costs. The first cost is led by the condition of the two parties involved in the economy, namely the capital provider and the party who is lacking capital, since each party has a different set of information, which is called asymmetry of information. The second cost is related to the costs incurred to conduct transactions, for example administration costs, transportation costs, and many others.

These two market frictions create financial markets and intermediaries that channel capital from those who have an excess to those lacking the capital to bridge and minimize the information and transaction costs borne of direct financing from the two parties. This can be difficult as they need to find, by themselves, people having the necessary and required conditions to do the exchange. This explains that financial markets and intermediaries have several functions, such as mobilizing savings, allocating resources, exerting corporate control, facilitating risk management, and easing the trading of goods, services and contracts.

In modern financial activities, these functions are generally and formally carried out by banking and capital market institutions. Banking activities revolve around the taking of deposits from customers and making loans to other customers who have a funding deficit. This mechanism has been the practice since the twelfth century, although it was far more straightforward compared to the current way of doing banking (Usher, 1934). The historical operation was more similar to the facility of promissory notes provided through current banking activities—merchants deposit their money in the banking office and require the banks to provide guarantees for their transactions. Initially, the banks were run by the private sector; later, governments also started to have bank-purposed institutions to collect money from society in relation to public finance.

Other than banking institutions, capital can also be provided by capital markets where companies can share their ownership by allowing it to be purchased by public investors through the stock exchange. The history of joint ventures can be dated back to the period of the *Veregnide Nederlandsche Geoctroyeerde Oostindische Compagnie* (VOC) established by the government of the Netherlands in 1602, to help finance war against Spain (Neal, 2005). The VOC shared certificates of ownership to the public in order to finance their voyage to the East Indies to acquire resources that could be traded on the market. In return, the certificates' owners

were expected to receive dividends or capital gains generated by the company from its trading activities. In that period, the share was permanent but transferable implying that if the shareholders were not satisfied with the dividends or capital gains, they could ask to return their shares. In 1609, the shares had no become longer refundable implying that the shareholders needed to sell their certificates to other people when they were not satisfied with the return. This development led to the existence of a director-shareholders relationship and the shareholders did not have any voting rights in the company. Despite the success, and drawbacks of the system, the VOC experienced its downfall in 1796 resulting in its dissolution (Neal, 2005).

Despite the fact that the Dutch were the first to develop the idea of joint ventures, the London Stock Exchange (LSE) is now more successful compared to the Amsterdam Stock Exchange due to a number of factors. The first one is that the capital stock of the Dutch East Indies Companies remained fixed until the end of their existence, while the English East India Company increased them in size (Neal, 2005). Second, the Dutch did not have an effective secondary market; third, the stock transfer could only be done monthly or quarterly; fourth, there was no encouragement for foreigners to be investors; and fifth, the directors were not renewed annually—the LSE had these five features in its operational activities.

It should be noted that capital markets do not only serve the issuance of equity, but also debt issuance, known as bonds, which are issued by a government or company who desires to raise more capital to finance its projects or the corporation itself. Bonds can also be explained as a certificate of right for claim by the bond buyer over the company who issues the bond, for which they will gain interest for every period and also the principal at maturity. Bond issuance itself also has its own history dating back to the twelfth century when several cities in Italy issued public debt to finance the extension of their territorial control (Pezzolo, 2005). The governments of Venice and Genoa wanted to expand their territorial control by borrowing from rich citizens. In return, they would receive goods or revenues, although the governments saw this as a short-term solution.

Having issued the bond, the governments of Venice, Florence, and Genoa sought to finance their needs, although with some costs. The governments, at some point, faced challenges in paying off the interest, since they had to increase the interest rate for citizens to buy the bonds, leading towards a collapse (Pezzolo, 2005). Nevertheless, government bonds served several

functions, such as transforming private wealth into military power since most debt was used for financing war. It served a political function as buying the bond meant that the citizens supported the regime; it acted as a social structure since it could be redistributed to the poor; it was an effective surrogate for cash money; and lastly, it provided new forms of social security and investment system through dowries, life annuities, and lotteries (Pezzolo, 2005).

In its development, bonds have been issued for different purposes, such as for financing infrastructure, covering government accrued deficits, increasing liquidity, and other things. In addition, they are not only issued by governments, but also by corporations to finance upcoming and recent projects, as well as to cover their debts. It also undergoes transformations in terms of issuance value, as small amounts of bond value are also traded so that more citizens are able to participate in bond trading.

2.2.2.1. Functions of financial intermediaries

Based on the explanation regarding financial intermediaries, as explained in Figure 2.1, financial institutions deliver several functions, such as facilitating risk management; mobilizing savings; allocating resources (ex-ante); exerting corporate control (ex-post); and easing the trading of goods, services, and contracts (Levine, 1997). The main objective of having financial intermediaries is to manage risks—liquidity risks and idiosyncratic risks—stemming from information and transaction costs in conducting financial activities between households and firms. Most households are often only able to deposit short-term funds, while firms require long-term commitments for their long-term projects, indirectly causing liquidity risks.

Financial intermediaries, such as banking institutions, will be the ones managing to transform liquid assets into illiquid assets, without neglecting the withdrawal needs of depositors, which can be managed effectively under normal conditions due to pooled savings. They have been able to support technological advancement, as shown in the period of the Industrial Revolution, where financial intermediaries were able to provide long-term investment for developing advanced technology to assist industrial production (Hicks, 1969). Risk management can also be performed by stock and bond markets by providing more liquid markets in order for investors to trade their investments without difficulty, by which liquidity allows capital accumulation to occur (Fanta & Makina, 2017). In particular, bond markets are suitable for

long-term financing, since bonds are intended for long-term borrowers to finance long-term projects that can enable higher productivity (Thumrongvit *et al.*, 2013).

The prevailing neoclassical growth theory works with the assumption that households will set aside a fraction of their income as savings, which can be used to finance firms to produce goods and services. Considering that the process of finding and matching households and firms is not easy to handle, implying higher transaction and information costs, financial intermediaries can pool their savings and mobilize them to support firms needing capital, and can be in the form of banking deposits, the buying of stocks, or the buying of bonds (*see*: Figure 2.1).

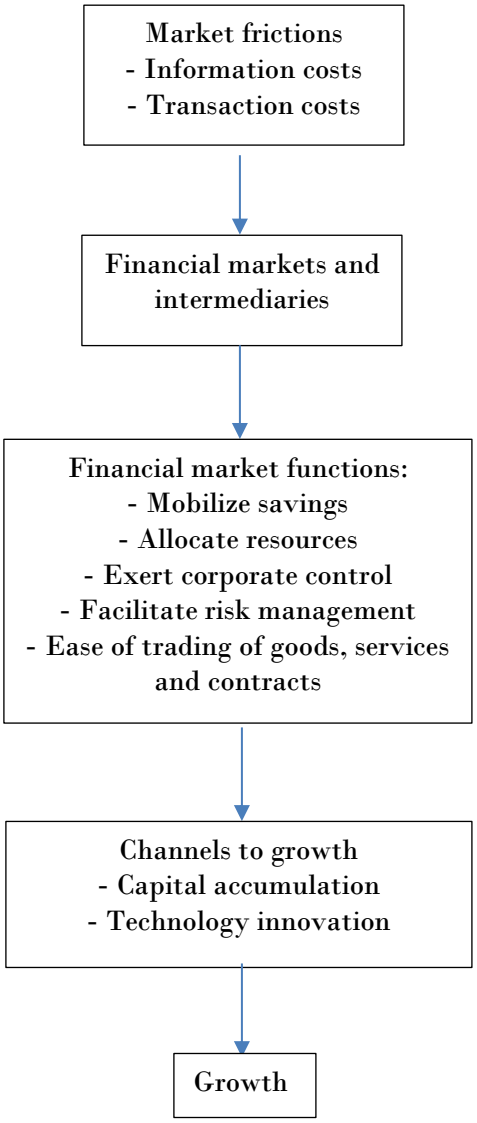
As shown in Figure 2.1, financial intermediaries, such as banking institutions, are also able to allocate resources, coming from household savings, to different firms or entrepreneurs according to several factors, such as the availability of collateral, the ability to generate returns, and the condition of cash flow. Such information would be more costly if individual savers needed to acquire money, by themselves, from the vast number of firms and entrepreneurs, reflecting that financial intermediaries are able to lower costs through scale. As in the capital market, this can provide information according to investors' risk preference on the rate of return, the maturity period, and the business sector, which can then allow investors to select the most suitable investment.

This ability will not only apply to ex-ante information, but financial intermediaries can also lower the information costs for ex-post information after an investment has been made, since it accrues higher costs for households to monitor firms' operational activity due to their lack of time and expertise. In this way, financial intermediaries are said to be able to exert corporate control by negotiating and obtaining financial agreements that will benefit their depositors and investors and can also manage the problem of moral hazard, since there is a separation of directors and managers (Fanta & Makina, 2017). By reducing information and transaction costs, interest rates will be brought down, implying that firms will have lower operational costs and more affordable goods and services for households to acquire, leading towards technological and individual specialization of production, technological innovation, and growth.

In addition, by acting as intermediaries, financial institutions can reassure households that their money is safe and firms that they can obtain capital, which eases the doing of business in a country. When firms are assured that they can do business, they will have an incentive to expand their operations and innovate technology. As firms are able to produce, they can

provide a return of capital and wages to households, which will be utilized to purchase products and also allocate a fraction of it to savings leading towards higher capital investment or capital accumulation. Technology innovation and capital accumulation will lead towards economic growth, considering that output is a function of capital, labour, and technology. Figure 2.1 provides a summary of the role financial intermediaries play in economic growth.

Figure 2.1: Role of Financial Intermediaries on Economic Growth



Source: Levine (1997:691)

2.2.2.2. Operational activities of financial intermediaries

To implement the functions of financial intermediaries into operational activities, their functions can be classified into five elements of activities for which the details can be seen in

Figure 2.2. These elements are: financial depth; financial efficiency; financial stability; financial openness; and financial access (Naceur *et al.*, 2017). First, financial depth can be defined as the contribution financial intermediaries make in providing capital to the public and being measured by the amount of private credit, liquid liabilities, stock market capitalization, and bond volume issuance. A higher volume of financing leads towards higher production capacity from firms, since they are able to acquire more capital, develop new technology, or employ more labour resulting in an increase in the volume of production output and demonstrating positive economy growth.

Second, financial efficiency is defined as the ability of financial intermediaries to deliver maximum output by utilizing minimum resources, reflecting that more efficient operational activities will increase the capital provided (Blejer, 2006; Grbic, 2016). The efficiency can be measured by a smaller value of interest rate spread, lower net interest margin, lower overhead costs, and high stock market turnover, as shown in Figure 2.2. Net interest margin (NIM) measures the difference between interest rates charged by banks for loans provided to the private sector and the rate given to deposit accounts. A lower NIM implies that the banks operate more efficiently, indicating more loans to be delivered and a higher return to capital. This will increase a firm's ability to accumulate capital and innovate technology, while also attracting more households to deposit their savings.

Overhead costs are costs related to activities other than interest-bearing activities, such as payroll (Naceur *et al.*, 2017). By having lower overhead costs, banks can manage to provide higher returns to depositors and a higher volume of loans for firms, leading to higher capital accumulation and technological innovation. As for the stock market, high stock market turnover suggests a more liquid market, attracting more investors to participate since they can trade their stocks easily.

Third, financial stability can be explained as the ability of financial intermediaries to maintain prudence, as failures created by financial intermediaries can affect both depositors/investors and creditors/entrepreneurs (Morgan & Pontines, 2014). As can be seen in Figure 2.2, financial stability is measured by a low number of non-performing loans, a low loan-to-deposit ratio, a capital adequacy ratio, and low stock price volatility. When delivering loans, banks conduct thorough assessments based on the historical record and also the forecasted value of the creditors' cashflow. However, some business may experience unexpected difficulties and an

inability to repay their loans—non-performing loans (NPL). A higher NPL leads to a decrease in a bank's availability of deposit that can be provided to entrepreneurs, indirectly causing lower capital accumulation and technology innovation. Thus, a lower volume of NPL is preferred in order for an economy to grow (Ghosh, 2017).

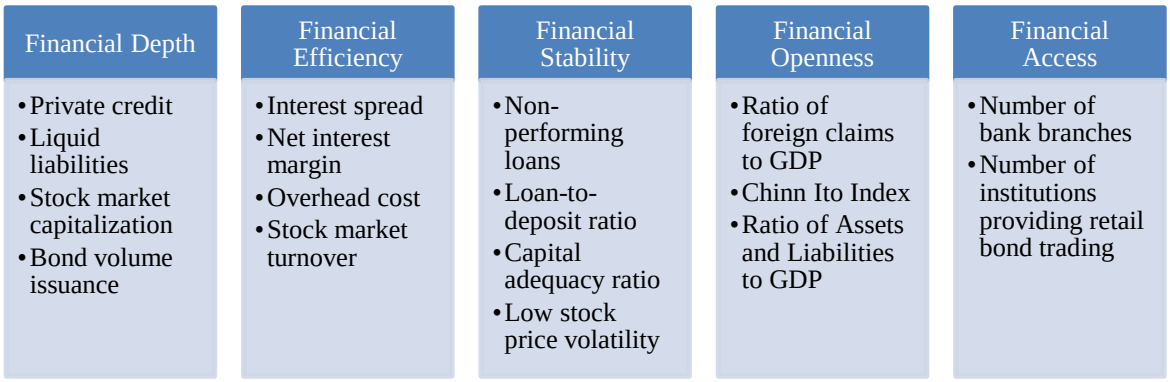
In banking institutions, it is also necessary to manage the loan-to-deposit ratio (LDR) and capital adequacy ratio to ensure prudent banking activity. LDR is measured by dividing loans and deposit in the banks, which can be expressed as the liquidity ratio, since banks should have adequate deposits remaining to cover any withdrawal by depositors (Natacha Valla, Beatrice Saes-Escorbiac, 2006; van den End, 2013). If a bank has a hundred percent LDR or over, it implies that all deposits are delivered as loans indicating the bank would not be able to cover any cash withdrawal. Less liquid banking activity is not preferred by depositors, since it reduces their confidence in placing their savings in the banks, which may lead to lower capital accumulation.

As for the capital adequacy ratio (CAR), calculated by dividing banks' capital with their risk-weighted assets, it measures the availability of capital in the banks to absorb any losses before they become insolvent and declare bankruptcy (Heid, 2007; Jokipii & Milne, 2008). The minimum ratio determined by the Basel regulation are 8% and 10.5% for Basel II and Basel III respectively. A lower ratio may cause unease in depositors, as they will be the first party to suffer if the banks incur any losses, suggesting that a higher CAR will reassure depositors to put their savings in the banks and increase capital accumulation and technological innovation indirectly.

In stock markets, financial stability is measured by the low volatility of stock price, since stock price is naturally fluctuating due to the interaction of the buying and selling of stock. However, this fluctuation or volatility should be kept at a minimum so that investors are able to maintain confidence in the stock market. Investor confidence will lead to higher investment creating higher capital accumulation and the ability of firms to develop technology.

Fourth, financial openness is also important for financial development, since it can increase the capital obtained by financial intermediaries from foreign countries leading towards higher capability of financial intermediaries to deliver funding to firms (Kose *et al.*, 2009; Naceur *et al*., 2017). It is measured by the ratio of foreign claims to GDP, the Chinn Ito Index, and the ratio of assets and liabilities to GDP, presented in Figure 2.2.

Figure 2.2: Elements of Financial Activities



Source: (Naceur *et al*., 2017)

Fifth, as part of financial development, financial access is the availability of financial activities for society, and it is assessed by the number of bank branches and number of institutions providing retail bond trading, so that both households and firms have higher access to capital. Higher financial access indicates higher opportunities for households to participate in financial transactions leading towards higher capital accumulation and higher ability of firms to innovate technology. Figure 2.2 summarizes the financial elements and their activities to support capital accumulation and total factor productivity growth.

Moving onto Islamic financial institutions, three institutions that can serve in promoting economic growth are Islamic banks, *shari'ah* stock, and Islamic capital markets, primarily the *sukuk* market. Islamic banks function like conventional banks in supporting economic growth, as shown in Figure 2.1. However, by essentialising the foundational principles of Islamic economics, financing delivered by Islamic banks needs to be examined since Islamic teaching prohibits several aspects and promotes others. For example, Islamic economics promotes profit-loss sharing, which can be implemented through *mudharabah* and *musharakah* contracts. This implies that these contracts will be better in supporting economic growth, as opposed to debt-based financial intermediation, as Islam discourages debt and suggests its avoidance. This is explained further in another sub-section.

As for the *sukuk* market *vis-à-vis* financial development leading to economic growth, it will contribute to financial deepening, since it will expand the investor base, especially for devout Muslims and for long-term investors, such as pension funds and insurance companies (Smaoui & Nechi, 2017). Moreover, the risk-sharing feature of *sukuk* can encourage lenders and borrowers to share business risks in return for profit shares.

2.3. ISLAMIC FINANCIAL DEVELOPMENT AND SOURCES OF GROWTH: CONCEPTUAL ISSUES AND DEVELOPMENTS

Islamic banks and the *sukuk* market, as the functional institutions of Islamic economics, are expected to fulfil the foundational principles and aspirations of Islamic economics, which also focuses on sustainable development. The knowledge base of Islamic economics—its ontological and epistemological sources (Quran, *Hadiths* and *Sunnah*)—defines the value system and the formation of axioms and foundational principles shaping the discipline of Islamic economics (Asutay, 2012). These principles construct the framework of economic activity, which aims to achieve intra and intergenerational social justice. It also sets the institutional framework for the emergence of certain institutions in conducting the Islamic foundational objective of constituting an Islamic moral economy system (Asutay, 2007b, 2007a).

The sources of knowledge provide the framework for the value system, grounded in the realisation of human well-being by maintaining the social and ecological environment. This is then articulated into foundational axioms: *tawhid* (unitarity and complementarity) and *rububiyyah* (process towards perfection in line with the development path). *Rububiyyah* leads towards the teaching and implementation of *'adl wa ihsan* (justice and equilibrium), which is then expanded into *tazkiyah* (purification and growth implying growth in harmony). All those components being brought together will result in *khilkiyyah* (affirmed behaviour), by also considering other conditions such as: *ikhtiyar* (free-will) and *hurriyah* (freedom); *fard* (responsibility); *haqq* (right); *amanah* (trust); *islah* (reform); *khilafah* (God's vicegerent) and human accountability before God; *ukhuwwah* (solidarity) and unity; and the fulfilment of *maqasid-al shari'ah* (objectives of the *Shari'ah*) (*see:* Asutay, 2007a,b; 2013; 2018)

These axioms and concepts provide the guideline for the individual, at the micro level, in order to function in society, and at the macro level, for fulfilling the role of *khilafah* assigned to human beings. This role leads human beings to have universal solidarity (*ukhuwwah*); understand that resources are in trust from God (*amanah*) and entrusted to human beings in order to facilitate their perfection (*rububiyah*) being ordered by God, without undermining any other stakeholder's interest (*tazkiyah*), with the objective of having a humble lifestyle; and acknowledging human freedom (*hurriyah*), which comes with a sense of responsibility (*fard*). It is expected that conducting any activities alongside these foundational principles will lead to

the establishment of individual welfare, alongside the public interest, as stated by *maqasid al-shari'ah*, which is interpreted as the well-being of all the stakeholders. This process identifies that the individual objective function is therefore *falah* or salvation in this world and in the hereafter; or salvation through *ihsan* or beneficence (Naqvi, 1994).

The axioms imply that the individual is not the ultimate owner of their wealth (*tawhid*), as the resources are in trust (*amanah*) from God, implying that other stakeholders have a certain claim on resources belonging to individuals. As a consequence, every human being will consider others' needs (*adalah* or justice and *ihsan*), including the environment and other creations, to seek perfection, which will direct it towards sustainability realizing that there is a future generation to be taken care of by individuals currently living in the world. This implies that there is an acknowledgement of individual empowerment, without neglecting the social good and all creatures, as the freedom of individuals comes with responsibility.

Considering such foundational axioms, Islamic economics aims at human emancipation and empowerment in achieving *falah* through *ihsan* (Asutay, 2018a; Jan & Asutay, 2019) They also identify the operational framework for economy and finance, such as: the prohibition of interest; the real economy and discouragement of debt economy; risk and profit-and-loss sharing; encouragement of justice and sustainability; and the recognition that God is the ultimate owner of resources and directs activity towards the elimination of poverty, the establishment of an equity-based economy, a corruption-free society, and a well-balanced economic system for all stakeholders (Asutay, 2018a).

Within such a framework and assumptions, growth and development is an essential aim and characteristic of Islamic economics (Chapra, 2008). While every aspect of economic activity should be conducted in pursuit of continuous growth, including capital and productivity—Islamic economics is not opposed to capital accumulation as long as it is combined with productivity, the benefit is not guaranteed and pre-determined and social good is observed (Shiller, 2012). The Ibn Khaldunian position clearly identifies the importance of development, or *imar*, with justice (Chapra, 2000). In relation to this latter component, individual empowerment and innovation is encouraged, which can lead to productivity considering that it does not violate the rights of human beings and other creatures.

The establishment of an equity-based economy is embodied in the presence of a risk sharing economy or profit-loss sharing business models that are articulated by *mudharabah* and

musharakah contracts. These contracts are in partnership form, implying that people who have excess money invest their money for people who are in need of money, commonly termed an investor and entrepreneurship relationship. As in the case of a *mudharabah* contract, the investor only provides the capital while the entrepreneur undertakes the task, while in the case of a *musharakah* contract both parties provide their capacity and capability, in terms of capital or expertise, and then they share the benefits.

Islamic banks and the *sukuk* market, which act as the institutions of Islamic economics, have a duty to achieve the objectives of Islamic economics. They are in a position to promote partnership contracts in providing financing for entrepreneurs, deliver financing for activities that can stimulate capital accumulation and productivity growth, and undertaking activities that can ensure sustainability for all creatures, not just human beings. In addition, the foundational aspects of Islamic economics incorporate the importance of particular activities that can lead towards social justice and sustainability by understanding that human beings should consider the future and thus consume in a responsible manner. This has a consequence for sectors that are more beneficial to be financed in relation to capital accumulation and productivity, such as agriculture and manufacturing.

2.3.1. Islamic Banks

The first Islamic bank, *Mit Ghamr*, was established in Egypt in 1963. It was a social bank by nature providing financing to small traders and artisans (Mayer, 1985). Later, the formation of the Islamic Development Bank in 1974 led to the emergence of an Islamic commercial banking model in the Muslim world. The first Islamic commercial bank was the Dubai Islamic Bank, which was established in 1975. Since then, Islamic banking has demonstrated unprecedented success.

In terms of asset growth, banking assets were only USD 331.68 billion in 2006, which then increased to USD 1,566 billion by 2017, from 246 Islamic banks in 42 countries (The Banker, 2018). Some of the banks were established as new institutions, some emerged through the conversion of conventional banks into Islamic banks, and some are Islamic windows established by conventional banks as additional service provided for customers inclining towards *shari'ah*-compliant banking activities.

Table 2.1 presents the development of total assets for Islamic banks globally and regionally from 2006 until 2017. It also depicts the number of countries, the number of institutions, and the value of return on assets (ROA). It shows that total global assets follow an increasing trend, dominated by the countries of the Gulf Cooperation Council (GCC); followed by countries that are part of the Middle East and North Africa (MENA) region, excluding the GCC countries; countries in Asia; countries in Australia, Europe, and America; and the lowest total assets are owned by countries in Sub-Saharan Africa (SSA). ROA also shows an increasing trend, although it demonstrated a decrease in 2015.

Table 2.1: Development of Global Islamic Banks 2007 - 2017

Year	Global total	GCC	Non-GCC MENA	SSA	Asia	Australia /Europe/ America	No of countries	No of registered institutions	ROA
2006	331.65	109.82	116.97	2.61	84.80	17.44	38	346	
2007	430.14	153.10	151.97	4.05	102.57	18.46	42	366	
2008	548.86	225.59	213.22	5.72	74.17	30.15	41	340	
2009	705.84	303.27	270.52	7.19	91.69	33.19	42	340	
2010	768.31	319.80	290.15	9.24	112.39	36.73	49	363	
2011	932.80	320.42	413.79	13.71	130.87	53.92	37	209	1.37%
2012	1221.39	478.91	471.95	10.26	254.05	52.28	34	215	1.43%
2013	1332.36	532.14	517.35	10.13	249.95	22.65	34	224	1.68%
2014	1211.24	613.20	334.74	8.00	238.58	16.99	34	224	1.10%
2015	1393.21	696.30	381.65	9.05	286.97	19.23	42	225	1.26%
2016	1458.17	717.12	419.48	9.70	296.33	17.09	43	238	1.29%
2017	1565.72	747.93	446.04	10.93	345.06	20.55	42	246	1.21%

Source: The Banker 2007-2018
Note: Total assets are in billion USD

Despite such positive developments in terms of total assets and ROA in Islamic banks, there was a steep decline in 2011 in the number of countries and number of registered institutions, due to the change in the collecting and presenting of data from The Banker (2013) by excluding institutions that do not report their data since 2009. Moreover, as can be seen, the total assets in SSA countries experienced a decline from 2012 onwards, before seeing a slight bounce back from 2016 to 2017. This decline did not just occur in SSA countries, but also in the region of Australia, Europe, and America, started in 2013 onwards, mainly due to the closure of HSBC Amanah operations in the UK, UAE, Bahrain, Bangladesh, Singapore, and Mauritius (The Banker, 2013).

Along with the rise and setbacks experienced by Islamic banks in different countries, Islamic banks appear to show stable and promising developments. This was evidenced during the global financial crisis in 2008, during which time Islamic banks demonstrated strong growth, although total assets in Asia experienced a downfall. However, it managed to bounce back in 2009. In addition, Islamic banks have provided alternatives for society in conducting financial transactions, other than those delivered by conventional banks, which implies that voluntary exclusion based on religion or Islam has been overcome by the emergence of Islamic banks (Ahmed, 2013).

In terms of financing and services offered, there are various services provided by Islamic banks, starting from capital financing, house financing, trade financing, and other fee-based services such as letters of credit and promissory-notes, all of which, however, must be in line with *Shari'ah* compliancy.

As regards the types of contracts utilised in Islamic financial activities, they can be categorised into two main groups: *tijari* (commercial) and *tabarru'* (non-commercial) contracts (Ayub, 2007). The first one can be divided into partnership and sale-based contracts, such as *mudharabah* and *musharakah* type profit-and-loss sharing and risk sharing contracts on the one side, and *murabahah*, *salam*, and *istisna* type contracts based on fixed income financing. As for *tabarru'* contracts, there are numerous activities such as *qard hasan*, *wakalah*, and *kafalah*.

Partnership or equity financing, *mudharabah* and *musharakah*, is in the form of providing capital or equity financing to entrepreneurs implying that Islamic banks are supposed to have two roles: as entrepreneurs following the deposits given by the customers and as a financier when Islamic banks have to deliver funds to entrepreneurs or customers. This is categorized as profit-loss sharing, since depositors, Islamic banks, and entrepreneurs share both profit and loss from the entrepreneurial activities conducted by entrepreneurs. However, this structure does not go along with Islamic banks and financial institutions, since it may increase the level of moral hazard from entrepreneurs, which has been eliminated by charging interest on conventional loans.

Sale-based, debt-based, or fixed income contracts are similar to conventional contracts with differences in the goods that are allowed to be traded and the time of payment, so as to avoid non-*halal* substances and *riba* transactions. *Murabahah* transactions involve goods being

delivered at time *t*, while the payment can be paid at the same time or later in a lump sum or instalment. *Salam* is a special case that was initially utilised for agricultural activities for farmers need working capital to operate, with the crops harvested at a later date. To avoid the aspect of *gharar*, in the *salam* structure, the specification of goods, the price, and time period have to be determined at the time of the contract agreement. As for *istisna*, it is similar to *salam*, but it is utilised for building or goods that need to be built and the progress of construction can be examined.

Currently, Islamic banks operate heavily with *murabahah* transactions, combining them with *wakalah* contracts in order to provide financing for customers, as seen in Table 2.2 the proportion of *murabahah* financing accounted for around 30–70%. *Salam* and *istisna* represent a tiny proportion of the total financing delivered by Islamic banks due to restrictions imposed on commercial banks regarding asset ownership. Rather than providing capital financing for entrepreneurs, Islamic banks set *murabahah* contracts by expecting clients to purchase equipment they require.

Tabarru' contracts are usually referred to as fee-based transactions—Islamic banks can charge certain fee amount to clients for the services or role provided to clients. Two further contracts that are commonly used by Islamic banks in some countries are *bai' al inah* and *tawarruq*. These are somewhat controversial due to their resemblance to debt-based transaction, although they provide flexibility for Islamic banks and their customers in getting business done. It should be noted that organised *tawarruq* has been banned by the Islamic *Fiqh* Academy in Jeddah, which is a multilateral institution under the Islamic Organisation for Corporation, but the majority of Islamic banks have defied this ruling and offer financing through organised *tawarruq*.

Considering the development of Islamic banks shifting towards mimicking debt-based financing by relying heavily on *murabahah* and *tawarruq* contracts, it may be said that Islamic banks are not so different compared to their counterparts and behave more as commercial banks (Nagaoka, 2012; Asutay, 2012). The data shows that *murabahah* financing accounts for more than 50% of activity, while *mudharabah* and *musharakah* financing accounts for less than 40% combined. The proportion of *murabahah* financing is increasing, while profit-loss-sharing financing is becoming unpopular.

Table 2.2: Proportion of Financing Based on Mode of Financing – Annual

Year	*Murabahah*	*Ijarah*	*Mudarabah*	*Musharakah*	*Salam*	*Istisna*	*Others*	PLS	Fixed
1992	0.00	0.00	0.44	0.00	0.00	0.00	0.56	0.44	0.00
1993	0.48	0.01	0.24	0.00	0.00	0.00	0.27	0.24	0.49
1994	0.48	0.01	0.22	0.00	0.00	0.00	0.29	0.22	0.49
1995	0.74	0.00	0.04	0.00	0.00	0.01	0.21	0.04	0.75
1996	0.74	0.00	0.04	0.00	0.00	0.02	0.20	0.04	0.76
1997	0.72	0.02	0.03	0.01	0.00	0.03	0.20	0.03	0.77
1998	0.73	0.02	0.02	0.01	0.00	0.03	0.19	0.03	0.78
1999	0.67	0.01	0.02	0.01	0.00	0.08	0.21	0.03	0.76
2000	0.67	0.01	0.07	0.16	0.00	0.03	0.06	0.23	0.71
2001	0.70	0.01	0.04	0.16	0.01	0.02	0.05	0.21	0.74
2002	0.73	0.05	0.04	0.10	0.00	0.02	0.06	0.14	0.80
2003	0.76	0.06	0.05	0.08	0.00	0.02	0.03	0.13	0.84
2004	0.75	0.07	0.06	0.07	0.00	0.02	0.03	0.13	0.84
2005	0.72	0.08	0.07	0.06	0.00	0.02	0.04	0.14	0.82
2006	0.69	0.09	0.07	0.07	0.00	0.02	0.06	0.14	0.80
2007	0.68	0.11	0.06	0.05	0.00	0.01	0.09	0.11	0.80
2008	0.68	0.13	0.06	0.07	0.00	0.01	0.05	0.13	0.82
2009	0.68	0.12	0.05	0.07	0.00	0.01	0.07	0.12	0.81
2010	0.66	0.13	0.06	0.06	0.00	0.01	0.08	0.12	0.80
2011	0.67	0.15	0.04	0.05	0.00	0.02	0.07	0.09	0.84
2012	0.67	0.17	0.02	0.05	0.00	0.02	0.07	0.07	0.86
2013	0.27	0.21	0.02	0.11	0.06	0.02	0.31	0.13	0.57
2014	0.26	0.23	0.02	0.10	0.05	0.03	0.30	0.12	0.57
2015	0.32	0.23	0.03	0.10	0.05	0.03	0.23	0.13	0.64
2016	0.31	0.22	0.02	0.11	0.05	0.03	0.26	0.13	0.61
2017	0.32	0.21	0.02	0.12	0.04	0.04	0.25	0.14	0.61
2018	0.27	0.19	0.02	0.11	0.05	0.04	0.31	0.13	0.56

Notes: *PLS* stands for profit-loss sharing financing; Fixed denotes fixed-income financing

Table 2.2 shows the proportion of different financing modes from Islamic banks globally from 1991 to 2018. It shows that the use of *murabahah* and *ijarah* financing keeps increasing while *mudharabah* and *musharakah* financing is following a downwards trend. *Mudharabah* financing peaked in 1992, since Islamic banks began to operate, which did not last long and they declined by half in the following year—*murabahah* financing took over half of total financing from that point onwards. However, *murabahah* financing had a smaller proportion from 2004 towards 2018 and has declined to 27% of total financing, being displaced by *ijarah* and *musharakah* financing, which have shown a steady increase annually.

Mudarabah and *musharakah* contracts are classified as profit-loss sharing (PLS) contracts since they have a risk sharing nature, while other contracts are classified as sale-based contracts, which deliver a fixed return, as fixed-income instruments. Grouping the contracts into *PLS* and *Fixed*, it can be seen that PLS financing extended by Islamic banks has a decreasing trend, while *Fixed* instruments-based financing has an increasing one. The reason is that PLS contracts are more complicated for Islamic banks to conduct with a commercial nature to their business, as the banks have to monitor the contracting firms in order to ensure that their performance is trustworthy due to the risk-sharing nature of the contracts. Such a risk structure runs against the institutional logic of conventional banking, which is mimicked by Islamic banks. On the other hand, conducting financial transactions using fixed-return contracts, such as *murabahah* and *ijarah*, are found to be more convenient for Islamic banks, since they are more straightforward and do not require further monitoring and assistance with relatively reduced risk exposure compared to equity financing contracts.

In addition, negative screening is also extended to further restrictions in Islamic banks in relation to the goods and services they can trade or involved in Islamic financial transactions. Such things as the production, services, and trade in products counter to human wellbeing are excluded from financing. These include arms and armaments, tobacco, alcohol, pork, and other unlawful entertainment related sectors. Beyond, such restrictions, the types of sectors that can be financed by Islamic banks, are generally divided into consumer durables, agriculture, manufacturing, trade, transportation, real estate, and banking and finance. Due to the real economy orientation of Islamic economics, Islamic banks are expected to provide more financing for agricultural, manufacturing, and transportation (which use renewable energy and consider public transportation) sectors compared to trading, real estate, and banking and finance.

Table 2.3 presents the proportion of financing for each sector from Islamic banks globally from 1998 to 2018. There are seven different sectors financed by Islamic banks: consumer durable (*cons*); agriculture (*agri*); manufacturing (*man*); trade (*trad*); transportation (*trans*); real estate (*real*); and banking and finance (*bankfin*). As can be seen in Table 2.3, the banking and finance sector becomes the most dominant sector financed by Islamic banks in 1998 at 73% followed by agriculture, trade, and manufacturing for 23%, 2%, and 1% respectively. The banking and finance sector claims more than half in the following year, while financing for agriculture

sector more than doubled. However, this growth only occurred in that year and it can be seen that both sectors experienced a decline from the next years onwards.

Table 2.3: Proportion of Sectoral Financing – Annual

Year	*cons*	*agr*	*man*	*trad*	*trans*	*real*	*bankfin*
1998	0.00	0.23	0.01	0.02	0.00	0.00	0.73
1999	0.00	0.55	0.04	0.05	0.00	0.00	0.35
2000	0.08	0.31	0.00	0.16	0.10	0.04	0.18
2001	0.08	0.18	0.00	0.17	0.23	0.07	0.22
2002	0.07	0.16	0.02	0.15	0.27	0.03	0.26
2003	0.09	0.18	0.01	0.12	0.26	0.03	0.23
2004	0.08	0.15	0.01	0.13	0.24	0.03	0.23
2005	0.06	0.18	0.01	0.10	0.30	0.06	0.20
2006	0.07	0.12	0.01	0.14	0.32	0.06	0.19
2007	0.10	0.10	0.01	0.14	0.33	0.05	0.18
2008	0.09	0.09	0.01	0.16	0.34	0.04	0.19
2009	0.11	0.09	0.01	0.17	0.27	0.04	0.23
2010	0.12	0.13	0.02	0.19	0.18	0.04	0.22
2011	0.14	0.13	0.02	0.15	0.17	0.04	0.20
2012	0.16	0.09	0.01	0.16	0.18	0.03	0.24
2013	0.22	0.03	0.18	0.09	0.15	0.21	0.13
2014	0.22	0.06	0.17	0.12	0.13	0.14	0.12
2015	0.23	0.08	0.18	0.13	0.14	0.13	0.12
2016	0.21	0.07	0.15	0.13	0.12	0.22	0.11
2017	0.21	0.08	0.16	0.13	0.12	0.22	0.10
2018	0.25	0.07	0.16	0.12	0.12	0.18	0.10

Notes: *cons* = consumer durables, *agr* = agriculture, *man* = manufacturing, *trad* = trade, *trans* = transportation, *real* = real estate, *bankfin* = banking and financial sectors

On the other hand, the share of the financing extended to the financial sector was taken over by trade, transportation, consumer durables, and real estate by 16%, 10%, 8%, and 4%, respectively. These sectors present stable growth for the share of total financing provided by Islamic banks from 2000 to 2012, resulting in a quite balanced proportion of total financing being shared by consumer durables, agriculture, trade, transportation, and banking and financing. However, agriculture, trade, transportation, and banking and financing have experienced a decline in 2013, with a continual decrease up to 2018 for transportation and banking and financing. In spite of this, manufacturing and real estate experienced drastic changes in their share of total financing from 2012 to 2013, which stayed stable until 2018. Putting it all together, the trend shows that Islamic banks moved towards consumer durables, manufacturing, real estate, and banking and financing for their choice of financing activities.

Such a trend indicates that Islamic banks are operating with a commercial objective by providing financing to other financial institutions, and for consumer durables and trade, as these sectors yield more stable and promising returns compared to other sectors. Providing financing to other financial institutions implies that Islamic banks channel funds deposited in them so that they can reach more people to be financed, due to the scale of Islamic banks at the beginning of their development. Consumer durables involve financing provided for the purpose of consumer consumption, such as vehicle, housing, and schooling. As a sector, consumer durables sector has a stable return, since financing is mostly delivered in the form of *murabahah*. As for trade, Islamic banks provide working capital financing for enterprises to run their business.

As for the transportation sector, the increase in its proportion may be due to development projects involving transport in countries where Islamic banks operate. This sector can include infrastructure related to transportation, transportation vehicles, and financing for public transportation. As the figures in Table 2.3 show, real estate and manufacturing financing saw a hike starting in 2013, suggesting that these sectors have developed in countries where Islamic banks operate, leading to higher financing for real estate and manufacturing activities. In addition, sectors that have developed can provide stable income for banks indicating that banks do not incur higher risks by providing financing to those sectors.

2.3.2. *Sukuk* Market

Another distinguished Islamic financial instrument is *sukuk*, which is part of Islamic capital markets. It is defined by the Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI) as "Certificates of equal value representing undivided shares in the ownership of tangible assets, usufructs and services or (in the ownership of) the assets of particular projects or special investment activities" (AAOIFI, 2015).

Sukuk is claimed to be an alternative to debt securities or bonds in the conventional financial sphere, although with different features, as Islamic finance does not allow debt sale. As a result, *sukuk* becomes an instrument whose characteristics are similar to common stock since both are certificates of ownership. Besides, stock is certificate by firms' ownership, implying that the income or return is tied to particular projects or investment activities. In terms of working mechanism, *sukuk* can be issued domestically or internationally, meaning they can be issued outside the issuers' legal jurisdiction. They can also be issued over short-term or long-term

periods, and can be issued by governments (sovereign), corporations, financial institutions, or government-backed companies (quasi-sovereign).

Table 2.4 shows the volume of *sukuk* issuance from 2001 to 2017 classified in terms of location of issuance, maturity period, and issuer. In general, total global issuance experienced an annual increase, although it saw a steep decrease in 2008 and 2014 presumably due to the global financial crisis and declining oil price respectively. Global issuance can be decomposed into international and domestic—domestic issuance has a much higher volume compared to the international one, although it has become half of domestic issuance in recent years.

Table 2.4: Percentage of *Sukuk* Issuance based on Location, Period and Issuer

Period	Total Global (in billion USD)	Total Intl	Total Domestic	Total Global-ST	Total Intl-ST	Total Domestic-ST	Global Sov	Global Corp	Global FIs	Global Quasi-sovereign
2001-5	33.22	0.29	0.71	0.23	0.18	0.82	0.34	0.58	0.02	0.06
2006	33.61	0.35	0.65	0.20	0.07	0.93	0.20	0.70	0.06	0.04
2007	50.18	0.28	0.72	0.07	0.01	0.99	0.15	0.79	0.03	0.03
2008	24.34	0.09	0.91	0.35	-	1.00	0.44	0.52	0.01	0.03
2009	37.93	0.19	0.81	0.55	-	1.00	0.66	0.23	0.01	0.10
2010	53.13	0.08	0.92	0.66	0.00	1.00	0.64	0.28	0.03	0.05
2011	93.17	0.09	0.91	0.47	-	1.00	0.73	0.17	0.04	0.06
2012	137.60	0.15	0.85	0.47	-	1.00	0.63	0.17	0.04	0.16
2013	136.27	0.17	0.83	0.46	0.02	0.98	0.61	0.26	0.04	0.09
2014	107.30	0.25	0.75	0.53	0.10	0.90	0.65	0.12	0.04	0.19
2015	67.82	0.32	0.68	0.24	0.47	0.53	0.50	0.22	0.12	0.16
2016	87.93	0.35	0.65	0.27	0.40	0.60	0.47	0.25	0.07	0.22
2017	116.72	0.32	0.68	0.15	0.58	0.42	0.53	0.19	0.10	0.17

Sources: IIFM (International Islamic Financial Market) (2018)
Notes: *Intl* = International, *ST* = Short-term, *Sov* = Sovereign, *Corp* = Corporate, *FI*s = Financial Institutions

As regards to the maturity period, short-term *sukuk* issuance, defined as *sukuk* having a maturity period of less than one year, has approximately 15 to 66% of share over the years. Similar to total issuance, short-term *sukuk* is also dominated by domestic *sukuk* issuance by 42 to 100% in different years. As for the type of issuer, corporate *sukuk* dominated in the early years and have faced a decreasing trend, being taken over by government (sovereign) *sukuk* making it the dominant issuer from 2009 onwards. The changing trends in issuer indicates that the government has started to put their trust in *sukuk* financing, since it has a strong base that can be a cushion for economic shocks. Corporate *sukuk* issuance depends on the economic cycle as shown in 2008 and 2014 due to the global financial crisis and the steep drop in the oil

price (IIFM (International Islamic Financial Market), 2016, 2018). The remaining *sukuk* volume is issued by financial institutions, purposely to meet Basel Capital Adequacy Ratio requirements, and quasi-sovereign *sukuk*, which saw a sudden boom in 2012 due to large issuances from Malaysia-based PLUS Berhad, the Saudi Electricity Company, and the General Authority of Civil Aviation in Saudi (IIFM (International Islamic Financial Market), 2018).

Table 2.5 shows the distribution of *sukuk* issuances according to region from January 2001 up to December 2017. It shows that domestic *sukuk* issuance comes mainly from Asia and the Far East, accounting for 83%. Delving more deeply into countries issuing *sukuk*, one can see it predominantly comes from Malaysia with 73% or 5,621 number of *sukuk* issuances. This was followed by Saudi Arabia, Indonesia, Sudan, and Bahrain with 7.4, 6.5, 2.56, and 2.27% of total *sukuk* issuance, respectively.

As regards international *sukuk* issuance, as Table 2.5 depicts, it is dominated by countries in the GCC and Middle East, accounting for 60%. The highest proportion, namely 29%, is held by United Arab Emirates (the UAE), followed by Malaysia, Saudi Arabia, and Indonesia at 25, 18, and 6%, respectively. In addition, there are several countries who have only issued international *sukuk*, such as China, Hong Kong, Japan, South Africa, France, Germany, Luxembourg, UK, USA, and Kazakhstan. On the other hand, there are also several other countries who have only issued domestic *sukuk*, for instance Bangladesh, Brunei Darussalam, Iran, Maldives, Sri Lanka, Jordan, Yemen, Gambia, Ivory Coast, Senegal, and Togo.

The domestic *sukuk* shows an increasing trend in Indonesia, Saudi Arabia, and Turkey due to its function for liquidity management, infrastructure financing, covering the fiscal deficit, and other purposes (IIFM (International Islamic Financial Market), 2018). Indonesia has also put increasing efforts in expanding their investor base by issuing retail *sukuk* denominated in smaller amounts, purposely for infrastructure financing.

Table 2.5: Regional Distribution of *Sukuk* Issuances (January 2001 – December 2017)

Region	Domestic *Sukuk*			International *Sukuk*		
	Number of issues	Amount USD Millions	% of Total Value	Number of issues	Amount USD Millions	% of Total Value
Asia & Far East	**6,097**	**630,033**	**82.89%**	**122**	**75,769**	**34.57%**
Bangladesh	4	37	0.00%			
Brunei Darussalam	149	9,583	1.26%			
China				1	97	0.04%
Hong Kong				5	3,196	1.46%
Indonesia	229	49,313	6.49%	15	13,503	6.16%
Iran	1	144	0.02%			
Japan				3	190	0.09%
Malaysia	5,621	557,832	73.39%	90	54,473	24.85%
Maldives	1	3	0.00%			
Pakistan	79	12,330	1.62%	4	3,600	1.64%
Singapore	12	788	0.10%	4	711	0.32%
Sri Lanka	1	3	0.00%			
GCC & Middle East	**403**	**98,004**	**12.89%**	**281**	**130,383**	**59.49%**
Bahrain	291	17,290	2.27%	101	10,430	4.76%
Jordan	3	272	0.04%			
Kuwait	1	332	0.04%	17	3,327	1.52%
Oman	4	941	0.12%	3	2,582	1.18%
Qatar	16	14,416	1.90%	14	11,435	5.22%
Saudi Arabia	72	56,250	7.40%	50	38,965	17.78%
UAE	14	8,251	1.09%	96	63,644	29.04%
Yemen	2	253	0.03%			
Africa	**247**	**21,158**	**2.78%**	**3**	**780**	**0.36%**
Gambia	210	136	0.02%			
Ivory Coast	2	460	0.06%			
Nigeria	3	444	0.06%	1	150	0.07%
Senegal	2	445	0.06%			
South Africa				1	500	0.23%
Sudan	29	19,429	2.56%	1	130	0.06%
Togo	1	245	0.03%			
Europe & Others	**161**	**10,849**	**1.43%**	**44**	**12,233**	**5.58%**
France				1	1	0.00%
Germany				3	206	0.09%
Luxembourg				3	280	0.13%
Turkey	161	10,849	1.43%	22	8,934	4.08%
UK				9	1,368	0.62%
USA				5	1,367	0.62%
Kazakhstan				1	77	0.04%
Total	**6,908**	**760,044**	**100.00%**	**450**	**219,165**	**100.00%**

Source: IIFM (International Islamic Financial Market) (2018)

As for international *sukuk*, it is increasing due to its stability when issued in USD-denominated amounts. This all shows that *sukuk* can serve the needs of long-term financing required by governments and corporations for their projects and infrastructure, and with the existence of economic growth through capital accumulation and total factor productivity growth, *sukuk* is a good match.

2.4. EMPIRICAL STUDIES ON FINANCIAL DEVELOPMENT AND SOURCES OF GROWTH

There has been a debate on the role of financial development on sources of growth, which has led to two main arguments: supply-leading and demand-following arguments. The first one explains that the supply of financial products lead to the utilization of products from other sectors, as they require some financing to be able to run their business, while the latter one argues that other sectors demand financial products so that they are able to fund their business (Patrick, 1966). These two arguments lead towards various studies to examine the existence of supply-leading and demand-following in different countries, time period, and to observe the effect of employing different measurements of financial development. Separating countries into least developed countries (LDCs) and developed countries (DCs) as the selected sample and two measures of financial development: currency ratio and monetization variable, Jung (1986) found that LDCs have higher frequency pattern of supply-leading causality than the demand-following one. Employing currency ratio as the financial development measure, the study found that LDCs still have supply-leading pattern, while DCs have demand-following pattern. Further, LDCs with higher GDP than average has stronger pattern of supply-leading argument. However, when monetization variable employed as measure of financial development, it does not produce different pattern.

A similar result of segregating developing countries and industrial countries is obtained by Calderón & Liu (2003), employing 109 countries from 1960 – 1994. The results showed that financial deepening has higher contribution on economic growth of developing countries compared to the industrial countries. Another study by Christopoulos & Tsionas (2004), employing 10 developing countries, also found that there is unidirectional causality from financial depth to economic growth.

In contrast with those studies that found supply-leading pattern in different sampled countries, a study by (Demetriades & Huseein, 1996) found little evidence that finance leads the process

of economic development. Employing 16 countries in time-series estimation, they found that the result is country-specific and bi-directional causality can occur in the relationship between finance and growth. The bi-directional causality between financial development and economic growth is also observed by Calderón & Liu (2003), aside another finding of supply-leading pattern in developing countries. In addition, a study by Abduh & Azmi Omar (2012) found a bi-directional causality using Indonesian data from first quarter of 2003 until second quarter of 2010.

On the other hand, there can be an evidence that financial development does not have causal relationship with economic growth as found by Goaied & Sassi (2010). They found that there is no significant relationship from employing data of 16 MENA countries from 1962 – 2006. This result can be argued that it is based on the work of Lucas (1988) that financial development and economic growth do not have a causal relationship, because there is no transaction cost under the neoclassical framework implying that financial intermediaries are not required in transmitting and channelling capital from households towards firms.

The available empirical studies in the existing body of knowledge have used different datasets, time-periods, and methodologies in order to capture the effect of financial development on economic growth. The early studies mainly worked with cross-sectional datasets with the objective of comparing industrial and non-industrial countries, since they aimed at examining which sources of growth had a more dominant contribution to economic growth, for example, in the way several countries were pioneers of technological advancement. In addition, cross-country analysis was also performed to examine the contribution of a country's legal system and political institutions, as the control variable, towards economic growth (Levine, 1997).

In accordance with the availability of longer-term datasets, several studies attempted to conduct time-series analyses to examine the causality and co-integration of financial development and economic growth. Having both cross-sectional and time-series datasets, more advanced analyses were performed using panel data analysis, through both static and dynamic panels. Table 2.6 presents a summary of the literature review regarding the relationship between financial development and economy growth.

With the development of Islamic finance, particularly Islamic banks, several studies also attempted to examine the relationship between Islamic banks and economic growth. A study by Abduh & Chowdhury (2012), employing Islamic banks in Bangladesh from first quarter of

2004 until second quarter of 2011, found that there is positive and significant relationship between Islamic banks and economic growth. Employing other dataset from nine countries having Islamic banks in their financial system, Gudarzi Farahani & Dastan (2013) found that there is positive granger causality between Islamic banks' financing and economic growth in the short-run and long-run. Another study of employing Middle East countries having Islamic banks found that there is also bi-directional causality between Islamic banks and economic growth (Tabash & Dhankar, 2014). A more recent study by Caporale & Helmi (2018), comparing two sets of countries: without Islamic banks and with dual-banking system, found that ther eis long-run causality from credit to GDP for countries with Islamic banks. However, a study by Hachicha & Ben Amar (2015) for Malaysia from first quarter of 2001 until fourth quarter of 2011 found that there is only short-run relationship between Islamic banks and economic growth.

In summary for the empirical studies, there can be five possible findings were developed: supply-leading; demand-following; interdependence; no causal relation; and negative causality from finance to growth (Fink *et al.*, 2003). The first four findings have been explained in the previous paragrapahs, while the fifth finding (Fink *et al.*, 2003) implies that the contribution of financial intermediaries does not quickly affect economic growth.

In relation with this study, it aims to examine the effect of financial development on sources of growth, particularly capital accumulation and total factor productivity. Most of the empirical literature considers economic growth to be the growth of value of GDP per capita from one period to the next, while the sources of growth are treated as the intermediary of the financial sector on economic growth. Several empirical studies (Beck, Levine, & Loayza, 2000; Levine, 1997; Robinson, 1971; Rosegrant & Evenson, 1992) use an accounting source of growth when using sources of growth as the dependent variable, explaining that capital accumulation and total factor productivity each have a value in contributing towards economic growth.

The various empirical studies being explored in the previous paragraphs have been conducted, theoretically, empirically, and descriptively, to examine, extensively, the relationship of banks and the stock market with economic growth, with little attention paid to the bonds market (Thumrongvit *et al.*, 2013).

Table 2.6: Summary of Literature Review

No	Author	Year	Sample	Methodology
1	Robinson	1971	Least developed countries	Cross-section regression
2	Jung	1986	Least developed countries	
3	Rosegrant & Evenson	1992	271 districts in India from 1965-1987	Panel fixed effects
4	King & Levine	1993	119 countries from 1960-1989	Cross-country regression
5	Levine	1997	77 countries	Cross-section regression
6	Beck *et al.*	2000	63 countries from 1960-1995	GMM
7	Calderón & Liu	2003	109 developing and industrial countries from 1960-1994	Geweke decomposition test; pooled data
8	Fink *et al.*	2003	13 highly developed countries from 1950-2000	Granger causality test
9	Hermes & Lensink	2003	67 least developed countries from 1970-1995	Cross-section regression
10	Christopoulos & Tsionas	2004	10 developing countries	Panel cointegration analysis
11	Aghion *et al.*	2005	71 countries from 1960-1995	Cross-section
12	Giuliano & Ruiz-Arranz	2006	100 developing countries	
13	Furqani & Mulyany	2009	Malaysia from 1997:1-2005:4	VECM
14	Goaied & Sassi	2010	16 MENA countries from 1962-2006	GMM
15	Abduh & Azmi Omar	2012	Indonesia from 2003:1-2010:2	ARDL
16	Abduh & Chowdhury	2012	Islamic banks in Bangladesh from 2004Q1-2011Q2	Cointegration
17	Gudarzi Farahani & Dastan	2013	Malaysia, Indonesia, Bahrain, UAE, Saudi Arabia, Egypt, Kuwait, Qatar, Yemen from 2001:1-2010:4	Panel cointegration analysis
18	Thumrongvit *et al*.	2013	38 countries from 1989 to 2010	GMM
19	Imam & Kpodar	2013	52 countries from 1990-2010	Fixed effects technique, GMM
20	Gheeraert	2014	Worldwide from 2000-2005	Regression
21	Tabash & Dhankar	2014	Middle East	Granger causality
22	Rajabi & Muhammad	2014	10 Asian Islamic countries from 1990-2009	Dynamic panel
23	Hachicha & Ben Amar	2015	Malaysia from 2000Q1-2011Q4	Cointegration
24	Gheeraert & Weill	2015	Islamic banks in 70 countries from 2000-2005	Stochastic frontier approach, DEA
25	Abedifar *et al.*	2016	22 countries with dual-banking system from 1999-2011	Fixed effects technique
26	Naceur *et al.*	2017	145 CCA and MENA countries from 1960-2011	GMM
27	Smaoui & Nechi	2017	18 countries issuing *sukuk* from 1995-2015	System GMM estimator
28	Caporale & Helmi	2018	14 emerging countries from 1993Q1-2016Q4	Cointegration; Panel causality test

Among the empirical studies on the bond market and economic growth nexus, for instance, Harvey (1989) explains that the yield curve of bonds is better than the stock market's return in explaining the variation of economic growth during 1953-1989. It can be explained by modern

asset pricing theories, suggesting the relation between expected asset returns and investor consumption decisions, which leads towards an implication that real interest rates contain information about expected economic growth (Harvey, 1989). It is further evidenced by Ahrens (2002) that term structure can indicate a future recession and by de Bondt (2002) that the corporate bond spread can predict real output growth. With the ability of non-financial companies to grow by using external financing, it can be argued that firm's capital structure can also support economic growth. These studies present the relationship between the bond market and economic growth through the term structure or yield curve, rather than through the capacity of bond volume to support economic growth. The contribution of the bond market can be argued to be based on its level of interest rate—whether it is higher or lower than the expected inflation or growth rate.

As a consequence, it may be suggested that financial sector development has direct and indirect effects on the sources of growth, since it can be the sector itself that makes the contribution, while it can also be channelled through other sectors. As a result, the effect of financial development on sources of growth is mixed, implying that it may have a positive, a negative, or even no effect at all.

Having presented the theoretical and empirical literature alongside the Islamic finance theoretical framework, the next section presents the research methodology and data as part of the empirical process leading to the empirical analysis in this study, which aims at examining the impact of the sources of growth of Islamic banks and *sukuk* development.

2.5.RESEARCH METHODOLGY AND DATA

This study explores and examines the impact of Islamic financial development, through Islamic banks and *sukuk* market development, on the sources of growth, namely capital accumulation growth and total factor productivity growth. In the empirical process, banking activities are divided into five categories, which are: net interest margin; overhead costs; loan to deposit ratio; non-performing loans; and capital adequacy ratio, with the first two representing financial efficiency and the remaining are variables for financial stability. As for the *sukuk* market, it is represented by the volume of *sukuk* issuance and its ratio to GDP.

2.5.1. Data

In order to examine the relationship between Islamic financial development, through Islamic banks and *sukuk*, and sources of growth, data for Islamic banks were assembled from the ORBIS Bankscope database for period ranging from 1989 to 2016. Another dataset for Islamic banks, financing delivered by Islamic banks based on sectoral financing and mode of financing, is taken from the Islamic Financial Service Board (IFSB) and presented in the form of annual bank-level data. As for *sukuk* market data, these were assembled from the Bloomberg database ranging from 1991, the first issuance, up to 2018. The dataset for sources of growth, represented by capital accumulation growth and total factor productivity growth, were generated from Penn-World Table (PWT), covering the range 1961 to 2014.

In addition, Islamic bank data were taken as an individual dataset, not aggregated into country value dataset, whereas the data for sources of growth were assembled from the country-level dataset. As for the *sukuk* dataset, it was generated as per issuance, which were then rearranged annually by issuer. The sample for Islamic banks consists of 192 Islamic banks in 34 countries, while the dataset for the *sukuk* market consists of 767 issuers from 28 countries. Considering that the dataset has different time frame, this study employs unbalanced panel data.

Besides the main dependent and independent variables, several control variables, in the form of macroeconomic and institutional variables, are introduced in this study. These are: GDP; GDP per capita; Human Capital Index (HCI); government consumption; country's population; private consumption; volume of exports and imports; foreign direct investment; governance index; legal system; and index of Islamic financial development. The data for these variables were generated from various source, such as the World Bank database and Penn-World Table.

As regards to sampling for the banking dataset, only Islamic banks having an annual report ending every December were included in the sample.

2.5.2. Dependent Variables

The variables utilised in this study are capital accumulation growth (*capg*) and total factor productivity growth (*tfpg*), which are known as sources of growth and generated from Penn-World Table ranging from 1961 to 2014. This study, however, only uses the last 25 years of

data since Islamic banks became visible in the early 1990s, with a reasonable number of such banks established during those years.

Capital accumulation is calculated from the value of capital stock using investment and prices for structures and equipment that are constant across countries (Feenstra *et al.*, 2015). In accordance, the capital accumulation growth is defined as the percentage of difference between capital stock at current purchasing power parity (PPP) in millions of US$2011. Productivity is measured by dividing output, namely output-side real GDP by using prices for final goods, exports, and imports that are constant across countries, with its input, consisting of capital stock, labor input data and share of labor income on GDP (Feenstra *et al.*, 2015). As to calculate the total factor productivity growth, it is the percentage difference of total factor productivity at constant national prices (2011 is equal to 1).

Capital accumulation growth and total factor productivity have been utilised in different empirical studies to further examine the transmission of economic growth, especially to decompose the factor that plays an important role in determining economic growth. Capital accumulation growth reflects the change of capital accumulated in the country, while total factor productivity growth represents the change of technology advancement and other factors that are not accounted for in capital accumulation growth.

2.5.3. Financial Development Variables

There are several independent variables utilised in this study to examine the relationship with sources of growth: net interest margin (*nim*); overhead costs (*oh*); loan-to-deposit ratio (*ldr*); capital adequacy ratio (*car*); non-performing loans (*npl*); volume of *sukuk* issuance (*lnsukuk*); ratio of *sukuk* issuance to GDP (*sukukgdp*). Net interest margin and overhead cost represent financial efficiency, indicating that lower net interest margin and overhead costs are preferable as they will make banks deliver more financing to firms causing higher capital accumulation and technological advancement.

Loan-to-deposit ratio, capital adequacy ratio, and non-performing loans represent financial stability, each of which has a particular relationship with the sources of growth. Loan-to-deposit ratio and capital adequacy ratio defines stable banking operation through their individual regulations, which is not to exceed a hundred percent ratio, although a very low ratio is also not preferable for depositors considering that liquidity is a concern for them. As for the

capital adequacy ratio, Basel has regulated the minimum ratio to be held by banks, at 8% for Basel II and 10.5% for Basel III. Higher capital adequacy ratio is considered to be better for stability as it reassures depositors that the banks have cushion if any bankruptcy occurs. As this will attract more depositors creating more capital to be able to deliver for the firms to generate more capital and innovate their technology.

As for the relationship of non-performing loans on sources of growth, it is quite a straightforward relationship, due to the fact that a lower number of non-performing loans is considered better as the banks can maintain their capital, which can then be delivered further. In addition, a lower number of non-performing loans indicate that the economy is running well since firms are able to repay their loans.

Volume of *sukuk* issuance and ratio of *sukuk* issuance to GDP both represent financial depth with the difference that volume of *sukuk* issuance only reflects the development of the *sukuk* itself, while the ratio considers how the *sukuk* market performs as part of the economy as a whole. The *sukuk* market is said to be able to provide long-term financing for firms, suggesting that it can further promote technological innovation requiring long-term commitment of investment. As a result, a higher volume of *sukuk* issuance and its ratio to GDP will lead to higher capital accumulation and total factor productivity growth.

2.5.4. Control Variables

Control variables are necessary for the model as the sources of growth are not only affected by financial development, but also by other developing factors in a country, including macroeconomic and institutional variables. These variables can also help to distinguish the characteristics of each country since this study employs a panel dataset.

2.5.4.1.1. Macroeconomic variables

The macroeconomic variables included in the model are: human capital index (*hci*), measured by the enrolment of school years; ratio of government consumption to GDP (*govcon*); ratio of private consumption to GDP (*lnrcon*); initial GDP per capita (*lngdpcap*); GDP (*lngdp*); volume of trade to GDP measured by difference between export and import volume (*trade*); and foreign direct investment (*fdi*).

The human capital index is said to have an important role in the sources of growth, since it measures the number of people being educated in the countries that will supply labour, hence it is expected that the human capital index will have a positive relationship with sources of growth (Beck *et al.*, 2000; Miller & Upadhyay, 2000; Rousseau & Wachtel, 2011).

The ratio of government and private consumption to GDP may have both types of relationship (Djajic, 1987; Rousseau & Wachtel, 2011). If consumption is utilized for increasing the capital stock and production output, then it will have a positive relationship with sources of growth. On the other hand, if the consumption constitutes a kind of inefficiency in production, it will have a negative relationship with the sources of growth. Initial GDP per capita measures different characteristic across countries: the countries with higher initial GDP per capita will have lower growth, because they have reached their peak and they only need to maintain steady growth. Meanwhile, countries having lower initial GDP per capita will put their efforts into catching up in production and consumption resulting in higher growth of capital accumulation and total factor productivity. Moreover, GDP itself is also examined so as to observe economic power itself without accounting for the population factor.

The volume of trade is expected to have a positive relationship with sources of growth, since a higher volume will lead towards higher income for firms, suggesting higher capital accumulation and ability to innovate their technology (Alcala & Ciccone, 2004; Beck *et al.*, 2000). This is also true for foreign direct investment, because the more investment coming into countries, the more capital they will have to develop their production capacity indicating higher capital accumulation and total factor productivity growth (Guillaumont Jeanneney *et al.*, 2006; Kose *et al.*, 2009).

2.5.4.1.2. Institutional variables

In addition to the macroeconomic variables, institutional variables are also included in the model, because the different institutional development in each country will have a different effect on the sources of growth. Acemoglu & Robinson (2013) explain that the UK was able to lead the Industrial Revolution due to the opportunity for society to acquire some power from the monarch, resulting in a willingness to further develop production, while empires in other parts of the world were reluctant to share their power and allow for any improvement. (Ayubi, 1996) explains the case for the Middle East in the same manner by arguing that the modes of

production are determined by power unlike the case of the UK, as explained in Acemoglu & Robinson (2013).

On that account, this study also attempts to include: legal system (*legal*); and governance index in each country (*gov*) for each country to differentiate behaviour depending on their characteristics. The first variable is constructed by following the definition of a legal system in Abedifar *et al*. (2012), while the governance index was obtained from the World Bank database, and the Islamic financial development index was generated from the Thomson Reuters database.

According to Abedifar *et al*. (2012), the legal system can be classified into three categories: country that do not implement *Shari'ah* law; countries having both *Shari'ah* and other legal traditions; and countries that implement *Shari'ah* law. This variable is constructed using a dummy variable taking the value of 0 for countries that do not implement *Shari'ah* law, a value of 1 for countries having both *Shari'ah* and other legal traditions, and a value of 2 for countries having *Shari'ah* law. In Abedifar *et al*. (2012), the legal system is employed to observe its relationship with credit risk in Islamic banks, with the assumption that countries implementing *Shari'ah* law will have a higher credit risk, although when the countries have Islamic banks, it has a negative relationship. In this study, considering that countries implementing *Shari'ah* law are generally still developing countries, they may have higher growth. In addition, the interaction of the legal system with the existence of Islamic financial institutions in a county may be a supporting factor towards sources of growth.

The governance index is composed of six different measurements: control of corruption (*cc*); government effectiveness (*ge*); political stability and absence of violence/terrorism (*pv*); rule of law (*rl*); regulatory quality (*rq*); and voice and accountability (*va*). Control of corruption measures the perception of the use of public power for any form of corruption and government effectiveness measures the perception of the quality for public services, civil services, and policy formulation and implementation (Kaufmann *et al.*, 2010). Furthermore, World Governance Indicator (2018) also explains that political stability and the absence of violence/terrorism measures the perception of the likelihood of any political instability including terrorism, while the rule of law measures the perception of to what extent a society has confidence in and abides by the rules, as well as the perception of the quality of contract enforcement, property rights, the police, the courts, and the likelihood of crime and violence.

Regulatory quality measures the perception of the ability of government to have sound policies and promote private sector development, while voice and accountability measures the perception of how far a society can participate in selecting its own government, express itself, freely form associations, and the freedom of the media (Kaufmann *et al*., 2010). The value for each measurement ranges from -2.5 to 2.5, with a higher value implying better governance. This study hypothesizes that better governance creates better opportunities for expanding production in the economy leading to higher capital accumulation and total factor productivity. In addition, when it interacts with Islamic financial development, it will have a positive relationship with sources of growth.

2.5.5. Sectoral and Mode of Financing Variables

It has been argued that Islamic banks have a definite objective regarding which sectors are suitable for funding and they have a distinctive feature of the mode of financing for customers. In other words, Islamic banks are expected to provide financing for real economy-oriented sectors in developing financing structures, but reality does not support this. In order to capture the financing delivered by Islamic banks in terms of sector, mode, or contractual manner, this study also estimates an additional two models that incorporate the financing provided by Islamic banks and its effects on sources of growth, for which the data is generated from the IFSB database.

As presented above, the financing extended by Islamic banks is divided into seven sectors: consumer durables (*cons*); agriculture (*agr*); manufacturing (*man*); trading (*trad*); transportation (*trans*); real estate (*real*); and banking and finance (*bankfin*). Modifying the equation set by Naceur *et al.* (2017), equation 2.2 presents the model incorporating sectoral financing, which aims to examine the effect of providing financing in different sectors towards the growth of capital accumulation and total factor productivity.

$$\boldsymbol{Y_{j,t} = \alpha + \beta_1 Z_{i,j,t} + \beta_2 M_{j,t} + \beta_3 IN_{j,t} + \varepsilon_{i,t}} \qquad (2.2)$$

where $Z_{i,t}$ measures the proportion of financing being delivered in each sector by Islamic bank i in country j at year t. $Y_{j,t}$, $M_{j,t}$, and $IN_{j,t}$ are the sources of growth, macroeconomic variables and institutional variables, respectively, in country j at time t.

Development in the agricultural sector can be claimed to provide positive capital accumulation and total factor productivity growth, since it is the foundation for moving on to the next sectors,

such as the industrial sector, by providing food production, a supply of savings, and generating demand for industrial products (Johnston & Mellor, 1961; Matsuyama, 1991). As for the manufacturing sector, the sector itself has the nature of continuous innovation to have better design for their products, which is reflected in the capital accumulation and total factor productivity growth (Voigtländer & Voth, 2006).

Moving on to the trade sector, it will have a positive relationship with total factor productivity growth, when it is export-oriented because it will face higher competition caused by globalisation leading towards higher innovation (Alcala & Ciccone, 2004; Kose *et al.*, 2009; Isaksson, 2007; Miller & Upadhyay, 2000). When it comes to the transportation sector, investment in transportation can have positive and/or negative effects on capital accumulation and total factor productivity growth, as transportation infrastructure is necessary to complement trucks with roads, ships with ports, as well as railways (Ford & Poret, 1991). Furthermore, transport investment can increase urban densities, open up export markets, provide spatial moving for labours, reducing wealth gaps, and increasing social welfare, which, eventually, leads towards higher productivity benefits (Graham, 2007; Hu & Liu, 2010; Isaksson, 2007; Ozbay *et al.*, 2007). On the other hand, it also creates negative externalities that can impede productivity, such as traffic jams, environmental pollution, and accidents (Hu & Liu, 2010).

Another infrastructure that also has a positive influence on capital accumulation and total factor productivity growth is the real estate sector, as its size and nature is a productive resource (Chau & Walker, 2006). A study by Liu, *et al.* (2017) on China's suburbanization shows that the profits from suburban property development can be utilized to subsidize industrial investment and infrastructure development in the outer suburbs, showing that it can serve as a mode of capital accumulation. As for the banking and financial sector, it can have a positive or a negative relationship with capital accumulation and total factor productivity—when it is seen as part of financial development, it can have a positive relationship (Guillaumont Jeanneney *et al.*, 2006; Han & Shen, 2015). On the other hand, providing financing to the banking and financial sector can be argued to lead towards financialization where it will impede investment in the real sector (Cecchetti & Kharroubi, 2015; Orhangazi, 2008).

As for the mode of financing, Islamic banks mainly utilise eight modes or structures of financing: *qard*, *murabahah*, *ijarah*, *salam*, *istisna*, *mudarabah*, and *musharakah*. These eight

modes of financing can be classified into three categories that are benevolence-based financing, profit-loss sharing scheme (*pls*), and fixed financing (*fixed*) modes. *Qard* belongs to the benevolence-based financing, since it is not supposed to create any monetary benefit from the activity, while the next four involve fixed financing, and the last two, namely *mudarabah*, *musharakah*, are profit-loss sharing schemes. As for the others, this study exempts them due to unavailable information regarding the use of financing. It should be noted that financing through fixed instruments can be said to have a positive relationship with capital accumulation growth (Hein, 2006). However, fixed income instruments are considered to be a way to financialization, since they provide financing to projects with better collateral although they have relatively low productivity (Cecchetti & Kharroubi, 2015). Having said that, financing through profit-loss sharing instruments has a better association with productivity residuals (Pushner, 1995).

Modifying equation set by Naceur *et al.* (2017), equation 2.3 presents a model that includes modes of financing in the function, reflecting $F_{i,t}$ as variables for modes of financing measured by the proportion of financing delivered by Islamic banks.

$$\boldsymbol{Y_{j,t} = \alpha + \beta_1 F_{i,t} + \beta_2 M_{j,t} + \beta_3 IN_{j,t} + \varepsilon_{i,t}} \qquad (2.3)$$

2.5.6. Summary of Variable Definition

Table 2.7 summaries the variables, their definition, and their data sources; detailed description of each variable is presented in the following the table.

Table 2.7: List of Variables, Definition, and Sources

Variable Name	Definition	Data Source
Dependent Variables		
capital accumulation growth	measured by taking the difference between current and previous capital stock (at current PPPs in mil. 2011US$)	PWT9.0
total factor productivity growth	measured by taking the difference between current and previous TFP (at constant national prices, 2011 = 1)	PWT9.0
Independent Variables		
net interest margin	measured by taking the difference between interest rate charged by bank for loans provided for private sector and the rate given to deposit accounts	ORBIS Bankscope
overhead costs	measured by dividing costs related to activities other than interest-bearing activities and total assets	ORBIS Bankscope
loan-to-deposit ratio	measured by dividing loans and deposits in the banks	ORBIS Bankscope

Variable Name	Definition	Data Source
capital adequacy ratio	measured by dividing banks' capital with their risk-weighted assets	ORBIS Bankscope
non-performing loans	measured by dividing non-performing loans and gross loans	ORBIS Bankscope
volume of sukuk issuance	measured by the volume of sukuk issuance (in logarithm form)	ORBIS Bankscope
ratio of sukuk issuance to GDP	measured by dividing volume of sukuk issuance and volume of GDP	ORBIS Bankscope
sectoral financing	proportion of Islamic banks' financing based on sector, such as consumer durable, agriculture, manufacturing, trade, transportation, real estate, banking-finance	IFSB
financing based on types of contracts	proportion of Islamic banks' financing based on types of contracts, such as *mudharabah*, *musharakah*, *murabahah*, *ijarah*, *salam*, *istisna*	IFSB
Control Variables		
human capital index	based on years of schooling and returns to education	PWT9.0
ratio of government consumption on GDP	measured by amount of cash payments for operating activities of the government in providing goods and services; it includes compensation of employees (such as wages and salaries), interest and subsidies, grants, social benefits, and other expenses such as rent and dividends	World Bank Database
ratio of private consumption on GDP	measured by real consumption of households and government, at current PPPs (in mil. 2011US$)	PWT9.0
initial GDP per capita	measured by the previous period for volume of GDP per capita (in logarithm form)	World Bank Database
GDP	volume of Gross Domestic Product (in logarithm form)	World Bank Database
volume of trade to GDP	measured from combination of export and import volume	World Bank Database
foreign direct investment	measured the net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, divided by GDP.	World Bank Database
legal system	classified into three categories: countries that do not implement *Shari'ah* law, countries having both *Shari'ah* and other legal traditions, and countries implementing *Shari'ah* law; employing dummy variable taking value of 0, 1, and 2 for country implementing other than *Shari'ah* law, both laws, and *Shari'ah* law respectively	Abedifar, *et al*.(2012)
population	number of population (in millions)	PWT9.0
governance index	measured by taking the average value of index from control of corruption, government effectiveness, political stability and absence of violence/terrorism, rule of law, regulatory quality, and voice and accountability	Calculated by the author
control of corruption	measured by the perception of the use of public power for any form of corruption	World Governance Indicators

Variable Name	Definition	Data Source
government effectiveness	measured by the perception of quality for public services, civil services, policy formulation and implementation	World Governance Indicators
political stability and absence of violence/terrorism	measured by the perception of the likelihood of any political instability including terrorism	World Governance Indicators
rule of law	measured by the perception of to what extent the society has confidence and abides by the rules, also the perception of the quality of contract enforcement, property rights, police, courts and likelihood of crime and violence	World Governance Indicators
regulatory quality	measured by the perception of the ability of government to have sound policies and promote private sector development	World Governance Indicators
voice and accountability	measured by the perception of how far a society can participate in selecting their government, express themselves, form associations, and the freedom of media	World Governance Indicators

2.5.7. Empirical Method

The dataset in this study consists of several Islamic banks and *sukuk* issuances in several countries over several years, resulting in the suitability of employing panel data analysis. In addition, due to the objective of observing the effect of each bank and *sukuk* issuance on the sources of growth, a different level of the dataset is utilized. The banking and *sukuk* variables are at the firm level, while the sources of growth are at the country level; hence, pooled data analysis is employed. In order to examine the robustness of the analysis, the analysis is also conducted on a country level dataset for both dependent and independent variables, analysing the data set in static and dynamic panel econometrics models.

Following Naceur *et al.* (2017), equation 2.4 shows the basic panel model being used in this study:

$$\boldsymbol{Y_{j,t} = \alpha + \beta_1 X_{i,t} + \beta_2 M_{j,t} + \beta_3 IN_{j,t} + \varepsilon_{i,t}} \qquad (2.4)$$

where:

$Y_{j,t}$ stands for the dependent variables, which are capital accumulation growth (*capg*) and total factor productivity growth (*tfpg*) for country *j*;

$X_{i,t}$ are the variables of financial development in the banking sector consisting of net interest margin (*nim*); loan-to-deposit ratio (*ldr*); non-performing loans (*npl*); overhead costs (*oh*); and

capital adequacy ratio (car) for each bank *i* in period *t*. Additionally, *sukuk* market variables are also included, namely the volume of *sukuk* issuance (*lnsukuk*) and the ratio of *sukuk* to GDP (*sukukgdp*).

$M_{j,t}$ denotes the third variable group, the control variables, explaining the macroeconomic factors in every country *j* at time *t* that affect sources of growth.

$IN_{j,t}$ are institutional variables as control variables, explaining the difference in institutions for every country *j* at time *t* that affect sources of growth.

Recent empirical studies have employed dynamic panel data analysis, namely the difference and system generalized method moment (*GMM*), as there can be problems of autocorrelation and endogeneity in only conducting econometric estimation using equation 2.4 (Mileva, 2007). Difference *GMM* implies that the current value of a dependent variable is influenced by the previous value of the dependent variable itself; while system *GMM* explains that there are independent variables that are predetermined or endogenous, rather than strictly exogenous. It indicates that the dependent variable is not the only one affected by the independent variables, but also the other way around. Thus, the difference or system *GMM* based equation can be in the form of equation 2.5 (Naceur *et al.*, 2017).

$$\boldsymbol{Y_{j,t} = \alpha + \gamma Y_{j,t-1} + \beta_1 X_{i,t} + \beta_2 M_{j,t} + \beta_3 IN_{i,t} + \varepsilon_{i,t}} \qquad (2.5)$$

In this model, the previous value of the dependent variable is to put into the *GMM* equation together with the main independent variable, while other control variables are treated to be strictly exogenous implying that they are not being affected by the dependent variables.

2.6. EMPIRICAL RESULTS AND DISCUSSION

This section presents the empirical results from examining the impact of Islamic financial development in the form of Islamic banks and the *sukuk* market on sources of growth starting with the descriptive statistics of the variables which are depicted in Table 2.8.

As can be seen, one thousand observations are included in the analysis and the variables are divided into banking variables, sources of growth variables, macroeconomic variables, and institutional variables. In addition, the descriptive statistics show that several variables have

high variation, for example the banking variables and the governance index. On the other hand, other variables have relatively low variation in their data.

Table 2.8: Descriptive Statistics – Islamic Banks

Variable	Obs	Mean	Std. Dev.	Min	Max
capg	1,386	0.1109	0.1163	-0.0632	1.5874
tfpg	1,026	-0.0063	0.0489	-0.4207	0.8121
nim	1,660	0.0414	0.0696	-0.4536	0.9009
ldr	1,567	0.8161	0.9354	0.0000	10.8667
car	1,032	0.2646	0.3685	-1.0849	6.9300
npl	900	0.1009	0.1460	0.0000	1.0000
oh	1,406	0.0567	0.0938	0.0010	1.3248
lngdp	1,679	19.8808	7.3985	-15.5701	28.6454
lngdpc	1,679	9.4930	1.3490	-0.3748	12.0033
hci	1,354	2.2079	0.5388	0.2458	3.7343
lnpop	1,384	16.4795	1.8223	10.8766	19.3546
lnrcon	1,384	25.5848	1.4847	21.2955	28.3447
expense	1,678	0.1814	0.1633	0.0000	0.9499
fdi	1,678	0.0293	0.0359	-0.0403	0.4120
rd	567	0.5602	0.5149	0.0344	2.6206
trade	1,678	0.8533	0.5376	0.0000	4.4160
govindex	1,637	-0.3659	0.7932	-1.8357	1.5922
legal	1,679	0.8076	0.5160	0.0000	2.0000

Notes: Obs = Number of observations, SD = Standard deviation, Min = Minimum, Max = Maximum

In order to observe the degree of correlation among the variables, Table 2.9 presents the correlation matrix for the variables. As a rule, high correlation is said to have value of higher than 0.7. As can be seen in Table 2.9, governance index, human capital index and human development index has high correlation, while other variables do not present high correlation.

Table 2.9: Correlation Matrix – Islamic Banks

	capg	*tfpg*	*nim*	*ldr*	*car*	*npl*	*oh*	*lngdp*	*lngdpc*	*hci*	*lnpop*	*lnrcon*	*expense*	*fdi*	*rd*
capg	1														
tfpg	0.1470	1													
nim	-0.0499	0.1023	1												
ldr	0.0075	0.1048	0.1236	1											
car	-0.0562	0.1175	0.0152	0.1325	1										
npl	-0.1808	0.0709	0.3705	-0.0322	0.1269	1									
oh	-0.1390	0.1271	-0.0173	-0.0485	0.0274	0.0736	1								
lngdp	0.2752	0.1251	0.022	0.1198	-0.0691	-0.1648	-0.1041	1							
lngdpc	0.0111	-0.0643	0.0102	0.0857	0.1517	-0.1576	-0.0237	0.0614	1						
hci	0.0726	0.0235	-0.1318	-0.0344	-0.0336	-0.0685	-0.2002	0.3087	-0.0707	1					
lnpop	0.3514	0.1413	-0.113	-0.1028	-0.1978	-0.0938	-0.0883	0.2292	-0.4773	0.2837	1				
lnrcon	0.3902	0.1198	-0.1297	-0.0958	-0.1987	-0.1347	-0.1186	0.2779	-0.3566	0.29	0.9845	1			
expense	0.0886	-0.1112	-0.0961	-0.1151	-0.0938	-0.017	-0.1227	0.0511	-0.0313	0.5742	0.1492	0.1553	1		
fdi	0.1195	0.3455	0.1302	0.2383	0.2772	0.0393	0.0046	0.3062	0.0225	0.2485	0.0605	0.0531	-0.0359	1	
rd	0.3383	0.1192	-0.1802	-0.0224	-0.0617	-0.1707	-0.2223	0.3391	-0.1902	0.6282	0.4385	0.4957	0.4433	0.1998	1
trade	-0.1043	0.4459	0.1594	0.2111	0.2239	0.0531	0.0263	0.2284	0.3411	0.3504	-0.1933	-0.1840	0.1525	0.6885	0.1796
govindex	-0.1352	-0.0026	-0.051	0.1182	0.1754	0.0105	0.0038	0.0131	0.0972	0.2023	-0.5531	-0.5650	-0.0317	0.1409	0.1604
legal	0.1032	-0.1222	0.0283	-0.0218	0.0416	-0.1391	-0.0428	0.0723	0.5896	-0.0761	-0.0281	0.0768	0.2238	-0.0316	-0.1223

2.6.1. Regression results for Islamic banks

This part explains the regression results for Islamic banking variables, divided into two different sub-parts based on the nature of the dataset: the first is the bank-level dataset and the second is the country-level dataset. The analysis and results are presented in such a manner, since this study aims to account the behaviour of each bank in affecting the sources of growth, and therefore the equation has two different levels of dataset, as mentioned in the methodology section. As for the country-level dataset, estimation is conducted to observe the robustness of the result when both dependent and independent variables are set at country level.

2.6.1.1. Bank-level dataset estimation

Table 2.10 presents the regression results using panel data analysis by taking individual banks as the unit of analysis across the years of the period, showing only the result from the panel with random effects estimation. Random effect estimation is selected according to the probability value of Hausman test, showing that it fails to reject that the coefficients estimated by fixed effect and random effect are not significantly different under 1% significant level. The result in Table 2.10 shows that non-performing loans (*npl*) have a significant negative relationship with capital accumulation growth, while other banking variables do not have any significant relationship with capital accumulation growth. The results show that lower non-performing loans in Islamic banks will support capital accumulation growth, which is also supported by the previous empirical evidence.

To further examination through dynamic panel data analysis, in order to account for the endogenous problem of autocorrelation, Table 2.11 presents the estimation results of employing system GMM. In conducting the system GMM, the model puts lagged period of *capg*, banking variables and GDP per capita (*lngdpc*), and the human capital index (*hci*) as the instrumental variables that are strictly endogenous and other control variables as the instrumental variables that are partly or strictly exogenous. In examining the vailidity of the variables, autocorrelation test for the first and second lag are performed, shown by AR(1) and AR(2), and instruments validity tests of Sargan and Hansen are also performed. The statistical results in Table 2.11 shows that there is autocorrelation in the first lag, which disappears ini the second lag. As for the overidentifying restrictions, both Sargan and Hansen tests show that

it fails to reject the null hypothesis that the overidentifying restrictions are valid, implying that the use of variables are valid.

Table 2.10: Regression Results – CAPG – Bank-level – Random Effect

Variables	*capg - panel random effects*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	-0.00764				
	(0.0374)				
ldr		0.000776			
		(0.00283)			
car			0.00450		
			(0.0109)		
npl				-0.0692***	
				(0.0239)	
oh					-0.0150
					(0.0331)
hci	-0.0258***	-0.0276***	-0.0249**	-0.0178	-0.0410***
	(0.00802)	(0.00799)	(0.0103)	(0.0111)	(0.0122)
L.lngdpc	-0.0137***	-0.0127***	-0.00857	0.0128**	-0.00782
	(0.00392)	(0.00393)	(0.00590)	(0.00509)	(0.00615)
rd	0.00752	0.0108	0.0149	0.00498	0.0265***
	(0.00831)	(0.00861)	(0.00994)	(0.00886)	(0.0100)
lnrcon	0.00269	0.00238	0.00315	0.0132***	0.00219
	(0.00215)	(0.00214)	(0.00322)	(0.00318)	(0.00223)
fdi	0.550***	0.592***	0.538**	0.383**	0.702**
	(0.193)	(0.205)	(0.215)	(0.175)	(0.341)
legal	0.00500	0.00481	0.00380	-0.00555	0.00426
	(0.00560)	(0.00558)	(0.00688)	(0.00714)	(0.00581)
Constant	0.190***	0.189***	0.119	-0.363***	0.163*
	(0.0691)	(0.0682)	(0.120)	(0.108)	(0.0891)
Observations	426	400	263	245	333
Number of banks	134	129	112	103	126
Prob(chi2)	0.000	0.000	0.000	0.000	0.000
R-squared	0.300	0.300	0.155	0.171	0.399
Hausman test	0.0828	0.0357	0.6503	0.1111	0.0081

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

The results show that only overhead costs (*oh*) have a positive relationship with capital accumulation growth, suggesting that Islamic banks still need to incur operating costs for capital to accumulate. As can be seen in the results in Table 2.11, in accordance with the macroeconomic and institutional variables, initial GDP per capita (*L.lngdpc*) has a significant negative relationship with capital accumulation growth, supported by previous studies (Beck et al., 2000; Naceur et al., 2017; Rioja & Valev, 2004). On the other hand, research and development expenses (*rd*), foreign direct investment (*fdi*), and government expenditure (*expense*) have significant positive relationships with capital accumulation growth, aligned with previous studies (Berthelemy & Varoudakis, 1996; Borensztein *et al.*, 1998; Djajic, 1987;

Zeng, 2003). As for variable of human capital (*hci*), it has negative relationship with capital accumulation growth which can be due to the condition that countries with high index of human capital experience lower capital accumulation growth.

Table 2.11: Regression Results – CAPG – Bank-level – *GMM*

Variables	*capg - panel gmm*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	-0.0264				
	(0.106)				
ldr		0.000161			
		(0.00553)			
car			-0.0490		
			(0.0560)		
npl				0.105	
				(0.190)	
oh					0.823*
					(0.429)
L.capg	0.378***	0.409***	0.512**	0.782***	0.204***
	(0.139)	(0.113)	(0.196)	(0.287)	(0.0692)
hci	-0.0522*	-0.0618***	-0.0749***	-0.113***	0.0483
	(0.0278)	(0.0170)	(0.0285)	(0.0296)	(0.0594)
L.lngdpc	0.0211**	0.0186***	0.0124	0.00703	0.0308**
	(0.00888)	(0.00580)	(0.0100)	(0.00765)	(0.0146)
rd	0.0196	0.0325**	0.0404**	0.0650***	-0.0313
	(0.0254)	(0.0143)	(0.0155)	(0.0156)	(0.0491)
fdi	0.673*	0.756**	0.552**	0.415	0.913*
	(0.369)	(0.325)	(0.229)	(0.350)	(0.498)
legal	-0.00562	-0.00452	-0.00586	0.00322	0.00121
	(0.00674)	(0.00544)	(0.00669)	(0.00937)	(0.00967)
expense	0.0916**	0.0715***	0.0302	-0.0340	0.169***
	(0.0372)	(0.0260)	(0.0338)	(0.0298)	(0.0642)
Constant	-0.0711	-0.0344	0.0687	0.167*	-0.434***
	(0.111)	(0.0758)	(0.132)	(0.0964)	(0.165)
Observations	426	401	264	246	334
Number of banks	135	130	113	104	127
Number of instruments	13	13	13	13	13
Prob-F	0.000	0.000	0.000	0.000	0.000
AR(1)	0.010	0.009	0.106	0.214	0.111
AR(2)	0.651	0.688	0.414	0.708	0.330
Sargan test	0.375	0.814	0.694	0.595	0.213
Hansen test	0.371	0.714	0.809	0.243	0.402

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

After examining the capital accumulation growth, Tables 2.12 and 2.13 present the relationship between banking variables and total factor productivity growth (*tfpg*). Employing fixed effect estimation, which is based on the value of Hausman test that rejects the appropriateness of random effect, Table 2.12 shows that loan-to-deposit ratio (*ldr*) and overhead costs (*oh*) have

a significant positive relationship with total factor productivity growth (*tfpg*). On the other hand, capital adequacy ratio (*car*) and non-performing loans have negative relationship with total factor productivity growth (*tfpg*).

Table 2.12: Regression Results – TFPG – Bank-level –Fixed Effect

Variables	*tfpg – fixed effects*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	0.0324				
	(0.0237)				
ldr		0.00471**			
		(0.00236)			
car			-0.0295*		
			(0.0160)		
npl				-0.0272*	
				(0.0147)	
oh					0.0272*
					(0.0153)
hci	-0.0244***	-0.0177**	-0.0293***	-0.0203***	-0.0164*
	(0.00634)	(0.00840)	(0.00704)	(0.00688)	(0.00875)
L.lngdpc	0.0161	0.0146	0.0317***	0.0330***	0.00933
	(0.0128)	(0.0103)	(0.00950)	(0.00961)	(0.0119)
lnrcon	-0.0234***	-0.0198***	-0.0144	-0.0200***	-0.0212**
	(0.00830)	(0.00699)	(0.00928)	(0.00685)	(0.00823)
legal	0.0943***	0.106**	0.0469	0.0680**	0.0960**
	(0.0306)	(0.0468)	(0.0418)	(0.0332)	(0.0449)
expense	-0.0221*	-0.0183	-0.0251	-0.00239	-0.0404***
	(0.0131)	(0.0114)	(0.0211)	(0.0150)	(0.0122)
trade	0.0531***	0.0128	0.0529***	0.0525***	0.0379*
	(0.00984)	(0.0258)	(0.0116)	(0.0130)	(0.0210)
Constant	0.362	0.295	0.0358	0.113	0.361*
	(0.239)	(0.182)	(0.196)	(0.133)	(0.216)
Observations	878	811	491	381	694
Number of banks	125	119	101	86	124
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.0836	0.0473	0.1327	0.1843	0.0528
Hausman test	0.0000	0.0001	0.0000	0.0000	0.0081

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

In addition, Table 2.13 presents the results from applying *system GMM* by including lag of total factor productivity growth (*tfpg*) and the banking variable as the endogenous variables. As for the exogenous variables, the model amounts human capital index (*hci*), governance index (*govindex*), government expenditure (*expense*), and lag of GDP per capita (*L.lngdpc*). The autocorrelation tests show that there is autocorrelation in the first lag, but there is no autocorrelation in the second lag. As for the test of instrument validity, Sargan and Hansen tests, Table 2.13 presents that the instruments variables are valid to be included in the model.

As for the main result, Table 2.13 shows that only non-performing loans (*npl*) has a positive relationship with total factor productivity growth (*tfpg*).

Table 2.13: Regression Results – TFPG – Bank-level – *GMM*

Variables	*tfpg – panel gmm*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	0.0694				
	(0.0650)				
ldr		-0.00598			
		(0.0156)			
car			0.0427		
			(0.0546)		
npl				0.241*	
				(0.134)	
oh					-0.0322
					(0.172)
L.tfpgrowth	0.526***	0.551***	0.688***	0.356	0.762***
	(0.173)	(0.172)	(0.174)	(0.233)	(0.113)
hci	-0.00866*	-0.00735	-0.0164**	-0.00630	-0.00213
	(0.00519)	(0.00566)	(0.00778)	(0.0126)	(0.00764)
L.lngdpc	-0.00125	-0.00200	-0.00266	-0.00383	-0.00271
	(0.00129)	(0.00158)	(0.00184)	(0.00333)	(0.00175)
govindex	0.00780**	0.00710**	0.0106**	0.00420	0.00200
	(0.00342)	(0.00346)	(0.00516)	(0.00692)	(0.00377)
expense	-0.0156**	-0.0165*	-0.00624	-0.00562	-0.0275***
	(0.00764)	(0.00897)	(0.0139)	(0.0154)	(0.00976)
Constant	0.0296	0.0404**	0.0538*	0.0276	0.0344
	(0.0184)	(0.0186)	(0.0310)	(0.0616)	(0.0258)
Observations	853	783	489	378	678
Number of banks	125	119	101	86	124
Number of instruments	9	9	9	9	9
Prob-F	0.000	0.000	0.000	0.000	0.000
AR(1)	0.000	0.000	0.011	0.013	0.006
AR(2)	0.726	0.838	0.975	0.779	0.001
Sargan test	0.082	0.338	0.412	0.445	0.295
Hansen test	0.103	0.540	0.329	0.615	0.438

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

The results in Table 2.12 and 2.13 suggest that Islamic banks with higher overhead costs (*oh*), are less efficient and have a positive relationship with total factor productivity growth (*tfpg*), which does not support previous empirical studies. This indicates that Islamic banks, as known to be new actors in the financial industry, still need to spend more in expenses so as to be able to catch up to their counterparts in supporting total factor productivity growth. As for non-performing loans (*npl*), Islamic banks with a lower ratio will support the growth of total factor

productivity (*tfpg*), which is supported by previous empirical evidence stating that higher financial stability supports higher total factor productivity growth (*tfpg*).

The results depicted in Tables 2.12 and 2.13 also suggest that governance index (*govindex*), initial GDP per capita (*lngdpc*), the legal system (*legal*), and ratio of trade to GDP (*trade*) have a positive relationship with total factor productivity, evidence supported by previous empirical studies (*such as:* Beck *et al*., 2000; Naceur *et al*., 2017). This result indicates that well-developed institutional quality and the existence of trade can support the productivity growth in the sampled countries.

On the other hand, ratio of private consumption to GDP (*lnrcon*), human capital index (*hci*), and the ratio of government expenditure to GDP (*expense*) have negative relationship with total factor productivity. It seems that the consumption and expenditure have not directed towards productive activities.

2.6.1.2. Country-level dataset estimation

In this part, the banking variables from the Islamic banks are aggregated into country-level data to observe the consistency and robustness of different datasets. Table 2.14 and Table 2.15 present the regression results taking capital accumulation growth (*capg*) as the dependent variable; whereas Table 2.16 and Table 2.17 depict the results for total factor productivity growth (*tfpg*) as the dependent variable.

Table 2.14 presents the results of random effect estimation, based on the Hausman test showing that it fails to reject the null hypothesis of no significant different between coefficients in fixed and random effects. The results show that non-performing loans (*npl*) and overhead costs (*oh*) have negative relationships with capital accumulation growth, which are consistent with the results in Table 2.10. As for the control variables, initial GDP per capita (*lngdpc*) and human capital index (*hci*) still have a significant negative relationship with capital accumulation growth, along with a positive relationship with foreign direct investment (*fdi*). It has the same results with Table 2.10.

Table 2.15 employs *system GMM* by including human capital index (*hci*); lag of capital accumulation growth (*capg*), the banking variables, and GDP per capita (*lngdpc*) as the instrumental variables of strictly endogenous. In addition, research and development

expenditure (*rd*), foreign direct investment (*fdi*), legal system (*legal*), and government expenditure (*expense*) are included as the exogenous variables. As for the autocorrelation test, AR(1) shows that there is autocorrelation in the first lag, but there is no autocorrelation in the second lag (AR(2)). The test for instrument validity, Sargan and Hansen tests, also shows that the instruments are valid to be included in the model.

Table 2.14: Regression Results – CAPG – Country-level – Random Effect

Variables	*capg - random effects*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	0.402				
	(0.248)				
ldr		0.00965			
		(0.0114)			
car			-0.00667		
			(0.0336)		
npl				-0.196***	
				(0.0683)	
oh					-0.187*
					(0.103)
hci	-0.00983	-0.0121	-0.0176**	-0.0157	-0.0313***
	(0.0119)	(0.0116)	(0.00832)	(0.0167)	(0.00676)
L.lngdpc	-0.0134**	-0.0156*	-0.0146**	-0.0108	-0.00945
	(0.00684)	(0.00804)	(0.00659)	(0.00689)	(0.00756)
fdi	0.313**	0.309**	0.437**	0.441***	0.326
	(0.149)	(0.157)	(0.219)	(0.168)	(0.229)
rd	-0.0172	-0.0183*	-0.00801	0.00566	-0.00261
	(0.0111)	(0.00987)	(0.0108)	(0.0137)	(0.0123)
Constant	0.238***	0.272***	0.277***	0.230***	0.259***
	(0.0655)	(0.0719)	(0.0638)	(0.0793)	(0.0718)
Observations	118	116	90	77	78
Number of countries	22	22	19	18	18
Prob(chi2)	0.004	0.013	0.006	0.074	0.000
R-squared	0.198	0.173	0.199	0.151	0.259
Hausman test	0.8520	0.8626	0.9910	0.9000	0.5261

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

The results in Table 2.15 show that capital adequacy ratio (*car*) is the only banking variable that has a significant positive relationship with capital accumulation growth. It is supported by previous empirical studies, such as Blum & Hellwig (1995) and Naceur *et al*. (2017). The result implies that higher capital adequacy ratio managed by Islamic banks will be able to reassure the depositors and increase their financing, which can create capital. As for the control variables, initial GDP per capita (*L.lngdpc*) still has positive relationship and human capital index (*hci*) has negative relationship with capital accumulation growth (*capg*) as in Table 2.11.

Table 2.16 and 2.17 present the regression results for total factor productivity growth using random effect and *system GMM* respectively. Random effect estimation is selected according to the Hausman test being presented in Table 2.16, showing that it fails to reject the null hypothesis of no significant different for estimators between fixed and random effect. As for Table 2.17, it presents the result for applying *system GMM* by including human capital index (*hci*) and the lag of total factor productivity growth (*tfpg*), the banking variables, and GDP per capita (*L.lngdpc*) as the endogenous variables. In addition, research and development expenditure (*rd*), foreign direct investment (*fdi*), legal system (*legal*), and government expenditure (*expense*) are included as the exogenous variables.

Table 2.15: Regression Results – CAPG – Country-level – *GMM*

Variables	***capg – annual panel gmm***				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	-0.336				
	(0.649)				
ldr		0.0237			
		(0.0176)			
car			0.215*		
			(0.106)		
npl				0.257	
				(0.244)	
oh					0.459
					(1.300)
L.capg	0.570***	0.583***	0.469*	0.913***	0.490**
	(0.125)	(0.0881)	(0.236)	(0.283)	(0.182)
hci	-0.0174	-0.0375	-0.0566*	-0.0583	-0.0171
	(0.0493)	(0.0267)	(0.0310)	(0.0713)	(0.0464)
L.lngdpc	-0.00136	-0.00238	0.0139	-0.00258	0.0330*
	(0.0216)	(0.0189)	(0.0122)	(0.0208)	(0.0187)
legal	-0.00113	-0.00227	-0.00545	0.000955	-0.0163
	(0.0209)	(0.0136)	(0.0150)	(0.0239)	(0.0131)
expense	0.000142	0.0338	0.0891	-0.0230	0.124
	(0.0699)	(0.0604)	(0.0744)	(0.0782)	(0.137)
Constant	0.106	0.130	-0.0254	0.150	-0.280
	(0.166)	(0.136)	(0.108)	(0.208)	(0.249)
Observations	117	116	90	77	78
Number of countries	22	22	19	18	18
Number of instruments	13	13	13	13	13
Prob-F	0.001	0.000	0.215	0.001	0.002
AR(1)	0.064	0.045	0.302	0.158	0.086
AR(2)	0.910	0.857	0.143	0.446	0.783
Sargan test	0.190	0.632	0.661	0.408	0.021
Hansen test	0.477	0.626	0.742	0.311	0.565

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

The statistical results for autocorrelation in Table 2.17 show that there is autocorrelation in the first lag, but there is no autocorrelation in the second lag. As for the tests of instrument validity, Sargan and Hansen tests, it shows that the instruments are valid to be included in the model. The main result demonstrates that only overhead costs (*oh*) has positive and significant relationship with total factor productivity growth (*tfpg*), which is consistent with the result in Table 2.12.

Table 2.16: Regression Results – TFPG – Country-level - Random Effect

Variables	***tfpg – random effects***				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	0.0913				
	(0.116)				
ldr		0.00355			
		(0.00632)			
car			-0.0158		
			(0.0163)		
npl				-0.0278	
				(0.0177)	
oh					0.0902***
					(0.0316)
hci	-0.00787*	-0.00819*	-0.00683	-0.0135**	-0.00986***
	(0.00461)	(0.00429)	(0.00489)	(0.00687)	(0.00254)
L.lngdp	-0.000844	-0.000820	-0.000939	-0.000928	-0.000732
	(0.000689)	(0.000722)	(0.000821)	(0.000744)	(0.000850)
lnpop	0.00338*	0.00350	0.00371	0.00633**	0.00406*
	(0.00200)	(0.00225)	(0.00247)	(0.00310)	(0.00215)
govindex	0.00910**	0.00783**	0.00801*	0.0169**	0.0122***
	(0.00414)	(0.00365)	(0.00411)	(0.00824)	(0.00369)
Constant	-0.0315	-0.0329	-0.0293	-0.0576	-0.0441
	(0.0353)	(0.0399)	(0.0403)	(0.0362)	(0.0331)
Observations	238	237	163	149	151
Number of countries	21	21	18	19	21
Prob(chi2)	0.1015	0.0257	0.2047	0.3662	0.0000
R-squared	0.0421	0.0403	0.0441	0.0848	0.0768
Hausman test	0.0232	0.0268	0.0484	0.0010	0.1407

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

Table 2.17: Regression Results – TFPG – Country-level - *GMM*

Variables	*tfpg – annual panel gmm*				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
nim	0.121				
	(1.010)				
ldr		0.00861			
		(0.0190)			
car			0.00962		
			(0.0428)		
npl				-0.0646	
				(0.125)	
oh					0.0917
					(0.313)
L.tfpgrowth	0.432**	0.472***	0.410***	0.260	0.512**
	(0.157)	(0.159)	(0.106)	(0.199)	(0.187)
hci	-0.0336***	-0.0334***	-0.0443***	-0.0287***	-0.0280**
	(0.00540)	(0.00595)	(0.0145)	(0.00811)	(0.0130)
L.lngdpc	-0.0265	-0.0208	-0.0283*	-0.0423*	-0.0238
	(0.0213)	(0.0171)	(0.0150)	(0.0229)	(0.0163)
govindex	0.0335**	0.0302**	0.0449**	0.0395**	0.0384**
	(0.0139)	(0.0136)	(0.0194)	(0.0149)	(0.0155)
expense	-0.0480	-0.0332	-0.0778	-0.102	0.0268
	(0.0725)	(0.0761)	(0.0604)	(0.0926)	(0.0667)
Constant	0.337	0.273	0.393**	0.510*	0.292
	(0.233)	(0.180)	(0.162)	(0.243)	(0.192)
Observations	110	108	82	69	73
Number of countries	19	19	16	15	15
Number of instruments	13	13	13	13	13
Prob-F	0.000	0.000	0.000	0.000	0.050
AR(1)	0.093	0.052	0.082	0.356	0.172
AR(2)	0.159	0.132	0.154	0.212	0.208
Sargan test	0.210	0.109	0.022	0.053	0.542
Hansen test	0.202	0.395	0.236	0.516	0.379

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

2.6.2. Regression results for *sukuk* market

This part of the analysis explains the regression results for the *sukuk* market by employing volume of *sukuk* issuance, which is divided into three sub-parts based on the dataset, namely the issuance-level dataset, firm-level dataset, and country-level dataset.

In issuance-level dataset, the *sukuk* dataset is set by the issuer across the time periods, while the dependent and control variables are in the country-level dataset. Columns (1) and (2) of Table 2.18 present the relationship between the *sukuk* market with capital accumulation growth (*capg*) and total factor productivity growth (*tfpg*), respectively, for the issuance-level dataset. In the issuance-level dataset, pooled least square is employed because the dataset is structured

in cross-section type. As the results demonstrate, the volume of *sukuk* issuance (*lnsukuk*) has a significant positive relationship with capital accumulation growth (*capg*) and total factor productivity growth (*tfpg*), although the coefficient is small.

Table 2.18: Regression Results – *Sukuk* and Sources of Growth

Variables	*issuance-level - PLS*		*firm-level - FE*		*country-level - FE*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	capg	*tfpg*	*capg*	*tfpg*	*capg*	*tfpg*
lnsukuk	0.000804***	0.000449***	0.00187	5.63E-05	-0.0005	0.00761
	-0.00011	-9.38E-05	-0.00123	-0.00077	-0.00865	-0.00802
hc	0.00642	0.0613***	0.0436	-0.244***	-0.56	-0.048
	-0.00409	-0.00364	-0.21	-0.044	-0.546	-0.0904
L.lngdpc	0.0172***	-0.0199***	0.17	0.262***	-0.0472	0.0122
	-0.00104	-0.00102	-0.172	-0.0304	-0.0525	-0.035
rd	-0.0795***	-0.0862***	0.0386	0.0660***		
	-0.0019	-0.00225	-0.0786	-0.021		
fdi	0.388***	0.352***	0.638**	1.357***	1.015	-0.0343
	-0.0113	-0.0103	-0.274	-0.0724	-0.727	-0.171
trade	-0.0325***	-0.0269***	0.101	0.123***	-0.239	0.0491*
	-0.00167	-0.00106	-0.0698	-0.0248	-0.184	-0.0223
expense	0.0402***	-0.0728***	0.0155	-0.0820***		
	-0.00246	-0.00229	-0.0181	-0.00915		
lnrcon	0.0369***				0.0164	0.0108
	-0.00119				-0.0548	-0.0178
legal	-0.0193***	0.0158***				
	-0.0016	-0.00146				
govindex	0.0239***	0.0932***	0.0125	0.0270*		
	-0.00222	-0.00231	-0.0264	-0.0154		
Constant	-0.996***	0.100***	-1.996	-2.187***	1.835	-0.514*
	-0.0329	-0.00987	-1.321	-0.278	-1.353	-0.274
Observations	6,704	6,667	377	373	86	66
Number of entities			158	156	11	9
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0969	0.0000
R-squared	0.58	0.692	0.4921	0.8556	0.25	0.2122
Adj R-sq	0.579	0.691				
Hausman test			0.0000	0.0000	0.0000	N/A

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

To observe the robustness of the estimation results in column (1) and (2), the dataset is then grouped into firms issuing *sukuk* annually—the *sukuk* data is at the firm level, annually and the sources of growth data is in the country-level data. The results presented in column (3) and (4) are based on the fixed effect estimation, as the Hausman test demonstrates that it rejects the appropriateness use of random effect for the model. The results show that there is no significant relationship between volume of *sukuk* issuance with capital accumulation growth and total

factor productivity. This indicates that the volume of *sukuk* issuance is still relatively small compared to the size of economy in the country to have a significant effect.

Column (5) and (6) in Table 2.18 present the results for country-level dataset, which volume of *sukuk* issuance is being aggregated in the country-level. It is also based on the fixed effect estimation as the Hausman test suggests. The result also demonstrates that volume of *sukuk* issuance does not have any significant relationship with capital accumulation growth (*capg*) and total factor productivity growth (*tfpg*).

2.6.3. Analysis based on sectoral financing by Islamic banks

This section provides an examination of the effects of financing provided to different sectors by Islamic banks on sources of growth, as the study aims to identify growth-oriented sectors. This is, as explained, due to the fact that Islamic economics essentialises the real economy and productive sectors. Therefore, this study examines whether such an objective is implemented by Islamic banks.

2.6.3.1. Bank-level dataset estimation

The data on sectoral financing was collected from IFSB, and Table 2.19 presents the descriptive statistics for the proportion of financing provided to each sector to total financing. Due to the constraints on the availability of data, there are only 341 observations globally from 1989–2014. As can be seen in Table 2.19, the manufacturing (*man*) sector has the lowest average, median, and maximum from total financing, implying that the manufacturing sector has been avoided by Islamic banks in the provision of financing. However, transportation (*trans*) has the highest average, median, and maximum from total financing implying that the transportation sector has been the dominant sector in obtaining financing from Islamic banks.

Table 2.19: Descriptive Statistics – Sectoral Financing

Variable	Obs	Mean	Std. Dev.	Min	Max
cons	341	0.1132	0.1510	0.0000	0.7678
agr	341	0.1301	0.1599	0.0000	0.7237
man	341	0.0141	0.0321	0.0000	0.3600
trad	341	0.1488	0.1404	0.0000	0.5579
trans	341	0.2374	0.2552	0.0000	1.0000
real	341	0.0391	0.1006	0.0000	0.6164
bankfin	341	0.2127	0.2020	0.0000	1.0000

Notes: Obs = Number of observations, SD = Standard deviation, Min = Minimum, Max = Maximum

Table 2.20: Correlation Matrix – Sectoral Financing

	capg	*tfpg*	*cons*	*agr*	*man*	*trad*	*trans*	*real*	*bankfin*
capg	1								
tfpg	0.0615	1							
cons	-0.0624	0.0040	1						
agr	0.0851	0.0848	-0.0284	1					
man	0.0916	0.1657	0.0966	-0.0237	1				
trad	-0.0718	-0.0911	-0.0584	-0.0695	-0.0285	1			
trans	-0.1720	-0.0839	-0.2156	-0.3866	-0.2150	-0.1795	1		
real	0.2298	0.2167	-0.0419	-0.0133	0.3189	-0.1537	-0.2757	1	
bankfin	0.0729	-0.1053	-0.2620	-0.1885	-0.0457	-0.2431	-0.2742	-0.0742	1

Regarding the correlation between variables, Table 2.20 maps out the correlation matrix between variables particularly to show the relationship between each sector and the sources of growth. It shows that financing the consumer durables (*cons*), trading (*trad*), and transportation (*trans*) sectors have a negative relationship with capital accumulation growth (*capg*). In addition, financing consumer durables, manufacturing (*man*), real estate (*real*), and banking and finance (*bankfin*) have a negative relationship with total factor productivity growth (*tfpg*).

Table 2.21 presents the results by employing random effect estimation, as the Hausman test suggests that it fails to reject the significant different in the estimators between fixed effect and random effect under 1% significant level. The result shows that financing consumer durables (*cons*) has a significant negative effect on capital accumulation growth (*capg*), while financing real estate (*real*) has significant and positive effect on capital accumulation growth (*capg*).

The results indicate that providing financing for consumer durables could not support capital accumulation growth as financing has mainly been used to purchase housing appliances. On the other hand, the financing provided for the real estate sector could increase the capital accumulation growth, as financing real estate can be said to be a form of investment, which can increase returns and lead towards higher capital accumulation.

As for the control variables, Table 2.21 presents that human capital index (*hci*) and ratio of trade to GDP (*trade*) have negative effect on capital accumulation growth (*capg*) for the sampled countries and periods. The effect of human capital index (hci) is similar to the results in Table 2.10 and 2.11, while the effect of *trade* is supported by study from Rioja & Valev (2004).

Table 2.21: Regression results – CAPG and Sectoral Financing – Bank-level – Random Effect

Variables	*capg - panel random effect*						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
cons	-0.177**						
	(0.0751)						
agr		0.102					
		(0.135)					
man			0.311				
			(0.331)				
trad				-0.0965			
				(0.0845)			
trans					-0.0321		
					(0.0466)		
real						0.171***	
						(0.0522)	
bankfin							0.0482
							(0.0548)
hci	-0.0980**	-0.0898*	-0.0987**	-0.0937**	-0.0935*	-0.106**	-0.0882*
	(0.0461)	(0.0462)	(0.0481)	(0.0469)	(0.0489)	(0.0482)	(0.0473)
L.lngdpc	-0.00849	-0.00390	-0.00378	-0.00290	-0.00492	-0.00458	-0.00520
	(0.00702)	(0.00743)	(0.00718)	(0.00575)	(0.00690)	(0.00682)	(0.00672)
fdi	0.463	0.413	0.507	0.400	0.498	0.525	0.481
	(0.325)	(0.365)	(0.324)	(0.357)	(0.335)	(0.322)	(0.313)
trade	-0.0697***	-0.0624**	-0.0664***	-0.0655***	-0.0681***	-0.0654***	-0.0690***
	(0.0214)	(0.0247)	(0.0221)	(0.0237)	(0.0211)	(0.0218)	(0.0214)
govindex	-0.00224	0.00573	0.00207	0.00595	0.00323	0.0117	-0.00162
	(0.0243)	(0.0284)	(0.0273)	(0.0251)	(0.0283)	(0.0283)	(0.0259)
Constant	0.513***	0.411***	0.441***	0.441***	0.453***	0.462***	0.426***
	(0.154)	(0.136)	(0.155)	(0.144)	(0.153)	(0.152)	(0.148)
Observations	274	274	274	274	274	274	274
Number of banks	57	57	57	57	57	57	57
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-square	0.1426	0.1294	0.1239	0.1272	0.1242	0.1320	0.1252
Hausman test	0.0209	0.0352	0.0044	0.0239	0.029	0.0006	0.0116

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

In relation to total factor productivity growth (*tfpg*), the regression results in Table 2.22 are obtained by conducting fixed effect estimation as suggested by Hausman test showing that random effect is not appropriate to be employed. Table 2.22 presents that there is no significant relationship between financing provided towards particular sector and the total factor productivity growth (*tfpg*) in the sampled countries and period.

Table 2.22: Regression Results – TFPG and Sectoral Financing – Bank-level – Fixed Effect

Variables	*tfpg – fixed effects*						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
cons	0.0460						
	(0.0373)						
agr		-0.00250					
		(0.0698)					
man			0.166				
			(0.141)				
trad				-0.0123			
				(0.0302)			
trans					-0.00824		
					(0.0142)		
real						-0.0331	
						(0.0585)	
bankfin							-0.0208
							(0.0194)
hci	-0.0264***	-0.0271***	-0.0259***	-0.0275***	-0.0266***	-0.0271***	-0.0272***
	(0.00477)	(0.00443)	(0.00506)	(0.00407)	(0.00489)	(0.00436)	(0.00466)
L.lngdpc	0.0322***	0.0316***	0.0323***	0.0313***	0.0312***	0.0320***	0.0317***
	(0.0106)	(0.0114)	(0.0105)	(0.0106)	(0.0111)	(0.0107)	(0.0106)
govindex	0.0324*	0.0338*	0.0343*	0.0348*	0.0335*	0.0342*	0.0346*
	(0.0185)	(0.0170)	(0.0177)	(0.0177)	(0.0188)	(0.0177)	(0.0178)
fdi	-0.206**	-0.213***	-0.203***	-0.214***	-0.197**	-0.215***	-0.237***
	(0.0765)	(0.0682)	(0.0706)	(0.0677)	(0.0814)	(0.0691)	(0.0827)
expense	-0.0585**	-0.0491	-0.0410	-0.0423	-0.0502**	-0.0385	-0.0599**
	(0.0244)	(0.0412)	(0.0248)	(0.0286)	(0.0247)	(0.0329)	(0.0290)
trade	0.0740***	0.0759***	0.0759***	0.0761***	0.0752***	0.0775***	0.0767***
	(0.0132)	(0.0120)	(0.0127)	(0.0127)	(0.0134)	(0.0126)	(0.0129)
lnrcon	-0.00279	-0.00211	-0.00167	-0.00128	-0.00271	-0.00231	-0.00176
	(0.00559)	(0.00524)	(0.00545)	(0.00630)	(0.00624)	(0.00551)	(0.00560)
Constant	-0.274	-0.282	-0.307	-0.299	-0.262	-0.283	-0.286
	(0.206)	(0.203)	(0.207)	(0.219)	(0.230)	(0.211)	(0.209)
Observations	207	207	207	207	207	207	207
Number of banks	43	43	43	43	43	43	43
Prob-F	0.0001	0	0.0007	0.0019	0.0002	0.0001	0.0006
R-squared	0.1935	1871	0.191	0.1879	0.1884	0.1882	0.1938
Hausman test	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001	0.0000

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

2.6.3.2. Country-level dataset estimation

The annual dataset aggregates the banking variables into the country-level dataset in order to observe consistency and robustness for different settings. Table 2.23 presents the descriptive statistics, which demonstrate that the manufacturing (*man*) sector received the lowest

proportion of financing, while Table 2.24 displays the correlation matrix indicating that there is no high correlation between the variables.

Table 2.23: Descriptive Statistics – Sectoral Financing – Country-level

Variable	Obs	Mean	Std. Dev.	Min	Max
cons	140	0.0908	0.09959	0.0000	0.5328
agr	140	0.1575	0.1484	0.0000	0.6806
man	140	0.0143	0.0282	0.0000	0.2002
trad	140	0.1349	0.1090	0.0000	0.4617
trans	140	0.2405	0.2444	0.0000	1.0000
real	140	0.0459	0.0973	0.0000	0.4684
bankfin	140	0.2113	0.1498	0.0000	0.7304

Notes: Obs = Number of observations, SD = Standard deviation, Min = Minimum, Max = Maximum

Table 2.24: Correlation Matrix - Sectoral Financing – Country-level

	capg	*tfpg*	*cons*	*agr*	*man*	*trad*	*trans*	*real*	*bankfin*
capg	1								
tfpg	-0.0470	1							
cons	0.0211	0.0161	1						
agr	0.0190	0.1083	0.1175	1					
man	0.0643	0.1176	0.0918	-0.0688	1				
trad	-0.0039	-0.1084	0.0435	-0.0862	-0.1575	1			
trans	-0.2227	-0.0068	-0.3394	-0.4547	-0.1244	-0.1626	1		
real	0.1725	0.1762	0.0150	-0.0906	0.4826	-0.1848	-0.2637	1	
bankfin	0.1340	-0.1625	-0.1434	-0.1981	-0.1518	-0.2659	-0.3252	-0.0455	1

For the regression results, it employs random effect estimation based on the Hausman test that fails to reject the null hypothesis suggested in Table 2.25. The estimation results in Table 2.25 demonstrates that only financing for real estate (*real*) has a significant positive relationship with capital accumulation growth, which seems to indicate that financing in the real estate sector is claimed to be similar to investment generating a return in the future. Considering that real estate offers promising future returns, Islamic banks have provided increasing financing for the real estate sector (*see:* Table 2.4) with the objective of obtaining higher capital and leading towards higher capital accumulation. Additionally, the real estate sector can generate returns from leasing and renting fees from the utilization of buildings resulting in higher capital accumulation (Liu *et al*., 2016).

Table 2.25: Regression Results – CAPG and Sectoral Financing – Country-level – Random Effect

Variables	*capg - random effect*						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
cons	0.151						
	(0.115)						
agr		-0.0831					
		(0.0668)					
man			-0.0695				
			(0.166)				
trad				-0.159			
				(0.103)			
trans					7.50e-05		
					(0.0446)		
real						0.275**	
						(0.110)	
bankfin							-0.00204
							(0.0650)
hci	-0.00933	-0.0198**	-0.0179**	-0.0259***	-0.0186**	-0.0359***	-0.0221**
	(0.0117)	(0.00941)	(0.00762)	(0.00996)	(0.00865)	(0.00592)	(0.00962)
L.lngdpc	-0.0163	-0.0178	-0.0160	-0.00474	-0.0156	-0.0181*	-0.0198
	(0.0146)	(0.0125)	(0.0133)	(0.0119)	(0.0134)	(0.0107)	(0.0153)
fdi	0.509*	0.615**	0.556	0.429	0.568	0.713**	0.558
	(0.309)	(0.280)	(0.359)	(0.339)	(0.378)	(0.342)	(0.396)
rd	-0.0208	-0.0158	-0.00757	-0.00164	-0.00791	0.0145	-0.00234
	(0.0397)	(0.0315)	(0.0323)	(0.0349)	(0.0318)	(0.0247)	(0.0314)
govindex	0.000736	-0.00830	-0.00733	-0.00504	-0.00760	-0.00127	-0.00531
	(0.0237)	(0.0187)	(0.0179)	(0.0166)	(0.0197)	(0.0201)	(0.0195)
Constant	0.275	0.333**	0.300*	0.228*	0.297*	0.336***	0.343*
	(0.172)	(0.146)	(0.154)	(0.138)	(0.152)	(0.127)	(0.178)
Observations	54	54	54	54	54	54	54
Number of countries	11	11	11	11	11	11	11
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010
R-squared	0.201	0.167	0.166	0.189	0.167	0.246	0.184
Hausman test	0.8660	0.9757	0.9628	0.8913	0.9391	0.9119	0.8924

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Examining the relationship between sectoral financing and total factor productivity growth (*tfpg*), it also employs random effect estimation that is suggested by the Hausman test presented in Table 2.26. As for the estimation results, Table 2.26 shows that financing the agricultural (*agr*) sector has a significant positive relationship with total factor productivity growth, while financing the banking and finance (*bankfin*) sector has a negative relationship with total factor productivity growth. This might indicate that financing the agricultural sector will lead to higher activities in planting and cropping, which, in turn, will result in higher productivity of

labour. As for financing the banking and finance sector, it will not necessarily increase total factor productivity growth, since financing this sector can be considered as channelling or investing available money to obtain a stable return.

Table 2.26: Regression Results – TFPG and Sectoral Financing – Country-level – Random Effect

Variables	*tfpg – random effect*						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
cons	0.0212						
	(0.0463)						
agr		0.0929**					
		(0.0412)					
man			0.0489				
			(0.142)				
trad				-0.0257			
				(0.0477)			
trans					-0.00437		
					(0.0271)		
real						0.116	
						(0.0814)	
bankfin							-0.0484**
							(0.0241)
hci	-0.0163***	-0.0171***	-0.0154**	-0.0202***	-0.0146	-0.0208***	-0.0198**
	(0.00622)	(0.00501)	(0.00607)	(0.00638)	(0.00983)	(0.00552)	(0.00768)
L.lngdp	-0.00276**	-0.00242**	-0.00255**	-0.00266**	-0.00252**	-0.00343**	-0.00289***
	(0.00108)	(0.00114)	(0.00102)	(0.00110)	(0.00103)	(0.00144)	(0.00102)
fdi	-0.317*	-0.381*	-0.232	-0.339*	-0.244*	-0.275	-0.360*
	(0.177)	(0.195)	(0.168)	(0.190)	(0.146)	(0.170)	(0.186)
trade	0.0582***	0.0574***	0.0537***	0.0596***	0.0550***	0.0538***	0.0535***
	(0.00998)	(0.0114)	(0.0104)	(0.0107)	(0.0104)	(0.0100)	(0.00743)
govindex	0.0244	0.0267	0.0204	0.0243	0.0218	0.0198	0.0220
	(0.0189)	(0.0187)	(0.0202)	(0.0198)	(0.0198)	(0.0153)	(0.0185)
lnpop	0.00766*	0.00755	0.00740*	0.00690	0.00755	0.00374	0.00950**
	(0.00447)	(0.00549)	(0.00393)	(0.00444)	(0.00553)	(0.00462)	(0.00375)
rd	-0.0103	-0.00156	-0.0120	-0.00608	-0.0118	0.00740	-0.00848
	(0.0229)	(0.0329)	(0.0209)	(0.0232)	(0.0224)	(0.0189)	(0.0226)
Constant	-0.0790	-0.0926	-0.0765	-0.0560	-0.0803	-0.00119	-0.0826
	(0.0707)	(0.0781)	(0.0537)	(0.0736)	(0.0808)	(0.0962)	(0.0666)
Observations	53	53	53	53	53	53	53
Number of countries	10	10	10	10	10	10	10
Prob(chi2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.279	0.325	0.281	0.276	0.280	0.280	0.309
Hausman test	0.5582	0.6558	0.2012	0.3400	0.1850	0.8921	0.7238

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

2.6.4. Analysis based on mode of financing by Islamic banks

This section presents the regression analysis for the effect of financing modes on the sources of growth so as to identify which financing mode is an important feature in Islamic banks in terms of contributing to growth compared to conventional banking financing. Due to the limited available data collected from IFSB, there are only 482 observations on global Islamic banks for the period 1989–2014. Table 2.27 shows that the highest proportion of financing provided by the sampled Islamic banks during the period in question was for the *murabahah* mode of financing, presented by the highest average, median, and maximum, while the lowest share was for the *salam* mode of financing.

Table 2.27: Descriptive Statistics – Mode of Financing

Variable	Obs	Mean	Std. Dev.	Min	Max
murabahah	481	0.6831	0.2911	0.0000	1.0000
ijarah	481	0.0998	0.1789	0.0000	1.0000
mudarabah	481	0.0546	0.1449	0.0000	0.9094
musharakah	481	0.0657	0.1256	0.0000	0.7810
salam	481	0.0014	0.0064	0.0000	0.0791
istisna	481	0.0180	0.0454	0.0000	0.2900

Notes: Obs = Number of observations, SD = Standard deviation, Min = Minimum, Max = Maximum

Table 2.28: Correlation Matrix – Mode of Financing

	capg	*tfpg*	*murabahah*	*ijarah*	*mudarabah*	*musharakah*	*salam*	*istisna*
capg	1							
tfpg	-0.0183	1						
murabahah	-0.1485	0.0169	1					
ijarah	-0.2013	-0.0911	-0.3577	1				
mudarabah	0.2473	-0.0146	-0.4432	-0.1016	1			
musharakah	0.2301	0.0579	-0.3448	-0.1676	0.0535	1		
salam	0.1574	0.0060	-0.2254	-0.1155	0.0680	0.5392	1	
istisna	0.2300	-0.0257	-0.0321	0.0213	0.0285	-0.0986	-0.0421	1

As mentioned above, the modes of financing can be categorized into two groups, which are profit-loss sharing (*pls*) and fixed-income (*fixed*) financing. Profit-loss sharing (*pls*) modes of financing include *mudarabah* and *musharakah*; while *murabahah*, *ijarah*, *salam*, and *istisna* are all forms of fixed-income financing (*fixed*). Comparing the proportion of both categories, Table 2.27 shows that profit-loss sharing (*pls*) only accounts for 12%, on average, of the total financing provided by Islamic banks, while fixed-income financing (*fixed*) claims 80% of total financing on average.

Table 2.28 presents the correlation matrix showing that there is no perfect multi-collinearity between the variables.

2.6.4.1. Bank-level dataset estimation

This study employs different structures of dataset in order to observe the relationship between modes of financing and sources of growth, consisting of the bank-level dataset and the country-level dataset. This section explains the estimation results for the bank-level dataset, where the mode of financing variables is employed on the bank level, while the sources of growth are on the country level.

Employing random effect suggested by the Hausman test, Table 2.29 shows that financing using *salam* has a significant negative relationship with capital accumulation growth (*capg*). This can be due to the nature of *salam* financing to provide working capital for agricultural products, which the principal and profit being returned in the future making it unsupportive towards nature of accumulation. As for the control variables, initial GDP per capita (*L.lngdpc*) and human capital index (*hci*) have negative relationship with capital accumulation growth (*capg*), while foreign direct investment (*fdi*) and government expenditure (*expense*) have positive relationship. This result is consistent with the results in Table 2.10 and 2.11.

To further examine the robustness of the estimation, this study also employs *system GMM* estimation to overcome the problem of endogeneity and autocorrelation, by including human capital index (*hci*) and the one-lagged period of capital accumulation growth (*capg*), variable for mode of financing, and GDP per capita (*L.lngdpc*) as the endogenous variables. In addition, research and development expenditure (*rd*), foreign direct investment (*fdi*), legal system (*legal*), and government expenditure (*expense*) as the exogenous variables under *ivstyle* in the Stata command. and putting other control variables into the *iv-style* part of the equation.

As for the statistical tests, Table 2.30 demonstrates that there is autocorrelation in the first lag, but there is no autocorrelation in the second lag. Examining the instrument validity, Hansen test suggests that the variables are valid to be included as the instruments in the model.

Table 2.30 shows the result, showing that *murabahah* and fixed instruments have significant positive relationships with capital accumulation growth (*capg*), while *musharakah*, *istisna*, and

profit-loss sharing financing (*pls*) have significant negative relationships with capital accumulation growth. As for the control variables, it has the same result with Table 2.29.

Table 2.29: Regression Results – CAPG and Mode of Financing – Bank-level – Random Effect

Variables	*capg - random effects*							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
murabahah	0.0134							
	(0.0178)							
ijarah		-0.0643						
		(0.0508)						
mudarabah			-0.0243					
			(0.0467)					
musharakah				-0.0373				
				(0.0352)				
salam					-1.109*			
					(0.667)			
istisna						0.00454		
						(0.272)		
pls							-0.0388	
							(0.0306)	
fixed								0.00536
								(0.0190)
hci	-0.0277**	-0.0278**	-0.0290**	-0.0306**	-0.0331**	-0.0286**	-0.0312**	-0.0283**
	(0.0128)	(0.0127)	(0.0128)	(0.0129)	(0.0129)	(0.0128)	(0.0129)	(0.0128)
L.lngdpc	-0.0216***	-0.0166**	-0.0211***	-0.0230***	-0.0211***	-0.0204***	-0.0242***	-0.0212***
	(0.00683)	(0.00730)	(0.00680)	(0.00707)	(0.00662)	(0.00693)	(0.00728)	(0.00727)
rd	0.00288	-0.00191	0.00123	0.00261	0.00277	0.00134	0.00261	0.00226
	(0.0171)	(0.0170)	(0.0169)	(0.0169)	(0.0168)	(0.0175)	(0.0169)	(0.0173)
fdi	0.688***	0.715***	0.697***	0.683***	0.705***	0.702***	0.674***	0.696***
	(0.206)	(0.205)	(0.206)	(0.206)	(0.204)	(0.206)	(0.206)	(0.207)
legal	0.00332	-0.000306	0.00431	0.00440	0.00484	0.00412	0.00477	0.00418
	(0.00974)	(0.0103)	(0.00970)	(0.00967)	(0.00962)	(0.00986)	(0.00966)	(0.00970)
expense	0.0660	0.0811*	0.0616	0.0637	0.0815*	0.0596	0.0667	0.0602
	(0.0444)	(0.0466)	(0.0438)	(0.0437)	(0.0452)	(0.0451)	(0.0438)	(0.0437)
Constant	0.342***	0.309***	0.351***	0.374***	0.358***	0.343***	0.389***	0.345***
	(0.0546)	(0.0604)	(0.0570)	(0.0621)	(0.0550)	(0.0560)	(0.0655)	(0.0555)
Observations	149	149	149	149	149	149	149	149
Number of banks	41	41	41	41	41	41	41	41
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.4309	0.4351	0.4297	0.4331	0.4396	0.4286	0.4351	0.4290
Hausman test	0.8240	0.9550	0.9603	0.4313	0.9726	0.8034	0.4872	0.9240

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

Table 2.30: Regression results – CAPG and Mode of Financing – Bank-level - *GMM*

Variables	*capg - panel gmm*							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
murabahah	0.0886***							
	(0.0305)							
ijarah		-0.108						
		(0.106)						
mudarabah			-0.557					
			(0.405)					
musharakah				-0.305**				
				(0.144)				
salam					0.356			
					(0.936)			
istisna						-1.078*		
						(0.589)		
pls							-0.220***	
							(0.0775)	
fixed								0.105**
								(0.0419)
L.capg	0.582***	0.635***	0.530***	0.525***	0.636***	0.767***	0.590***	0.544***
	(0.0957)	(0.143)	(0.114)	(0.111)	(0.111)	(0.156)	(0.0889)	(0.108)
hci	-0.0326*	-0.0398*	-0.0407**	-0.0449***	-0.0349*	-0.0583**	-0.0497***	-0.0258
	(0.0187)	(0.0225)	(0.0191)	(0.0146)	(0.0186)	(0.0241)	(0.0176)	(0.0199)
L.lngdpc	-0.00795	0.00808	-0.0230*	-0.0309**	-0.00406	0.0142	-0.0245*	-0.0179**
	(0.00535)	(0.0238)	(0.0130)	(0.0132)	(0.0136)	(0.0162)	(0.0122)	(0.00882)
legal	-0.00546	-0.00491	0.00601	0.00816	0.00285	-0.00903	0.00273	-0.00113
	(0.00849)	(0.0147)	(0.00797)	(0.0111)	(0.0103)	(0.0141)	(0.0100)	(0.00805)
expense	0.105***	0.117	0.0818**	0.0999**	0.0772	0.133**	0.0997***	0.0780
	(0.0370)	(0.0923)	(0.0355)	(0.0471)	(0.0488)	(0.0641)	(0.0313)	(0.0486)
Constant	0.131***	0.0517	0.373***	0.470***	0.147	0.0169	0.409***	0.195***
	(0.0425)	(0.192)	(0.132)	(0.141)	(0.116)	(0.128)	(0.137)	(0.0643)
Observations	148	148	148	148	148	148	148	148
Number of banks	40	40	40	40	40	40	40	40
Number of instruments	17	17	17	17	17	17	17	17
Prob-F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(1)	0.045	0.074	0.146	0.064	0.054	0.061	0.069	0.048
AR(2)	0.283	0.378	0.397	0.445	0.351	0.498	0.429	0.254
Sargan test	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Hansen test	0.266	0.093	0.170	0.207	0.140	0.185	0.330	0.392

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

These results in Table 2.30 imply that providing financing through *murabahah* and fixed instruments can help increase capital accumulation growth, since they can be utilized for any kind of need, and they also provide a certain rate of return; financing through *musharakah* and profit-loss sharing financing modes do not guarantee returns resulting in unfavourable use of those instruments in financing. As for *istisna* type contracts, these are mainly utilized for construction, which will generate returns over the long-term, rather than over the short-term.

Table 2.31: Regression Results – TFPG and Mode of Financing – Bank-level – Random Effect

Variables	*tfpg - random effects*							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
murabahah	-0.00935							
	(0.00729)							
ijarah		-0.00690						
		(0.0190)						
mudarabah			0.0198*					
			(0.0115)					
musharakah				0.0291**				
				(0.0128)				
salam					0.629*			
					(0.325)			
istisna						-0.0242		
						(0.129)		
pls							0.0313***	
							(0.0113)	
fixed								-0.0109
								(0.00779)
hci	-0.0264***	-0.0258***	-0.0262***	-0.0252***	-0.0248***	-0.0259***	-0.0256***	-0.0263***
	(0.00723)	(0.00716)	(0.00705)	(0.00672)	(0.00671)	(0.00718)	(0.00649)	(0.00715)
L.lngdpc	-0.0161***	-0.0172***	-0.0172***	-0.0158***	-0.0169***	-0.0173***	-0.0152***	-0.0154***
	(0.00371)	(0.00360)	(0.00341)	(0.00331)	(0.00332)	(0.00347)	(0.00320)	(0.00375)
rd	0.0268***	0.0280***	0.0280***	0.0268***	0.0261***	0.0278***	0.0266***	0.0265***
	(0.00674)	(0.00708)	(0.00700)	(0.00687)	(0.00715)	(0.00755)	(0.00668)	(0.00675)
fdi	-0.352**	-0.358***	-0.358***	-0.350***	-0.370***	-0.359***	-0.346***	-0.348**
	(0.138)	(0.137)	(0.136)	(0.133)	(0.135)	(0.136)	(0.131)	(0.137)
trade	0.0360***	0.0359***	0.0363***	0.0370***	0.0371***	0.0353***	0.0384***	0.0366***
	(0.00642)	(0.00603)	(0.00629)	(0.00640)	(0.00636)	(0.00662)	(0.00644)	(0.00634)
legal	0.0212***	0.0208***	0.0214***	0.0213***	0.0211***	0.0211***	0.0215***	0.0204***
	(0.00602)	(0.00593)	(0.00567)	(0.00566)	(0.00573)	(0.00584)	(0.00561)	(0.00577)
govindex	0.0236***	0.0242***	0.0252***	0.0253***	0.0260***	0.0244***	0.0266***	0.0231***
	(0.00842)	(0.00799)	(0.00808)	(0.00828)	(0.00810)	(0.00813)	(0.00834)	(0.00836)
Constant	0.173***	0.177***	0.175***	0.158***	0.171***	0.178***	0.151***	0.168***
	(0.0407)	(0.0385)	(0.0370)	(0.0364)	(0.0363)	(0.0381)	(0.0346)	(0.0403)
Observations	145	145	145	145	145	145	145	145
Number of banks	37	37	37	37	37	37	37	37
Prob(chi2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.189	0.185	0.188	0.198	0.195	0.185	0.204	0.191
Hausman test	0.0124	0.0056	0.0141	0.0081	0.0125	0.0078	0.0160	0.0117

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

Examining the relationship between mode of financing and total factor productivity growth (*tfpg*), the results of which are presented in Tables 2.31 and 2.32. Table 2.31 employs random effect estimation as suggested by Hausman test and the result shows that *mudarabah, musharakah, salam,* and profit-loss sharing (*pls*) financing have a significant relationship with total factor productivity growth, showing a positive trend. This may indicate that profit-loss

sharing instruments will be able to increase productivity, as they require partnerships and encourage the ability to be more productive and efficient, since the profit and loss financing should be shared by both parties.

As for the control variables, initial GDP per capita (*L.lngdpc*), human capital index (*hci*), and foreign direct investment have negative relationship with total factor productivity growth (*tfpg*), while ratio trade to GDP (*trade*), governance index (*govindex*), and legal system (*legal*) have positive relationship. The positive relationship between *trade* and total factor productivity growth (*tfpg*) is supported by previous studies (Alcala & Ciccone, 2004; Guillaumont Jeanneney *et al.*, 2006), while positive of governance index and legal system is supported by study of (Levine, 1999b).

To further explore the robustness of the estimation results, system *GMM* estimation is employed by including human capital index (*hci*) and the lag of total factor productivity growth (*tfpg*), variable of financing types, and GDP per capita as the endogenous variables. In addition, research and development expenditure (*rd*), foreign direct investment (*fdi*), ratio trade to GDP (*trade*), legal system (*legal*), and the governance index (*govindex*) are the exogenous variables. The statistical test for system GMM in Table 2.32 suggests that there is autocorrelation in the first lag, but there is no autocorrelation in the second lag. As for the instrument validity, Sargan and Hansen tests suggest that it fails to reject the null hypothesis of valid overidentification.

The main results in Table 2.32 show that *salam* and *istisna* contracts have significant negative relationships with total factor productivity growth, which can be due to the limited utilization of *salam* and *istisna* contracts in the operational activities of Islamic banks. As for the control variables, foreign direct investment (*fdi*) has positive relationship with total factor productivity growth (*tfpg*) that is in contrast from the result in Table 2.31. In addition, human capital index (*hci*) still has negative relationship with total factor productivity growth (*tfpg*).

Table 2.32: Regression Results – TFPG and Mode of Financing – Bank-level - GMM

Variables	*tfpg - gmm*							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
murabahah	-0.0707							
	(0.149)							
ijarah		0.0246						
		(0.0305)						
mudarabah			0.112					
			(0.0817)					
musharakah				-0.0530				
				(0.164)				
salam					-2.173**			
					(1.062)			
istisna						-1.295*		
						(0.672)		
pls							-0.00229	
							(0.0912)	
fixed								-0.0822
								(0.107)
L.tfpgrowth	0.627***	0.489***	0.637***	0.752***	0.741***	0.586***	0.667***	0.565***
	(0.228)	(0.157)	(0.172)	(0.229)	(0.201)	(0.151)	(0.215)	(0.195)
hci	-0.0317***	-0.0316***	-0.0313***	-0.0338***	-0.0345***	-0.0312***	-0.0320***	-0.0304***
	(0.00609)	(0.00417)	(0.00553)	(0.00539)	(0.00602)	(0.00380)	(0.00557)	(0.00566)
L.lngdpc	0.0195	-0.00255	0.0260	0.0389	0.0355	0.0179	0.0284	0.0142
	(0.0374)	(0.0155)	(0.0218)	(0.0299)	(0.0268)	(0.0160)	(0.0269)	(0.0224)
rd	0.0381	0.0410***	0.0543***	0.0657**	0.0669***	0.0340*	0.0553**	0.0322
	(0.0506)	(0.0118)	(0.0156)	(0.0258)	(0.0192)	(0.0178)	(0.0212)	(0.0310)
fdi	0.0694	-0.0757	0.136	0.306	0.286	0.0706	0.184	0.000923
	(0.403)	(0.167)	(0.240)	(0.356)	(0.278)	(0.193)	(0.311)	(0.271)
trade	0.0185	0.0235**	0.00960	-0.00807	-0.00904	0.00345	0.00260	0.0264
	(0.0457)	(0.0102)	(0.0172)	(0.0325)	(0.0216)	(0.0141)	(0.0287)	(0.0303)
legal	0.00754	0.0127	-0.00304	-0.0146	-0.0125	-0.000581	-0.00584	0.00963
	(0.0382)	(0.0122)	(0.0161)	(0.0255)	(0.0185)	(0.0110)	(0.0222)	(0.0214)
govindex	-0.0104	0.00801	-0.0189	-0.0414	-0.0415	-0.00525	-0.0246	-0.000234
	(0.0506)	(0.0190)	(0.0269)	(0.0466)	(0.0327)	(0.0208)	(0.0399)	(0.0331)
Constant	-0.118	0.0446	-0.232	-0.340	-0.307	-0.126	-0.247	-0.0556
	(0.440)	(0.145)	(0.208)	(0.272)	(0.255)	(0.154)	(0.244)	(0.264)
Observations	145	145	145	145	145	145	145	145
Number of banks	37	37	37	37	37	37	37	37
Number of instruments	14	14	14	14	14	14	14	14
Prob-F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(1)	0.003	0.004	0.005	0.007	0.004	0.017	0.009	0.004
AR(2)	0.761	0.398	0.572	0.773	0.893	0.359	0.668	0.624
Sargan test	0.993	0.787	0.982	0.903	0.958	0.968	0.980	0.935
Hansen test	0.971	0.687	0.950	0.740	0.944	0.919	0.907	0.898

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

2.6.4.2.Country-level dataset estimation

In this section, the mode of financing data is aggregated into the country level to observe the consistency and robustness of the estimation results. Table 2.33 shows that *murabahah* still has the highest proportion of financing within Islamic financing among the sampled banks and Table 2.34 shows that there is no perfect multi-collinearity between variables.

Table 2.33: Descriptive Statistics – Mode of Financing – Country-level

Variable	Obs	Mean	Std. Dev.	Min	Max
murabahah	201	0.7103	0.2829	0.0000	1.0000
ijarah	201	0.0638	0.1051	0.0000	0.4754
mudarabah	201	0.0490	0.1241	0.0000	0.9094
musharakah	201	0.0495	0.0956	0.0000	0.5214
salam	201	0.0007	0.0029	0.0000	0.0264
istisna	201	0.0216	0.0436	0.0000	0.2900

Notes: Obs = Number of observations, SD = Standard deviation, Min = Minimum, Max = Maximum

Table 2.34: Correlation Matrix – Mode of Financing – Country-level

	capg	*tfpg*	*murabahah*	*ijarah*	*mudarabah*	*musharakah*	*salam*	*istisna*
capg	1							
tfpg	-0.0459	1						
murabahah	-0.1849	0.0662	1					
ijarah	-0.0741	-0.1323	-0.0336	1				
mudarabah	0.1213	-0.0337	-0.4097	-0.1393	1			
musharakah	0.2071	0.0121	-0.2978	-0.2151	0.1439	1		
salam	0.1829	-0.0078	-0.1696	-0.1311	0.1207	0.5135	1	
istisna	0.3019	0.0098	0.0384	0.1369	0.0013	-0.1284	-0.0619	1

Employing panel random effect estimation suggested by the Hausman test, Table 2.35 shows the results using capital accumulation growth as the dependent variable. Table 2.35 shows that financing using *salam* can have a negative relationship with capital accumulation growth, which is similar to the results in Table 2.29, based on the bank-level dataset. The control variables also demonstrate similar result with Table 2.29, which initial GDP per capita (*L.lngdpc*) has negative relationship with capital accumulation growth (*capg*), while foreign direct investment (*fdi*) has positive relationship.

As for the total factor productivity growth, the result is presented in Table 2.36 by employing fixed effect estimation suggested by the Hausman test that rejects the appropriateness use of random effect. The result shows that *ijarah* and *mudarabah* have negative relationship with

total factor productivity growth (*tfpg*), while financing through *musharakah* and *salam* have positive relationship. The result is similar with Table 2.31, except that *mudarabah* has reverse sign. It can be due to the aggregation of dataset into country-level, which *mudarabah* financing in country-level has different trend from bank-level dataset. As for the control variables, initial GDP per capita (*L.lngdpc*) still has negative relationship with total factor productivity (*tfpg*), similar with the result in Table 2.31.

Table 2.35: Regression Results – CAPG and Mode of Financing – Country-level

Variables	*capg - random effect*							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
murabahah	-0.0235							
	(0.0279)							
ijarah		0.0245						
		(0.0790)						
mudarabah			-0.0235					
			(0.0627)					
musharakah				-0.0110				
				(0.0634)				
salam					-2.486*			
					(1.391)			
istisna						0.247		
						(0.183)		
pls							-0.0117	
							(0.0519)	
fixed								-0.0215
								(0.0312)
hci	-0.0245**	-0.0230**	-0.0240**	-0.0241**	-0.0272***	-0.0226**	-0.0245**	-0.0248**
	(0.0103)	(0.00968)	(0.0106)	(0.0113)	(0.0103)	(0.00981)	(0.0117)	(0.0107)
L.lngdpc	-0.0219***	-0.0245***	-0.0255***	-0.0254***	-0.0252***	-0.0248***	-0.0259***	-0.0217***
	(0.00705)	(0.00693)	(0.00580)	(0.00651)	(0.00711)	(0.00696)	(0.00627)	(0.00758)
fdi	0.568**	0.525**	0.559**	0.545**	0.556**	0.537**	0.554**	0.580***
	(0.224)	(0.260)	(0.256)	(0.241)	(0.274)	(0.256)	(0.244)	(0.214)
rd	-0.0103	-0.00805	0.000695	-9.57e-06	-0.00599	-0.00387	0.00162	-0.00588
	(0.0139)	(0.0151)	(0.0129)	(0.0141)	(0.0157)	(0.0147)	(0.0141)	(0.0134)
Constant	0.388***	0.392***	0.399***	0.399***	0.411***	0.391***	0.404***	0.383***
	(0.0571)	(0.0575)	(0.0451)	(0.0568)	(0.0617)	(0.0561)	(0.0570)	(0.0542)
Observations	76	76	76	76	76	76	76	76
Number of countries	14	14	14	14	14	14	14	14
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.291	0.286	0.290	0.289	0.293	0.288	0.290	0.293
Hausman test	0.8499	0.8648	0.7961	0.5856	0.6915	0.8593	0.6563	0.8592

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

Table 2.36: Regression Results – TFPG and Mode of Financing – Country-level

Variables	*tfpg – fixed effects*							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
murabahah	0.0141							
	(0.0135)							
ijarah		-0.0946**						
		(0.0331)						
mudarabah			-0.0465*					
			(0.0227)					
musharakah				0.103**				
				(0.0407)				
salam					2.060***			
					(0.196)			
istisna						-0.0698		
						(0.207)		
pls							-0.0151	
							(0.0356)	
fixed								0.00894
								(0.0130)
hci	-0.0208	-0.00800	-0.0202	-0.0146	-0.0150	-0.0164	-0.0173	-0.0196
	(0.0162)	(0.0199)	(0.0131)	(0.0184)	(0.0186)	(0.0193)	(0.0149)	(0.0154)
L.lngdp	-0.00264*	-0.00245	-0.00262*	-0.00297**	-0.00276*	-0.00276*	-0.00270*	-0.00273*
	(0.00138)	(0.00139)	(0.00143)	(0.00134)	(0.00139)	(0.00137)	(0.00141)	(0.00138)
Constant	0.0786*	0.0615	0.0891**	0.0745*	0.0763*	0.0819*	0.0832**	0.0802*
	(0.0426)	(0.0438)	(0.0322)	(0.0406)	(0.0419)	(0.0435)	(0.0345)	(0.0413)
Observations	149	149	149	149	149	149	149	149
Number of countries	14	14	14	14	14	14	14	14
Prob-F	0.004	0.0001	0.0066	0.0305	0	0.1363	0.0621	0.0681
R-squared	0.096	0.1021	0.1033	0.107	0.0963	0.093	0.0934	0.0933
Hausman test	0.0293	0.0256	0.0273	0.0121	0.0205	0.0307	0.0367	0.0282

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

2.7. CONCLUSION

This chapter attempts to explain and examine the relationship between Islamic financial development and sources of growth in the form of capital accumulation growth and total factor productivity growth. In this study, Islamic financial development consists of Islamic banking variables and the *sukuk* market. The banking variables follow the operational elements of financial institutions, categorized into financial depth, financial stability, financial efficiency, financial openness, and financial access. The empirical analysis employs loan-to-deposit ratio, non-performing loans, and capital adequacy ratio as the measurement for financial stability; and net interest margin and overhead costs as part of financial efficiency.

In terms of the *sukuk* market, the volume of *sukuk* issuance, is examined in their relationship to sources of growth. In addition, financing delivered by Islamic banks, in terms of the mode of financing and the sectors of financing, are also examined in this study.

Employing pooled panel, random effect, fixed effect, and dynamic panel data analysis, this study finds that Islamic banks with a higher capital adequacy ratio have a positive relationship with capital accumulation growth, which is in line with previous research (Blum & Hellwig, 1995; Jokipii & Milne, 2008; Naceur *et al.*, 2017) suggesting that a higher capital adequacy ratio leads to higher depositor protection, which can boost depositors' trust and eventually increase capital. On the other hand, this study finds that a higher capital adequacy ratio has a negative relationship with total factor productivity growth, as supported by (Heid, 2007), suggesting that the capital adequacy ratio can limit a bank's ability to lend resulting in fewer projects financed and lower productivity. Considering the contrasting relationships with capital accumulation and total factor productivity growth, it is necessary for Islamic banks to manage and balance its capital to support both sources of growth.

Examining non-performing loans, this study finds that Islamic banks with lower non-performing loans have a positive relationship with capital accumulation and total factor productivity growth, which is in line with the findings generated by previous studies (*see*: Beck *et al.*, 2013; Ghosh, 2017; Han & Shen, 2015; Klein, 2013; Naceur *et al*., 2017). As non-performing loans reflects the quality of assets, namely banking loans and projects being financed, the higher value of non-performing loans can impede the development of the financial sector leading towards lower capital accumulation and total factor productivity. This result indicates that it is necessary for Islamic banks to maintain their financial stability so as to be able to support sources of growth.

On the other hand, looking at the net interest margin and overhead costs, the results show that Islamic banks with less efficient operational activities have a positive relationship with capital accumulation and total factor productivity growth. However, this result contrasts with the findings generated in previous studies (*see:* Claessens & Laeven, 2003; Naceur *et al*., 2017). These studies explain that a more competitive and more efficient banking operation leads towards better growth. The result from this study might indicate that as Islamic banks have entered the financial industry later than their conventional counterparts, they still need to

increase their expenditure, particularly overhead costs, in order for the banks to grow and then support the sources of growth.

Moving towards the *sukuk* market, the results show that the volume of *sukuk* issuance has positive relationship with capital accumulation growth. This is supported by, among others, Smaoui & Nechi (2017), who also found a positive impact of the *sukuk* market on economic growth.

When the financing of Islamic banks is categorized according to mode of financing and sectors, this study produced various results for different instruments and sectors. As the results indicate, financing consumer durables shows a negative relationship with capital accumulation growth, as it does not support capital formation due to its nature for purchasing housing appliances and individual needs. On the other hand, financing the real estate sector shows a positive relationship with capital accumulation, which is in line with Liu *et al.*'s (2017) findings for China's suburbanization, in which most of the countries in the sample were developing countries that were developing their real estate and property sector for their growing population and generating a return to finance other cities or suburbs. Moreover, considering the nature of real estate, in that it can be classified as an investment asset, the positive relationship with capital accumulation may be due to the perspectives on investing in real estate that can generate prospective returns in the long-term, as the real estate sector has the highest return compared to other investment assets (HSBC, 2017). Having said that, it seems that Islamic bank financing has relied heavily on the real estate sector, because it is motivated by the expectation of returns to cover the costs of operational activities in the Islamic banks, without considering other factors, such as social and environmental factors.

Examining its relationship with total factor productivity growth, the results show that financing the agricultural and real estate sectors has a positive relationship with total factor productivity growth. As for the former, this may indicate that the agricultural sector has gradually been developing more efficient and productive output by developing technological equipment, as the agricultural sector is deemed to be the foundation for developing the industrial sector (Johnston & Mellor, 1961). This is in accordance with the condition of the sampled countries, most of which are developing countries who are motivated to expand their industrial sectors. As for the latter, the positive relationship may be due to them expanding activities in real estate

development by employing more workers and also that real estate, particularly buildings, can be used for productive purposes (Chau & Walker, 2006).

Financing the banking-finance sectors, on the other hand, has a negative relationship with total factor productivity growth, indicating that Islamic banks put their money in the latter sector so as to guarantee returns, as banking and finance is known to offer promising returns. These findings are in line with a study conducted by Cecchetti & Kharroubi (2015).

Regarding the mode of financing, the results show that financing using *salam* has a negative relationship with capital accumulation and total factor productivity growth. financing through *murabahah* contract can also improve capital, which supports the evidence that Islamic banks have been using *murabahah* contract heavily to support the capital formation. However, financing through profit-loss sharing modes has a negative and positive relationship with capital accumulation and total factor productivity growth respectively. This indicates that profit-loss sharing financing might not be able to support capital formation, but it can help with increasing productivity and this is supported by findings established in previous studies (*see:* Cecchetti & Kharroubi, 2015; Orhangazi, 2008; Pushner, 1995).

The results imply that different instruments of Islamic finance show different relationships with sources of growth, such as Islamic banks with lower non-performing loans having a positive relationship with sources of growth, but they need to manage and find a balance in terms of the capital adequacy ratio, in order to support both capital accumulation and total factor productivity growth. On the other hand, as Islamic banks emerged and developed much later than conventional banks, they still need to incur high expenses for supporting sources of growth. Therefore, Islamic banks still need to be aligned with the aspirations of Islamic economics, in relation to balancing the capital-oriented objective and the productivity-oriented output away from the domination of capital.

The overall findings in relation to the sectors financed by Islamic banks show that financing the consumer durables and banking-financial sectors shows a negative relationship with sources of growth, as these two sectors have a relatively high proportion of financing. The results seem to suggest to Islamic banks that if they continue their current operational activities, providing a high proportion of financing in the consumer durables and banking and financial sectors, Islamic banks will not be able to contribute towards capital accumulation and total factor productivity growth. This is despite the fact that these two growth areas are part of the

aspirational values of Islamic economics, which aims at developing a new paradigm of development by empowering humans, capital, labour, land, and technology through the real economy.

This similar aspiration is also reflected in the empirical results produced by this study in relation to the mode of financing, where financing through fixed instruments has a positive relationship with capital accumulation growth. On the other hand, financing through profit-loss sharing instruments has a negative relationship with capital accumulation growth, but a positive relationship with total factor productivity growth. These results imply that the current operational nature of Islamic banks is marked by a high proportion of financing through fixed instruments, which emphasises capital as the centre of financial activities. The claimed deviation of Islamic banks from the aspirations of Islamic economics suggests an embedded economy with the aim of balancing the role of capital and other modes of production. Moreover, the results also indicate that financing through profit-loss sharing instruments can better accentuate the aspirations of Islamic economics by de-centring capital and creating a re-embedded economy, including re-embeddedness in real economy.

In relation to the *sukuk* market, the results show that Islamic banks have been able to fulfil both capital and productivity-oriented objective although the coefficient for productivity is smaller than the capital accumulation. This implies that the *sukuk* market still needs to put some effort into managing and achieving the aspirations of Islamic economics by de-centring the role of capital in economic and financial activities.

To conclude, the development of Islamic banks and the *sukuk* market has been able to support capital accumulation and total factor productivity growth in different ways, as has been shown in this study, although their contribution is still smaller than the contribution of the conventional financial industry in some aspects. However, Islamic banks have followed the same institutional logic as conventional banks by emphasizing financing strategies to generate higher returns, as shown by their financing activities in particular sectors and through certain modes of financing, which can be explained by the necessity of operating on a level playing field with their conventional counterparts. Nevertheless, the results also suggest the distinctive feature of Islamic finance, such as the profit-loss sharing mode of financing and *sukuk* issuance, do have the potential to support productivity in order to contribute to the sources of growth, which can accentuate the aspirations of Islamic economics in a better manner.

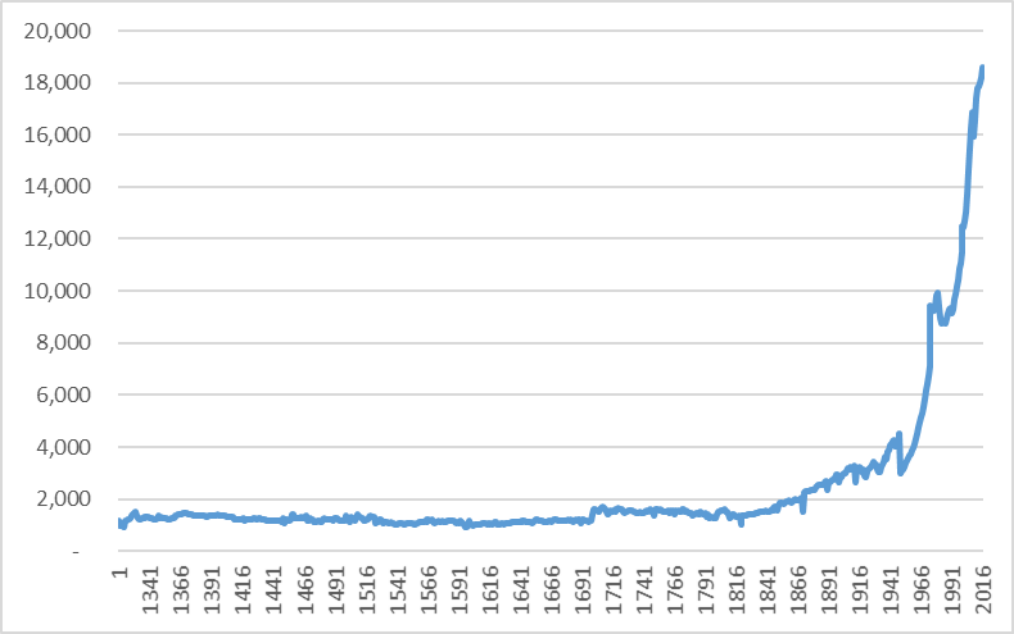
Chapter 3

ISLAMIC FINANCE AND SOCIO-ECONOMIC DEVELOPMENT: CONCEPTUAL AND EMPIRICAL EXPLORATIONS

3.1. INTRODUCTION

Global economic activity has shown tremendous growth as well as diversity and this can be seen in the trends and composition of the Gross Domestic Products (GDP), which accounts for production, consumption and investment activities for each economy. The growth trajectory of GDP over time is evidenced in Figure 3.1., showing rapid increase between 1950s and 2008, while the growth was much slower from 1AD to 1950: this indicates an increased pace of growth since 1950s.

Figure 3.1: World GDP Levels, 1AD – 2008AD



Source: Bolt *et al.* (2018, modified)
Note: in million 1990 International Geary-Khamis dollars

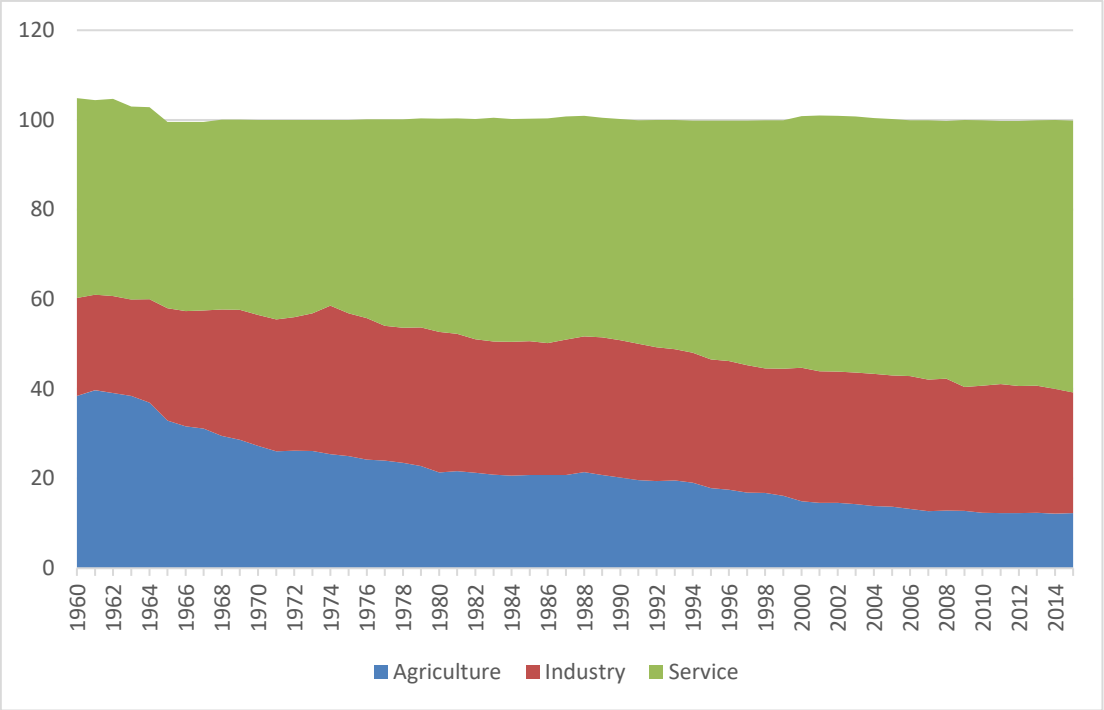
Taking into account population growth, the GDP per capita was around USD 666 in 1820, and had increased to USD 2,111 in 1951 and USD 18,592 in 2016 (Bolt *et al.*, 2018). This is an

indication that countries are, in varying degrees, able to maintain production activities, people's ability to consume, and the funding and investment for further development within each country. Such a growth trajectory is considered to reflect the well-being of society and to expand people's ability and choices in the fulfilment of their needs leading to increase in life satisfaction. However, Proto & Rustichini (2013) explain that happiness and GDP per capita has a negative relationship once the GDP per capita reaches USD 15,000: this poses a dilemma in the trade-off between economic growth and human happiness.

Breaking the issue down by sectors which constitute economic activities, the value-added created by the agriculture sector experienced a decrease from 1960 to 2015, as depicted in Figure 3.2, whilst the industrial and services sector demonstrated an increasing trend over these decades. The sectorial trajectory indicates that economic activities have moved towards the service-based sector and away from agricultural activities: this does not only affect the output produced by the changing nature of economic activity but also the types of employment required; this has also changed the nature of social formation in societies in line with the changing production system such as the difference of socio-cultural activities between the rural and urban areas. Such a shift has also brought about rural-urban issues, as with the change in the economic structure, people have moved to the urban areas for industrial and service-based employment and rural areas are left only for the agricultural activities.

Focusing on economic growth as the main objective along with the changing nature of sectorial distribution of value added has led to several issues: these include inequality within and between countries, inequality between people living in rural and urban areas, environmental degradation, and the level of happiness within the society (Banerjee & Duflo, 2003; Easterlin, 1974; Firebaugh & Beck, 1994; Kuznets, 1955; White & Anderson, 2001). It has been argued by the neo-classical school that inequalities and environmental degradation will occur at the early stages of development as people need to work harder and natural resources have to be used efficiently to meet the growth target (Grossman & Krueger, 1995; Kuznets, 1955). However, at some point, the development will provide convenience for society and the natural depletion can move into restoration. Such a prediction by neo-classics has not come true, as development related problems, including inequality and climate change, have engulfed the entire world.

Figure 3.2: Value-added Distribution by Sector (%)



Source: World Bank Database (2017)

The different levels of economic growth between countries leads to the classification and the definition of countries as developed and underdeveloped countries: this aims to differentiate countries dominated by industry and the services sector from countries with a higher proportion of agricultural activities respectively: agricultural activities are seen to be the basic activities that can only fulfil sustenance needs. In reflecting on the economic growth trajectories, the evidence of a non-linear relationship between income and inequalities, and between income and environmental degradation mentioned above is a phenomenon that has taken place in developed countries, where the industrialization process occurred in the 19th century: this has led to increased economic growth in 20th century signifying them as developed or industrialised countries, while the developing countries are still in the process of catching up (Allen, 2011). Moreover, the least developing countries (LDCs) are still struggling to provide basic necessities amid global inequality and environmental tensions.

As the theory and empirics in modern times indicates, the measurement of economic activities has focused on the material well-being and these emphases higher incomes which results in higher production and consumption. However, with the emergence of social consideration in economics as we move beyond the neo-classical position, it is argued that there is a systematic bias in theory and policy making that neglects the essential point of development: this is to

empower people and society to achieve their best form rather than considering them as a tool or means of achieving economic growth (Ahmad, 2006).

As a response and as a moderating tool, another measurement has been constructed which can reflect the development within a society, although economic growth itself cannot be neglected as a precondition of development (Szirmai, 2005). As part of this new emerging paradigm, the Human Development Index (HDI) was developed as a comprehensive development measurement tool, which takes into account GDP per capita, life expectancy and literacy rates which represent economic activity, health and education. The last two components are essential in achieving the best form for human being and allowing them to participate in the development process.

The establishment of HDI is recognized as an alternative to the conventional measurement of growth which had only included income per capita as a proxy of economy development (*see:* Diener & Suh, 1997; Hicks & Streeten, 1979; Ram, 1982). On the other hand, Sen (1999) argues that development is a broader concept and measurement, which has to take into account the political freedoms and guarantee of human rights. Such philosophical and social considerations essentialise the notion that socio-economic development indicators are necessary to measure human development through a wider lens.

Considering the need to incorporate socio-economic indicators alongside material well-being, the United Nations (UN) has formulated several goals and targets: initially it launched the Millennium Development Goals (MDGs) in 2000, which was followed by the Sustainable Development Goals (SDGs). The MDGs had eight goals to be achieved during 2001 – 2015. They were: eradicating extreme poverty and hunger, achieving universal primary education, promoting gender equality and empowering women, reducing child mortality, improving maternal health, combating HIV/AIDS, malaria and other diseases, ensuring environmental sustainability, and building a global partnership for development. The SDGs are the continuation of the MDGs, which has further goals to be achieved by 2030. It represents expanded goals with detailed actions related to the environment. These include ensuring sustainable consumption and production patterns and taking urgent action to combat climate change and its impacts. Thus, in order to measure the performance and achievements in relation to the identified goals and targets, there has been an increased attention given to socio-economic indicators as a measure of economic development.

Since financial institutions play an important role by providing financing for firms and consumers so that they can fulfil their needs and projects, their role in socio-economic development has also come under scrutiny with the advancement of SDGs and ESGs (ethics, social and governance) related expectations. However, commercial financing might not be appropriate to support such development initiatives and projects due to their being part of the profit-maximisation oriented institutional logic. Consequently, international aid and development funds generated by multinational organizations have aimed to cover the financing needed for development programs. The fund comes from developed countries, considering that developing and least developing countries need to achieve the development targets. Another institutional form that is currently being used for financing development programmes is Islamic financing alternatives, such as financing from Islamic banks and the Islamic capital markets such as *sukuk* (Ahmed *et al.*, 2015).

Islamic finance, as the institutional form and the articulations of Islamic economics, is expected to support socio-economic development: Islamic economics emerged as a counter hegemony with the objective of emancipating and empowering human beings and other stakeholders including environment with a human well-being centred development agenda (Asutay, 2007a; Chapra, 1993; Ghazali, 1990; Haq, 1995). In line with such a moral economy of Islam, development in Islam is comprised of three dimensions: individual human self-development, physical-material development of the earth, and the development of society as a whole (Mirakhor & Askari, 2010). As Mirakhor & Askari (2010) discuss, the first dimension is the most important and is to be achieved before achieving the other two dimensions: it starts from the recognition of the self, God, and the need for harmonization with the rest of humanity and creation since human beings are the trustees on the earth to support the lives of themselves and other creatures. As part of such a paradigm, Islamic finance is expected to deliver and contribute to the development needs of society by considering an extended stake-holding paradigm beyond profit maximisation. Therefore, profit-and-loss sharing, risk-sharing, and participatory financing type financing paradigms, as part of the Islamic moral economy are essentialised to ensure the objective of *riba* or interest prohibition.

As the Islamic view of development is a comprehensive paradigm with multiple dimensions beyond material well-being, it is well-aligned with the programs of the MDGs and SDGs established by the UN. Islamic financial markets, being the main institutional arrangements in economic and financial spheres within Islamic norms, have seen a tremendous growth. This is

evidenced by the number of Islamic banks, the total assets of Islamic banks, market value of *shari'ah* stocks, volume issuance of *sukuk*, *etc*. Such horizontal and vertical growth observed in the Islamic finance sphere can be examined understand how Islamic finance in the form of Islamic banks and *sukuk* markets has been able to reflect the objectives of Islamic economics towards socio-economic development and also how it can contribute in the future.

In order to fulfil such an aim, the following research questions are developed:

(i) What concepts and measurements have been advanced to embed socio-economic development?

(ii) What is the development paradigm of Islamic economics and where are Islamic finance institutions located within such a paradigm?

(iii) What is the relationship of Islamic financial development (in the form of Islamic banking and *sukuk* markets) with socio-economic development?

This study represents a significant effort, as it examines whether the growth direction of Islamic financial development has been consistent with the objectives of Islamic economics or whether it shows a divergence as argued by several other studies (such as: Asutay, 2007, 2012; Khan, 2010; Zaman & Asutay, 2009). It is significant in that it explores the potential and future contribution of Islamic financial institutions towards socio-economic development.

In order to fulfil the stated aims and objectives, the rest of the paper is organised as follows: Section 2 explains the evolution of development concept and policy, while Section 3 provides the conceptual dimensions, philosophy and process of development under the Islamic economics framework. This is followed by a survey of the empirical studies on Islamic financial development and socio-economic development in Section 4. Section 5 stipulates the hypothesis development, followed by research methodology and data in Section 6. Section 7 explains and discusses the results and it ends with Section 8 as the conclusion.

3.2. EXPLORING THE EVOLUTION OF THE ECONOMIC DEVELOPMENT CONCEPT AND POLICY

In the early years, economic development was assessed through economic growth, measured by Gross National Income (GNI) per capita, which was then replaced with GDP per capita.

GDP per capita measures the total production and consumption of people living within a country, measured in the local currency unit (Victor, 2015). Theoretically, it is constituted by the neo-classical form of economic growth theory, in which output is a function of the saving and investment rate, capital and labour productivity, and technological advancement.

Due to country specific characteristics, every country has a different initial point of total output, since they have different abilities to save, amounts of capital, population sizes and technological innovation. Nevertheless, the theory explains that the difference of income among countries will converge in the future since the developing countries, which is defined with lower GDP per capita, will be able to catch up with the developed countries (Goldin, 2018). However, Goldin (2018) also explains that the convergence has not seemed to occur, leading towards further investigations in explaining the divergence of economic growth among countries.

In explaining the existence of income differences among countries, different theories of economic development were evolved, such as the linear-stages theory, structural-change models, the international-dependence revolution, the neoclassical counterrevolution, and the new growth theory (Todaro & Smith, 2011). The first theory, linear-stages theory, was based on Rostow's stages of growth which suggests that there are five stages of economic development: the first is traditional society, then it prepares the pre-conditions for take-off into self-sustaining growth, the take-off period; the drive to maturity period follows and it concludes with the age of high mass consumption. Todaro & Smith (2011) further explain that Harrod-Domar put emphasis on the important pre-conditions for the take-off which were the mobilization of domestic and foreign saving so that adequate financing is available to accelerate the economic growth.

The second theory is the structural-change models explaining that development occurs when developing countries transform their economic activities from the agricultural-dominated economy into a more modern industrialized, manufacturing and service economy (Todaro & Smith, 2011). It argues that agricultural activities depend on the land's productivity, which is fixed, and people's need for food is income inelastic, implying that the activities should move towards industrial activities for a country to be able to increase their production and output in order to be considered as developed (Thirlwall & Pacheco-Lopez, 2017; Todaro & Smith, 2011).

The third theory is the international-dependence revolution, which considers that developing countries are dependent on the rich countries. It is based on three explanations: neo-colonial dependence model, false-paradigm model, and dualistic-development thesis (Todaro & Smith, 2011). The neo-colonial dependence model is based on the Marxist thinking that there is a highly unequal system in the relationship between rich and poor countries resulting in the dependence of poor countries on rich countries. As for the false-paradigm model, it explains that the existence of developed and underdeveloped countries is due to the assistance provided by developed countries towards developing countries that does not consider the culture and social structure in the recipient countries resulting in faulty and inappropriate advice (Todaro & Smith, 2011).

Furthermore, the dualistic-development thesis embraces four elements: the existence of superior and inferior, chronic and not merely transitional, the situation in which the gap tends to increase, and the superior factors that are not able to pull up the inferior factors. This dualism can be in the form of economic and social differences, such as the level of technology, geographic development, social customs and attitudes between the domestic and imported social system (Thirlwall & Pacheco-Lopez, 2017).

The neoclassical counterrevolution theory being the fourth theory explains that development occurs due to the supply-side macroeconomics and the privatization of public corporations, implying that developing countries need to implement neoliberal policies to reach the level of development.

Lastly, the new growth theory suggests that development can occur when there is a technological change in the economic activities, resulting in what is termed endogenous growth (Todaro & Smith, 2011).

It is argued, on the other hand, that underdevelopment occurred due to geographical and governance issues (Thirlwall & Pacheco-Lopez, 2017; Todaro & Smith, 2011). Different geographical area has different resource characteristics leading towards different production activities affecting the value of total output and income. In addition, governance also plays an important role, in particular in the public sector, as certain governments might abuse their power and disfavour the society's well-being, for example, rent-seeking behaviour for natural resources (Goldin, 2018).

It can be seen that development cannot only be defined on the basis of total income within a country, since underdevelopment can occur from several factors, which may be cultural, historical, based on the availability of land, labour, and capital and its relationship with other countries (Goldin, 2018). Consequently, it might not be necessary for developing countries to follow the exact path of developed countries: this was the case with Japan when modifying Western technology to fit into their demographic condition (Todaro & Smith, 2011). Another implication is that development should be a natural process and a lengthy process: the experience in Europe took three centuries to transform the subsistence countries towards the maturity stage (Thirlwall & Pacheco-Lopez, 2017). Therefore, Mehmet (1990) refers to Eurocentricity of economic theory making, suggesting that the development-oriented theory and policy reflects the realities of the Western countries, and does not consider the specificities of the developing countries. However, Mehmet (1990) argues that despite its Eurocentric nature, such theories and policies, such as neo-liberalism have been imposed on the rest of the world. Moreover, focusing on the GDP growth as a measure of economic development, which relates only to the total output and income, can create several issues with the measurement and the fact that it does not reflect the welfare of society (Hogendorn, 1996).

It should also be noted that there are several issues related with measurement of total output and income in developing countries, ranging from the technical issues up to the concept of measurement itself. One of the technical issues can come from the poor collection of statistics, since the countries might not have proper systems of collecting and storing their dataset. Another technical issue is the existence of non-market transactions conducted without cash and an underground economy that is not accounted in the statistics. The latter which can come from goods and services produced for individual's own use, informal work typically done by women, and exchanges made within inner groups (Goldin, 2018).

Problems with measurement arise from the assumption of taking total output as a measurement of welfare. In fact several types of goods included in the output calculation might not increase society's welfare, for example air and water pollution (Daly, 2008; Kubiszewski *et al*., 2013). Another conceptual issue is that total output is not yet able to account for product quality, leisure activities, psychical concerns (working condition and job satisfaction), and the fact that durable goods are only accounted when they are being produced and sold although they still have a value until they cannot be used anymore (Fleurbaey, 2009; van den Bergh, 2009). In

addition, the measurement of GNP per capita cannot provide information on distribution among the people (Banks, 1981).

It brings up the discussion that GDP per capita is not supposed to be the sole measurement and was designed to be part of macro-economic planning. Therefore it is not meant to be used for determining whether a country is categorized as a developed or developing one (Thirlwall & Pacheco-Lopez, 2017). Focusing only on material values will undermine important factors that affect the quality of life, such as self-development, love and possessing meaning in life (Diener & Suh, 1997). Hence, economic development should take a broader perspective by also recognizing the social system within country, such as values, beliefs, attitudes towards effort and risk taking, religion and the class system, so that the transformation is based on what societies pursue. It is important to recognise that the shift will also change the social structure within society (Hogendorn, 1996; Thirlwall & Pacheco-Lopez, 2017; Todaro & Smith, 2011). It implies that the changes in qualitative aspects of life, consisting of life-sustenance (housing, clothing, food and minimal education), self-esteem (self-respect and independence) and freedom from wants, ignorance and squalor, has to accompany the increase in income which is regarded as the material or quantitative aspect of life. Additionally, although the increase in output and income can broaden people's choices, it should not only be experienced by a few elites in a country, but by the larger part of the population.

The inclusion of multidimensional factors in explaining development can broadly be termed as socio-economic development, which includes historical, institutional, cultural, demographic, political, social and ecological factors (Szirmai, 2005). Such a concept elaborates the social indicators, such as health, education, technology or life expectancy to be studied separately from the economic factors although they affect the economy directly or indirectly (Hicks & Streeten, 1979). It also leads towards the human development approach explaining that human improvement, known as life-sustenance, should be fulfilled before meeting the secondary and tertiary needs of a more developed society in a country.

In an attempt to measure the multi-dimensional nature of development, a number of index compositions were put forward. For example, Hicks & Streeten (1979) constructed an index including life expectancy at birth, literacy and primary school enrolment, calorie supply per head, infant mortality, per cent of population with access to potable water, and per cent of population with access to sanitation. Additionally, Ram (1982) attempted to broaden the index

by including adult literacy rates, access to safe drinking water, primary school enrolment rates, availability of basic medical care, average lifespan, and calorie or protein intake levels.

Although there is no universal agreement regarding the socio-economic indicators, the UN published the first Human Development Report (HDR) in 1990 that presents a Human Development Index (HDI) for every country. The HDI is composed of GDP per capita, years of schooling and life expectancy as proxies of material well-being, education and health, respectively. It is considered as an alternative measurement by broadening the measurement of development, as GNP per capita cannot, for example, explain the distributional issues (Noorbakhsh, 1998; Sagar & Najam, 1998).

Despite being a relatively comprehensive measure, the HDI has had several critics since its inception regarding the components included in the index and technical issues in constructing the index (Bérenger & Verdier-Chouchane, 2007; Hou *et al.*, 2015; Noorbakhsh, 1998). For example, as a shortcoming, it is claimed that it has not included environmental variables; it has strayed from the original vision and there has been no update in its index construction (Sagar & Najam, 1998). In relation to technical issues, it is criticised that it takes an average of the components rather than a multiplication, having the same weight for each component, and combining stock and flow variables (Hou *et al.*, 2015; Noorbakhsh, 1998). There is modification, such as the multiplication process called the Modified Human Development Index (MHDI) and the factor loadings named as MHDIF, showing that these indices produce almost similar ranking results with HDI. As for the flow variables, the results show that countries can have a high HDI because the value of education and health is measured in stock, which these countries have accumulated over the years. On the other hand, countries with lower HDI can have high HDIF because these countries have been putting their efforts into improving their education and health sectors. As a result, HDIF and HDI converge in wealthy countries, while they diverge in poor countries indicating that HDI can only reflect what has been accumulated over time.

The conceptual issues of using limited variables are being developed further by several studies, such as creating an index of Quality of Life by adding civil liberties and political rights to the HDI (Bérenger & Verdier-Chouchane, 2007; Dasgupta & Weale, 1992). For example, Diener & Suh (1997) attempted to include social indicators based on normative ideals, subjective experiences and the ability to select goods and services as an index. They found that, for

example, Tunisia which has a lower income than Israel, has a similar quality of life on the social indicator index (Diener & Suh, 1997). (Rahman *et al.*, 2005) proposed that a multidimensional index should be constructed including social dimensions such as social relationships, emotions, health, work, material well-being, civil and political liberties, personal security, and environmental quality. Following the introduction of a social dimension, an attempt has been made to combine Sen's (1985) capability approach and the HDI, including components that can represent the ability to produce (opportunities and freedom), and including life expectancy, maternal mortality, civil rights and political freedom, trade openness and carbon emissions.

3.2.1. Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs)

Realising that economic development should not only focus on the volume of GDP per capita, as mentioned in the previous section, several indices have been developed in order to better reflect development efforts and consequences. In an attempt to mobilise the forces for a defined development paradigm as practice and policy in the face of an urgency to alleviate socio-economic problems, in the Millennium Summit in 2000 eight MDGs were adopted, covering issues of poverty, health, education, gender and environment, which was implemented from 2001 to end in 2015 (Dalgaard & Erickson, 2009). Its commitment was "to spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty" (United Nations, 2015). It put people at the centre and in the forefront, leading to a different way of conducting decision-making activities.

MDGs were seen as a tool to promote global awareness of development related issues in developing countries, which could be implemented globally since they were easy to articulate, not legally binding, and could be achieved by both practical and specific measures (Sachs, 2012). On the other hand, MDGs also had several problems both in their formulation and also implementation. For example, Vandemoortele (2002) mentioned that the global target might not feasibly be achieved at country-level since every country has their own starting point and each has a different socio-cultural condition; furthermore these difference existed between different societies within countries.

Additionally, there was no credible costing when calculating the funding required to achieve the goals, including political costs, which explains the unreasonable expectations of what can

be achieved and the role of aid (Clemens *et al.*, 2007). MDGs did not have intermediate targets, did not consider historical performance, did not include the private sector engaging from the beginning, and did not encourage society to take part in achieving the goals. In terms of how it expresses the achievement, different scales could give different results, shown by Fukuda-Parr *et al.* (2013). Modifying the expression would give different results in terms of number of countries that could or could not achieve the targets.

Despite the above-mentioned setbacks, MDGs ended in 2015 and achieved several of its targets which are presented in Table 3.1. It shows that there was an outstanding progress on poverty, hunger and disease, while the progress for environmental issues has not reached the same level. Hence, the environmental issues are being emphasized in the SDGs, which are the continuation programme of MDGs.

Table 3.1: MDGs' Targets and Achievements

Goals	Achievements
Eradicate extreme poverty and hunger	47% in 1990 into 14% in 2015
Achieve universal primary education	100 million out-of-school children of primary school age in 2000 into 57 million in 2015
Promote gender equality and empower women	90% of countries have more women in parliament since 1995
Reduce child mortality	Global number of deaths of children under five decreases from 12.7 million in 1990 into 6 million in 2015
Improve maternal health	Global maternal mortality ratio decreases from 380 deaths per 100,000 live births in 1990 into 210 in 2013
Combat HIV/AIDS, Malaria and other diseases	New HIV infections fell by around 40%; an increase of people living with HIV receiving antiretroviral therapy; a decrease in malaria deaths by 6.2 million; an increase in lives saved from tuberculosis by 37 million
Ensure environmental sustainability	1.9 billion people have gained access to piped drinking water since 1990
Global partnership for development	Official development assistance increases from $81 billion in 2000 to $135 billion in 2014

Source: The Millennium Development Goals Report (2015)

As MDGs came to an end, in the 2012 summit SDGs were put forward as the new development agenda. They reflected the growing need of sustainable development for the world *(Griggs et al.*, 2013; Sachs, 2012). SDGs aim to combine economic development, environmental sustainability and social inclusion, and place an emphasis on the protection of earth due to human activities that have created early ageing of the earth: this is termed 'anthropocene'.

Another prominent target is social inclusion, aiming at a form of justice that includes economic justice and poverty alleviation.

Table 3.2: SDGs' Targets and Achievements

Goals	Measures
No poverty	World's population are covered by at least one social protection cash benefit, economic losses from disasters
Zero hunger	Number of people undernourished, number of children stunting, wasting and overweight
Good health and well-being	Percentage of births attended by skilled health personnel, number of under-5 deaths, HIV incidence, ending malaria
Quality education	Percentage of children and adolescents achieving minimum proficiency in reading and mathematics
Gender equality	Percentage of child marriage to decrease, number of hours women spend in unpaid work
Clean water and sanitation	Percentage of people has access on safe drinking water services, sanitation facilities, and wastewater treatment
Affordable and clean energy	Generation of renewable energy, people having access to clean cooking fuels and technologies
Decent work and economic growth	Reducing earning inequalities, reducing youth unemployment
Industry, innovation and infrastructure	Reducing global carbon emission, increasing 3G mobile coverage in LDCs
Reduced inequalities	Zero tariff export, income remittance in low and high-income countries
Sustainable cities and communities	Reducing number of people died from ambient air pollution, reducing damaged housing from natural disaster
Responsible consumption and production	Countries having sustainable policy, companies having sustainable report
Climate action	Implementation of Paris Agreement
Life below water	Increasing mean coverage of marine KBAs, level of acidity
Life on land	Reducing the land degradation, reducing the trend of biodiversity decline
Peace, justice and strong institutions	Reducing human trafficking, proportions of prisoners, increasing birth registration
Partnerships for the goals	ODA for capacity-building, increasing LDCs' share of world merchandise export

Source: The Sustainable Development Goals Report (2018)

The 17 goals and measures of SDGs are presented in Table 3.2, with the consequences for humans, the environment and the earth, although it seems ambitious that this is to be achieved by 2030. Several studies have mentioned the problems associated with SDG. For example, it is argued that rather than setting up global targets, country-specific targets should have been developed which would be more engaging for the local policy makers and the society (Fitchett & Atun, 2014). In addition, failing to consider the country-level specific policies will create another issue for developing countries, since it does not address the problems of conflict,

militarisation, labour migration, and war-driven displacement on development (El-Zein *et al*., 2016). However, goal number sixteen can be a starting point to eliminate militarisation activities in developing countries. Furthermore, by setting the goals using a top-down approach, it is argued that SDGs neglects the notion that the poor are likely to resolve their own issues rather than being dependant on help from multinational organizations (Easterly, 2015).

Overall, despite the drawbacks, it is claimed that SDGs are expected to meet their targets and improve welfare for human-being safeguarding the earth's system for now and the future.

3.2.2. Economic Development and International Finance

To close the development gap between developed and developing countries, several policies and instruments have been used by both parties and also by the multinational organizations: these include amongst many others, the World Bank, International Monetary Fund, Asian Development Bank. In 1975, with the initiation of the 'Lima Declaration', the aim was that developing countries would produce 25 per cent of the world manufacturing output (Thirlwall & Pacheco-Lopez, 2017). Similarly, another multilateral policy was set in 1980, known as 'Arusha Declaration', which stated that there is a need for a new international monetary order, while the 'Copenhagen Declaration' in 1995 stated several policies for developing countries, such as the commitment from developed countries to reserve 20 per cent of their aid for basic social projects. All these attempts are constructed around 'convergence theory' that developing countries need to converge with the developed countries.

Under the market system and the globalization process, developing countries have been experiencing a disadvantage in competing with developed countries: they do not have the necessary financial means to support economic activity, implying that they have shortcomings in saving and investment rate, capital and labour productivity, and technological advancement. Hence, a proportion of global trade can be set aside for the developing countries to fulfil so that the total output produced can increase as well. It is predicated that higher trade leads to higher income, higher consumption and the ability to acquire more goods and services to fulfil people's needs: if this process can be sustained, it can lead to socio-economic development (Hogendorn, 1996).

At the micro level, financial assistance is considered as an optional policy towards individuals so that they can have a higher production and consumption ability, which then results in higher

income leading towards higher saving rates. The financial capital is commonly provided through the informal financial sector, such as moneylenders and savings group, rural financial institutions, and friends and relatives (Thirlwall & Pacheco-Lopez, 2017). The financial assistance can also be provided through formal institutions, which has an indirect effect through financial inclusion, implying that people who have not had access to financial institutions can have access which then increases their ability to participate in economic activities.

As an additional source, financial assistance can also be provided by foreign countries through foreign direct investment, foreign debt, or foreign aid. Foreign direct investment and foreign debt are commercial funds, which can be used by developing countries to increase their total output directly or indirectly through an increase in their productivity. Foreign direct investment requires a return on investment, which is generated from the commercial activities, which is beneficial for the developing countries since it may create knowledge spill over from the developed countries: it creates profit outflows from the developing to the developed countries. Moreover, the production tools might not be appropriate for the developing countries, since the premise is built according to the characteristics of the developed countries (Thirlwall & Pacheco-Lopez, 2017).

Another international financial assistance is foreign debt, which requires interest payment and the principal payment at the maturity date and commonly executed in foreign exchange currency (Goldin, 2018; Thirlwall & Pacheco-Lopez, 2017). If the borrower is not able to generate income productivity higher than the cost of borrowing, it will create issues of interest payment and principal repayment, particularly when it is in other foreign exchange currencies. Hence, there is a need for a scheme of sustainable debt in which foreign debt does not become a burden for developing countries.

The last type of assistance, namely foreign aid, is generally used directly to solve particular issues in developing countries: these might include alleviating poverty, increasing literacy, increasing access to water, or other issues depending on the schemes and objectives of donor countries. The donor countries channel their funds directly through their own organizational aid, in the form of bilateral aid, or indirectly through multinational organizations, in the form of multilateral aid (Goldin, 2018). The foreign aid can be in the form of concessionary loans, financial grants, and may cover technical assistance, humanitarian work, or disaster relief.

Although foreign aid can be claimed to relieve the burden in developing countries, it might not deliver the expected targets as the developing countries have yet to reach an appropriate governance system, implying an unnecessary waste of aid diverging from its purpose. Additionally, it might lead the developing countries to develop dependence on developed countries and might not be sustainable in the future.

3.2.3. Critical Reflections on Economic Development Theories and Policies

The theories and policies of economic development have emerged due to the differences of economic growth condition in industrialised countries and other countries, motivating the need to explain reasons behind the differences. However, the formulation of theories and policies has been negating the socio-cultural, economic, and political characteristics of the underdeveloped countries, as the theories and policies are formulated under a 'Western' framework (Brohman, 1995; Mehmet, 1995; Nafziger, 1976). This is due to the concept of neoclassical economies, which excludes the historical and dynamic nature of changes in economic activities, resulting in a simple model of technical tools for allocating resources without taking into account the complex situation in the empirical world (Brohman, 1995).

Furthermore, the theories have classified the LDCs as a separate system from the developed countries (DCs) in which their underdevelopment does not have any relationship with the activities conducted in the DCs: this is inaccurate since there is domination and subordination within the international system (Burkett & Hart-Landsberg, 2003; Nafziger, 1976). Such theoretical and policy explanations, including Kuran's (2003, 2004, 2012) work on the underdevelopment of the Muslim world, neglecting the effects of colonialism and post-colonial imperialism that have been experienced by LDCs in their relationship with DCs; in addition there is the imposed capitalism by the DCs in their economic activities through globalization in which the exchange system is unequal between the DCs and LDCs, favouring the DCs (Field, 1981; Nafziger, 1976; Petras, 1981).

Reflecting on theory of economic development through a critical perspective, globalization becomes a necessary process in which the LDCs can benefit from DCs through the flow of investment, trade, and financial assistance (Brohman, 1995; Coronil, 2000; Field, 1981). In order to catch-up with the DCs, LDCs should have more entrepreneurs to increase their economic activity; however, these entrepreneurs need capital for their business. As local capital is weak, foreign investment is required to finance these entrepreneurs (Brohman, 1995).

International trade can also be an important instrument in development, since LDCs can provide goods and services that have a competitive advantage over other countries (Goldin, 2018).

Having said that, globalization has also been centred on Western countries, examples include the domination of transnational business based in the USA and other industrialised countries in the international market: businesses from LDCs might not be able to compete either locally and globally (Brohman, 1995; Coronil, 2000). In addition, Coronil (2000) explains that globalization can be taken into account as a new type of capitalist expansion and colonization moving towards the polarization of trans-local integration and cultural homogenization. Thus, globalization has also been neglecting the institutional differences between countries (Pieterse, 2000).

As a measurement for development, there has been progress from the focus of GDP as the sole indicator, moving towards the establishment of HDI, and formulation of MDGs and SDGs as an attempt to include wider socio-economic factors in measuring the progress of human well-being. Having said that, these policies are also formulated under the concept of the neoclassical economic paradigm that separates people from their history, culture, and social relationship, resulting in policies that embodies Western culture showing the hegemony of neoliberal globalization (Brohman, 1995; Coronil, 2000; Mehmet, 1995). Furthermore, the foreign aid provided for LDCs, including for the education sector is claimed to further the Westernisation process (Tabulawa, 2003), the policy formulation will be uniform and reflect the hegemony of Western countries without reasonable prescription that considers the socio-cultural and political dynamics for each country (Einhorn, 2001).

There should be an effort therefore, to formulate a theory of economic development based on the social construct within particular settings: development should be able to reflect the changes in social relations and institutions by understanding the local historical and geographical characteristics (Brohman, 1995). The same condition should also be implemented in preparing the developmental policies, which should not be imposed from 'North' to 'South', should not be imposed on people in a Eurocentric project under the justification of modernisation since each country has its own characteristics, and should involve the whole local economy and community for a proper coordination: development cannot be promoted through market-driven development program (Brohman, 1995; Pieterse, 2000; Sacco *et al.*, 2014). In other words, the

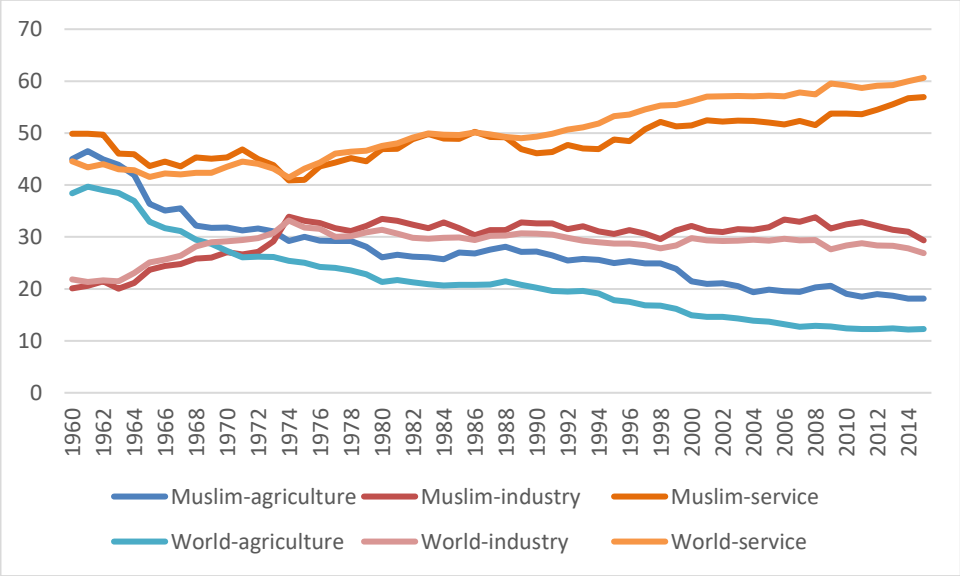
entire claim that neo-classical economic development policy is value free is a fallacy as in reality such policies represents Eurocentric value system (Ahmad, 2003; Mehmet, 1995).

After reviewing the development related debate through the available mainstream knowledge base, and identifying the criticisms raised against mainstream theory and policy making, the following section discusses Islamic economic development with the objective of presenting a norm and value based economic development theory.

3.3. ISLAMIC ECONOMIC DEVELOPMENT: CONCEPT, PHILOSOPHY AND PROCESS

The underdevelopment explored in the previous section is widely experienced by Muslim countries, which is evidenced by the sectoral distribution and HDI of the countries compared to the world average in figure 3.3 and figure 3.4. The percentage of value-added by sectors on GDP shows that agricultural sector has a higher share in the economy in Muslim countries and a slightly higher in industrial activities, while the service sector is still lower than the world average. This indicates that, according to the DC benchmarks, Muslim countries are still in the process of developing in relation to the objective of industrialisation governed by policies set by global-level institutions, although industry has a higher percentage than the world average, which might be due to the relatively heavy manufacturing sector in Muslim countries due to the fact that Western countries have pushed industrial manufacturing onto developing countries.

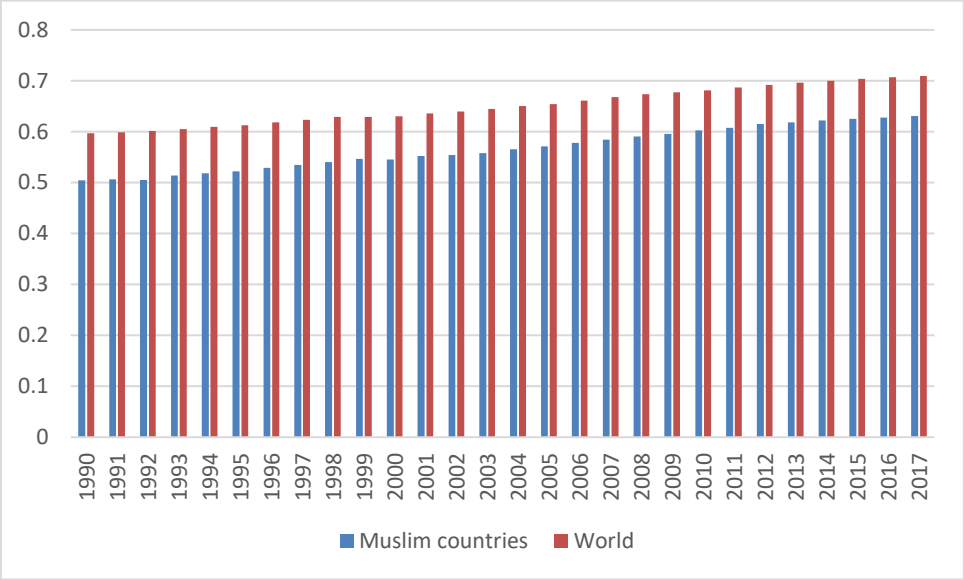
Figure 3.3: Value-Added Distribution by Sector (%)



Source: World Bank Database (2017)

As for the value of HDI, figure 3.4 shows that Muslim countries have a lower HDI compared to the world average, indicating that Muslim countries are still below the average in terms of income, life expectancy, and education.

Figure 3.4: Human Development Index – World and Muslim Countries



Source: UNDP, *Human Development Report* 2018

As regards the Muslim countries vis-à-vis economic development, according to the Human Development Report 2018, Qatar has a GNI per capita of USD 116,818 which is the highest in the world, while Qatar ranked only 34th in HDI. On the other hand, Australia's GNI per capita is 43,560, yet it was ranked 3rd in the HDI ranking. This clearly suggests that economic growth does not necessarily directly deliver better living conditions—Qatar's case is a clear demonstration of the ineffectiveness of economic growth leading to economic development. This also suggests that there are other channels that prevent such countries reaching Western benchmarks in economic development.

While Islam is blamed for underdevelopment in the Muslim world by some (*e.g.* Kuran, 2003, 2004, 2012), Islam considers economic and financial matters through its own normative worldview by essentialising development rather than capital accumulation (Asutay, 2018a). Therefore, Ayubi (1996) attributes the development failures in the Muslim world to the concentration of power in the Muslim world, rather than to Islam itself.

In responding to development needs in Muslim societies in contemporary times, as part of Islamic identity, a search for Islamic economics and finance has been advanced. In order to

tackle underdevelopment in Muslim countries, the claim was made that financial sources should be mobilised through authentic financial institutions, responding to the normative and cultural requirements of Islam and Muslim societies (Asutay, 2018b). Therefore, as part of the counter-hegemonic Islamic economics movement, the formal institutions of Islamic banking and finance emerged as part of this movement, their foundations derived from the Islamic sources of knowledge, known as the Qur'an and *hadith*. Such a normative construction of economics leads towards a different concept of development in the Islamic economics framework.

Islamic economic development is located in Islamic ontology and its articulation in the form of *shari'ah* principles, which constitute moral and ethical concepts, shaping economic, social, and political activities (Mannan, 1989). This further entails that the Islamic concept of economic development has a comprehensive framework, including social, moral, and spiritual constraints incorporated into constraints of material resources (Haq, 1995). It puts an emphasis on the human being as the focus of development, by ensuring the positive condition of its physical and socio-cultural environment, both in the qualitative and quantitative measure (Ahmad, 2004).

Islam, as a worldview, is based on progression towards the excellence (*ahsan*) by achieving *ihsan* (beneficence) at the individual and the societal level. Naqvi, (1994) defines *ihsan* as 'equilibrium', in the sense that those who have reached a certain level of wealth and empowerment should help others to reach similar levels, whereby the micro-foundation of Islamic economic development is constituted. Within such a framework, the individual objective function is defined as *falah*, or salvation in this world, and hereafter subject to *ihsan* (Asutay, 2019; Khan, 1984), while Islamic economics aims at emancipating and empowering the individual (Asutay, 2018a) through *adalah*, or justice (Ahmad, 2004; Chapra, 2000; Naqvi, 1994). Islamic economics, as a counter-hegemony, emerged in the post-colonial period as a constructivist development discourse based on human-centred developmentalism, going beyond capital accumulationist economic development (Asutay, 2018a).

The Islamic economic development paradigm emerges from the theoretical construct of Islamic economics, which is constituted through the axioms of Islamic economics (Ahmad, 2004; Asutay, 2007a, 2007b, 2012; Naqvi, 1994). These are discussed as follows:

Tawhid, as the foundational axiom of Islamic economics, essentialises the fact that all stakeholders' rights must be considered in the course of economic activity. It implies complementarity and unitarity in the sense that everything is created by God and no one thing can have domination over the other. Therefore, by prohibiting interest, Islamic economics de-centres finance in favour of the interests of the other stakeholder so that equilibrium can be achieved between all the factors of production (Asutay, 2018b). As part of the Islamic economic paradigm, *adalah* aims at social justice; while *ihsan* aims at equilibrium through distribution in society. *Tazkiyah*, on the other hand, essentialises growth in every aspect and requires growth to be conducted in harmony with all stakeholders, while *rububiyah* ensures that all creatures develop and progress in line with *fitrah*, or the developmental path given to them, and any barrier to their development must be removed (Asutay, 2007a, 2007b). Hence, Islam essentialises extended stake-holding-based development as part of Islamic political economic frame and the substance of Islamic moral economy.

As identified previously, Islamic economics, by definition, is a development-oriented paradigm. It aims at inter- and intra-generational equity in a dynamic solution (Naqvi, 1994) with the optimality of this world and hereafter resulting in a two-dimensional solution (Asutay, 2007a, 2018a). In this, economy the normative world of Islam is considered to be embedded in its opposition to commodification and fictitious commodities, while essentialising distribution, mutuality, and reciprocity through a value-oriented framework (Asutay, 2018b).

Furthermore, in order for development to take place, there are two conditions that need to be fulfilled: belief and belief-affirming action and consciousness from members of society that they be aware of God at all times so that their actions and behaviour are in compliance with the rules prescribed in Islamic law (Mirakhor & Askari, 2010). This belief will be the ultimate anchor in conducting the developmental process, in which government, people, and resources influence each other in a just manner, with people as the main objective (Chapra, 2000).

Islamic economics considers that development should enable human beings to contribute towards the larger well-being of people, starting from circle of the family, then inter-family, and finally community (Mannan, 1989). In order to develop further, human-centred development is the first goal and should be achieved through development policy by: improving attitudes and character; education and training to develop skills; promoting knowledge and research; and creating mechanisms to participate responsibly and creatively.

Through its development, Islamic economics aims to emancipate and empower the individual as the main objective function (Asutay, 2018a).

The second goal is the expansion of useful production that can be achieved by fulfilling basic necessities, defence requirements, and self-sufficiency in the production of basic capital goods. Basic necessities consist of: food, clothing, shelter, and water as physiological needs; the protection of life, religion, honour, property, posterity, and the meeting of physiological needs as part of safety and security needs; needs of belonging and association; the need for self-esteem and esteem by others; and the need for knowledge through education and learning (Haq, 1995).

The third goal is the improvement in the quality of life that can be obtained by employment creation, social security, and an equitable distribution of income and wealth. This goal can be seen to be a social obligation among human beings, as the first and second goals focus more on individual development. Employment creation is a social obligation, since some individuals need to perform various tasks so that economic activities operate and can satisfy other people's needs, which can be done by utilizing their intelligence and physical strength (Haq, 1995). By taking income generated from work, social security can be achieved by allocating the payment of *zakah* so that the less fortunate can benefit and there exists an equitable distribution of wealth and income.

The fourth goal is to have balanced development in different regions and different sectors of society and economy (Ahmad, 2006). The fifth goal is to develop new technology, so that society can become self-sufficient. This leads to the sixth goal, which is to reduce international dependency and ensure greater integration within the Muslim world.

As regards economic activity, the Islamic worldview is translated into a framework detailing production, distribution, and consumption activities (Mannan, 1989). The distributive and productive process is shaped by the profit-motive, kinship, social responsibilities, and morality—Islam also encourages production and consumption, as a means to material well-being, and as long as they are treated as means of satisfying human needs in a proper sense, not as an end themselves (Hasan, 2006). Accordingly, an increase in selective consumption can be an instrument of development, for example, in terms of calorie consumption per head, investment in housing, health improvement programs, and social security benefits. Islam promotes moderation in consumption by having smaller consumption basket, saving part of

one's income, utilising available resources responsibly, and establishing institutional settings for the mobilization of savings (Mannan, 1989; Sadeq, 2006).

In terms of policy measures, Islamic development suggests that there should be a balance between work and worship; mutual cooperation and obligations within society; a more just and equitable society constructed from labour reforms and fair treatment; an expansion of education and training facilities; a reduction in the narrow concentration of asset ownership; economic restructuring; financial restructuring; a long-term strategic policy plan that incorporates the available physical and human resources; and freedom of action and conscience (Mannan, 1990; Asutay, 2016). In line with such a paradigm, Islamic financial activities are expected to provide financing for: productive purposes; people who do not have enough collateral; activities that combine social and financial purposes; and social security schemes for those who cannot participate in productive activities.

The development paradigm of Islamic political economy is well summarised by Ibn Khaldun (b.1332-d.1406), who provides a broad framework (cited by Chapra, 2000, pp. 147-148)

> The strength of the sovereign (*al-mulk*) does not become consumed except by implementation of the *Shari'ah*;
> The *Shari'ah* cannot be implemented except by a sovereign (*al-mulk*);
> The sovereign cannot gain strength except through the people (*al-rijal*);
> The people cannot be sustained except by wealth (*al-mal*);
> Wealth cannot be acquired except through development (*al-'imarah*);
> Development cannot be attained except through justice (*al-'adl*);
> Justice is the criterion (*al-mizan*) by which God will evaluate mankind; and
> The sovereign is charged with the responsibility of actualising justice.

As can be seen, Islamic economics is an entirely development-oriented paradigm, a claim that is opposed by some, including Kuran (2003, 2004, 2012). Therefore, Islamic financial institutions, as the main emergent institutions of Islamic economics, are expected to contribute to such objectives, alongside the traditional social welfare institutions of Islam, such as *zakat*, *waqf*, *ar-rahnu* (pawnbroking), and *qard al-hassan* (interest-free loan). This study aims to explore empirically the development impact of Islamic finance in the form of Islamic banks and *sukuk* markets. The next section discusses how Islamic finance can contribute to economic development in a conceptual manner and presents findings from various empirical studies, before presenting the empirical process developed by this study.

3.4. ISLAMIC FINANCE AND DEVELOPMENT: CONCEPTUAL AND EMPIRICAL SURVEY

As discussed above, financial resources are essential for developing countries to reach a certain level of development. Considering the religious-cultural sensitivities around compliance with *Shari'ah* among Muslims, Islamic financial institutions are considered to be essential in providing *Shari'ah* compliant financing for the development needs of the societies in which they operate. Due to being located within the developmentalist and normative nature of Islamic economics, Islamic finance is expected to contribute to socio-economic development, since Islamic economics promotes human-centred development by ensuring harmonization with other stakeholders, including the environment and future generations.

The very first Islamically constituted bank was *Mith Ghamr* in 1963 in Egypt, which aimed to reduce the underdevelopment of the society by empowering small artisans and entrepreneurs (Asutay *et al.*, 2013; Mayer, 1985). After the emergence of the first commercial Islamic bank in 1975, a range of Islamic financial institutions have developed, including: Islamic banks; Islamic stocks; Islamic funds; *takaful*; Islamic microfinance; and Islamic capital markets, namely, *sukuk*, as well as the recent innovations in the form of Islamic crowdfunding and Islamic fintech platforms.

Islamic finance considers interest-based financing to be unfair and inequitable since it shifts the risk from one party (creditor) to another party (debtor) by charging a fixed return and ignoring the condition of the debtor and their future revenue stream (Iqbal & Mirakhor, 2013; Mirakhor & Zaidi, 2007). As an alternative, Islamic finance proposes risk sharing, profit-loss sharing, and financing to the real economy for its operational activities, as these characteristics are deemed to be fair and equitable since both parties share their risk and return based on a predetermined ratio (Mirakhor & Zaidi, 2007). These particular characteristics of Islamic finance can be said to be more suitable for supporting socio-economic development, since both parties will put their utmost effort into conducting projects and ensure that the other fulfils their duties. Moreover, interest-based financing has been seen to be vulnerable as it is built under artificial demand and supply created by the paradigm of 'financialisation', which does not reflect the true aspirations of society. This is demonstrated by the global financial crisis of 2008, which was due to high leverage and unnecessary financial transactions for generating high returns (Smolo & Mirakhor, 2010). As part of the financial system, Islamic finance can provide

a distinct service for society to support the effort of achieving socio-economic development; the prohibition of interest aims at fairer economic transactions by removing the dominance of capital through the embedded economic system by submerging finance into its value system and economy (Asutay, 2018a). This is in line with Shiller's (2012) definition of finance being a servant of the goals of a society, rather than being a paradigm in itself.

Within the normative world of Islamic economics, Islamic banks are expected to support socio-economic development directly through financing projects or businesses that are socially and economically beneficial to society, or indirectly through the inclusion of the 'un-bankable' in financial sector so that they can participate in economic activities and increase total output. Islamic banks can support economic development through resource mobilization by collecting deposits from customers and distributing it to entrepreneurs (Gundogdu, 2018). Islamic banks can also enhance financial stability, as Islamic banks are expected to provide equity-based financing, rather than debt-based financing, which has been claimed to be the source of the global financial crisis in 2008 (McNally, 2009). Arguably, Islamic banks are more resilient in terms of their capital ratio, leverage, and return on assets and equity, meaning that the effects of financial crises on Islamic banks are limited (Parashar & Venkatesh, 2010; Tlemsani & Al Suwaidi, 2016).

Islamic banks can also support socio-economic development through corporate social responsibility (CSR) activities. A study by Migdad (2017), however, shows that it has little value and only a marginal effect on the community.

Despite the many functions that can be carried out by Islamic banks to contribute to the development, it is clear that the operational activities of Islamic banks are converging with their conventional counterparts by providing more financing in debt-based contracts, such as *murabahah* and *tawarruq* (Ahmed *et al*., 2015; Asutay, 2007b, 2012; F. Khan, 2010; Rudnyckyj, 2014, 2019). With such a convergence, one may argue that Islamic banks would not have a competitive advantage compared to conventional ones, despite the fact that Islamic banks showed better performance before the 2008 crisis, they were not safe from it (Mongid, 2016; Olson & Zoubi, 2017).

Another distinguishable instrument within Islamic capital markets is *sukuk*, which according to the Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI) is defined as "Certificates of equal value representing undivided shares in the ownership of

tangible assets, usufructs and services or (in the ownership of) the assets of particular projects or special investment activities" (AAOIFI, 2015). As implied, in the case of *sukuk*, the underlying assets can be tangible assets, projects, services, investments, and business. *Sukuk* can be designed with different structures, such as sale-based (*murabaha*, *istisna*, *salam*); *ijarah*; investment-based (*mudarabah*, *musharakah*, *wakalah*); or hybrid structures. *Musharakah* and *ijarah sukuk* are adapted to finance projects and assets that are exclusively managed by entrepreneurs, while *istisna sukuk* are used to finance mega-projects such as ports and airports (Latham & Watkins, 2015).

Sukuk has the characteristics of a long-term investment and is usually utilized for financing large-scale investment projects, which can be said to have an important role in facilitating economic development (Sairally, 2007). This indicates that *sukuk* is suitable for financing socio-economic development programs, since this type of program requires a long period to accomplish and usually needs infrastructure to be developed first. *Sukuk* can also help to establish an efficient Islamic capital market and reinforce the 'added value' of Islamic finance to economic growth (Ben Jedidia Khoutem, 2014). It also easily provides more funds to finance economic development and solve the problems of poverty and unemployment due to its nature as 'marketable Islamic intermediation'.

Sukuk have been issued by corporations in different parts of the world to finance their projects or other needs, for which they can generate funds for increasing their productivity leading towards higher total output and positive externalities for society. For example, Indosat, a telecommunication company in Indonesia, issued *sukuk* to finance their purchase of BTS (base transceiver station) towers in 2002. By issuing the *sukuk*, Indosat can run their operational activities and more people can obtain the benefits of them.

Sukuk can also be issued by governments (sovereign) and government-backed companies (quasi-sovereign) for financing the development of public infrastructure and capital goods, which can enable the private sector's production process to experience increasing returns to scale and lead towards higher total output. Governments from different countries have issued sovereign *sukuk*, in various structures, to finance their needs, such as *ijarah sukuk* issued by the government of Pakistan that has been structured in such a way that it allows the government to gain funds for meeting its expenditures (Shaikh, 2015).

Governments can also use the proceeds of *sukuk* issuance for: fiscal support; liquidity management; education and health projects; infrastructure development; and environment-related projects. For example, Indonesia and Sudan issued a number of *sukuk* to raise funds for governmental projects, while liquidity management is widely utilized by central banks, such as the central banks of Indonesia and Malaysia. As for education projects, governments in Nigeria and Indonesia have issued *sukuk* for the construction and rehabilitation of schools, while the health-related *sukuk* were issued by the World Bank to fund the supply of vaccines for some of the world's poorest nations in 2014 (Richardson, 2019).

In terms of infrastructure financing, the governments of Saudi Arabia and Malaysia issued *sukuk* to finance electricity projects in 2010 and the Klang Valley Rapid Mass Transit Project, respectively. Addressing the issue of environmental sustainability, Malaysia issued the first green *sukuk* in 2017 to finance sustainable and climate-resilient growth (Aassouli *et al.*, 2018); Indonesia has also issued green *sukuk* to finance infrastructure related projects (Gorbiano, 2019).

Islamic finance can also support socio-economic development through social finance, such as *zakat*, *sadaqah*, and *waqf* (*see:* Cattelan, 2018). *Zakat* is a social obligation for Muslims when their wealth has reached certain amount of value, while *sadaqah* is a voluntary giving which does not have any requirements. In Islamic history, *zakat* was used as the main institution to provide social and welfare services in society and a distributive tool between the rich and the poor. In recent years, it has been possible to develop *zakat* funds for development purposes. As regards *waqf* (charitable endowment), it has been utilized to build schools, hospitals, and markets for societal development (Gorbiano, 2019). Additionally, there has been wide discussion regarding the role of Islamic microfinance, utilizing Islamic social finance, in alleviating poverty (Aliyu *et al.*, 2017; Cattelan, 2018; Obaidullah, 2015; Usman & Tasmin, 2016a).

As the discussion in this section highlights, Islamic finance, through its various institutions and instruments, can be an important catalyst for development in the form of empowering individuals in the society through alleviating poverty and expanding choices in life, including financing infrastructure and entrepreneurship. This research aims to examine the propensity for development of Islamic finance through an empirical analysis. In the following section, the

development performance of Islamic banks and *sukuk* markets in relation to Islamic economic aspirations are examined.

3.5. SEARCHING FOR ISLAMIC FINANCE AND DEVELOPMENT NEXUS: HYPOTHESIS DEVELOPMENT

As has been explained in the previous section, employing GDP per capita as the only measurement of development is not sufficient to capture true development in society—GDP per capita is not able to reflect human well-being and happiness. As a result, several indices have been constructed to better reflect development in society through socio-economic indicators. In order to support socio-economic development, it has been widely acknowledged that financial institutions have a resource mobilisation role in supporting development, by providing financial assistance in various structures.

Accordingly, this study attempts to employ indices that are broader than GDP per capita, which can better reflect socio-economic development, and examines the relationship of Islamic financial development with these indices. The indices considered in this study include: HDI; education index; gender development and inequality index; the gini coefficient; infrastructure index; and environmental index.

HDI can be said to be the first established index to measure development by considering development to be broader than economic growth—it consists of life expectancy, years of schooling, and GNI per capita. A number of empirical studies, such as Outreville (1999), Baddeley (2011), and Alam *et al.* (2016) suggest that financial development has a positive relationship with GDP per capita, human capital development, life expectancy, and education expenditure. Hence, Islamic financial institutions are expected to have a positive relationship with HDI.

H_1: Islamic financial development has a positive relationship with HDI

Education is considered to contribute to the process of development. Educated people will be able to increase their productivity, leading towards higher outputs and incomes. Moreover, education will enable individuals to expand their opportunity spaces to contribute to and participate in society. Following the empirical study of Becchetti & Conzo (2014), which found

that years of credit history had a positive effect on child schooling, and considering the objective of Islamic economics, Islamic finance is expected to support the education sector.

H_2: Islamic financial development has a positive relationship with the education index

The role of women has also been under-stated in economic matters, in particular in development, as their roles range from being a mother and worker to being an entrepreneur or agent of change (Thirlwall & Pacheco-Lopez, 2017). Higher GDP per capita and trade openness can pave the way for increased participation by women in economic activities, implying that women will have higher personal savings, which can then increase their capabilities (Arora, 2012). Furthermore, the relationship can also be curvilinear, indicating that higher GDP per capita leads to increase in gender equality, before becoming lower and then improving again in the future (Eastin & Prakash, 2013). The reason is that better economic condition provides better employment opportunities for female labour, however the patriarchal nature of society limits the development for female labour, resulted in lower women empowerment. At some period, the economic development will set different social norms providing another better opportunity for women empowerment. Having said that, it seems that financial institutions do not directly affect gender equality issues, but the increase in economic growth will have an impact in expanding opportunity spaces for women. Thus, financing is still a crucial precondition to support gender equality, and can be provided for education, health, and family planning (Sen & Mukherjee, 2014), but also for microfinance in developing countries. Hence, by empowering women through financial reach and inclusion, it is expected that Islamic financial institutions can support the role of women in society.

H_3: Islamic financial development has a positive relationship with the gender development index

H_4: Islamic financial development has a negative relationship with the gender inequality index

As has been explained, income distribution is an essential measure, since GDP per capita can only provide information at an aggregated level, without separating the contribution from the rich and poor. Considering that equality has become one of the targets to be achieved globally as part of the SDGs, financial assistance is required to fulfil this objective. Empirically, financial institutions have an inverse U-shaped relationship with income inequality, implying

that higher financial development will lead to a higher difference between rich and poor, which will then decrease after certain point of financial development (Greenwood & Jovanovic, 1990). The contribution of financial development to income equality can be direct, through providing finance to the poor, or indirect, by enhancing economic performance and better employment opportunities (Kappel, 2010). Considering that Islamic economics, as an embedded moral economy, aims at equality through social justice (*adalah*) and beneficence (*ihsan*), Islamic finance is expected to have a negative relationship with income inequality, which is represented by the gini coefficient.

H_5: Islamic financial development has a negative relationship with the gini coefficient

Infrastructure also plays an important role in supporting development through increased economic activity, such as the availability of electricity, fresh water, telecommunications, and transportation. Available and well-built infrastructure can help an economy to grow directly, through an increase in labour productivity, and indirectly, through the ability of a society to access goods and services on the market (Jung *et al.*, 2013; Latif *et al*., 2018). Moreover, by providing mass infrastructure, rural areas can also benefit and more people will utilize the infrastructure, which then leads to higher economic growth (Démurger, 2001; Roller & Waverman, 2001). Hence, financial provision for infrastructure projects is essential in order to develop the well-being of society. Since Islamic economics promotes development, or *imar*, which also necessitates the construction of public infrastructure, it is expected that Islamic finance has a positive relationship with infrastructure development.

H_6: Islamic financial development has a positive relationship with infrastructure index

Another important factor is the environment, as it provides an ecosystem and natural resources for society, which enables human beings to perform their duties. The issue of sustainability has been on the rise in both discourse and practice, since people started to be aware of the consequences of their economic activities, which can harm the environment. Neglecting the needs of the environment could result in the loss of biodiversity and places to live for human beings. There have been empirical studies that have attempted to analyse the environmental Kuznets curve (EKC), the inverted U-shaped relationship between economic growth and level of environmental degradation, and discover the EKC phenomenon in various countries (Charfeddine & Ben Khediri, 2016; Jalil & Feridun, 2011; Ozturk & Acaravci, 2013; Saboori *et al.*, 2012; Shahbaz *et al.*, 2015). To limit the effect of development on the environment,

several policies have been taken into consideration, including social cost-benefit analyses and environmental accounting. Considering that Islamic economics aims at the essentialisation of the interests of all stakeholders, including the environment, through *tawhid*; essentialises the development path to perfection through *rububiyah*; and emphasizes that growth has to be harmonious through *tazkiyah* so that justice or *adalah* can be achieved, it promotes the harmonization of economic activities with the environment. Therefore, Islamic finance is expected to be considerate of environmental issues in its operational activities.

> H_7: Islamic financial development has a positive relationship with the environmental performance index

Based on the hypotheses presented, in the following sections the empirical process is presented.

3.6. RESEARCH METHODOLOGY AND DATA

This section explains the research methodology and data in order to answer the research questions, which aims to examine the relationship between Islamic financial development and socio-economic indicators. This section starts with the data, index construction, the variables, and the methodology.

3.6.1. Data and Data Sources

Data for Islamic banks was generated from the ORBIS database for the period ranging from 1989 to 2016. Data for the *sukuk* market was generated from the Bloomberg terminal for the period ranging from 1991 up to 2018. As for the socio-economic indicators, several sources were utilised to obtain the data, including the World Bank Database, the United Nations Development Program Database, and the Environmental Performance Index organizer.

As regards the Islamic bank data, they were analysed as bank-level dataset, not being aggregated into country-level value datasets; whereas the data for socio-economic development indicators were organised at country-level. As for the *sukuk* dataset, it was generated as per issuance, and then rearranged according to the issuer on an annual basis. To develop the sample for the banking dataset, only Islamic banks having an annual report ending every December are included in the sample to have uniformity in the dataset because some banks end their report in other months.

The sample size for the Islamic bank data consists of 192 Islamic banks in 34 countries, while the dataset for the *sukuk* market consists of 767 issuers from 28 countries for the period 1989-2016.

3.6.2. Dependent Variables and Index Construction

This part explains the indices employed as the dependent variables and the construction of several indices. In general, an index value was calculated as shown in equation 3.1, implying that the country having the lowest value for each item will have an index value of 0, while the country having the highest value for each item will have an index value of 1.

$$\boldsymbol{index_i} = \frac{(x_i - \boldsymbol{min_i})}{(\boldsymbol{max_i} - \boldsymbol{min_i})} \qquad (3.1)$$

HDI

This study employs HDI as constructed by the United Nations, which combines life expectancy at birth; expected years of schooling and mean years of schooling; and GNI per capita (PPP $) as indicators of a long and healthy life, knowledge, and a decent standard of living, respectively. An index was calculated based on the equation shown in equation 3.1, implying that any country with an index value of 1 has the best HDI, while any country having an index value of 0 is the worst performer in terms of HDI.

Education Index

This study also employs an education index as a dependent variable, which was directly generated from the UN database. The education index combines the expected years of schooling and mean years of schooling and follows the calculation presented in equation 3.1.

Gender Development Index (GDI)

The gender development index employed in this study was also generated from the UN Development Program database (UNDP), which segregates the HDI for female and male populations. It aims to measure gender inequality in terms of life expectancy, education, and decent income. After calculating the HDI for both female and male populations, the gender development index was calculated by dividing the HDI for females by the HDI for males. A 0 GDI value indicates total gender inequality, while a value of 1 implies total gender equality.

Gender Inequality Index (GII)

The gender inequality index utilized as a dependent variable in this study was also directly generated from the UNDP database. It aims to reflect the disadvantage experienced due to gender related biases in three components: reproductive health, empowerment, and the labour market (United Nations, 2016). While reproductive health only takes into account the female population, measuring the maternal mortality ratio and the adolescent birth rate, empowerment is measured by the number of people with at least secondary education and the shares of parliamentary seats occupied by women and men. As for the labour market, it accounts for labour force participation rates for the female and male population. The value ranges from 0 to 1, where a value of 0 means women and men are fairly equal; while a value of 1 means women and men are fairly inequal.

Gini Coefficient

The *gini* coefficient employed in this study is generated directly from the World Bank database, which measures inequality, ranging from a value of 0 (perfect equality) to a value of 1 (perfect inequality). It is based on the Lorenz curve, which maps the cumulative income share on the *y*-axis against the distribution of population on the *x*-axis.

Infrastructure Index

The infrastructure index, as presented in Table 3.3, was constructed using the infrastructure indicators available in the World Bank Database. It aims to capture the state of infrastructure in terms of electricity, transportation, water resources, telecommunications, and investment in those areas, as presented in Table 3.3. It calculates the index value for each indicator for all countries annually; then the infrastructure index is obtained by taking the average value of those indicators.

Table 3.3: List of Items for Constructing Infrastructure Index

No	Item
1	Electric power consumption (kWh per capita)
2	Quality of port infrastructure, WEF (1=extremely underdeveloped to 7=well developed and efficient by international standards)
3	Air transport, registered carrier departures worldwide
4	Air transport, freight (million ton-km)
5	Annual freshwater withdrawals, total (billion cubic meters)
6	Annual freshwater withdrawals, total (% of internal resources)
7	Renewable internal freshwater resources, total (billion cubic meters)
8	Renewable internal freshwater resources per capita (cubic meters)
9	Investment in energy with private participation (current US$)
10	Investment in telecoms with private participation (current US$)
11	Investment in transport with private participation (current US$)
12	Investment in water and sanitation with private participation (current US$)
13	Air transport, passengers carried
14	Railways, goods transported (million ton-km)
15	Railways, passengers carried (million passenger-km)
16	Rail lines (total route-km)
17	Liner shipping connectivity index (maximum value in 2004 = 100)
18	Container port trafic (TEU: 20 foot equivalent units)
19	Mobile cellular subscriptions
20	Mobile cellular subscriptions (per 100 people)
21	Fixed telephone subscriptions
22	Fixed telephone subscriptions (per 100 people)
23	Fixed broadband subscriptions
24	Improved water source, rural (% of rural population with access)
25	Improved water source, urban (% of urban population with access)
26	Improved water source (% of population with access)
27	Investment in ICT with private participation (current US$)
28	Public private partnerships investment in telecom (current US$)
29	Individuals using the Internet (% of population)
30	Public private partnerships investment in energy (current US$)
31	Public private partnerships investment in water and sanitation (current US$)
32	Public private partnerships investment in transport (current US$)

Source: World Bank Database (2018, modified)

Environmental Performance Index (EPI)

The Environmental Performance Index (EPI) is a global metric for ranking performance on high-priority environmental issues. It presents a scorecard highlighting the best and worst performer in terms of environmental issues (Environmental Performance Index, 2018). The components of the EPI are presented in Table 3.4.

Table 3.4: Components of Environmental Protection Index (IPE)

Policy Objective	Issue Category	TLA	Weight	Indicator	TLA	Weight
Environmental Health - HLT (40%)	Air Quality	AIR	65%	Household solid fuels	HAD	40%
				PM_{25} Exposure	PME	30%
				PM_{25} Exceedance	PMW	30%
	Water & Sanitation	H2O	30%	Drinking Water	UWD	50%
				Sanitation	USD	50%
	Heavy Metals	HMT	5%	Lead exposure	PBD	100%
Ecosystem Vitality - ECO (60%)	Biodiversity & Habitat	BDH	25%	Marine protected areas	MPA	20%
				Biome Protection (National)	TBN	20%
				Biome Protection (Global)	TBG	20%
				Species protection index	SPI	20%
				Representativeness index	PAR	10%
				Species habitat index	SHI	10%
	Forests	FOR	10%	Tree cover loss	TCL	100%
	Fisheries	FSH	10%	Fish stock status	FSS	50%
				Regional marine trophic index	MTR	50%
	Climate & Energy	CCE	30%	CO_2 emissions - total	DCT	50%
				CO_2 emissions - power	DPT	20%
				Methane emissions	DMT	20%
				N_2O emissions	DNT	5%
				Black carbon emissions	DBT	5%
	Air pollution	APE	10%	SO_2 emissions	DST	50%
				NO_x emissions	DXT	50%
	Water resources	WRS	10%	Wastewater treatment	WWT	100%
	Agriculture	AGR	5%	Sustainable nitrogen management	SNM	100%

Source: EPI 2018 Policy Maker Summary (2018)

The dataset for each category is provided by the EPI organizer, although the index is not provided at this point. Thus, the index is calculated in this study according to equation 3.1, for each category. The average of these constitute the Environmental Performance Index (EPI).

3.6.3. Financial Development Variables

There are several financial variables taken as independent variables, which are examined in their relationship with socio-economic indicators. These are: net interest margin (*nim*); overhead costs (*oh*); loan-to-deposit ratio (*ldr*); capital adequacy ratio (*car*); non-performing loans (*npl*); volume of *sukuk* issuance (*lnsukuk*); and ratio of *sukuk* issuance to GDP (*sukukgdp*). The relationship between banking variables and socio-economic indicators is presented through the financial inclusion index (*findex*), indicating that a more efficient and stable

banking system brings about and induces financial inclusion, which then improves the capability of society to have higher values for socio-economic indicators.

As for the *sukuk* market, it can have both a direct and an indirect relationship with socio-economic indicators—the latter is moderated through the financial inclusion index (*findex*). The financial index employed in this study was manually constructed for this study by selecting several indicators provided by Demirgüç-Kunt *et al.* (2018), which are presented in Table 3.5. The index was constructed by calculating the index for each item, based on equation 3.1. Then the average was taken for each indicator to define the financial inclusion index.

Table 3.5: List of Financial Inclusion Indicators

No	Items
1	Account (% age 15+)
2	Financial institution account (% age 15+)
3	Withdrawal in the past year (% with a financial institution account, age 15+)
4	Used the internet to pay bills in the past year (% age 15+)
5	Used the internet to pay bills or to buy something online in the past year (% age 15+)
6	Used the internet to buy something online in the past year(% age 15+)
7	Paid online for internet purchase (% internet purchasers, age 15+)
8	Paid cash on delivery for internet purchase (% internet purchasers, age 15+)
9	Saved to start, operate, or expand a farm or business (% age 15+)
10	Saved for old age (% age 15+)
11	Saved at a financial institution (% age 15+)
12	Saved using a savings club or a person outside the family (% age 15+)
13	Saved for education or school fees (% age 15+)
14	Saved any money in the past year (% age 15+)
15	Outstanding housing loan (% age 15+)
16	Debit card ownership (% age 15+)
17	Borrowed from a financial institution (% age 15+)
18	Borrowed from a financial institution or used a credit card (% age 15+)
19	Main source of emergency funds: loan from a bank, employer, or private lender (% able to raise funds, age 15+)
20	Sent or received domestic remittances in the past year (% age 15+)
21	Received domestic remittances in the past year (% age 15+)
22	Sent or received domestic remittances: through a financial institution (% age 15+)
23	Received domestic remittances: through a financial institution (% age 15+)
24	Sent domestic remittances in the past year (% age 15+)
25	Sent domestic remittances: through a financial institution (% age 15+)
26	Sent domestic remittances: using an account (% age 15+)
27	Sent domestic remittances: through a mobile phone (% age 15+)
28	Sent domestic remittances: through a money transfer service (% age 15+)
29	Sent domestic remittances: through an over-the-counter service (% age 15+)
30	Paid utility bills: using a financial institution account (% age 15+)

No	Items
31	Paid utility bills: using an account (% age 15+)
32	Paid utility bills: using a mobile phone (% age 15+)
33	Received wages: into a financial institution account (% age 15+)
34	Received wages: into an account (% age 15+)
35	Received private sector wages: into a financial institution account (% age 15+)
36	Received private sector wages: into an account (% age 15+)
37	Received public sector wages: into a financial institution account (% age 15+)
38	Received public sector wages: into an account (% age 15+)
39	Paid school fees: using a financial institution account (% age 15+)
40	Paid school fees: using an account (% age 15+)
41	Received wages: through a mobile phone (% age 15+)
42	Received private sector wages: through a mobile phone (% age 15+)
43	Received public sector wages: through a mobile phone (% age 15+)
44	Paid school fees: using a mobile phone (% age 15+)
45	Received wages: first account opened to receive wages (% age 15+)
46	Received private sector wages: first account opened to receive wages (% age 15+)
47	Received public sector wages: first account opened to receive wages (% age 15+)
48	Received a public sector pension: into an account (% age 15+)
49	Received government transfers: into a financial institution account (% age 15+)
50	Received government transfers: into an account (% age 15+)
51	Received a public sector pension: through a mobile phone (% age 15+)
52	Received government transfers: through a mobile phone (% age 15+)
53	Debit card used to make a purchase in the past year (% age 15+)
54	Used a debit or credit card to make a purchase in the past year (% age 15+)
55	Received government transfers: first account opened to receive government transfers (% age 15+)
56	Received payments from self-employment: into a financial institution account (% age 15+)
57	Received payments from self-employment: into an account (% age 15+)
58	Received payments from self-employment: through a mobile phone (% age 15+)
59	Used a mobile phone or the internet to access a financial institution account in the past year (% age 15+)
60	Used a mobile phone or the internet to access an account (% age 15+)
61	Used checks to make payments in the past year (% age 15+)
62	Credit card ownership (% age 15+)
63	Credit card used in the past year (% age 15+)
64	Deposit in the past year (% with a financial institution account, age 15+)
65	Received government payments: into a financial institution account (% age 15+)
66	Received government payments: through a mobile phone (% age 15+)
67	Received government payments: into an account (% age 15+)
68	Received government payments: first account opened to receive government payments (% age 15+)
69	Received government payments in the past year (% age 15+)
70	Made or received digital payments in the past year (% age 15+)
71	Received digital payments in the past year (% age 15+)
72	Mobile money account (% age 15+)

Source: Demirgüç-Kunt *et al.* (2018)

3.6.4. Defining Control Variables

Control variables need to be included in the model as development and the socio-economic indicators are not only affected by financial development—other factors have an impact, including macroeconomic and institutional variables. These variables may also help distinguish the distinctive characteristics of each country since this study employs panel estimation method.

3.6.4.1.Macroeconomic variable

Macroeconomic variables in the model include: the ratio of government consumption to GDP (*govcon*); the ratio of private consumption to GDP (*lnrcon*); growth of GDP per capita (*gdpcg*); GDP growth (*gdpg*); volume of trade to GDP (*trade*) measured by the difference between export and import volume, and foreign direct investment (*fdi*).

The ratio of government and private consumption to GDP may show both types of relationship: if the consumption is utilized to support socio-economic indicators, then it will show a positive relationship with the indicators (Anand & Ravallion, 1993; Kappel, 2010). On the other hand, if the consumption might not be channelled for financing the infrastructure development of socio-economic indicators efficiently due to the lack of governmental quality (Gomanee *et al.*, 2004). Growth of GDP per capita measures different characteristic across countries, according to which countries in a developed state are likely to have lower growth of GDP per capita, since they have already achieved a level of sustenance, resulting in higher values for socio-economic indicators (Arora, 2012). Meanwhile, countries in a developing state are characterized by higher growth of GDP per capita as they work towards catching up with the developed countries, still having lower values for socio-economic indicators.

The volume of trade is expected to show a positive relationship with socio-economic indicators, since a higher volume will lead towards higher income suggesting a greater ability to fulfil the needs represented by socio-economic indicators (Eastin & Prakash, 2013; Shahbaz *et al.*, 2013). This similarly works for foreign direct investment—the more investment coming into a country, the more capital available to develop its production capacity resulting in higher income and better ability to fulfil socio-economic or development expectations (Lim & Chen, 2012; Tsai, 2007). Another control variable that can be included for the estimation is ratio of expenditure on research and development to GDP, as this expense can be used to develop infrastructure

supporting socio-economic indicators, particularly related with education and health (Cozzarin, 2006).

3.6.4.2.Institutional variables

In addition to macroeconomic variables, institutional variables also need to be included in the model, because the different level of institutional development in each country will have a corresponding impact on sources of growth. For example, Acemoglu & Robinson (2013) explain that the UK was able to drive forward with the Industrial Revolution due to the opportunity for capital owners to acquire a certain level of power from the monarch resulting in the creation of an opportunity space to further develop production, while empires in other parts of the world, such as in the Middle East, were reluctant to share their power and allow for any improvement (Ayubi, 1996).

As part of capturing the impact of institutional development, this study also attempts to include the legal system (*legal*) and the governance index (*govindex)* for each country to differentiate the impact of institutional behaviour depending on its characteristics. The variable regarding the legal system was constructed following the definition of 'legal system' in Abedifar *et al*. (2012). The governance index was obtained from the World Bank database and the Islamic financial development index was generated from the Thomson Reuters database.

According to Abedifar *et al*. (2012), the legal system can be classified into three categories: countries that implement *Shari'ah* law; countries that do not implement *Shari'ah* law; and countries having both *Shari'ah* and other legal traditions. The variable is constructed by employing a dummy variable taking the value of 0 for countries that do not implement *Shari'ah* law; a value of 1 for countries having both *Shari'ah* and other legal traditions; and a value of 2 for countries having *Shari'ah* law. In Abedifar *et al*. (2012), the legal system is employed, as a control variable measuring degree of religiosity, expecting that it affects credit risk experienced in Islamic banks. It is assumed that countries implementing *Shari'ah* law will have a higher credit risk, although it is found that in the countries having Islamic banks, it has a negative relationship. In this study, considering that countries implementing *Shari'ah* law are generally still developing countries, they may show lower values for socio-economic indicators (Djikstra, 2018; Jalil & Feridun, 2011).

The governance index is composed of six different measurements: control of corruption (*cc*); government effectiveness (*ge*); political stability and the absence of violence/terrorism (*pv*); rule of law (*rl*); regulatory quality (*rq*); and voice and accountability (*va*). Control of corruption measures the perception of the use of public power for any form of corruption and government effectiveness measures the perception of the quality of public services, civil services, and policy formulation and implementation (Kaufmann *et al*., 2010). The World Governance Indicator (2018) explains that political stability and the absence of violence/terrorism measures the perception of the likelihood of political instability including terrorism. Rule of law measures the perception of the extent to which a society has confidence in and abides by the rules, it also includes the perception of the quality of contract enforcement, property rights, the police, the courts, and the likelihood of crime and violence.

Regulatory quality measures the perception of the government's ability to have sound policies and promote private sector development; voice and accountability measures the perception of how far a society can participate in selecting their government, express themselves, freely associate, and the freedom of the media (Kaufmann *et al.*, 2010). The value for each measurement ranges from -2.5 to 2.5, with a higher value implying better governance. Several studies (Adams-Kane & Lim, 2016; Blackburn & Forgues-Puccio, 2010; Flavin *et al.*, 2014) have shown that quality of governmental institutions can affect the development of socio-economic indicators. This study hypothesizes that better governance creates better opportunities for a society to expand its capability in fulfilling the requirements of socio-economic indicators.

3.6.5. Summary of Variables and Data

A summary of the variables, their definition, and their sources is presented in Table 3.6.

Table 3.6: List of Variables, Definition, and Sources

Variable Name	Definition	Source
Dependent Variables		
human development index	constructed by combining life expectancy at birth, expected years of schooling and mean years of schooling, and GNI per capita	World Bank Database
education index	measured by combining the expected years of schooling and mean years of schooling	United Nations Database
gender development index	segregating HDI for female and male population	UNDP Database

Variable Name	Definition	Source
gender inequality index	reflecting the disadvantage experienced due to gender related biases in three components: reproductive health, empowerment, and labour market	UNDP Database
gini coefficient	based on Lorenz curve, which maps the cumulative income share on the Y-axis against the distribution of population on the X-axis	World Bank Database
infrastructure index	constructed by using the infrastructure indicators, capturing electricity, transportation, water resources, telecommunications, and investment in those areas	World Bank Database
environmental performance index	global metric for ranking the performance on high-priority environmental issues	Environmental Performance Index (Yale University, Columbia University, World Economic Forum)
Independent Variables		
net interest margin	measured by taking the difference between interest rate charged by bank for loans provided for private sector and the rate given to deposit accounts	ORBIS Bankscope
overhead costs	measured by dividing costs related to activities other than interest-bearing activities and total assets	ORBIS Bankscope
loan-to-deposit ratio	measured by dividing loans and deposit in the banks	ORBIS Bankscope
capital adequacy ratio	measured by dividing banks' capital with their risk-weighted assets	ORBIS Bankscope
non-performing loans	measured by dividing non-performing loans and gross loans	ORBIS Bankscope
volume of sukuk issuance	measured by the volume of sukuk issuance (in logarithm form)	ORBIS Bankscope
ratio of sukuk issuance to GDP	measured by dividing volume of sukuk issuance and volume of GDP	ORBIS Bankscope
financial inclusion index	constructed by using financial inclusion indicators	Demirguc-Kunt, *et al.* (2018), modified
Control Variables		
ratio of government consumption to GDP	measured by amount of cash payments for operating activities of the government in providing goods and services; it includes compensation of employees (such as wages and salaries), interest and subsidies, grants, social benefits, and other expenses such as rent and dividends	World Bank Database
ratio of private consumption to GDP	measured by real consumption of households and government, at current PPPs (in million 2011US$)	PWT9.0
growth of GDP per capita	measured by taking the difference between volume of GDP per capita in this period and previous period	World Bank Database
GDP growth	measured by taking the difference between volume of GDP in this period and previous period	World Bank Database
volume of trade to GDP	measured by combination of export and import volume	World Bank Database
foreign direct investment	measured net inflows (new investment inflows, less disinvestment) in the reporting economy from foreign investors, divided by GDP.	World Bank Database

Variable Name	Definition	Source
legal system	classified into three categories: country that do not implement *Shari'ah* law, countries having both *Shari'ah* and other legal traditions, and countries that implement *Shari'ah* law; employing dummy variable taking value of 0, 1, and 2 for country implementing other than *Shari'ah* law, both laws, and *Shari'ah* law respectively	Abedifar, *et al*.(2012)
governance index	measured by taking the average value of index from control of corruption, government effectiveness, political stability and absence of violence/terrorism, rule of law, regulatory quality, and voice and accountability	Calculated by the author
control of corruption	measured by the perception of the use of public power for any form of corruption	World Governance Indicators
government effectiveness	measured by the perception of quality of public services, civil services, policy formulation and implementation	World Governance Indicators
political stability and absence of violence/terrorism	measured by the perception of likelihood of any political instability including terrorism	World Governance Indicators
rule of law	measured by the perception of to what extent a society has confidence in and abides by the rules, also the perception of quality of contract enforcement, property rights, the police, the courts, and likelihood of crime and violence	World Governance Indicators
regulatory quality	measured by the perception of the ability of government to have sound policies and promote private sector development	World Governance Indicators
voice and accountability	measured by the perception of how far a society can participate in selecting its government, freely express itself, freely associate, and the freedom of the media	World Governance Indicators

3.6.6. Empirical Method

This section explains the empirical methods employed in this study to investigate the research questions set out at the beginning of the paper.

3.6.6.1. Linear Regression

In examining the relationship between *sukuk* and the indices, following Donou-Adonsou & Sylwester (2016) and Smaoui & Nechi (2017), equation 3.2 is presented as follows:

$$\boldsymbol{y_{i,t} = \alpha + \beta_1 x_{j,i,t} + +\beta_2 m_{i,t} + \beta_5 inst_{i,t} + \varepsilon_{i,t}} \qquad (3.2)$$

where:

$y_{i,t}$ is the dependent variable or socio-economic indicator, which can be HDI, education index, GDI, GII, gini coefficient, infrastructure index, or EPI in country *i* at time *t*.

$x_{j,i,t}$ is the main independent variable, which is the *sukuk* market issued by firm *j* or country *i* at time *t*.

$m_{i,t}$ and $inst_{i,t}$ are macroeconomic and institutional variables in country *i* at time t, respectively, and are treated as the control variables.

3.6.6.2. Non-Linear Regression (Quadratic)

It has been widely discussed (*see:* Anand & Kanbur, 1993; Figini & Görg, 2011; Koechlin & Leon, 2007; Law & Singh, 2014) that finance and economic development can show a quadratic relationship in which the early stages of financial development might harm socio-economic development. However, it will show a reverse relationship with socio-economic indicators after a certain threshold of financial development is reached. In order to examine such a relationship, equation 3.3 is constructed as follows:

$$\boldsymbol{y_{i,t} = \alpha + \beta_1 x_{j,i,t} + \gamma_1 x^2_{j,i,t} + \beta_2 m_{i,t} + \beta_3 inst_{i,t} + \varepsilon_{i,t}} \qquad (3.3)$$

Compared to equation 3.2, equation 3.3 has the additional variable of $x^2_{j,i,t}$, which is the squared value of *sukuk* issuance by firm *j* or country *i* at time *t*.

3.6.6.3. Moderating Variables through Financial Inclusion

Equations 3.2 and 3.3 show the relationship between *sukuk* issuance and development indicators, considering that *sukuk* is issued to finance projects, which can directly increase socio-economic development. However, other financial products can also have an impact on socio-economic development, such as banking products, although the effect is transmitted through their ability to increase financial inclusion. As such, the effect of financial institutions through financial inclusion affecting socio-economic indicators is presented in equation 3.4 (Dzombo *et al.*, 2018; VanderWeele, 2016; Wahba & Elsayed, 2015):

$$\boldsymbol{y_{j,t} = \alpha + \beta_1 x_{i,j,t} + \beta_3 inst_{i,t} + \varepsilon_{i,j,t}} \qquad (3.4)$$

$$\boldsymbol{findex_{j,t} = \alpha + \beta_1 x_{i,j,t} + \beta_3 inst_{i,t} + \varepsilon_{i,j,t}} \qquad (3.5)$$

$$\boldsymbol{y_{j,t} = \mu + +\beta_1 x_{i,j,t} + \gamma_1 findex_{j,t} + \beta_2 m_{i,t} + \beta_3 inst_{i,t} + \epsilon_{j,t}} \qquad (3.6)$$

The next section presents the empirical findings based on the model and the empirical process described so far.

3.7. ISLAMIC FINANCIAL DEVELOPMENT AND ECONOMIC DEVELOPMENT: EMPIRICAL FINDINGS

This section provides the empirical results and discussion to answer the research questions; it starts with the descriptive statistics, correlation matrix, and the regression results.

3.7.1. Linear Regression Results for *Sukuk* Market

This section provides an explanation regarding the regression results to examine the linear relationship between *sukuk* issuance and the identified indices.

Table 3.7: Distribution of *Sukuk* Based on the Category

Category	Number
Financial	5,476
Infrastructure	3,762
Manufacturing	1,759
Service	257
Sovereign	1,181
Treasury	704
Total	13,139

Source: Bloomberg Database (2018)

Table 3.8: Distribution of *Sukuk* Based on the Structure Type

Sukuk Structure Type	Contract	Number
Bay' al 'ina *Bay' bi thaman ajil* *Ijara* *Istisna'* *Istithmar* *Murabaha* *Salam* *Wakala bil istithmar*	Fixed	6,197
Mudaraba *Musharaka*	PLS	1,542
Hybrid Sukuk		522
Other Sukuk		4,878
Total		13,139

Source: Bloomberg Database (2018)

Table 3.7 presents the distribution of *sukuk* included in the sample based on the category of issuance purpose; Table 3.8 presents the distribution of *sukuk* included in the sample based on the types of contracts. Table 3.7 shows that the majority of *sukuk* were issued for financial purpose by financial firms, followed by: issuance for infrastructure purposes; the manufacturing sector; *sukuk* issued by government (sovereign); the purpose of liquidity by central banks (treasury); and for the service sector.

Table 3.8 presents the distribution of *sukuk* issuance based on the types of contracts. The dominant types are fixed types of contracts.

3.7.1.1.Firm-level dataset

In this part, *sukuk* issuance is grouped into firm-based issuance by annum, while the development indicators remain in the country-level dataset. Tables 3.9 and 3.10 present the descriptive statistics and correlation matrix, respectively.

Table 3.9: Descriptive Statistics – *Sukuk* – Firm-level

Variable	Obs	Mean	Std. Dev.	Min	Max
lnsukuk	1,500	20.0411	2.4292	6.9078	31.3687
hdi	1,358	0.7617	0.0595	0.4440	0.9240
educ	760	0.6805	0.0604	0.3550	0.9000
gdi	235	0.9245	0.0570	0.7160	1.0000
gii	756	0.3223	0.0936	0.0690	0.6720
gini	282	44.7245	3.7013	29.6000	49.1000
infra2	1,590	0.3043	0.1350	0.0719	0.8889
epi	1,576	0.0846	0.0412	0.0000	0.2812
gdpg	1,622	0.0476	0.0238	-0.0734	0.2325
gdpcg	1,622	0.0519	0.1033	-0.3915	0.3228
rd	843	0.9294	0.3591	0.0425	2.8223
fdi	1,693	0.0316	0.0338	-0.1588	0.8744
trade	1,693	1.3879	0.6158	0.0000	4.4262
expense	1,693	0.1636	0.1392	0.0000	0.5505
lnrcon	1,250	26.4414	0.7717	21.5004	30.2474
legal	1,693	0.2274	0.5142	0.0000	2.0000
govindex	1,452	0.2352	0.3913	-1.5261	1.6997

Notes: Obs = Number of observations, SD = Standard deviation, Min = Minimum, Max = Maximum

Table 3.10: Correlation Matrix – *Sukuk* – Firm-level

	lnsukuk	*hdi*	*educ*	*gdi*	*gii*	*gini*	*infra2*	*epi*	*gdpg*	*gdpcg*	*rd*	*fdi*	*trade*	*expense*	*lnrcon*
lnsukuk	1														
hdi	-0.5772	1													
educ	-0.5257	0.9721	1												
gdi	-0.3153	0.8407	0.9010	1											
gii	0.8426	-0.7668	-0.7988	-0.5851	1										
gini	0.2528	0.2183	0.1600	0.3884	0.2491	1									
infra2	-0.5860	0.7403	0.6788	0.4765	-0.6504	0.1397	1								
epi	0.4325	-0.7672	-0.7055	-0.6433	0.5414	-0.5390	-0.6159	1							
gdpg	0.3085	-0.2876	-0.2776	-0.1932	0.3077	0.3959	0.1217	-0.1938	1						
gdpcg	0.1171	-0.3641	-0.3611	-0.5508	0.1275	-0.3703	0.0974	0.1527	0.4289	1					
rd	-0.9240	0.7655	0.7020	0.4466	-0.8966	-0.1901	0.6998	-0.5399	-0.4210	-0.1425	1				
fdi	0.2065	-0.3238	-0.3600	-0.1370	0.4727	0.3976	-0.2451	0.2374	0.0255	-0.1426	-0.2531	1			
trade	-0.1707	0.4074	0.4739	0.3064	-0.5038	-0.3038	0.2537	-0.3069	-0.0095	0.0554	0.2315	-0.9774	1		
expense	0.1656	-0.3313	-0.3964	-0.6646	0.2694	-0.6372	-0.2040	0.5537	-0.2978	0.4508	-0.1018	-0.1732	0.0275	1	
lnrcon	0.0658	0.0523	-0.0100	0.1732	0.2732	0.4761	-0.0002	0.0298	-0.1857	-0.3515	-0.0120	0.9062	-0.8557	-0.1982	1
legal	0.1146	-0.7944	-0.7828	-0.8970	0.3177	-0.6895	-0.4910	0.7459	0.0078	0.5279	-0.2850	0.0251	-0.1750	0.6203	-0.2986
govindex	-0.6210	0.9153	0.9536	0.7808	-0.8831	-0.1378	0.6481	-0.5778	-0.3767	-0.2323	0.7746	-0.5002	0.5826	-0.2093	-0.1747

Employing fixed effect estimation suggested by Hausman test, Table 3.11 shows that the volume of *sukuk* issuance has a significant negative relationship with the gender inequality index. On the other hand, it has a significant positive relationship with the infrastructure index and the environmental performance index. This result implies that *sukuk* has been able to support the gender inequality index, the infrastructure index, and the environmental performance index, which may be due to the *sukuk* issued in firm-level has been utilized to support these socio-economic indices.

Table 3.11: Regression Results – Firm-level – Fixed Effects

Variables	*(1)* *hdi*	*(2)* *educ*	*(3)* *gdi*	*(4)* *gii*	*(5)* *gini*	*(6)* *infra2*	*(7)* *epi*
lnsukuk	0.000249	0.000724	-0.000506	-0.00537**	0.00662	0.00462***	0.00125**
	(0.000177)	(0.000915)	(0.000676)	(0.00268)	(0.00528)	(0.00126)	(0.000567)
gdpcg	0.00406**	0.0824***	-0.00360	0.149**	-10.47***	0.00769	-0.0190***
	(0.00197)	(0.0206)	(0.00607)	(0.0582)	(1.322)	(0.00509)	(0.00360)
trade	-0.0359***	-0.0512***	-0.00285	-0.0654***	14.08***	-0.0424***	-0.126***
	(0.00313)	(0.0137)	(0.0118)	(0.0242)	(1.584)	(0.0101)	(0.0216)
lnrcon	0.0467***	0.0805***	0.0175***	-0.114***		-0.0169	-0.0275***
	(0.00312)	(0.0138)	(0.00376)	(0.0253)		(0.0107)	(0.00777)
expense	0.00222	-0.0142*	-0.00854	-0.0770***	27.68***	0.0163*	0.113***
	(0.00163)	(0.00745)	(0.0201)	(0.0265)	(3.534)	(0.00953)	(0.00553)
govindex					-4.779***		
					(0.147)		
rd							-0.0534***
							(0.0196)
Constant	-0.425***	-1.405***	0.474***	3.552***	17.05***	0.682**	1.038***
	(0.0859)	(0.385)	(0.103)	(0.712)	(3.294)	(0.294)	(0.230)
Observations	1,245	650	185	647	277	1,214	770
Number of firms	607	396	140	394	193	590	400
Prob-F	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.933	0.780	0.400	0.166	0.846	0.074	0.616
Hausman test	N/A	0.000	0.000	0.000	0.000	0.000	0.000

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

Looking at the control variables, Table 3.11 shows that growth of GDP per capita (*gdpcg*) and ratio of private consumption to GDP (*lnrcon*) have positive and significant relationship with HDI, the education index, and the gini coefficient (*gini*). This result is supported by different studies (*see:* Arora, 2012; Gomanee *et al.*, 2004), explaining that growth of GDP per capita can support HDI and decrease the gender inequality. On the other hand, ratio of trade to GDP (*trade*) and government expenditure (*expense*) have negative relationship with HDI, the education index, and the gini coefficient (*gini*). It is supported by different studies (*see:* Gomanee *et al.*, 2004; Hamori & Hashiguchi, 2012; Neaime & Gaysset, 2018), explaining that

trade openness might create further inequality and poverty within the society because the existence of unequal access of resources.

3.7.1.2.Country-level dataset

In this part, *sukuk* issuance is aggregated into country level data by annum—the same level as the development indicators. Tables 3.12 and 3.13 present the descriptive statistics and correlation matrix, respectively, showing that the number of observations is much lower compared to the number of observations at the firm level (*see:* Table 3.9). As for the correlation matrix, there is no perfect multicollinearity between the variables.

Table 3.12: Descriptive Statistics – *Sukuk* – Country-level

Variable	Obs	Mean	Std. Dev.	Min	Max
lnsukuk	152	20.7037	3.0117	6.9078	27.2185
hdi	130	0.7511	0.1220	0.4440	0.9240
educ	77	0.6516	0.1335	0.3550	0.9000
gdi	64	0.9172	0.0766	0.7160	1.0000
gii	73	0.3694	0.1699	0.0690	0.6720
gini	23	37.6913	6.1472	29.6000	49.1000
infra2	153	0.3013	0.1360	0.0719	0.8889
epi	155	0.0807	0.0566	0.0000	0.2812
gdpg	159	0.0461	0.0370	-0.0734	0.2325
gdpcg	159	0.0418	0.1112	-0.3915	0.3228
rd	56	0.9176	0.7720	0.0425	2.8223
fdi	178	0.0362	0.0855	-0.1588	0.8744
trade	178	0.9994	0.9059	0.0000	4.4262
expense	178	0.1472	0.1632	0.0000	0.5505
lnrcon	117	26.0248	1.7109	21.5004	30.2474
legal	178	0.6067	0.6310	0.0000	2.0000

Notes: Obs = Number of observations; SD = Standard deviation; Min = Minimum; Max = Maximum

Table 3.13: Correlation Matrix – *Sukuk* – Country-level

	lnsukuk	*hdi*	*educ*	*gdi*	*gii*	*gini*	*infra2*	*epi*	*gdpg*	*gdpcg*	*rd*	*fdi*	*trade*	*expense*	*lnrcon*
lnsukuk	1														
hdi	-0.6590	1													
educ	-0.6463	0.9823	1												
gdi	-0.6209	0.9211	0.9422	1											
gii	0.8190	-0.8477	-0.8991	-0.8178	1										
gini	0.0685	0.2286	0.1764	0.3975	0.0995	1									
infra2	-0.6240	0.8532	0.8338	0.7436	-0.7528	0.1920	1								
epi	0.4743	-0.7831	-0.7556	-0.8112	0.6065	-0.6092	-0.6440	1							
gdpg	0.2546	-0.1870	-0.1633	-0.0538	0.2150	0.4761	0.0119	-0.3114	1						
gdpcg	0.3952	-0.3712	-0.3371	-0.4732	0.2663	-0.3047	-0.1260	0.2504	0.2489	1					
rd	-0.9201	0.8380	0.8137	0.7190	-0.8762	-0.0637	0.7655	-0.5344	-0.4176	-0.3243	1				
fdi	0.1375	-0.3533	-0.3929	-0.2417	0.4808	0.4007	-0.2664	0.2565	-0.0038	-0.0532	-0.1938	1			
trade	-0.1989	0.4684	0.5184	0.3918	-0.5769	-0.3000	0.3539	-0.3794	0.0396	-0.0053	0.2643	-0.9848	1		
expense	0.4455	-0.4443	-0.4857	-0.7165	0.4647	-0.6719	-0.3627	0.7120	-0.3805	0.4714	-0.3082	-0.0580	-0.0801	1	
lnrcon	-0.0172	-0.0632	-0.1292	-0.0080	0.2956	0.4448	-0.0282	0.0985	-0.1722	-0.2081	0.0490	0.9405	-0.9028	-0.0839	1
legal	0.4269	-0.8752	-0.8464	-0.9266	0.5945	-0.6412	-0.7131	0.8829	-0.0872	0.4639	-0.5635	0.1366	-0.2793	0.6824	-0.1093
govindex	-0.6816	0.9474	0.9733	0.8657	-0.9368	-0.0468	0.8004	-0.6512	-0.2524	-0.2650	0.8420	-0.5136	0.6165	-0.3463	-0.2584

Employing different estimation method suggested by the Hausman test for each index, Table 3.14 shows that the volume of *sukuk* issuance has a significant positive relationship with HDI and gini coefficient, while having a significant negative relationship with the gender development index and gender inequality index. This result is slightly different from the results in Table 3.11, which might be due to the structure of the dataset when being aggregated into country-level it has different characteristics. It seems that the result in Table 3.14 is more relevant considering that countries having *sukuk* issuance have not put attention towards gender-related issues. On the other hand, HDI and income equality have been two common measurements that the sampled countries are working on.

Looking at the control variables, the results in Table 3.14 present that it has similar results in Table 3.11, except that growth of GDP per capita has negative relationship with the education index and ratio of private consumption to GDP has positive relationship with the Environmental Performance Index. It can be due to the different structure of dataset affecting the statistical signs.

Table 3.14: Regression Results – Country-level

Variables	***(1)*** ***hdi***	***(2)*** ***educ***	***(3)*** ***gdi***	***(4)*** ***gii***	***(5)*** ***gini***	***(6)*** ***infra2***	***(7)*** ***epi***
lnsukuk	0.00323**	0.00452	-0.00601*	0.0104*	-0.455***	0.00438	0.00152
	(0.00125)	(0.00483)	(0.00361)	(0.00586)	(0.159)	(0.00356)	(0.00212)
gdpcg	-0.00943	-0.144**	-0.0189	0.486*	-1.903	0.0236	-0.0600***
	(0.0136)	(0.0526)	(0.0161)	(0.266)	(3.078)	(0.0255)	(0.0233)
trade	-0.0508***	-0.0321	0.0177**	-0.0982***	2.130	-0.0393***	0.00373
	(0.0153)	(0.0202)	(0.00821)	(0.0232)	(1.458)	(0.0126)	(0.0114)
lnrcon	0.0234***	0.0354***	0.00375	-0.0286*		-0.0171***	0.0261**
	(0.00718)	(0.00985)	(0.00304)	(0.0163)		(0.00535)	(0.0104)
expense	0.0103	-0.0908		0.164	-0.716	0.00979	
	(0.0189)	(0.0710)		(0.136)	(1.444)	(0.0243)	
govindex					-4.336***		-0.000897
					(0.695)		(0.0137)
rd							-0.00278
							(0.0118)
Constant	0.139	-0.296	0.930***	0.937*	43.90***	0.685***	-0.610**
	(0.185)	(0.298)	(0.121)	(0.485)	(2.899)	(0.167)	(0.274)
Observations	116	64	52	61	21	111	51
Number of countries	24	20	19	18	10	24	17
Prob-F	0.0003	0.0000	0.0002	0.0000	0.0000	0.0001	0.0063
R-squared	0.5821	0.5876	0.2542	0.5890	0.297	0.1902	0.4812
Hausman test	N/A	0.0000	0.8601	0.5157	0.9953	0.0000	0.6153
Estimation method	FE	FE	RE	RE	RE	FE	RE

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses

3.7.2. Non-Linear Regression Results for *Sukuk* Market

This study also attempts to examine the non-linear relationship between the *sukuk* market and development indicators by including the squared value of the logarithm of *sukuk* volume issuance in the model. This aims to capture the existence of a threshold for the relationship between the volume of *sukuk* issuance and socio-economic indicators.

3.7.2.1.Issuance-level dataset

Table 3.17 presents the results for the issuance-level dataset and shows that the volume of *sukuk* issuance has an inverse U-shaped relationship with HDI, the education index, and the environmental index. However, it has a U-shaped relationship with the gender development index, the gender inequality index, and gini coefficient.

The results imply that the volume of *sukuk* issuance supports HDI, the education index, the gender inequality index, the gini coefficient, and the environmental performance index before it reaches a certain volume of issuance, which can then reverse the condition. This result may be due to the fact that higher volumes of *sukuk* are issued in countries that have lower values for development indicators; whereas lower volumes of *sukuk* are in countries that have better values for the indicators, as other financial instruments are more developed in these countries leading towards various alternatives for financing. On the other hand, the volume of *sukuk* issuance can lead towards more equal gender development after it reaches a certain volume of issuance.

As for the control variables, Table 3.15 presents that growth of GDP per capita (*gdpcg*) has negative relationship with HDI, the gender development index, the gender inequality index, and the infrastructure index. On the other hand, it has positive relationship with the education index, the gini coefficient, and the environmental performance index. This evidence can be due to the condition that developed countries, categorized by lower growth, already have high level of index for HDI, gender-related issues, and infrastructure (Deb, 2015). On the other hand, countries categorized as developing, shown by higher growth, are aligned to increase the level of education and income equality.

In addition, ratio of trade to GDP (*trade*), research and development expenditure (*rd*), and governance index (*govindex*) have positive relationship with the socio-economic indicators. It

is supported by several studies (*see:* Alam *et al.,* 2016; Arora, 2012; Eastin & Prakash, 2013), explaining that these control variables can encourage the enhancement of socio-economic indicators in a country. On the other hand, government expenditure (*expense*) has negative relationship with the socio-economic indicators that can be due to the inefficiency of disbursing the expenditure towards the development of socio-economic activities and the expenditure composition (Mauro, 1998; Shelton, 2007).

Table 3.15: Non-linear Regression Results – Issuance-level Dataset

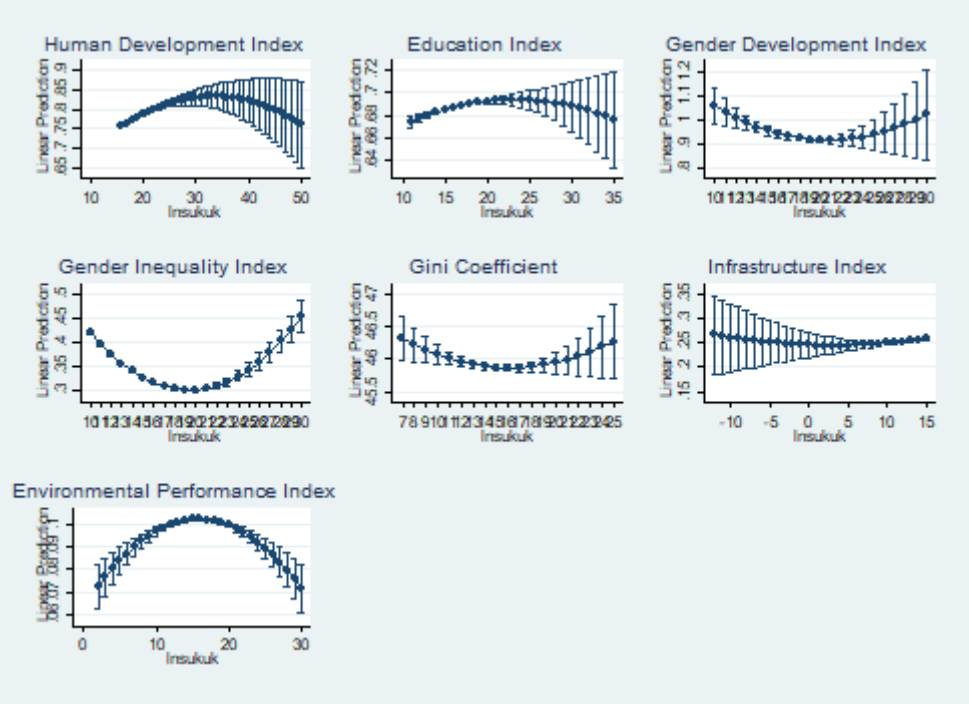
VARIABLES	(1) *hdi*	(2) *educ*	(3) *gdi*	(4) *gii*	(5) *gini*	(6) *infra2*	(7) *epi*
lnsukuk	0.0172***	0.00595***	-0.0516**	-0.0528***	-0.171**	-0.000576	0.00485***
	-0.00147	-0.00224	-0.0219	-0.00265	-0.0811	-0.00172	-0.000816
sukuksq	-0.00026***	-0.000128*	0.00125**	0.00136***	0.00526*	9.45e-05*	-0.00015***
	-4.72E-05	-6.58E-05	-0.000618	-8.32E-05	-0.00272	-5.53E-05	-2.57E-05
gdpcg	-0.0613***	0.0596***	-0.0861*	0.113***	-17.30***	-0.0957***	0.0110***
	-0.00376	-0.00456	-0.0498	-0.00874	-0.484	-0.00449	-0.00176
trade	0.0506***	0.00480***	0.0412***	-0.123***	4.853***	0.0259***	-0.0383***
	-0.00109	-0.00111	-0.0045	-0.00176	-0.129	-0.00192	-0.000668
expense	-0.0933***	-0.0349***		0.117***		-0.0524***	0.167***
	-0.00383	-0.00387		-0.00656		-0.00438	-0.00207
rd		0.0936***	-0.0224***		-3.380***		0.0103***
		-0.00146	-0.00805		-0.238		-0.000827
govindex					1.643***	0.0487***	
					-0.249	-0.00254	
Constant	0.484***	0.520***	1.418***	0.974***	40.29***	0.207***	0.0835***
	-0.0115	-0.0189	-0.193	-0.0213	-0.668	-0.0135	-0.00661
Observations	10,986	3,311	158	5,509	1,710	11,162	7,049
Prob-F	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.299	0.614	0.418	0.516	0.781	0.229	0.577
Adj R-sq	0.298	0.613	0.398	0.515	0.779	0.229	0.576

Notes: *, **, *** denotes 10%, 5%, 1% significance level respectively; Standard errors in parentheses

In order to understand the quadratic relationship between the volume of *sukuk* issuance and socio-economic indicators in a better manner, Figure 3.5 graphically presents the relationships for each socio-economic indicator. As can be seen in Figure 3.5, the volume of *sukuk* issuance has an inverse U-shaped relationship with HDI, the education index, and EPI that is not in line with the environmental Kuznet's curve explaining that financial development will reduce environmental conditions, although it will lead to better values for the indicators after a certain volume of financial development.

In addition, the volume of *sukuk* issuance has a U-shaped relationship with the gender development index, the gender inequality index, the gini coefficient, and the infrastructure index. Considering the direction of the relationship between financial development and socio-economic indicators, only the relationship between the volume of *sukuk* issuance and the gender development index and the infrastructure index show the expected signs. This indicates that the initial issuance of *sukuk* will reduce the values for the gender development index and the infrastructure index, but this relationship will be reversed after a certain volume of *sukuk* issuance.

Figure 3.5: Quadratic Curves Between *Sukuk* and Socio-economic Indicators – Issuance-level



Discussing further the turning point of the quadratic curves, Figure 3.5 presents that there is a different threshold of the volume of *sukuk* issuance for each socio-economic indicator. Figure 3.5 shows that for HDI, the threshold for the volume of *sukuk* issuance is 33, or equivalent to USD 231 trillion, which is at the outside of the maximum volume of *sukuk* issuance included in the sample, as presented in Table A3 in Appendix A. This implies that the current *sukuk* issuance can still support HDI, although it will reduce the HDI value after the threshold, which is based on the equation and sample utilized in this study.

As for the education index, it has a turning point of 23, equivalent to USD 12 billion, which is slightly outside the maximum value of *sukuk* issuance included in the sample, as presented in Table A3 in Appendix A. It may also indicate that the current volume of *sukuk* issuance can support the education index value up to the threshold point, after which it might decrease the index value. In terms of the other indices, they have turning points within the range of *sukuk* issuance included in the study: 20 or USD 920 million for the gender development index; 19 or USD 269 million for the gender inequality index; 16 or USD 11 million for the gini coefficient; and 16 or USD 10 million for the environmental performance index. However, the turning point for the infrastructure index is very low, which implies that there is a weak quadratic relationship between the volume of *sukuk* issuance and the infrastructure index.

3.7.2.2. Analysis based on firm-level annual dataset

This section aggregates the dataset by firm-issuance by annum, and the analysis is presented in Table 3.16 from employing the fixed effects estimation suggested by the Hausman test. The result presents that there is no evidence of quadratic relationship between volume of *sukuk* issuance and HDI.

As can be seen, the relationship between the volume of *sukuk* issuance and the education index and the gender development index are consistent with the result presented as individual issuance. On the other hand, it presents a different sign for the infrastructure index. The result suggests that the volume of *sukuk* issuance will lead to higher unequal gender development before it reaches a certain volume that will reverse the situation.

In relation to the control variables, Table 3.16 presents that growth of GDP per capita (*gdpcg*) has similar result with Table 3.15, except that it has negative relationship with the environmental index. It seems that countries categorized as developed countries, included in the sample, has already put their efforts to revive the environment (Tamazian *et al.*, 2009). Other variables, such as ratio of trade to GDP (*trade*), government expenditure (*expense*), governance index (*govindex*), and expenditure on research and development (*rd*) have negative relationship with the socio-economic indicators. One possible reason is that these control variables widen the gap in the society in accessing the infrastructure to develop their socio-economic indicators (Hamori & Hashiguchi, 2012; Kappel, 2010; Neaime & Gaysset, 2018).

In order to better portray the quadratic relationship between the volume of *sukuk* issuance and socio-economic indicators, Figures 3.6 presents the quadratic curves based on the fixed effects estimation. The turning points for most indices are higher than the average value of *sukuk* issuance, as shown in Table 3.9, which is around 20.0411 or USD 505 million.

Table 3.16: Non-linear Regression Results – Firm-level – Fixed Effect

Variables	*(1)* *hdi*	*(2)* *educ*	*(3)* *gdi*	*(4)* *gii*	*(5)* *gini*	*(6)* *infra2*	*(7)* *epi*
lnsukuk	6.04e-05	0.0152**	-0.00779*	0.0165	-0.0796	0.0213**	0.00442
	(0.00184)	(0.00749)	(0.00432)	(0.0151)	(0.0615)	(0.00898)	(0.00421)
sukuksq	4.84e-06	-0.000364*	0.000165*	-0.000551	0.00222	-0.000430*	-8.30e-05
	(4.80e-05)	(0.000186)	(9.97e-05)	(0.000423)	(0.00171)	(0.000230)	(0.000114)
gdpcg	0.00405**	0.0830***	-0.00687	0.150***	-10.47***	0.00790	-0.0188***
	(0.00197)	(0.0195)	(0.00626)	(0.0576)	(1.317)	(0.00519)	(0.00361)
trade	-0.0359***	-0.0526***	-0.00606	-0.0675***	14.06***	-0.0434***	-0.127***
	(0.00314)	(0.0139)	(0.0124)	(0.0238)	(1.574)	(0.0102)	(0.0218)
lnrcon	0.0467***	0.0805***	0.0169***	-0.114***		-0.0166	-0.0282***
	(0.00311)	(0.0142)	(0.00361)	(0.0252)		(0.0108)	(0.00779)
expense	0.00222	-0.0140*	-0.0103	-0.0767***	27.54***	0.0167*	0.114***
	(0.00163)	(0.00717)	(0.0196)	(0.0264)	(3.491)	(0.00949)	(0.00550)
govindex					-4.766***		
					(0.139)		
rd							-0.0532***
							(0.0197)
Constant	-0.423***	-1.544***	0.573***	3.343***	17.94***	0.516*	1.028***
	(0.0868)	(0.412)	(0.103)	(0.766)	(3.019)	(0.300)	(0.231)
Observations	1,245	650	185	647	277	1,214	770
Number of firms	607	396	140	394	193	590	400
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.9331	0.7831	0.4135	0.1677	0.8467	0.0810	0.6165
Hausman test	N/A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: *, **, *** denotes 10%, 5%, 1% significance level respectively; Standard errors in parentheses

The turning points for each indicator are: 21 or USD 1.2 billion for the education index; 18 or USD 61 million for the gini coefficient; 25 or USD 57 billion for the infrastructure index; and 27 or USD 366 billion for the EPI. After this threshold, the volume of *sukuk* issuance will decrease the values of those indicators. On the other hand, the turning points of 24 or USD 17 billion for the gender development index; and 15 or 3 million are necessary to make the effect of *sukuk* positive towards these indicators. These results may imply that the countries in the sample have experienced better development in the education index, the gini coefficient, the infrastructure index, and the environmental index alongside a higher volume of *sukuk* issuance. However, issues related to gender has not been prioritized for financing.

Figure 3.6: Quadratic Curves Between *Sukuk* and Socio-economic Indicators – Firm-level – Random Effects

3.7.2.3. Analysis based on the country-level annual dataset

To further examine the characteristics of the dataset, this sub-section presents the results when individual issuance is aggregated to the country level, which is the same level as the socio-economic indicators used. Table 3.17 presents the results of random effect suggested by the Hausman test, which shows a significant positive relationship between the volume of *sukuk* issuance and the education index and the gender development index. In addition to the estimation results presented in Tables 3.21, the quadratic curves can also be observed in Figures 3.7.

As for the control variables, Table 3.17 demonstrates that growth of GDP per capita (*gdpcg*) has similar results as in Table 3.16. Variable for ratio of trade to GDP (*trade*) has negative relationship with HDI, that is different from result in Table 3.15. However, *trade* has positive relationship with the gender inequality index aligned with result in Table 3.15. As for private consumption (*lnrcon*), it has positive relationship with HDI, which can be due to the fact that private consumption can complement the public spending to fulfil the socio-economic needs (Lowry, 2013). Governance index (*govindex*) also has positive relationship with HDI, in

addition to the gender inequality index, the gini coefficient, the infrastructure index, and the environmental index. It provides evidence that good quality of governmental institutions can support the development of socio-economic indicators (Adams-Kane & Lim, 2016; Flarin *et al.*, 2014). The positive relationship can also be observed between research and development expenditure and the education index, implying that the expenditure has been provided to support the provision of education infrastructure (Cozzarin, 2006).

Table 3.17: Non-linear Regression Results – Country-level – Random Effects

Variables	*(1)* *hdi*	*(2)* *educ*	*(3)* *gdi*	*(4)* *gii*	*(5)* *gini*	*(6)* *infra2*	*(7)* *epi*
lnsukuk	-0.00143	0.0455***	0.0236**	0.00323	-1.287	0.0110	0.00267
	(0.00680)	(0.0136)	(0.00950)	(0.0505)	(1.991)	(0.0138)	(0.0131)
sukuksq	0.000105	-0.00123***	-0.000548**	-8.75e-05	0.0203	-0.000250	-0.000124
	(0.000156)	(0.000358)	(0.000220)	(0.00118)	(0.0485)	(0.000338)	(0.000341)
gdpcg	-0.0132*	-0.0580	-0.00988	0.304	-2.229	0.0234	-0.0483*
	(0.00764)	(0.0808)	(0.0117)	(0.199)	(3.061)	(0.0237)	(0.0260)
rd		0.0517*					-0.00595
		(0.0273)					(0.0110)
govindex	0.0372***	0.0700		-0.102***	-4.317***	0.0611***	
	(0.0125)	(0.0440)		(0.0361)	(0.802)	(0.0122)	
fdi	0.0370	-0.316	0.0359	0.353		0.0359	-0.0290
	(0.0999)	(0.208)	(0.0344)	(0.371)		(0.0925)	(0.0315)
trade	-0.0302**	0.0184		-0.0734***	2.186		
	(0.0146)	(0.0245)		(0.0279)	(1.452)		
lnrcon	0.0304***	0.0292				-0.00240	0.0255***
	(0.00630)	(0.0243)				(0.00753)	(0.00971)
expense			-0.108***	0.117	-1.566	0.0321	0.0942***
			(0.0223)	(0.147)	(2.717)	(0.0224)	(0.0183)
legal							-0.00669
							(0.0162)
Constant	-0.0226	-0.554	0.700***	0.400	52.08***	0.195	-0.568*
	(0.196)	(0.734)	(0.102)	(0.534)	(19.43)	(0.249)	(0.343)
Observations	112	33	63	72	21	108	51
Number of countries	24	15	21	19	10	24	17
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.6906	0.7239	0.1216	0.5637	0.0189	0.4472	0.5639
Hausman test	0.0000	0.2579	0.3564	0.3052	0.9552	0.5379	0.9926

Notes: *, **, *** denotes 10%, 5%, 1% significance level respectively; Standard errors in parentheses

Figure 3.7 demonstrates a weak quadratic relationship between the volume of *sukuk* issuance and HDI, the gender inequality index, the gini coefficient, the infrastructure index, and the environmental index, which is shown by the straight lines in the graphs. Moreover, the only consistent relationship is between volume of *sukuk* issuance and the education index, which has turning point of 18.5 or equivalent to USD 107 million, which may indicate that countries issuing *sukuk* are also developing their education sector. On the other hand, the relationship

between volume of *sukuk* issuance and the gender development index has a reverse curve compared to the curves in Figure 3.5 and Figure 3.6, which might be due to the aggregation of the dataset into country-level.

Figure 3.7: Quadratic Curves Between *Sukuk* and Socio-economic Indicators – Country-level – Random Effect

3.7.3. Mediating Variable for *Sukuk* Market

This section aims to examine the effect of the *sukuk* market on socio-economic indicators, indirectly, through the financial inclusion index. Table 3.18 only presents the result for equation 3.6, but it provides the coefficients of *sukuk* issuance volume in equation 3.4 at the end of the table. It shows that financial inclusion index does moderate the volume of *sukuk* issuance in affecting socio-economic indicators, presented by the decrease in the values of coefficients for volume of *sukuk* issuance. The result is estimated by random effect estimation suggested by the Hausman test for Column (1)-(3). As for Column (4) and (5), random effect is selected because of other statistical consideration.

Table 3.18 presents the results for the firm-level dataset. They show that the financial inclusion index has a significant positive relationship with HDI, the education index, the gender development index, the gender inequality index, and the infrastructure index. This implies that volume of *sukuk* issuance can impact the value of HDI and the infrastructure index through

financial inclusivity for both men and women—greater participation in financial transactions can lead towards improved ability to access education, health services, and utilize infrastructure.

Table 3.18: Regression Result – *Sukuk – MV* – Firm-level

Variables	*(1)* ***hdi***	*(2)* ***educ***	*(3)* ***gdi***	*(4)* ***gii***	*(5)* ***infra***
findex	0.0862**	0.127**	0.105**	-0.290***	0.683***
	(0.0390)	(0.0637)	(0.0531)	(0.0890)	(0.140)
lnsukuk	-0.000538**	-0.000757	-0.00160	0.00258**	-0.000304
	(0.000271)	(0.000507)	(0.00112)	(0.00105)	(0.00305)
gdpcg	-0.0459**	-0.0236	0.00686	-0.0167	0.219**
	(0.0203)	(0.0325)	(0.0141)	(0.0478)	(0.105)
expense	-0.0604	-0.179*	-0.0929	0.0467	-0.580***
	(0.0805)	(0.101)	(0.0681)	(0.118)	(0.122)
Constant	0.778***	0.696***	0.942***	0.364***	0.131
	(0.0146)	(0.0183)	(0.0336)	(0.0376)	(0.0878)
Observations	238	238	84	238	238
Number of firms	207	207	79	207	202
Prob(chi2)	0.0000	0.0000	0.0883	0.0000	0.0000
R-squared	0.4081	0.3809	0.5395	0.5293	0.5042
Hausman test	N/A	N/A	0.0453	0.0000	0.0000
lnsukuk in equation 3.4	-0.00188**	-0.00332***	-0.00119***	0.0110***	-0.00374***
	(0.000916)	(0.00123)	(0.000459)	(0.00151)	(0.00116)

Notes: *, **, *** denotes 10%, 5%, 1% significance level respectively; Standard errors in parentheses

As for the control variables, Table 3.18 presents that growth of GDP per capita (*gdpcg*) has positive relationship with HDI, but negative relationship with the infrastructure index. It seems that countries with higher growth, classified as developing countries, are still pursuing the infrastructure development (Alam *et al.*, 2016). On the other hand, countries with lower growth, classified as developed countries, has settled with the human development index (Lofstrom, 2009). On the other hand, government expenditure (*expense*) has negative relationship with the socio-economic indices, except with the environment index. The negative relationship can also be observed between ratio of foreign direct investment (*fdi*) and the environmental index. it can be due to the foreign investment has been used to produce more output, consequently hampers the environment (Jalil & Feridun, 2011).

3.7.4. Mediating Variable for Islamic Banks' Characteristics

This study also aims to examine the relationship between banking variables and development indicators, which is mediated through the financial inclusion index. Islamic banking efficiency and stability do not have a direct relationship to the socio-economic indicators. It is expected that the Islamic banking variables, which are net interest margin (*nim*), capital adequacy ratio

(*car*), loan-to-deposit ratio (*ldr*), and non-performing loans (*npl*), will support the socio-economic indicators through the financial inclusion index—more efficient and stable banking operations can provide more financing for society, expanding the development related opportunity space.

To examine the relationship between Islamic banking variables and socio-economic indicators, the dataset is aggregated into a country-level dataset. The results only show that loan-to-deposit ratio (*ldr*) and non-performing loan (*npl*) are able to be mediated through financial inclusion index to have relationship with socio-economic indicators. Tables 3.19 and 3.20 present the results for including loan-to-deposit ratio (*ldr*) and non-performing loan (*npl*) respectively.

Table 3.19: Regression Results for Islamic Banks – MV (1)

Variables	***(1)*** ***hdi***	***(2)*** ***educ***	***(3)*** ***gdi***	***(4)*** ***gii***	***(5)*** ***infra***	***(6)*** ***epi***
findex	0.0255**	0.0303**	0.0134*	-0.235**	0.206***	0.0774**
	(0.0105)	(0.0147)	(0.00739)	(0.0984)	(0.0437)	(0.0345)
ldr	0.00483	0.00749	0.00222	-0.0306***	0.0262	0.000176
	(0.00320)	(0.00474)	(0.00262)	(0.0103)	(0.0315)	(0.0121)
gdpcg	-0.0341***	-0.0481***	-0.00574	0.105	-0.0554	0.159***
	(0.00685)	(0.0102)	(0.00520)	(0.107)	(0.0375)	(0.0311)
trade	0.00631	0.0133*	-0.00318	-0.0544**	0.0199	
	(0.00466)	(0.00688)	(0.00350)	(0.0219)	(0.0283)	
expense	-0.0227**			0.0207	0.00513	
	(0.0106)			(0.0759)	(0.0521)	
govindex						-0.0421**
						(0.0206)
fdi						-0.0135
						(0.0215)
rd						0.00922
						(0.0187)
Constant	0.683***	0.568***	0.902***	0.558***	0.115***	0.0566**
	(0.0198)	(0.0227)	(0.0121)	(0.0431)	(0.0269)	(0.0247)
Observations	137	133	126	122	161	53
Number of countries	30	30	29	29	30	20
Prob(chi2)	0.0000	0.0136	0.0879	0.0000	0.0000	0.0000
R-squared	0.4526	0.4449	0.2951	0.6609	0.4582	0.2493
Hausman test	N/A	N/A	N/A	0.0000	0.0645	0.1668
ldr in equation 3.4	0.00475	0.0105	0.000547	-0.0366	-0.0289	-0.00479**
	(0.00501)	(0.00964)	(0.00670)	(0.0267)	(0.0236)	(0.00233)

*Note*s: *, **, *** denotes 10%, 5%, 1% significance level respectively; Standard errors in parentheses

The estimation for Table 3.19 column (5) and (6) is based on random effect estimation due to the result from hausman test, showing that random effect estimation is better to be chosen compared to fixed effect estimation. As for column (1) – (3), the hausman test does not provide

conclusive result implying that either estimation can be employed which random effect is selected because it is more efficient. As for column (4), the hausman test presents that fixed effect estimation should be chosen. However, the p-value of F-statistic in fixed effect estimation is not significant. As for Table 3.20, the estimation is conducted by employing random effect estimation.

The results show that the financial inclusion index has a significant positive relationship with HDI, the education index, the gender development index, the gender inequality index, the infrastructure index, and the environmental performance index. The result present that financial inclusion index does moderate the banking variables, shown by the decrease in coefficients value of the banking variables between equation 3.6 and equation 3.4.

Table 3.20: Regression Results for Islamic Banks – MV (2)

Variables	***(1)*** ***hdi***	***(2)*** ***educ***	***(3)*** ***gdi***	***(4)*** ***gii***	***(5)*** ***infra2***
findex	0.0390**	0.0368**	0.0170*	-0.311***	0.227***
	(0.0162)	(0.0159)	(0.00893)	(0.0872)	(0.0496)
npl	0.0108	0.00485	-0.00201	-0.0980*	-0.0623
	(0.0093)	(0.0147)	(0.00662)	(0.0566)	(0.0593)
gdpcg	-0.0416***	-0.0595***	-0.00622**	0.151	-0.0696
	(0.0069)	(0.0170)	(0.00260)	(0.132)	(0.0436)
trade	0.0066*	0.0123*	-0.00249	-0.0463**	0.0303
	(0.0040)	(0.00680)	(0.00356)	(0.0226)	(0.0277)
expense				0.0320	0.00697
				(0.0868)	(0.0619)
Constant	0.6776***	0.573***	0.903***	0.554***	0.130***
	(0.0240)	(0.0275)	(0.0144)	(0.0411)	(0.0266)
Observations	117	112	105	105	138
Number of countries	30	30	29	29	30
Prob(chi2)	0.0000	0.0001	0.0548	0.0000	0.0000
R-squared	0.5047	0.468	0.3387	0.6276	0.4443
Hausman test	N/A	N/A	N/A	0.1313	0.0219
npl in the equation 3.4	-0.0584	-0.0522	-0.0129	-0.140	0.241
	(0.0386)	(0.0496)	(0.0330)	(0.107)	(0.207)

Notes: *, **, *** denotes 10%, 5%, 1% significance level respectively; Standard errors in parentheses

The result implies that a better financial inclusion index can lead towards better human development, educational accomplishment, gender equality, income equality, infrastructure development, and environmental performance. In relation to the Islamic bank variables and the financial inclusion index, the results indicate that if Islamic banks are able to undertake their

activities in a more efficient and stable manner, this will support financial inclusivity. As a result, a larger section of society can be served and engage in financial activities. This will help people attain greater socio-economic development, which in turn will result in them achieving a better socio-economic position.

As for the control variables, Tables 3.19-3.20 present that growth of GDP per capita (*gdpcg*) and government expenditure (*expense*) have negative relationship with the socio-economic indices, except for the gini coefficient and the environmental index. On the other hand, ratio of trade to GDP (*trade*) has positive relationship with the socio-economic indices. In addition, ratio of foreign direct investment to GDP (*fdi*) has negative relationship with the environmental index, which can be cause by the use of foreign direct investment to increase production leading towards decreasing environmental index (Ozturk & Acaravci, 2013). As for the governance index (*govindex*), it has positive relationship with the environmental index implying that better governmental institutions can increase the environmental index.

Employing the moderating variables of Islamic banks through the financial inclusion index and rationalizing that the operational activities of Islamic banks can support the development of socio-economic indicators through increasing participation in financial transactions, the results show that Islamic banks with more efficient and stable activities can include more people in financial activities. As a result, this enables more people to obtain financing and increases their ability to achieve better values for socio-economic indicators, such as attending school, having a healthier life, having a higher income, and making better use of infrastructure.

3.8. CONCLUSION, AND THEORETICAL AND POLICY IMPLICATIONS

This chapter has attempted to explore the debate around economic development by discussing the evolution from GNP per capita oriented development towards a set of more comprehensive indicators of development addressing socio-economic development. The concept of development itself emerged due to the gap observed between countries: industrialized countries and countries with agricultural economies, which can be considered least developed or developing countries. This separation is mainly focused on the ability of a country to produce and consume, which is measured by GDP per capita. However, this measurement has started a wide discussion on how development should not only be measured by monetary values of production and consumption.

Adding to the debate, there has been a wide discussion on how the increase in production and consumption has been at the expense of societal development, gender equality, environmental quality, and income equality, which suggests that linear economic growth produces a number of social and development problems. As a result, there have been various formulation of more comprehensive indicators to better reflect socio-economic development premised on the idea that development should not be relegated to the pursuit of income generation, but it should also consider wealth distribution between and within countries and equal opportunities for all stakeholders.

Having said that, it has become apparent that countries that are classified as least developed, in terms of income, also experience shortcomings in other socio-economic indicators. This does not come as a surprise as developed countries have been moving away from sustenance fulfilment towards the essentialisation of socio-economic issues that were neglected during the period of increasing their outputs and income. In order to locate the issues in the global agenda, the UN initiated the Millennium Development Goals (MDGs), aiming at alleviating poverty and improving the quality of life in developing countries. These have been followed by the Sustainable Development Goals (SDGs), which set broader goals to be achieved by all nations, including the developed countries. However, for developing countries to work towards achieving the SDGs, financial resources are difficult to find, which essentialises the importance of finance.

There has been an ongoing discussion regarding the opportunity for Islamic financial instruments to support target fulfilment in relation to socio-economic development, as Islamic finance may be better suited to assisting development of those countries categorized as Muslim countries. In addition, Islamic finance, as an accentuation of Islamic economics, is expected to operate under the objectives of Islamic economics, which essentialises achieving well-being in this world and hereafter (*falah*). This well-being can be achieved through the axioms of unity (*tawhid*), as all creatures are created by God, implying that every creature has to be just towards all others (*'adl*) by ensuring the equal distribution (*ihsan*) of opportunities to reach perfection (*rububiyyah*), without harming other stakeholders and being in harmony (*tazkiyah*). With such a paradigmatic promise, Islamic economics has emerged as a counter-hegemony that essentialises a human-centred development strategy, and Islamic financial institutions have emerged to essentialise the objectives of Islamic economics. The features and peculiarities of Islamic finance, in a theoretical sense, such as the prohibition of interest and the essentialisation

of profit-and-loss sharing and risk sharing, are expected to work towards such development objectives.

In relation to such a paradigm, this chapter aims to examine the relationship between Islamic financial development, represented by the volume of *sukuk* issuance and Islamic banking variables, and socio-economic indicators, such as HDI, education, gender development, gender inequality, the gini coefficient, infrastructure, and environmental performance. Employing different levels of data and estimation, this study provides mixed results. Generally, the results indicate that the volume of *sukuk* issuance seems to have been impacting HDI and the gini coefficient in the country-level dataset, which is aligned with studies by Outreville (1999) and Baddeley (2011). It indicates that *sukuk* has been used as an instrument to provide stability in a country in order to increase HDI and to reduce inequality in the society.

On the contrary, as the results demonstrate, expansion of *sukuk* has also not been able to support the gender development index and the gender inequality index in country-level dataset. This is not in line with the study conducted by Arora (2012), although it can be explained by Eastin & Prakash (2013) who suggest that there can be three stages of effect from economic development on gender development and there is a positive, negative, and then positive relationship in the first, second, and third stages, respectively.

This study also finds that the volume of *sukuk* issuance has not been able to impact the infrastructure index in country-level dataset, which runs contrary to the results achieved in several studies (*such as:* Pradhan *et al.*, 2016; Sassi & Goaied, 2013), which find that there is a positive dynamic relationship between financial development and ICT (information, communication, and technology) infrastructure. One possible reason is that the volume of *sukuk* issuance is relatively small compared to other financial instruments, resulting in a very limited relationship with the infrastructure index. In addition, infrastructure is one of the prerequisites of development and the sampled countries have been increasing infrastructure spending, while the volume of *sukuk* issuance does not necessarily see an increasing trend.

Lastly, this study shows that *sukuk* expansion has not been able to support the education index either, both in firm-level and country-level dataset. In a different context, Wydick's (1999) study on the effect of credit for households on child schooling in Guatemala finds that it has a negative effect because of the family-labour-substitution effect, in which children in the family are asked to work as the credit is utilized for purchasing physical machinery. However, it seems

that the market size of *sukuk* issuance is still relatively small compared to the conventional financial industry, alongside the situation in which countries issuing higher volumes of *sukuk* have lower values for socio-economic indicators.

Further examining the non-linear relationship between the volume of *sukuk* issuance and socio-economic indicators, the results show that it has a U-shaped relationship with the gender development index and the gender inequality index that can be supported by Eastin & Prakash (2013), who find that there is curvilinear relationship between economic development and gender equality. This might provide an indication that the volume of *sukuk* issuance will be able to support gender equality after reaching a particular level of issuance.

Mediating the sukuk market and Islamic banking variable through the financial inclusion index, the results show that financial inclusion can support the human development index, which confirms the findings of other studies (such as: Alam *et al*., 2016; Beck *et al.*, 2007; Demirgüç-Kunt & Levine, 2009; Rewilak, 2013, 2017), as well as the education index, the gender development index, the gender inequality index (Sen & Mukherjee, 2014), the infrastructure index, an the environmental performance index. Hence, more efficient and stable Islamic banks (*see:* Accornero *et al.*, 2017; Berger & Udell, 1994; Cornett *et al.*, 2011; Jiménez *et al.*, 2017; Morgan & Pontines, 2014) and a higher volume of *sukuk* issuance is expected to bring about financial inclusivity, through which more people are able to access socio-economic services, which can increase the development level in a society.

The results from this study show that Islamic financial development has not been able to support nor impact the socio-economic indicators, which is in contradiction with the aspiration of Islamic economics, as discussed above. There are several possible underlying reasons for these findings: firstly, the conditions of the countries included in the sample can be categorized as those of developing countries, which are still striving to pursue development by extensive construction of housing, railroads, and other public infrastructure—these all consume a lot of resources and produce negative externalities (Leichenko & Solecki, 2008). Furthermore, these countries are rich in commodities that are extracted to be utilized by both developing and developed countries, such as the production of rubber, jute, oil, palm oil, spices, tin and phosphate, which also create environmental problems, such as deforestation, depletion of oil deposits, and desertification in Sub-Saharan Africa (Ahsan, 2004; Kula, 2001).

The second possible reason is the inefficiency and ineffectiveness of the state as policy maker and executor of development policy. Muslim countries included in the sample in this study and developing countries and recognized as having limited political legitimacy and lacking democracy (Abootalebi, 1995; Chapra, 2008a; Germeraad, 1993). The absence of democracy has led towards a misuse of resources and manpower, resulting in lower development in socio-economic fields (Yaseen Gada, 2014).

The third possible reason is the nature of the development indicators that are formulated under the hegemony of developed countries, which may not consider the characteristics of developing countries and undermine the ability of a society to solve their own issues, resulting in complications in implementing necessary programs (Easterly, 2015; El-Zein *et al*., 2016; Germeraad, 1993).

The last possible reason is the nature of Islamic financial institutions that operate under neoclassical economics, which is, by definition, ahistorical, static, and focusing on simple technical devices (Brohman, 1995), while Islamic finance has a different ontology and epistemology. Considering that neoclassical economics has been criticized for not being compatible with the nature of development, the operational activities of Islamic finance may face difficulty in implementing its proper duties, such as profit-loss sharing, and has been opting to follow its counterpart by employing fixed-income based instruments (Nagaoka, 2012). As such, the institutional logic of banking, as well as capital markets, shapes the nature and operation of Islamic banks and Islamic capital markets regardless of their inherently moral constructs (Asutay, 2018).

The results in this study also indicate that Islamic financial instruments have the potential to support socio-economic development, which can be a way of accentuating the true aspirations and objectives of Islamic economics. However, the amount of issuance for the *sukuk* market, still requires to be elevated so that it can support socio-economic development. In addition, considering the types of *sukuk* being issued that are mainly for financial and liquidity purposes, there should be a higher volume of *sukuk* issuance for developing health services, education services, network services, and environmental preservation, alongside facilities that can increase people's capabilities of accessing those services, such as equal opportunities of employment and involvement in economic activities. In addition, Islamic banks should operate more efficiently and in a more stable manner by utilizing financial technology, for example, so

that they can reach more people to provide them with better access for development. Furthermore, Islamic banks should also embed their financing activities with the real economy, taking into account all stakeholders, rather than only providing financing for generating profit for shareholders.

Lastly, it should be mentioned that, according to their institutional logic, commercial banking and financialised capital markets are not expected to make a difference to socio-economic expectations as essentialised by Islamic economics. Therefore, in order to have socio-economic impact it is important to consider development-oriented institutional formations, which can help to achieve the aspirations of Islamic economics. Such institutional innovation, however, should not be relegated to traditional institutions and instruments such as *zakat*, *waqf*, and *sadaqah* as contemporary socio-economic challenges requires dynamic institutions that are able to respond to the enormity and expansive nature of contemporary socio-economic problems. Thus, development objectives have to be institutionalised to fulfil the counter-hegemonic nature of the Islamic economics movement.

Chapter 4

AN EMPIRICAL ANALYSIS ON THE CONTRIBUTION OF ISLAMIC FINANCE ON SUSTAINABLE DEVELOPMENT THROUGH CO_2 EMISSION REDUCTION: DEMAND REDUCTION, DE-MATERIALITY AND DEGROWTH FRAMES

4.1. INTRODUCTION

Environmental sustainability has become an essential global matter, which is directly related to the economic and financial sector, and therefore financial institutions must also consider the effect of their activities on environmental well-being. The massive development of manufacturing and transport industries along with the modern consumption culture has led to air and water pollution and environmental degradation including climate change: this damage to the environment stems from the substances being used in the production process as well as direct exploitative environmental practices. Financial institutions are also implicated in these adverse activities by financing the companies who are involved in such activities (Gokmenoglu *et al*., 2015). While the growth of industrial activity is one requirement for a country to have further economic development, a number of initiatives have emerged to reduce the accompanying adverse impact allowing industrial growth to coexist with a lesser demand on resources and a controlled consumption culture. Consequently, with the growing awareness of environmental sustainability, the recent debate has been seeking an optimality between preserving the environment and pursuing the economic growth of a country.

The financial regulators and institutions, including relevant NGOs and public policy makers, have introduced various instruments and mechanism to balance the effect of economic growth on the environment, these include formulating the Socially Responsible Investment (SRI), which aims to provide an alternative investment sphere for investors for stocks being listed in the capital market by applying both positive and negative screening, and including requirements related with environment. In addition, there has been the emergence of the green bond sphere that is intentionally issued to fund projects related with environmental

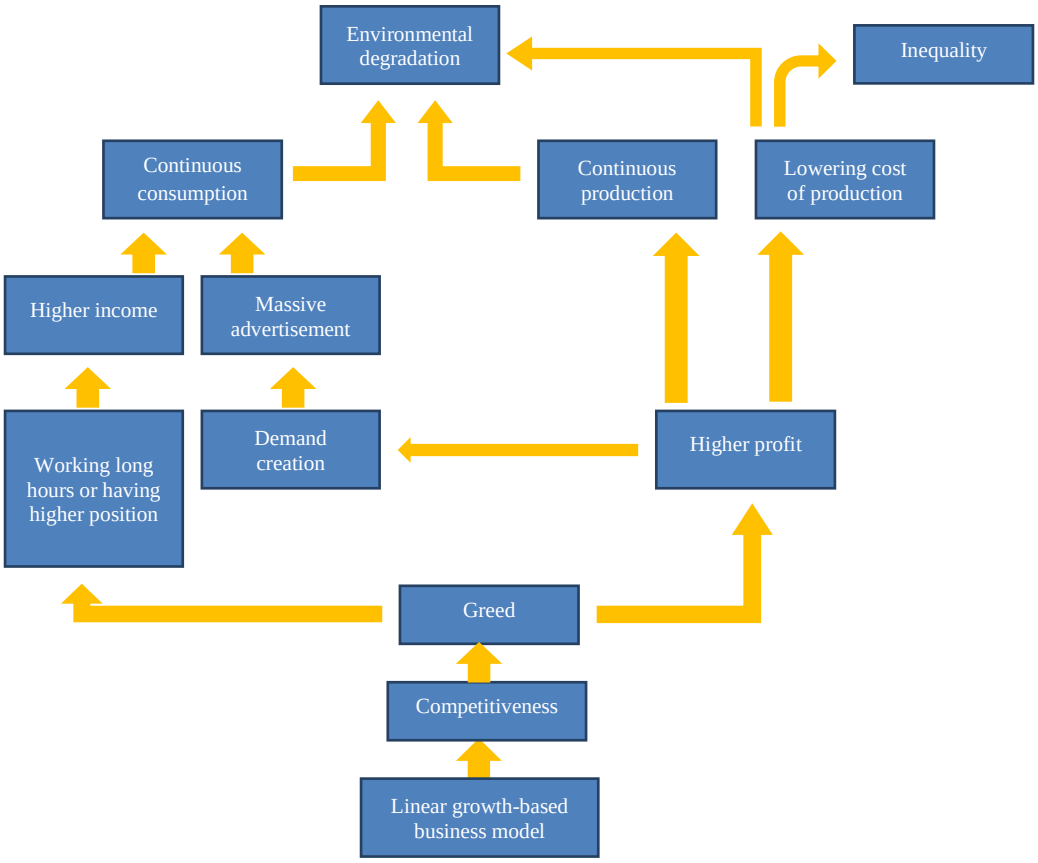
conservation and climate change prevention. Recently, some financial institutions, for example Morgan Stanley, HSB and ICBC have joined the Task Force on Climate-related Financial Disclosures (TCFD), established by the Financial Stability Board (FSB). Furthermore, insurance and pension fund companies such as ING, have joined the ranks concerned that climate change may cause a future of financial crisis and therefore, they have been developing initiatives to work towards reducing the adverse effects of financing projects that can cause further deterioration in environmental quality (Pavoni, 2017).

The discussion of reducing environmental degradation, however, has been mainly within the frame of moderating the consequences of finance capitalism without paying systemic attention to the underlying cause of the observed reduction in environmental quality. For example, the nature of economic growth theories and policies are not reconsidered in such re-focusing process. As argued, among others, by Booth (1998), Jackson (2009), Kopnina & Shoreman-Ouimet (2015) and D'Alisa *et al.*, (2015), the prevailing linear economic growth model assuming that the economy needs to have continual positive growth, should be revised in order to preserve the environment and communities. It is further argued by Kopnina & Shoreman-Ouimet (2015) that sustainability policies alone will not be sufficient to conserve the current condition of the earth, already in a deteriorating state as evidenced by the changing climate. Consequently, as an alternative, a steady-state economic growth theory and policy is proposed, which is premised on three important rules: (i) it is not allowed to extract non-renewable resources faster than the rate of renewable substitutes development; (ii) it is not allowed to extract renewable resources faster than the regeneration rate, and (iii) it is not allowed to emit waste faster than it can be absorbed by the ecosystem (Daly, 1995).

In order to reach the steady-state economy, starting from the current linear growth economy, there is a need for a transition, which can be termed the 'degrowth economy' (Dietz & O'Neill, 2013) so that the impact on the natural resources can be stabilised. Further, Dietz & O'Neill (2013) argue that the concept of degrowth emphasizes the change of systems by understanding that financial systems are a subsystem of the economy; that economy is part of human society and it is all the subsystem of the biosphere, which has always been the claim of moral economy through embeddedness. Thus, financial and economic activities cannot grow exponentially without considering the condition of human society and the biosphere, which might not be able to cope with further expansion. The correction mechanisms to overcome the observed problems require an increase of equitable distribution of income and wealth, the establishment of

comprehensive monitoring systems, the adoption of incremental approach, and an improvement of cooperation and coordination across all levels of government.

Figure 4.1: Flow of Growth towards Environmental Degradation



The degrowth approach has been brought to the agenda to respond to the consequences of the linear growth model with the objective of saving the environment from further degradation. However, there is a deeper effect of the linear growth model, which methodologically essentialises competition and greed within the efficiency and rationality frame: this will accelerate the problems faced. Figure 4.1 further displays that as economic actors consist of households and firms, this effect acts on both sides as firms aim for higher profit continuously, and households pursue higher consumption. For firms to have higher profit to achieve positive growth, the market economy facilitates this by increasing the volume of production and/or lowering the cost of production. Lowering the cost of production is usually done in the factors of production side, such as acquiring the lowest price of material resources, wages for labour, and the cost of capital: this creates income inequality between labour and management within the firms and also in the companies dealing with the factors of production.

In order to absorb the higher volume of produced goods and services, households are expected to have higher consumption, for which demand can be created through increased advertising, as depicted in Figure 4.1, which has become normal in modern consumer society. As part of the institutional logic of the market economy, consumer society essentialises only material well-being implying that owning or consuming more is better. Such a lifestyle leads to the condition in which people put their efforts in to working longer hours so that they can earn more and purchase more goods in order to enhance their social status. However, this only concerns materialistic values and might not lead to enhancement in intrinsic values such as self-acceptance, affiliation and a sense of belonging (Jackson, 2009). All the while creating a tension on the well-being of other stakeholders including the environment. It seems that the current economic system provides a delusional happiness through the acquisition of more material goods, which may not necessarily provide the buyers with the satisfaction they hoped for.

In order for the production and consumption to sustain its growth trajectory, financial institutions have also played an important role by providing the funds for firms and households to carry out their activities. The current economic system, mainly created by debts in the banking system, has led to an ease of obtaining funds leading to higher production and consumption, inevitably resulting in environmental degradation. In addition, the mainstream macroeconomic model has treated the environment as a common factor of production, which can be used and even exploited without considering its social value.

Since the late 1960's a number of movements and discourses have emerged challenging the mainstream assumptions: these range from *Small is Beautiful* by Schumacher (1975) to *Sustainable Development Goals* (SDGs) initiated by the UN and to the Islamic economics and finance movement since late 1960s. As a value based and embedded proposition, Islamic economics and finance responds to the main problems faced in the modern economy by suggesting a human centre development economy in which justice for all stakeholders are essentialised by removing the hegemony of one factor of production, namely capital. It also turns the neo-liberal equation in another direction by considering human well-being as an end in itself rather than instrumentalising humans for economic activity and growth. However, despite being a counter hegemonic movement in its essence (Asutay, 2012), the main institutions developed from the Islamic economics and finance movement have been Islamic banking and finance (IBF), which merely move capital in the same way as conventional banks

and financial institutions but through Islamic metaphors. The performance of Islamic banks and financial institutions demonstrates divergence from the substantive morality of Islamic economics by becoming more financialised rather than serving the interest of the larger stakeholders (Asutay, 2007b, 2012).

Recently, however, Islamic finance has been under the spotlight for its ability to facilitate the achievement of SDGs. The development of Islamic finance, as the financing arm of the Islamic economics movement, has demonstrated a tremendous trajectory in terms of number of Islamic banks and financial institutions and also in terms of the value of its assets. It started with the formation of *Mit Ghamr* in Egypt in 1963 as a social banking experiment, while the modern Islamic banking emerged in 1975 as a commercial banking model based on shareholder value maximisation. At the end of 2017, the value of assets for global Islamic banks had reached USD 1,509 billion coming from 375 registered Islamic financial institutions in 42 countries (The Banker, 2018).

The observed Islamic financial activity has expanded into other spheres beyond Islamic banks, as various countries have developed Islamic stock indexes in their capital markets: these include Jakarta Islamic Index (Indonesia), FTSE SGX Asia Shariah 100 (Singapore), FTSE Shariah (Thailand), Dow Jones Islamic Index (USA), MSCI Malaysia Islamic Index, MSCI World Islamic Index, FTSE Shariah Global Equity Index Series. In addition, *sukuk* market has also developed in order to reap the market for *shari'ah* bond. A number of countries and corporations are now issuing *sukuk* in order to finance their projects and businesses, as well as to attract wider investors.

It should be noted that in its theoretical sense, there are important intersections between ethical finance, socially responsible finance, impact investment financing, SDGs and Islamic finance, as such qualities and features do define what Islamic economics and finance is in its essence (Asutay, 2019). As a value based proposition, the foundation of Islamic finance is located in Islamic ontology, that is Quran and *Sunnah*, which is characterised with the prohibition of *riba*, minimization of *gharar* or uncertainty and the prohibition of *maysir* or gambling along with being founded on risk-sharing and profit-and-loss sharing based principles. As part of *Shari'ah* screening, along with the prohibition on *riba*, *gharar* and *maysir*, the principles of Islamic finance prohibits investment in companies involved in conventional financial products, alcohol, pork, gambling, weapon, and companies with certain thresholds of financial activities

(BinMahfouz & Ahmed, 2014; Derigs & Marzban, 2008) Furthermore, in a theoretical sense, as part of Islamic economics, Islamic finance is expected to fulfil socio-economic objectives: these include ecological consequences with the objective of providing an opportunity space for ecological developments as part of Islamic economics' stake-holding development (Asutay, 2007b). Since all the stakeholders are expected to be treated equally due to *tawhidi* (complementarity and unitary) nature of knowledge and since all the resources are considered *amanah* or held in trust from Allah, protection and development of each stakeholders including the environment is considered essential along with prevention of *israf* or waste: this encourages de-materiality and degrowth with the objective of establishing equilibrium between the interests of different stake-holders.

The development of Islamic financing products itself has been mainly focused on the ability to provide alternative financing in relation to conventional financial products. The focus has been on negative screening of financing contracts, sources of funds, and how the funds are being used. However, it has not dealt with the socio-economic development and environmental issues and sustainability, which requires internalising the consequences of financing activities in the decision-making process. The current practice in Islamic finance is relegated to negative *shari'ah* screening, which ensures the *shari'ah* compliance of financial products and screens the stocks being listed in the capital markets. However, as opposed to such form-oriented concerns, the substance related objectives have yet to be achieved in the Islamic finance sector which include environmental concerns. *Shari'ah* screening criteria, hence, still allows investment in companies with environmental consequences such as projects related with oil and gas production, exploration, and distribution: these are prohibited by the Socially Responsible Investment (SRI) criteria (Renneboog *et al*., 2008).

Under the pressure of global development as well as with the ongoing criticism raised against the Islamicity of Islamic finance, the sector is searching for 'its authentic soul' with the development of green *sukuk,* Islamic bonds that are structured for financing carbon-conscious related projects (Aassouli *et al.,* 2018). The first green sukuk was issued in 2012, known as Orasis *sukuk.* The proceeds were to be invested in assets for solar energy production (Richardson, 2019). Richardson (2019) also mentions that there are several green *sukuk* being issued by Malaysian corporations and Indonesian government in 2015-2019, such as *sukuk* Tadau and *sukuk* QSP being issued in 2017 and *sukuk* SKSB issued in 2018. These are used for financing solar photovoltaic plants, and the Indonesian green *sukuk* issued in 2018 with the

proceeds being used to finance projects related with climate change mitigation. Malaysia has also provided SRI *sukuk* guidelines for *sukuk* permitting only finance projects related with environmental preservation and protection, energy conservation, promotion of renewable energy, gas emission reduction, and quality life improvement (Moghul & Safar-Aly, 2014). In addition, as mentioned by Moghul & Safar-Aly (2014), *sukuk* has also been used by Australian solar companies to finance photovoltaic projects in Indonesia. Although it has not been extensively utilised, green and SRI oriented Islamic finance has a promising future, since countries in the Middle East and North Africa (MENA) are eager to develop renewable energy projects. Moreover, Saudi Arabia has specifically mentioned that they have been developing King Abdullah City for Atomic and Renewable Energy, along with United Arab Emirates or UAE that has a vision of diversifying its economy by increasing share of non-oil sector to 64% of GDP by 2030. All these policies suggest an increasing opportunity for Islamic finance to move away from the capital dominant paradigm to essentialise its inherent social responsibility.

This paper, hence, aims at examining the impact of Islamic finance on the fulfilment of Islamic moral economy objectives in terms of de-materiality and degrowth: it has the objective of identifying the sustainable development impact of Islamic banking in the form of CO_2 emission levels. In doing so, CO_2 emission is considered as an initial sustainable development benchmark for de-materiality and degrowth, and the impact of Islamic financial expansion on CO_2 levels is empirically examined by developing the following research questions:

(i) What is the rationale for de-materiality and degrowth in Islamic economics?

(ii) What is the relationship between expansion and development of Islamic finance and CO_2 emissions?

(iii) Is there a significant difference in the CO_2 emission reduction produced by the sectors being financed by Islamic banks?

(iv) Is there a significant difference between the different modes of financing used by Islamic banks on CO_2 emissions?

In an attempt to respond to these questions, a model developed by Sapkota & Bastola (2017) is used, which has been further developed to examine the relationship between Islamic financial development and CO_2 emissions in countries where there is a significant and systematic Islamic

banking presence. Considering the distinctive features of Islamic banks, the equation observes the relationship between financing activities of Islamic banks and the CO_2 emission by including GDP per capita, population, and the legal system of each country.

The rest of the paper is organised as follows: Section 2 explains the theoretical framework of degrowth and de-materiality rationalization. Section 3 provides further theoretical framework of Islamic moral economy in constructing the de-materiality concept, followed by the empirical studies of financial development and carbon emissions in Section 4. Section 5 stipulates the research method and data, while Section 6 discusses the results. The paper ends with Section 7 as the conclusion.

4.2. DEGROWTH AND DEMATERIALIZATION: EXPLORING THE THEORETICAL FRAMEWORK

The current economic system has been operating under the framework of an expansive economy or positive growth, implying that the volume of output has to grow annually so that it can absorb employment led by increase in capital accumulation and technological advancement. The volume of output is represented by GDP, which measures the aggregate monetary value of goods and services being produced (or consumed) nationally. In its inception, it was measured by Gross National Product, which was claimed to be a convenient measurement at that time. However, since the monetary value of goods and services has become the main focus of the economic system, the growth of GDP becomes the objective of all activities.

There has been wide discussion regarding the drawbacks of GDP being used as the measure of economy activity: for example, GDP does not distinguish whether the increase in GDP results in positive or adverse consequences. Several negative consequences of focusing on GDP are: externalities of economic activities on environment, resulting in environmental degradation; dis-embeddedness of financial and economic activities from the society and biosphere; and disregard the income distribution within nation (O'Neill, 2015a; Victor, 2015). Moreover, the increase in GDP can be due to the commercialization and commodification of many assets contributing to GDP basket rather than the production as understood in traditional practices. Thus, economic growth itself should not become the primary policy objective, as this can distort the importance of fulfilling other objectives, such as well-being and prosperity.

Measuring economic development through GDP does not account for the externalities including the negative impact on the environment. The problem occurs despite a number of correction and moderating mechanisms that have been developed by market economy. For example, as stated by Grossman & Krueger (1995), it is expected that countries with high level of growth, shown by high level of income per capita, will have lower carbon emissions caused by more sophisticated technological advancement to create cleaner industrial process, higher consciousness regarding the social responsibility for environmental impact, or the shift from manufacturing and industrial activities into the services sector which might have lower impact on environmental degradation. In other words, under the market system, higher income level is expected to eventually correct the environmental consequences.

As to tackle the environmental impact while still being aligned with the positive growth, the issue of sustainability has been raised as a concern towards preserving the environmental quality for future generations. Many countries and companies have started to implement sustainability plans for their production and consumption as a consequence of the SDGs movement: activities include developing more environment-friendly energy and fuel, technology for cleaner energy consumption, and raising awareness in society regarding more environmental-friendly habits and activities. Several regulations have also been initiated to reduce the effect of economic activity on carbon emissions, such as imposing a tax on carbon emissions and plastic shopping bags, applying emissions trading, and introducing cost-benefit analysis and contingent valuation (Nordhaus, 2013; Smith, 2011).

As opposed to a linear growth economy, under the conditions of a circular or closed-loop economy, sustainability and waste reduction can be achieved by engaging in product-life extension activities, such as reusing, repairing, reconditioning or upgrading, remanufacturing and recycling (Brennan *et al.*, 2015). This is in line with the promotion of durable goods production and consumption rather than the fast fashion trend. In addition, there has been the notion of decoupling, implying the use of less resources for the production process by emphasizing more efficient technologies (Jackson, 2009). However, these activities will still produce waste and heat for the environment, as explained under the law of thermodynamics that (i) energy and matter cannot be created or destroyed, and (ii) the entropy will increase over time in any isolated system (Kerschner & O'Neill, 2015). Taking into account that planet Earth is an isolated system, the entropy from all the economic activities, namely production and consumption, will increase over time. Moreover, considering that the environment has its

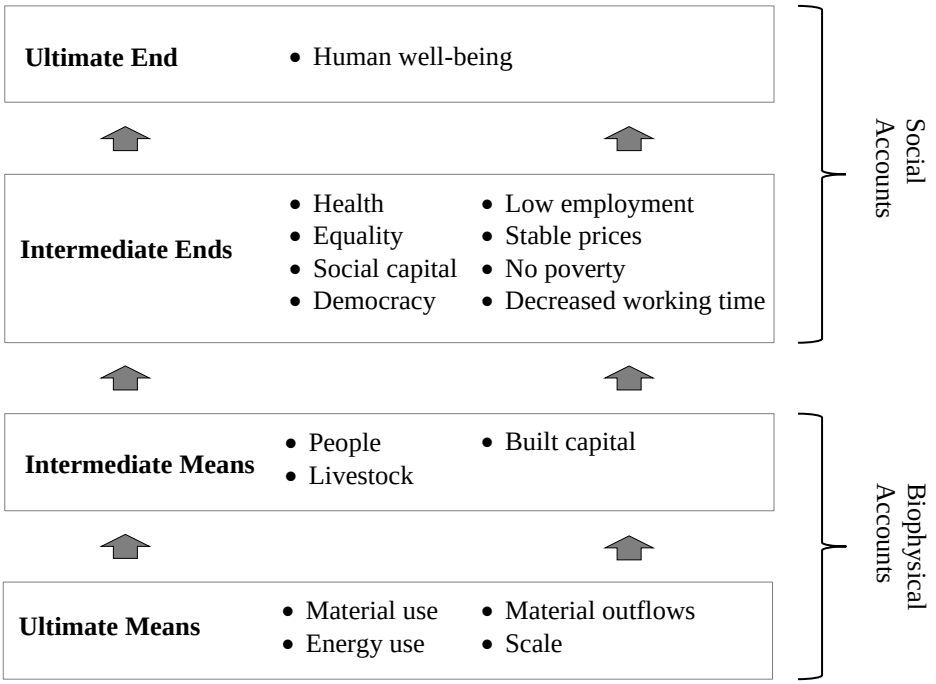
metabolism system, such as the regeneration period, extracting the natural resources will create increasing environmental decline.

Having said that, the mainstream approach of correcting the adverse environmental consequences will not be adequate to deal with the environmental degradation and carbon emissions: it merely focuses on moderating the consequences. However, paradigms such as 'degrowth' should be considered as an alternatives, which essentialises that growth does not always have to be positive or economic activities always increasing: the volume of production and consumption does not necessarily have to have an increasing trend (D'Alisa *et al*., 2015). The general aim of the degrowth paradigm is, hence, to decrease social metabolism to a sustainable steady state level by decentring growth.

4.2.1. Components of Growth under Degrowth Framework

The concept of degrowth attempts to reconstruct an economic system that has been dominated by the capitalist view: this has diverged from the value base of society, as economics, in its essence, should be a science of human beings in the community (Skidelsky & Skidelsky, 2012). It should consider the interest of all the stakeholders (Asutay, 2012) including the environment rather than serving the markets. In a system analysis, the economy is considered as a subsystem of the biosphere, which implies considering environmental resources as something that can be extracted extensively without considering its metabolism and so creating imbalances. This implies that material, energy and scale are the ultimate means for further production to take place, as presented in Figure 4.2. However, there is a limit for their extraction in the face of unlimited consumption habits. While the use of resources aims to respond to needs resulting in human well-being (O'Neill, 2015), the sustainability of resources remains a huge difficulty in the face of the 'delusional needs' that the modern society imposes.

Figure 4.2: The Indicators in the Degrowth Accounts



Source: O'Neill (2015:1214)

As can be deduced from Figure 4.2, in relation to this means-ends conception, economic growth is not an end in itself, it is one of the necessary conditions for the ultimate ends to occur. This implies that the economic system under the degrowth paradigm includes other indicators which should be considered in the economic and financial decision-making system: these include biophysical (*e.g.* energy use, carbon emissions, ecological footprint) and social indicators (*e.g.* happiness, health, equity, poverty). However, it cannot be deduced that since degrowth necessitates reduction in growth, it will not necessarily result in an increase of happiness; on the contrary, at least, as a paradigm it will not decrease happiness. As a paradigm, it could lead to a decrease in income inequality, increase mobility, existence of work sharing (freedom and reproductive), improved environmental aspects (natural space), which are indeed all sources of happiness.

Considering that the current system paradigm essentialises economic growth regardless of human well-being and happiness, the degrowth paradigm essentialises human well-being as the ultimate end by instrumentalising material well-being for this end: it takes into account intrinsic values, such as self-acceptance, affiliation and sense of belonging (Jackson, 2009). Additionally, it is claimed that after certain level of income, economic growth does not have a positive relationship with HDI (Easterlin, 1974). Thus, as part of degrowth theories, production

that is only related with material well-being should be reduced, since it does not contribute to higher human happiness, and yet will still consume natural resources in order to run the production process (Dietz & O'Neill, 2013; Sekulova, 2015).

Having said that, under the existing capitalist framework, however, reducing the production will lead to lower employment, which eventually might create social recession in the society. Additionally, the companies will also have lower profit, implying lower investment on technological advancement. Further implication will be that societies would no longer benefit from improvements in technology and healthcare which have been experiencing rapid growth in recent decades (Nordhaus, 2013). Thus, degrowth, by definition require a new paradigm with its own modes of production, value definition and distribution theory (Asutay, 2018b).

4.2.2. Characteristics of Degrowth

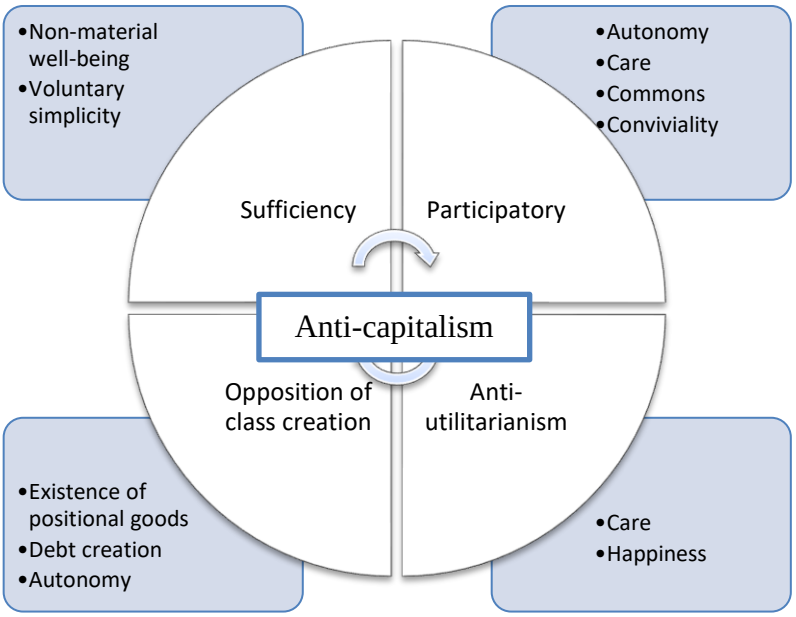
The degrowth paradigm can be defined as the attempt to rebuild the current economic system in order to achieve social equity and environmental sustainability (Brand-Correa & Steinberger, 2017; Garcia, 2012). In doing so, the paradigm features several characteristics, which situate it under the framework of anti-capitalism. These features can be grouped into 'sufficiency', 'participatory', 'opposition of class creation' and 'anti-utilitiarianism' (*see:* D'Alisa *et al*., 2015), as shown in Figure 4.3.

Among the listed features, 'sufficiency' can be explained as the condition of 'having enough' in order to achieve a higher degree of happiness: there is evidence that happiness only increases up to a certain level of income growth (Easterlin, 1974). As argued by the degrowth concept, the preposition of material well-being proposed by the capitalist framework, having a higher income and the ability to consume a higher monetary value of goods and services, cannot be supported in the face of the socio-economic and environmental consequences. In a broader sense, the degrowth paradigm opposes the assumptions of capitalism's framework, and its glorification of material well-being. Thus, the paradigm challenges the neo-classical model that accumulation of wealth and growth in consumption is the only way for human beings to progress and develop (Blauwhof, 2012).

Another component under sufficiency that is presented in Figure 4.3 is 'voluntary simplicity' as a way of life that pursues non-materialistic sources of satisfaction and meaning (Alexander, 2015). By implementing non-material well-being and voluntary simplicity, it will then be

possible to reduce the demand for material consumption resulting in a lower production of material goods and services. Consequently, it will lower the use of natural resources and also the energy circulation in the biosphere: it will be conducive to lower environmental degradation. In addition, lower emphasis on material well-being will support a more equitable society: a reduction in materialism will reduce competition.

Figure 4.3: Characteristics of Degrowth



Source: D'Alisa *et al.*, (2015); modified

As heavily argued by Marxists as well, the capitalist economic model also leads to 'class creation' and 'class segmentation': different classes evolved due to the existence of the labour division leading towards the separation of capital owners and the working class (Andreucci & McDonough, 2015; Cutillas *et al.*, 2015; Skidelsky & Skidelsky, 2012). Thus, capitalism is defined through its capital accumulation and capital hegemony. This has resulted in the dependency of the working class on the capital owners, making the latter the dominant class in society. As the operational mechanism of such a system, capital has become the main source of debt creation leading to the emergence of 'indebted individual' (Lazzarato, 2012). The capital owner will not provide their capital without any return leading to the emergence of a sustained debt culture as the main source of economic activity. In addition, the creation of positional goods in the capitalist economy sustains class distinctions which is a concern in terms of social harmony (Jackson, 2017; Skidelsky & Skidelsky, 2012). Thus, the degrowth paradigm opposes class creation so that social equity and environmental sustainability can be

achieved (D'Alisa *et al.*, 2015). By treating the interests of human and other stakeholders as equal, degrowth paradigm suggests that there should be autonomy and cooperation among them rather than a domination from one part, which can be human and human relationship or human and other stakeholders relationship, with others (D'Alisa *et al.*, 2015; Skidelsky & Skidelsky, 2012). As a result, for example, natural resources and labour will be seen as equal counterparts with the capital owner, which implies that the rights of none of the stakeholders should be undermined: this will lead towards social equity and environmental sustainability (Asutay, 2018b).

The neo-classical paradigm relies on the notion of 'utility maximization', suggesting that individuals will maximize their utility function in consuming goods and services within their budget constraints, while firms will maximize their profit within their operational frontier. Utility is defined as the level of satisfactions that can be provided by the goods and services consumed by human beings rather than their volume (Jackson, 2009). However, the utility measurement is difficult and therefore different proxies have been developed. Neo-classical economics measures utility as the monetary value of the goods and services for which the consumers are willing to buy out of their income. It leads to the inconsistency of behaviour between happiness-based measure of utility and expenditure-based measure of utility. It seems that utility does not serve the fundamental purpose of measuring the quality of satisfaction, but instead utility relegates quality satisfaction into monetary value that can be equated with the happiness of human beings. Moreover, aggregating individual utility is not equal to social utility, indicating that the maximization of individual utility might hamper others' utility: self-maximisation does not consider other stakeholder's interest as can be seen in the social and ecological imbalances.

The degrowth paradigm is at its heart anti-utilitarian (Romano, 2015), as depicted in Figure 4.3. The anti-utilitarianism argues the importance of social bond, unlike the utilitarian argument that emphasizes on self-interest explaining that compensation for losers is not required as long as the total utility is at maximum. This is proposed as the paradigm to be pursued involving the idea of care towards others and individual happiness. It is argued by many that 'care' and 'happiness' have been neglected by the market system, since they cannot be quantified in terms of monetary value which can then be accounted into GDP. Consequently, social relationship and reciprocity are absent from society under a market economy, which can, directly and indirectly, obstruct human and social well-being leading to a disembedded condition (Polanyi,

1944). By essentialising that one cannot maximize one's own utility without having probability of creating negative spill overs on other individual and stakeholders' interests; in contrast the degrowth paradigm's objective is pursuing social well-being in general without foregoing other stakeholders' well-beings.

Another assumption of capitalism is importance of individual 'self-interest', which neglects the social nature of human beings in the initial decision making by leaving such expectations to post-decision making as a corrective mechanism and does not allow for the altruism that creates structural integration (Asutay, 2018a). The idea of individuality as a result of rationalism has led to several crises, including financial and environmental crises, since in the market economy, greed and the importance of self has been the sole goal of economic activities: this was evident in the global financial crisis in 2008. In contrast to capitalism's emphasis on individual self-interest, the degrowth paradigm proposes the participatory principle within society and natural environment that is presented in Figure 4.3. This principle of participatory can be derived into 'autonomy', 'care', 'commonality', and 'conviviality' propositions of the degrowth paradigm. Autonomy can be defined as the ability of people to provide decision for themselves independently and consciously although it cannot be equated with independence: the conscious aspect of autonomy should be understood as consciousness towards other relationships that form life in its everydayness (Deriu, 2015).

The participation in society that has been put aside is 'care', which is defined as the daily activities for people's own well-being or for the community (D'Alisa *et al.*, 2015). Considering that economic growth models of neo-classical economy only account for activities that have monetary values, caring activities are not able to be included in the formal account of economic activities: this discourages people in the society carrying out these caring activities that are supposed to be necessary for human and society well-being (D'Alisa *et al.*, 2015). As a corrective mechanism such actions are left to the welfare state and civil society (Asutay, 2018a). Further, the relationship within a society should be formed under the character of 'commons', defined as a shared responsibility and governance system that is not based on money and legal contracts (Helfrich & Bollier, 2015). The degrowth paradigm suggests that there should be social understanding and commitment towards the activities and responsibilities that will be shared within society. This can lead towards dematerialization as the community will cooperate in production and consumption resulting in lower use of material and less demands on the environment (Johanisova *et al.*, 2015). When the individuals as part

of society acknowledges that they are supposed to cooperate and share with each other, they will put their effort into finding the balance between enjoying the use, value and exchange value, called 'conviviality' (Deriu, 2015). It constructs the understanding that modern tools should be used in a shared manner without instruction from a particular group of experts.

4.2.3. Implementation of Degrowth

After identifying the main features of the degrowth paradigm, it should be noted that it has three broad goals, that is to 'reduce the environmental impact from human activities', 'redistribute income and wealth within and between countries', and 'promote the transition from materialistic towards convivial and participatory society' (Cosme *et al.*, 2017). It is argued, among others by Kallis *et al.*, (2012), that these goals can be achieved by promoting lower production, lower private consumption, and increasing leisure and well-being. However, under capitalism, lower production and consumption implies lower growth which is seen as a crisis or a collapsing state, a condition that is certainly not preferred by the market system (Blauwhof, 2012; Garcia, 2012). Therefore, under the current social and political framework, the degrowth paradigm seems to be unfeasible and the proponents of market economy also suggest that it might not be environmentally effective due to the unintended rebound effects and economic inefficiency (van den Bergh, 2011).

Having said that, several works have attempted to demonstrate the activities and implementations that can be employed to achieve degrowth. For example, a softer or weaker form of degrowth can be implemented through dematerialization, that is reducing the use of material consumption by having more efficient production processes so that the economy can still grow (D'Alisa *et al.*, 2015). Another weaker form of degrowth is by establishing product-life extension activities, such as reusing, repairing, reconditioning or upgrading, remanufacturing, and recycling (Brennan *et al.*, 2015). It is under the notion of circular economy that waste can become the input for another process, which is thermodynamically impossible; however, there will still be 'waste' and heat emitted from the production and consumption processes resulting in negative spill over impact on the environment.

Although it is considered as the soft tone of degrowth, dematerialization is an important part of essentialising the degrowth paradigm, when it is accentuated as an attempt to change the consumer lifestyle that currently prevails and being pursued by the global society (Bodenhorn & Ulturgasheva, 2017; Gutowski *et al.*, 2017). The implication is that dematerialization should

not only be seen as increasing material efficiency, while continuing to increase production and consumption. Instead, it has to begin with material efficiency, added to energy efficiency, material demand reduction, an increase in product's durability, and promotion of pro-ecological behaviour (Fletcher, 2017; Kasser, 2017; Worrell & Carreon, 2017).

Pro-ecological behaviours (PEBs) are activities related to the efforts at reducing environmental impact, and including recycling, green purchasing, reducing consumption, and sharing resources (Kasser, 2017). This study argues that PEBs have positive relationship with personal well-being, which implies that engaging in PEBs can increase the satisfaction of psychological needs and then increase personal well-being. Additionally, it is suggested that people with good mood, who have intrinsic values, mindfulness, and act towards 'voluntary simplicity' have higher engagement with PEBs. It indicates that well-being is not always represented with material ownership, and well-being co-exists better with environmentally sustainable behaviour. Another attempt in examining the PEBs can be found in a study, for example, by Whitmarsh *et al.*, (2017) which compares PEBs in Brazil and the UK; and the results show that PEBs are more frequently being practised in Brazil. However, there is little recycling activities in Brazil which can be explained by the lack of the necessary infrastructure. Additionally, their findings show that dematerialization behaviours are more apparent in Brazil than in the UK, which can be due to the different production methods and characteristics of the two countries.

In addition to the PEB, several methods can be conducted to implement the framework of de-materiality, such as charging prices or taxes on goods and services that require a heavy use of material, and providing subsidies and incentives for using more durable materials as well as developing new resilient materials to promote more environmental sustainability leading towards lower material turnover (Aidt *et al.*, 2017; Fletcher, 2017; Gutowski *et al*., 2017; Kallis, 2017). Further, de-materiality can be pursued by implementing a sharing economy for various activities, including sharing heavy equipment and electrical tools within a neighbourhood, or more widely through online platform systems (Frenken, 2017). With lower material use, it is expected that it will also reduce the use of energy and resources, which the energy and technology to process the materials can be replaced by human labour since the scale is manageable (Gutowski *et al*., 2017).

Having outlined activities that can be conducted to implement de-materiality, the execution requires significant effort from people and society, as material goods have been symbolic

attributes within a society which considers more material to be better (Fletcher, 2017; Gutowski *et al*., 2017). Understanding this concept, there is the need for a shift from focusing on objects towards having a frugal lifestyle and enjoying relational goods: this can begin by focusing on basic needs through recomposing consumption (Gough, 2017; Kallis, 2017). There should be an effort for transformative changes in supply and demand and to shift the consumer preferences by inducing conscious purchasing which promotes sustainable consumption (Marteau, 2017; Prabhu, 2017). A study by Roberts *et al.* (2017) show that 53% of adults regretted purchasing their electronic devices.

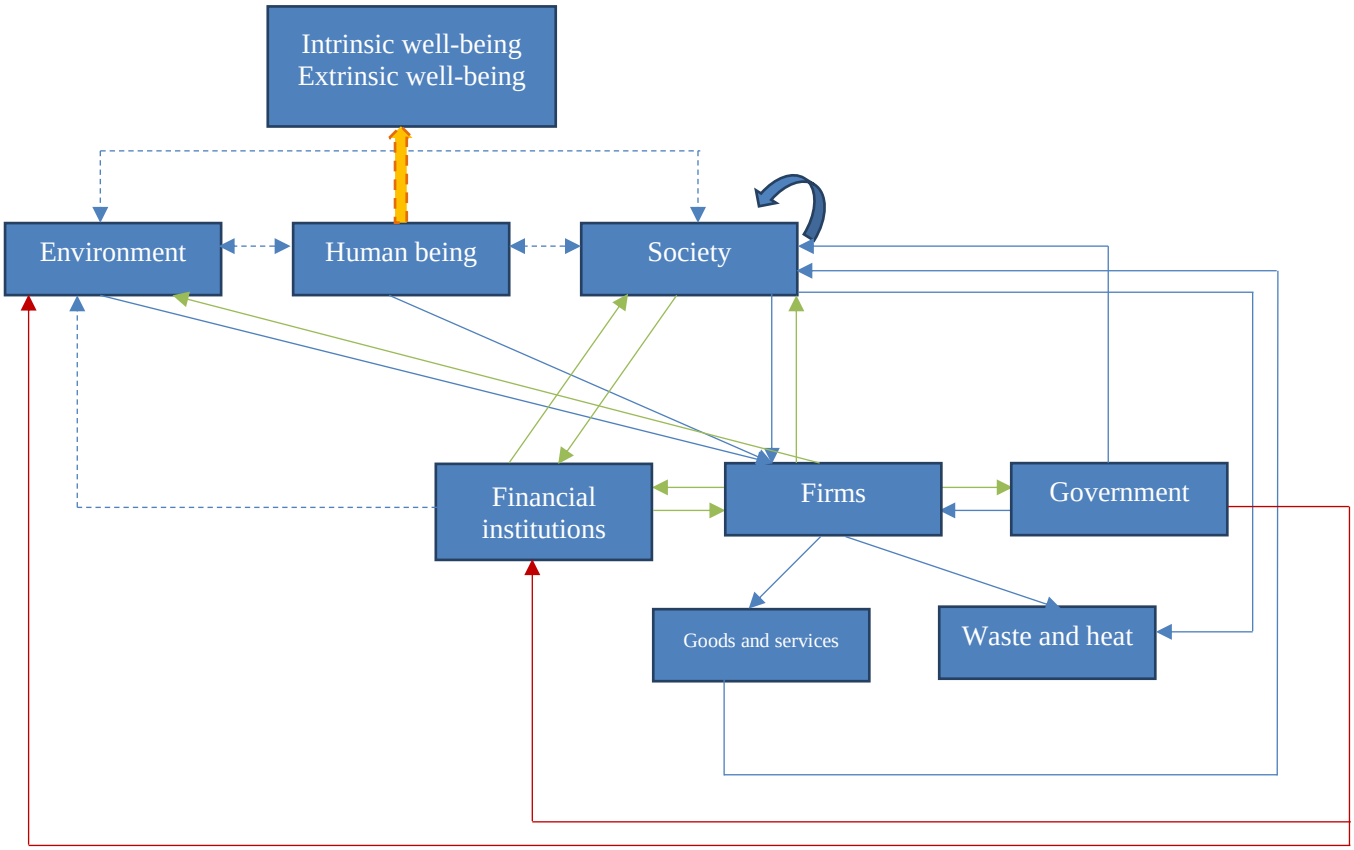
The implementation of dematerialization shows that the effort of being environmentally sustainable cannot be conducted individually, as it is interlinked with environmental elements and society at large; this involves institutions such as financial institutions, firms, and government. In other words, as suggested in Figure 4.4., the activities encouraged by the degrowth paradigm should involve the participation and interaction of all stakeholders. As can be seen in Figure 4.4, such activities can be categorized into community-level activities, working activities, income, consumption, financial activities, government policy and population (*see:* Bregman, 2018; Brennan *et al*., 2015; Dietz & O'Neill, 2013; Jackson, 2009, 2017; Kallis *et al*., 2012; Rezai *et al.*, 2013; Skidelsky & Skidelsky, 2012). One of the efforts that can be performed by society is to recycle, reuse, and reduce, as shown in the circular arrow in Figure 4.4.

The basic proposition is that the intrinsic and extrinsic well-being of human beings is the ultimate end of the degrowth paradigm (Buch-Hansen, 2018; Cosme *et al*., 2017), which can be moderated by intermediate ends constructed within society and the environment that are supported by institutions such as financial institutions, firms and government. It implies that society, the economy and financial systems are part of a biosphere indicating that there should be no dominating power among the stakeholders. As presented in Figure 4.4, the environment is included alongside with human beings and society, interacting with financial institutions, firms and governments, and they will produce the goods and services to be consumed, and waste and heat are the residual from the production and consumption process.

The role of people and society in the integrated system developed in Figure 4.4., which represents the degrowth paradigm is through essentialisation of local living, cooperatives, and local or community-based social enterprises: the aim is to maintain social metabolism and

increase the involvement among the stakeholders (D'Alisa *et al.*, 2015). By doing this, it can also raise awareness from the society regarding the urgency of changing the culture of consumerism and moving towards sustainable consumption in order to preserve natural resources and reduce the emission of waste and heat. In addition, there should be support from firms by decreasing the number of advertisements, which previously aimed to persuade society to consume ever more goods and services; hence, ethical advertisement should be considered (Jackson, 2017).

Figure 4.4: Factors of Production in Degrowth Concept



It should be noted that reduction in consumption might hamper the goods and services being supplied from the firms' side, forcing the firms to reduce their production, as presented in Figure 4.4. In this model, every party is connected in the system so that a change in one component will affect other parts. In addition, reducing production will lead to unemployment, which is necessary for the firms to change their perspective by implementing work-sharing and a reduction of working hours (Bregman, 2018; Gough, 2017; Schor, 2014). Reducing working hours will help to maintain the volume of production and absorb unemployment: this will lead more leisure time for employees so that they can get involved with social or community

activities for their own individual well-being as well as for social welfare. Shorter working hours, will lead to a more stable and sustainable life, maintaining the regeneration rate within the social metabolism. Moreover, these changes need to be supported by the revision of the objectives of business in relation to their view of production and profit. Rather than maximizing production and profit, the degrowth paradigm aims to provide a particular function for customers. Another business model that can be implemented is to increase the employee-owned companies, in which there could be higher involvement of employees in the firms and companies resulting into lower conflict of interest over increasing a companies' profit or individual gain.

Furthermore, the work-sharing can be accompanied by the provision of a basic income in order for the individuals to fulfil their basic needs. These are defined as universal, final, not part of some other goods, and indispensable, and include as health, security, respect, personality, harmony with nature, friendship, and leisure (Alexander, 2015; Jackson, 2017; Skidelsky & Skidelsky, 2012). Alongside this, there is also a need to reduce the income gap in society to eliminate class creation: the implication is that important and necessary jobs are not defined by the material rewards attached, but from their wider benefit towards society and environment.

The 'financial system and institutions', should be reconstructed away from the current mainstream financial system: a start should be made with money and debt creation (*see:* Gough, 2017). The ability of commercial banks to create debt and the existence of interest rates on money leads towards a fictitious economy. A positive or linear growth economy has to operate in order to payback this debt and its interest (Dietz & O'Neill, 2013). Thus, it will be necessary to re-embed the economy and financial system into society (Asutay, 2018a) and the biosphere using activities such as community banking, non-debt money, zero interest rates, and the establishment of local currencies. Moreover, financial institutions have to include ecological elements within their operational activities, such as investing in cleaner technology, as shown in Figure 4.4 where financial institutions eventually affect the environment.

Under the prevailing reality of nation states, none of these activities can be operated without the interactional and regulative power of 'government' as depicted in Figure 4.4. Thus, government should be able to provide policies that can support the degrowth paradigm for the improvement of society at large as part of public policy. For instance, by implementing a 'cap and share' on resources and CO_2 for individuals, firms or even the state so that the equal

distribution can be achieved. Moreover, government can also contribute through the generation of public finance and the provision of basic needs for society.

4.3. ISLAMIC MORAL ECONOMY TURN: ESSENTIALISING DEMAND REDUCTION, DE-MATERIALITY AND DEGROWTH

The previous section discussed the newly emerging degrowth paradigm for environmental and social sustainability, which is based on an anti-capitalism framework. In this section, the discussion turns to the Islamic economics framework in understanding the need for generating a moral economy paradigm with social-economic and environmental optimality whereby a distinct model of production and its consequent social formation is explained. In doing so, the parallelism of Islamic economics or IME with degrowth and de-materiality is also discussed.

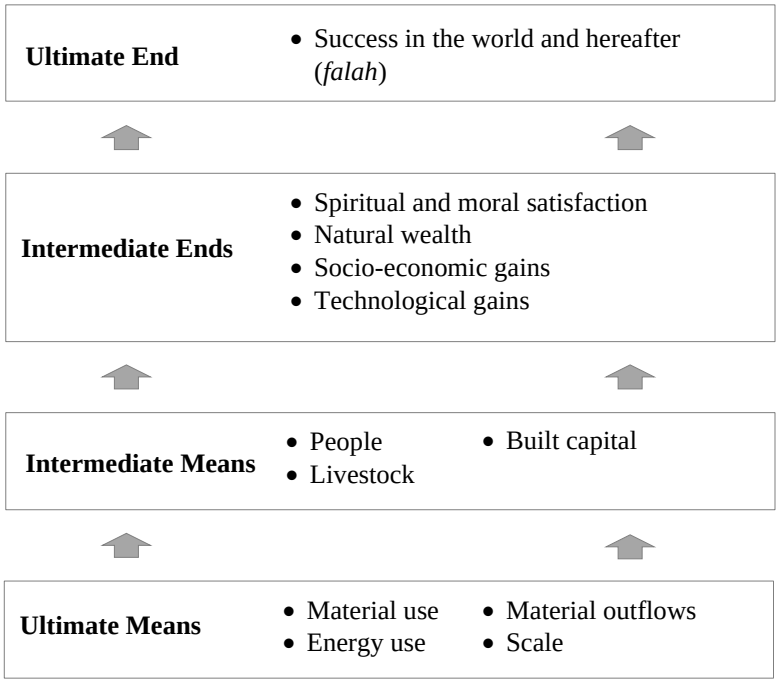
Islamic economics' distinct ontology and epistemology is derived from the revealed knowledge of Islam, namely Qur'an and Sunnah. This shapes the meaning and institutions of everyday life, including economic activity that governs the relationship among factors of production and all other stakeholders (Asutay, 2015). Under the notion of IME, these economic activities, along with other activities and tasks, have to support the ultimate aim, achieving *falah* or salvation in this world and hereafter in a two-dimensional equilibrium by essentialising *ihsan* or beneficence for social equilibrium (Asutay, 2012, 2018b).

As depicted in Figure 4.5, in order to achieve the ultimate end, namely *falah*, several intermediate ends must be achieved. These are spiritual and moral satisfaction, natural wealth, socio-economic gains, and technological gains. In these intermediate ends, IME does not only put its emphasis on human and material well-being, but also on the well-being of other stakeholders on the earth and the social relationships within the society: it predicates that all the stakeholders on earth have the same level of importance, and therefore in an interactive manner each is expected to support the sustainability of the others (Asutay, 2018a). Considering such an extended and proactive view of stake-holding, it is clear that the current market system has been in an unattainable position from the objectives of IME.

The market system views natural resources as sources of extraction rather than treating them as the 'ultimate means' for producing the 'intermediate means', as depicted in Figure 4.5, which the ecology is not part of consideration in calculating the monetary value of production and consumption or GDP (Abdul-Matin, 2012; Al-Jayyousi, 2012). Furthermore, the

environmental crisis was partly also caused by the institutional logic of the materialistic society that promotes consumption of material goods for solace; this is also encouraged by the volume of advertising which all promote the notion that having more is better. This is a result of the institutional logic of market economy being based on linear growth and maximisation. Such a structure is also supported by the endless credit or loans offered by financial institutions to finance consumption. According to this institutional logic continuous consumption is a necessary condition to absorb the products of continuous production. This is a result of industrialization and the phenomenon of not pausing for equalizing the social metabolism (Foltz *et al.*, 2003). In a broader economic and financial system, the system has created the commodification of public goods, fictitious loans created by the banking system, and the domination of capital resulting in the existence of an economy that only belongs to the powerful people or countries resulting in domestic (between the citizens) and international (between the countries) asymmetries (D. L. Johnston, 2013).

Figure 4.5: Means-Ends Relationships under Islamic Moral Economy



Sources: O'Neill (2015); Asutay (2018b)

The environmental and social crisis seems to be caused by the domination of one party over others, such as human towards other stakeholders and capital owners towards labour or the working class (Orwell, 2000; Schumacher, 1975). This violates the main axiom of Islamic economics, that is *tawhid* (complementarity and unitarity), which states that since God created the earth and everything that inhabits in it, by definition none of the creatures or stakeholders

can have power or control over the others: rather they should complement each other in reaching the ultimate objective in a unitarity manner (Asutay, 2012, 2018b). In other words, it implies that there is no domination between people, plants, animals, air, water, land as all depend on each other for their survival and everything is part of the web of life within the unitarity by complementing each other (Abdul-Matin, 2012). This is presented in Figure 4.5

In order to manage the physical world, human being are chosen as the representative (*khilafah*) on earth: their main task is to act as stewards and to take care of other stakeholders by utilizing their intellect, skills and the moral wisdom (D. L. Johnston, 2013). Human beings were created to have intrinsic value and it is their souls that distinguish human from non-human: they must be productive and independent in actualising their potential abilities without being supressed by the capitalist or socialist system (Abdul-Matin, 2012). Human beings are also created to have a dual nature, both selfish and altruistic: the first is in relation to their needs and wants, while the latter is defined as the capacity of human being to look after other stakeholders of the earth (Al-Jayyousi, 2012).

As everything on earth belongs to Allah, which is trusted (*amanah*) on human beings, they have the responsibility to ensure that everything has equal access to the resources as justice or '*adl* has to be ensured in all activities. This implies assuring the best, and not the maximised, use of resources (Asutay, 2007a; Naqvi, 1994). In relation with other human beings or society, individuals have to promote relationships between people by removing oppressions with the recognition that material possessions are means not an end. In most cases of oppression, the essentialisation of material possessions cases the oppression (Abdul-Matin, 2012). Consequently, there is a need to redefine the concept of capital so that it does not undermine the value of human beings: this stems from the existence of class creation which implies that capital owner dominates the economic activities (Asutay, 2018a).

In relation to the environment within IME paradigm, human beings have to understand the characteristics of nature in order to be the best vicegerent or *khalifah* of Allah on earth: nature has its own regularity, order and meaning, and this internal coherence has to be respected (Al-Jayyousi, 2012; Foltz *et al*., 2003). Nature is also a creature of Allah and is held *amanah* or in trust from Allah. Human beings do not have the right to possess or destroy nature and it must be treated with respect. Any transformation of natural resources has to have purpose and meaning: this might be as a source of food, shelter, and or as a means for nurturing human

souls. In IME, the environment, similar to any other stakeholder, must be given the necessary opportunity and space to develop (Asutay, 2012, 2018b). Thus, human beings are not supposed to dominate the nature, which expressed in *khilafah*; the concept of *'adl* (justice) should also be applied in the relationship between human and all other stakeholders.

The principle of justice (*'adl*), as another axiom of IME, suggests that all the interests of all the stakeholders in every form should be sought for equally (Naqvi, 1994). In addition, when justice cannot deliver for the right, the axiom of beneficence (*ihsan*) aims at ensuring that those creatures or stakeholders who are in a better position should be able to help others to reach similar opportunity spaces to develop (Asutay, 2018b). This is predicated on another axiom, namely *rububiyyah*, which implies that Allah created all creatures with a path for perfection, and therefore justice and beneficence aims to ensure that everything should be able to reach their own perfection as the intermediate means of achieving intermediate ends and eventually their ultimate end (Ahmad, 1994; Naqvi, 1994).

Taking into account these principles, it is expected that human and other stakeholders live in balance (*mizan*) and harmony (*tazkiyah*), respecting each other and understanding the unity (*tawhid*) among them. In other words, *tazkiyah* or 'growth in harmony' suggests that one's actions should be in line with the interest of other creatures and stakeholders so that balance or *mizan* can be achieved as intended by *tawhid*.

As a methodological basis, IME is predicated on *maqasid al-Shari'ah* or the objectives of *Shari'ah*, which is defined as 'well-being of creatures' (Chapra, 2000). This implies that whatever activity including economic and financial activity is conducted must be in line with the well-being of all the stakeholders and creatures within the axioms stated so far. As stated by Asutay & Yilmaz (2018), *maqasid* constitutes the main methodological thrust in producing IME by rendering the substantive morality to the form based *fiqhi* approach.

Consequently, as the IME axioms state that natural resources have to be respected: they should not be wasted through overconsumption, polluted, which can spoil ecological balance, there should be no harm done to other life in the process of fulfilling human beings' needs, and finally there should be no creating of arbitrary and meaningless products, the only purpose of which is enjoyment (Foltz *et al*., 2003). Future generations must also be considered, and the use of natural resources should not undermine the rights of future generations to live a healthy and meaningful life: IME refers to intra and intergenerational equity (Ahmad, 1979; Naqvi,

1994). Such a state is proposed to be achieved by implementing the principle of *zuhd* (simplicity or sufficiency) in everyday life and not elevating the pursuance of material well-being. As a consequence there is a reduction in the use and outflow of materials and energy (Al-Sadr, 2010). This is suggested to be achieved through scaling down the ultimate means, which will, accordingly, scale down the pressure on the environmental capacity to harbour the waste and heat coming from the production and consumption processes.

Following the explanation of axioms under the IME paradigm, it can be inferred that the economic activities should be embedded or submerged in the value system of the society: this suggests a social formation expressed within Islamic morality (Asutay, 2018a). Further, the economic activities have to be ethical that is based on Islamic value system, should incorporate reciprocity within society and encourage community-based economy without violating the individual's right to develop their own selves. IME also promotes a sharing, participatory, and redistributive economy in which people in society can have the opportunities to contribute to the economic activities and empower each other to develop as individuals and as a group (Asutay, 2018b). This can ensure that Islamic economics develops an intergenerational and intragenerational economy in which economic activities can be sustained and provided equally within society and for future generation (Ahmad, 1979; Naqvi, 1994).

The necessary financing for IME should take place through the operational activities of Islamic finance, such as prohibiting *riba*, essentialising profit-loss sharing, risk sharing, and asset-based financial transactions (Asutay, 2018a). By focusing on the risk sharing and the real economy, IME emphasizes that human being and society are the centre of economic activities by considering other stakeholders without any domination from any factors of production, particularly the capital; the prohibition of interest aims to overcome the hegemony of the capital to establish equal representation with other factors of production (Asutay, 2018a). With this understanding, *falah* is the ultimate end that needs to be achieved by human being through the implementation of *adl* (justice), *ihsan* (beneficence), *tazkiyah* (harmony) so that *tawhid's* objective of unitarity and complementarity between all the stakeholders on earth in the operational of economic activities should be ensured (Asutay, 2018b).

Looking at the aims of IME for achieving *falah*, it can be seen that GDP growth is only one of means to achieve it. As discussed above, the degrowth paradigm also attempts to shift the conception from focusing on GDP growth to achieving human well-being. Just as the principles

of IME essentialise justice and harmony among stakeholders, similarly, the degrowth paradigm also suggests that factors other than capital, for example people and natural resources, should be treated as the ultimate means. Within financial activities, IME promotes the use of profit-loss sharing and discourages the use of debt; again, the degrowth paradigm also proposes a sharing economy through cooperatives and a lesser use of debt. Thus, there is a close proximity between IME and degrowth and de-materiality: in fact, the latter can be seen as a sub-set of the IME paradigm. The objective function and each of the axioms of IME essentialises harmony (*tazkiyah*) between all the stakeholders: each of the stakeholders were created with a path to perfection (*rububiyah*) and justice (‘*adl*) can only be ensured if they are treated according to their path to perfection. Thus, the philosophy of degrowth is in line with the IME paradigm.

In sum, considering the abovementioned principles, Islam suggests demand reduction and de-materiality in order to save the earth and rebuild the relationship between humans and other stakeholders. It also in agreement with the degrowth paradigm’s concern for reducing the environmental impact and restoring the social metabolism between human-human and human-nature relationships.

4.3.1. Expected Implementation of Islamic Moral Economy

Theoretically, IME governs the production and distribution among the agents of economic activities within Islamic modes of production, which incorporates substantive morality in every aspect of activity. Considering the principles and axioms that have been discussed in the previous sub-section, economic activities should incorporate essential micro equality, moderation, prohibition of envy, compassion, spending on others, and still put the effort into achieving productivity (A. Zaman, 2010).

As regards to the relations among the factors of production, as depicted in Figure 4.6, IME suggests that they have the same level of importance and there is no dominant relationship between human beings, capital, land, the environment and society. For example, the prohibition of interest (*riba*) is intended to overcome the hegemony of capital owner over labour (Asutay, 2018a). It should prevent indefinite growth which is a product of interest being charged on loans. Since money that is lent has to grow, this can only be achieved by positive and linear economic growth requiring the unsustainable exploitation of labour, productivity and natural resources. Accordingly, the relation between human beings, environment, society, firms and financing institutions as the capital provider, should be one of equality by having partnership

contracts rather than an employer-employee relationship. It can be implemented through profit-loss sharing, self-employment, and relation of masters and apprentices among the parties. It can be inferred from Figure 4.6 that every party is interlinked, and that production and consumption will create waste and heat, which eventually affects all those involved; therefore, IME aims at harmony between all these stakeholders to prevent such consequences.

The abolition of interest can also lead towards the discouragement of putting a higher portion of income into savings and investment with lower risk for the gain of self-interest. Rather, it promotes a more equitable distribution of financial resources by considering principle of living in simplicity or sufficiency. It will be understandable that everyone has to bear risk to obtain any profit, and not only by generating money from money (Chapra, 1985). In addition, by reducing the importance of the positive growth required but instead understanding the unity (*tawhid*) of all stakeholders, all elements in society are no longer in a race to be the biggest and most profitable institution. As a result, justice (*'adl*) and harmony (*tazkiyah*) are the aims for labour and natural resources in the part they play in fulfilling human needs.

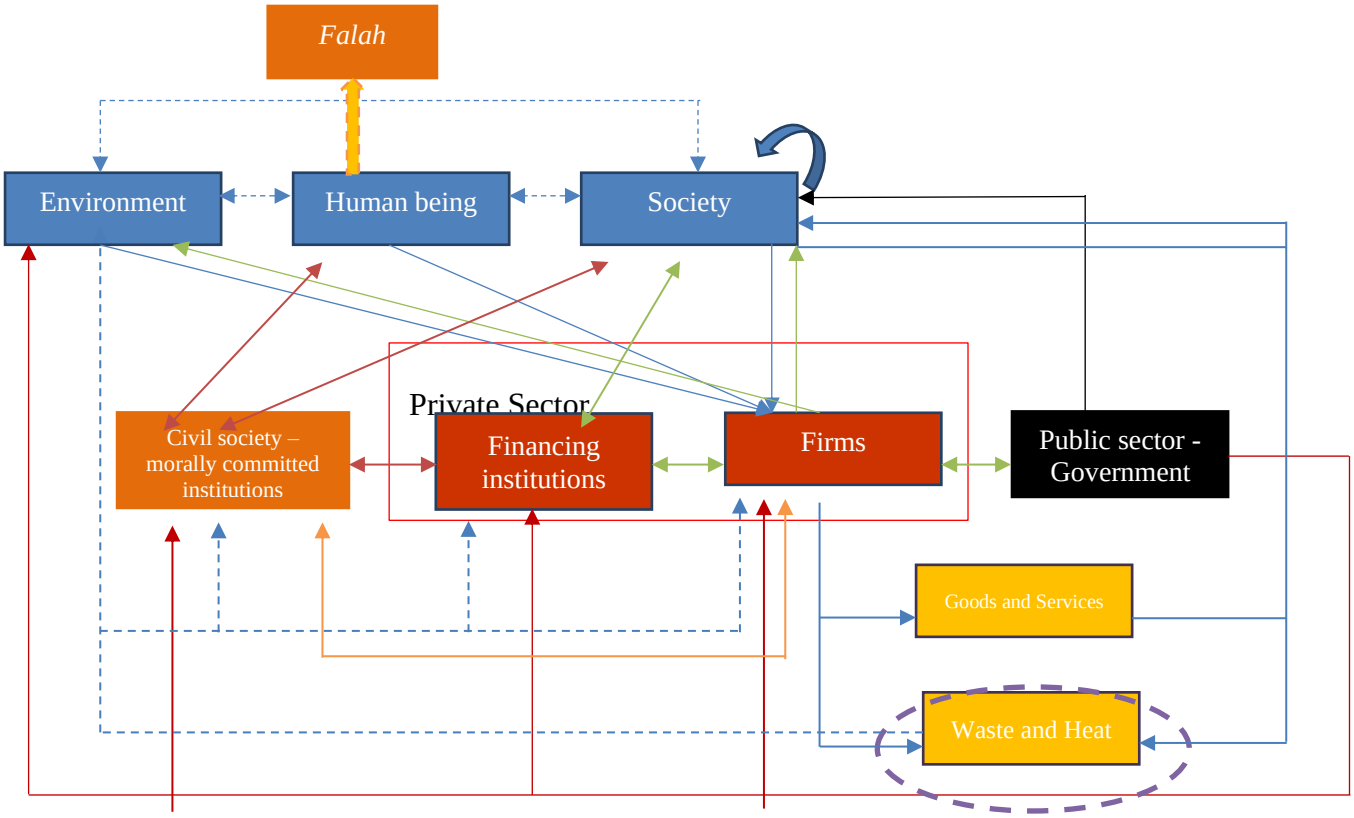
Considering that people are individually accountable in front of the God due to *khalifah* nature, the individual has an obligation to put their efforts into utilizing their capability to fulfil the basic needs, such as health, education, food, housing, and the provision of opportunities for employment, for themselves and their family (Zaman, 2010). If the individual is incapable of providing these basic needs, then society needs to help as suggested by *ihsan* or beneficence. The government therefore can have its role in ensuring the fulfilment of basic needs.

It should be noted that the proposed paradigm suggests that government has an important role in constructing public policy to ensure the well-being of its people and natural resources, for instance by providing security for people, regulating the working conditions, setting the moral filter for the private sector, regulating the circulation of money, and ensuring the use of natural resources so that it is sustainable for the future generations. These are depicted by the arrows from the government sector in Figure 4.6. Government can generate revenues from *zakat* and *ushr*, land tax (*kharaj*), natural resources tax, and customs duties on imports goods (A. Zaman, 2010). These revenues can then be used to build an infrastructure that supports stakeholders' well-being, the provision of healthcare, education, and opportunities for employment.

If government provides several benefits for society and there is no requirement for positive or linear economic growth, firms or employers can provide the basic income in accordance with

the work conducted by the employee without exploiting and violating the labour: This is in agreement with the principles of *tawhid* or unitarity and complementarity, justice (*'adl*), and harmony (*tazkiyah*). The private sector can operate within the market environment, which Islam is not opposed to, as long as it incorporates the moral and social filters and the principles of IME (Ahmad, 2004) implying that market exchange is methodologically defined by IME.

Figure 4.6: Factors of Production in Islamic Moral Economy



The private sector is not expected to operate under the neo-classical market system of self-maximising, which should not be the main focus of human and nature relationship, thus the *ihsan* or beneficence in terms of establishing social equilibrium can be exercised through morally committed individuals and institutions (Tag el-Din, 2013) in a structured manner. As part of *ihsani* social capital (Malik, 2018), *infaq* or giving for sake of Allah includes provision of *zakah* (compulsory alms giving after certain threshold of wealth and income) as the right of the society from individual wealth, *waqf* (pious trusts or foundations) and other charitable institutions, non-profit organization (NGO), and other voluntary organizations with different purposes: these can operate to ensure equitable distribution of wealth and income within and between countries by essentialising *ihsan*. Such institutions as part of civil society constituted by morally committed institutions as depicted in Figure 4.6 interact with human beings, society,

private sector, and government. This interaction will also emit heat and is affected by the heat produced by the economic activities, shown by the dotted blue lines.

The last of the stakeholders, and often ignored, is the earth and its environment. It should be included within economic activities. They have a social metabolism that needs to be maintained and respected identified by the *rububiyah* and *tazkiyah* principles, as shown in Figure 4.6. Considering the current damage on earth, it will not be sufficient if the economic activities only scale down material use while encouraging continuous consumption: there will always be wastes and heat produced from every single activity on earth. Thus, energy, produced and consumed, should be taken into account when conducting economic activities.

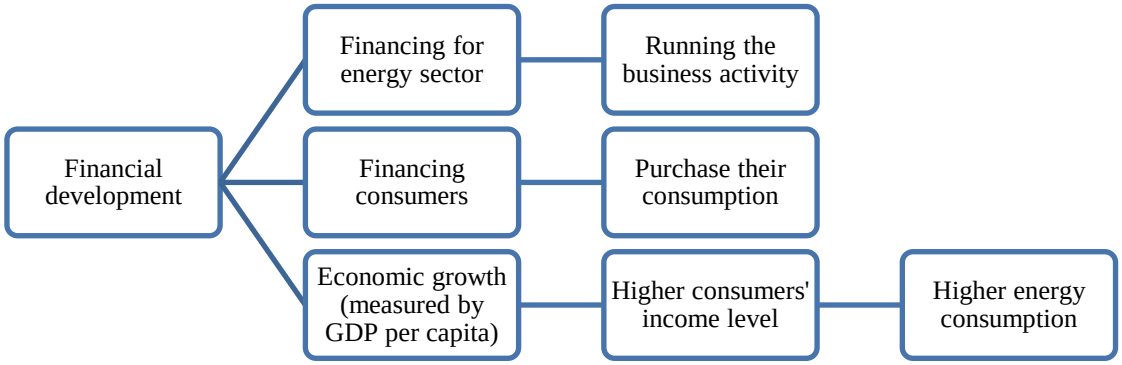
In conclusion, in line with the debate generated in this section so far, as identified in Chapter 1 and the beginning of this chapter, this paper aims to empirically test the main contentions of the debate presented here in the case of Islamic finance by proxying the degrowth and de-materiality through CO_2 emission reduction. This chapter so far has rationalised the case as to why CO_2 emission reduction should be part of IME paradigm, and hence should constitute one of the objectives of Islamic banks. In the following sections, initially a survey of empirical studies on financial development and CO_2 emissions presented following an econometrics analysis examining the relationship with CO_2 emission and Islamic banking and Islamic capital markets (*sukuk*) developments.

4.4. EMPIRICAL STUDIES ON FINANCIAL DEVELOPMENT AND CO_2 EMISSIONS

This study examines the contribution of financial institutions on degrowth and de-materiality through environmental quality/dis-quality, that is represented by carbon emissions or CO_2 : the volume of CO_2 has to be maintained at a certain level for the environment to be categorized as healthy and to balance the social metabolism. Figure 4.7 presents the mechanisms by which financial institutions can affect the environment directly and indirectly: the former can occur when finance is provided for the energy sector to run their business activity which will increase energy usage (Furuoka, 2015). This use will further increase when banks finances consumers to purchase their consumption needs whereby it creates a debt-based economy. This inflated demand results in excessive production and consumption leading to increased CO2 and also depletion of resources and environmental degradation. In addition, the indirect effect can occur by inducing economic growth through credit provision, as economic growth is reflected in

higher income per capita leading towards higher production and consumption and greater energy consumption (Furuoka, 2015).

Figure 4.7: Financial Development on CO_2 Emissions



Source: Furuoka, (2015:431, modified)

The studies related to economic growth and environmental impact have been hypothesised from the work of Kuznets (1955), explaining that economic growth and income inequality forms an inverted-U curve. Building on that hypothesis regarding the expansion of economic activity or economic growth and environmental impact, a number of empirical studies were conducted. One such research by Grossman & Krueger (1991; 1995) resulted in the Environmental Kuznets Curve (EKC) demonstrating that there is an inverted-U curve relationship between GDP per capita and several indicators of environmental health such as urban air pollution, oxygen regime in rivers, and metal contamination of rivers. It suggests that when countries experience the first stage of economic growth, they have more pollutants due to the expansion in industrial and manufacturing activities. As the countries become richer, they will have the ability to create more sophisticated technology which could reduce the pollutants: this assumes the development of a higher consciousness regarding social responsibility.

Utilizing different dataset and methodology, different results are obtained in studying the empirical relationship between financial development and carbon emissions. Employing the Asian dataset for 1980-2012, Furuoka (2015) finds that there is a long running equilibrium relationship between financial development and energy consumption with a unidirectional causality from energy consumption towards financial development implying that an increase in energy consumption leads towards higher financial development in Asia.

Using the dataset from Turkey for the period of 1976-2012, Gokmenoglu *et al*., (2015) found that the unidirectional causality moves from financial development towards carbon emissions implying that the increasing activities in financial transaction leads towards higher carbon emissions in Turkey. This supports the argument that financial development provides better access to financial transaction for consumers. The unidirectional causality was also observed in the case of Pakistan from 1971-2011 by Abbasi & Riaz (2016), who found that the efficiency of financial intermediation and stock market Granger caused per capita CO_2 emissions: these can be caused by better financial development leading to lower financing cost and an increase in the investment of production capacities to increase production.

In order to have broader perspectives regarding financial development and carbon emissions, some empirical studies have made an effort to examine the inverted U-shaped constructed theoretically by Kuznets in 1955. Utilizing global data from 1980-2010 and by classifying the countries based on income level, it is found that financial development lowers the carbon emissions in high-income countries, while emissions have an increasing trend in middle- and low-income countries (Nasreen & Anwar, 2015). The existence of the Environmental Kuznet's Curve is also confirmed in the case of United Arab Emirates (UAE) using data from 1975-2011, as Charfeddine & Khediri (2016) evidenced that there is an inverted U-shaped relationship between financial development and carbon emissions in the UAE.

Apart than financial development, some other factors have been demonstrated to play important roles in the increase of carbon emissions: for example there is empirical evidence that energy prices have negative and significant effect on energy consumption, implying that more expensive energy prices can have beneficial effects on the environment (Komal & Abbas, 2015). Another factor is GDP per capita, which has been shown to have a greater impact than financial development in contributing towards carbon emissions (Abbasi & Riaz, 2016). However, in a different data set it has been found that fossil fuel energy has higher elasticity on carbon emissions compared to GDP per capita (Riti *et al.*, 2017).

While the studies mentioned only refer to the nexus between financial development and the environment or CO_2 level, as discussed above, the degrowth paradigm requires further moderating factors including consumption and production as well as de-materiality. However, this study is constructed around CO_2 emission as a proxy for degrowth and de-materiality in relation to financial development, which is examined in the case of Islamic banking and the

sukuk market in the following sections. The previous section has presented the theoretical frame of IME.

4.5. RESEARCH METHOD AND DATA

This study examines the effect of financing provided by Islamic banks and also *sukuk* development on the volume of carbon emissions or CO_2 as a proxy for degrowth and sustainability. The financing from Islamic banks is divided into sectors being financed, namely consumer durables, agriculture, manufacturing, trade, transportation, real estate, and banking-finance sectors and the mode of financing that is categorized as profit-loss sharing and fixed instrument financing. The *sukuk* market development is measured by the volume or the amount of *sukuk* issuance and its ratio with GDP.

4.5.1. Data

In fulfilling its stated aims, this study employs the financing data of Islamic banks in a global scope, which is generated from the Islamic Financial Service Board (IFSB) database with period ranging from 1989 to 2014 presented in the form of bank-level annually. As for the *sukuk* market data, it is generated from Bloomberg terminal with a period ranging from 1991 to 2018 and the *sukuk* data is presented based on its issuer every period they issue the *sukuk*. The macroeconomics related and carbon emissions data is generated from the World Bank database presented in country-level data annually ranging from 1961 to 2014.

Data for financing of Islamic banks is taken as an individual dataset, not being aggregated into the country value dataset, whereas the data for carbon emission is available as a country-level dataset. The *sukuk* dataset, is generated per issuance, which then is rearranged in the form of the issuer annually. The sample size for Islamic banks consists of 192 Islamic banks in 34 countries, while the dataset for *sukuk* market consists of 767 issuers from 28 countries: for the list of countries is presented in Table A.1 and A.2 in Appendix A.

In addition to the main dependent and independent variables, several control variables, such as GDP per capita, country population, ratio of government expense to GDP, and oil price, are included in this study. The data is generated from the World Bank database, ranging from 1961 to 2016, presented by country level annually. Only Islamic banks having annual reports ending in December are included in the sample.

4.5.2. Dependent Variables

The dependent variable in this study is the volume of carbon emission (CO_2) produced by the sampled countries annually, generated from World Bank database ranging from 1961 to 2014. The CO2 emissions from the database is calculated from the burning of fossil fuels, the manufacture of cement, and carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring. In order to further detail the analysis, the volume of carbon emission is categorized based on the sources, namely gaseous fuel (*gf*), liquid fuel (*lf*) and solid fuel (*sf*). The gaseous fuel is derived from natural gas, while liquid fuel comes from petroleum-derived sources of energy, and solid fuel is derived from the use of coal.

The volume of carbon emissions has been used as a proxy for environmental degradation as its concentration warms the lower atmosphere and influences global radiation balance (King *et al.*, 1992). The continuous increase of greenhouse gas emissions is considered to have negative impacts on the ecosystem: it harms biodiversity, food supplies and human security (European Commission, 2019).

4.5.3. Independent Variables

The independent variables examined in this study are sectoral financing and the mode of financing from Islamic banks and the volume of *sukuk* issuance. Sectoral financing is categorized into consumer durables (*cons*), agriculture (*agr*), manufacturing (*man*), trade (*trad*), transportation (*trans*), real estate (*real*), and banking-finance (*bankfin*); while the mode of financing is classified according to the nature of financing such as profit-loss sharing (*pls*) and fixed-income instrument (*fixed*). PLS contracts consists of *mudharabah* and *musharakah* contracts, while fixed instrument includes *murabahah*, *ijarah*, *salam*, and *istisna*.

Regarding the sectors to be financed and referring to the *shari'ah* screening criteria established to select *shari'ah*-compliant stocks, sectors that are prohibited to investment are sectors related with the production and consumption of alcohol and pork, *riba*-based financial activities, gambling, entertainment, weapons manufacture, and some others such as the sectors considered harmful to human well-being. However, considering that the nature of Islamic economics essentialises financing the real economy and discourages a debt-based economy and 'money making financial money', it can be said that agriculture, manufacture, trade and transportation as examples of the real economy's sectors are encouraged compared to consumer durables,

real estate and the banking and financial sectors (Rudnyckyj, 2019: 192). Consumer durables are sourced from the real economy, but in the consumption side they are related to debt-based financing (see Watkins, 2017:110 for further debate on the financialisaton caused by consumer durables financing). Furthermore, considering the impact on the environment, the sectors can be narrowed down into only agriculture because manufacture and transportation leads to higher carbon emissions due to the use of fossil fuel in the process, although mechanisation in agriculture also has carbon emission implications.

As for the relationship between the mode of financing and carbon emissions, having the PLS based financing contract rather than debt-based financing contracts will lead to being conscious of empowering the entrepreneurs when providing the fund, since the nature of partnership contract is to share the risk and the returns. They are unlike debt-based instruments, whose consequences are similar to those of mainstream financial activities, that is more on the risk transfer side without any consideration from the creditor regarding the ability of debtor to repay the capital that is lent. Furthermore, having debt-based financing instruments leads to higher consumption since it is more comfortable to conduct the transaction without concerning the purpose of using the capital: the only consideration is the repayment in the future. On the other hand, in the case of PLS financing, the nature of partnership is risk-sharing implying that both creditor and debtor are more cautious ensuring that the capital leads towards more productive activities.

Sukuk, is purposely issued to finance long-term projects, such as building infrastructure, and so it can be said that it will support the development of new technology that aspire to reduce environmental degradation. However, considering that *sukuk* can also be issued as a liquidity instrument, it might not support the reduction of carbon emissions.

4.5.4. Control Variables

Control variables need to be included in econometric modelling, and in this case there will be other factors that affect volume of carbon emissions beyond the Islamic financial development variables. The variables could also help to differentiate the characteristics of different countries, since this study employs panel dataset.

Several control variables are included in the econometric modelling in this study, such as GDP per capita (*lngdpc*), population in the country (*lnpop*), ratio of foreign direct investment to GDP

(*fdi*), ratio of research and development expenditure to GDP (*rd*), and oil price (*lnoil*). GDP per capita has been mentioned several times in the previous sub-section and it implies a greater ability of society to consume, resulting in higher energy consumption and leading towards higher carbon emissions (Furuoka, 2015). Population is said to contribute through consumption: an increase in population results in higher consumption and leads towards higher carbon emissions (Dietz & O'Neill, 2013). Moreover, as hypothesised by Daily & Ehrlich (1992), environmental degradation is a product of population, affluence and technology.

The ratio of foreign direct investment to GDP, can have a positive or negative effect on the volume of carbon emissions, depending on the sample and period. Foreign direct investment is argued to be able to reduce the volume of carbon emissions by the introduction of better technology and innovation from other countries, usually developed countries (Abbasi & Riaz, 2016; Mielnik & Goldemberg, 2002). On the other hand, foreign direct investment can increase the volume of carbon emission if that the investment is being used for developing plants and factories to foster production output which will create higher volume of carbon emission (Seker *et al.*, 2015; Shahbaz *et al.*, 2015).

Another factor that can affect the volume of carbon emission is spending on research and development: it can have a positive or negative relationship with the volume of carbon emissions depending on the countries included in the sample and the time frame. If the spending on research and development is used for innovation in cleaner energy, it can have negative effect on volume of carbon emission (Tamazian & Bhaskara Rao, 2010; Tamazian *et al.*, 2009). However, research and development can also work for the innovation in technology for production which can increase resource use and energy intensity, unintentionally leading towards higher production output implying an increase in volume of carbon emissions (Çoban & Topcu, 2013; Kivyiro & Arminen, 2014).

As for the oil price, utilising different dataset from different periods and sample countries provide different relationship with carbon emissions (Balaguer & Cantavella, 2016; Nwani, 2017; Zaghdoudi, 2017). An increase in oil price might reduce carbon emissions since people are discouraged from consuming oil-based tools, but it might also increase carbon emissions from other sources of energy such as coal and natural gas.

Table 4.1: List of Variables, Definition, and Sources

Variable Name	Definition	Source
Dependent Variables		
carbon emissions	calculated from the burning of fossil fuels, manufacture of cement, and carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring (in kilotons)	World Bank Database
gaseous fuel	derived from the natural gas (in kilotons)	World Bank Database
liquid fuel	generated from petroleum-derived sources of energy (in kilotons)	World Bank Database
solid fuel	derived from the use of coal (in kilotons)	World Bank Database
Independent Variables		
sectoral financing	proportion of Islamic banks' financing based on sector, such as consumer durable, agriculture, manufacturing, trade, transportation, real estate, banking-finance	IFSB
financing based on types of contracts	proportion of Islamic banks' financing based on types of contracts, such as *mudharabah, musharakah, murabahah, ijarah, salam, istisna*	IFSB
volume of sukuk issuance	measured by the volume of *sukuk* issuance (in logarithm form)	Bloomberg Terminal
ratio of sukuk issuance to GDP	measured by dividing the volume of *sukuk* issuance and volume of GDP	Bloomberg Terminal
Control Variables		
GDP per capita	measured by the volume of GDP per capita (in logarithm form)	World Bank Database
population	number of population (in millions)	PWT9.0
foreign direct investment	measured the net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, divided by GDP.	World Bank Database
research and development expenditure	measured the capital and current expenditures private and public sectors, covering basic and applied research and experimental development	World Bank Database
oil price	Measured from the average crude oil spot price of Brent, Dubai and West Texas Intermediate, equally weighted	World Bank Database

4.5.5. Empirical Process and Method

This study employs panel data analysis since the dataset consists of several Islamic banks from different countries within several years. In addition, due to the objective of observing the effect of financing from each bank and *sukuk* issuance on the carbon emissions, different levels of

dataset are used. The banking and *sukuk* variables are in firm-level, while the carbon emissions is in country-level; hence, pooled data analysis is employed. To further examine the robustness of the analysis, it is also conducted by country-level for both dependent and independent variables, analysing it in static and dynamic panels.

Following the model developed by Sapkota & Bastola (2017), this study explores the relationship between financing provided by Islamic banks on different sectors and using different mode of financing as the main independent variable alongside the volume of *sukuk* issuance, and carbon emission. Equation 4.1 shows the model being developed in this study:

$$\boldsymbol{Y_{j,t} = \alpha + \beta_1 X_{i,t} + \beta_2 lngdpc_{j,t} + \beta_3 lngdpc^2_{j,t} + \beta_4 C_{j,t} + \varepsilon_t} \qquad (4.1)$$

where $Y_{j,t}$ is the dependent variable, particularly amount of carbon dioxide emission of country *j* at time *t* measured by the emissions in kilotons from liquid fuel consumption coming from natural gas and petroleum-derived sources of energy and solid fuel coming from the use of coal. This study will also segregate the dependent variable into the categorization of energy source (*SE*), comprised of liquid fuel consumption (*lf*), gaseous fuel consumption (*gf*), and solid fuel consumption (*sf*).

$X_{i,t}$ denotes the independent variables, divided into: Islamic bank-specific variables explaining the proportion of financing delivered to different sectors; mode of financing delivered by the Islamic banks; and volume of *sukuk* issuance. The sectors being financed by Islamic banks are: consumer durables (*cons*), agriculture (*agr*), manufacturing (*man*), trading (*trad*), transportation (*trans*), real estate (*real*), and the banking and finance (*bankfin*) sectors for each Islamic bank *i* at time *t*. As for the mode of financing delivered by the Islamic banks are: profit-loss sharing financing (*pls*) comprising of *mudarabah* and *musharakah* contracts; and fixed-income instrument (*fixed*) comprising of *murabahah*, *ijarah*, *salam*, and *istisna* contracts.

The equation is then followed by GDP per capita (*lngdpc*) and the square of GDP per capita (*lngdpc2*) to account for the environmental Kuznets curve. In addition, $C_{j,t}$ are the control variables affecting the carbon dioxide emissions, such as GDP (*lngdp*), population (*lnpop*), ratio of foreign direct investment on GDP (*fdi*), ratio of research and development expenditure on GDP (*rd*), oil price (ln*oil*) of country *j* at time *t*.

4.6. EMPIRICAL RESULTS AND DISCUSSION

This section provides the empirical results of the presented model in examining the relationship between Islamic financial development and carbon emission: it starts with the presentation of carbon emissions distribution by country and by year for the countries sampled in this study: this is shown in Table 4.2 and 4.3 respectively.

Table 4.2: Distribution of CO_2 Emissions by Country

Country	CO_2	Gas	Liquid	Solid
UK	481,693.00	36%	36%	28%
South Africa	462,329.00	2%	12%	86%
Indonesia	360,163.00	18%	49%	33%
Saudi Arabia	356,489.00	32%	68%	0%
Thailand	290,487.00	30%	48%	22%
Turkey	267,638.00	28%	28%	44%
Malaysia	198,550.00	35%	38%	27%
Pakistan	139,036.00	47%	42%	12%
Egypt	133,738.00	41%	57%	2%
Algeria	122,758.00	57%	43%	1%
UAE	109,065.00	75%	24%	1%
Iraq	101,955.00	13%	87%	0%
Philippines	78,370.20	9%	51%	39%
Nigeria	65,209.00	46%	53%	0%
Kuwait	60,617.30	35%	65%	0%
Bangladesh	59,021.80	71%	23%	6%
Oman	55,320.40	80%	20%	0%
Qatar	52,320.90	78%	22%	0%
Syria	49,943.20	25%	75%	0%
Singapore	45,160.00	38%	61%	1%
Tunisia	23,731.00	51%	49%	0%
Bahrain	23,164.70	84%	16%	0%
Yemen	18,394.30	3%	96%	1%
Lebanon	17,197.50	0%	96%	3%
Jordan	16,459.40	12%	87%	1%
Kenya	10,267.10	0%	93%	7%
Sudan	9,153.47	0%	100%	0%
Tanzania	8,826.47	20%	76%	4%
Brunei Darussalam	8,548.69	78%	22%	0%
Cyprus	5,698.52	0%	100%	0%
Senegal	4,242.44	1%	87%	12%
Mauritania	1,627.93	0%	100%	0%
Maldives	1,092.03	0%	100%	0%
Gambia	248.75	0%	100%	0%

Source: World Bank Database (2018)

Table 4.2 presents the distribution of carbon emissions by country, in a descending order, throughout the periods included in the sample. It shows that the UK has the highest volume of carbon emission with relative equal distribution from the sources of fuel, while South Africa is the only country that has highest proportion of solid fuel or coal. As can be seen in Table 4.2, most countries are still leaning towards liquid fuel or petroleum-based sources of energy, followed by natural gas.

Table 4.3: Distribution of CO_2 Emissions by Year

year	co2	gas	liquid	solid
1989	33,215.70	52%	48%	0%
1990	49,207.50	28%	72%	0%
1991	40,326.00	20%	76%	3%
1992	76,290.70	34%	65%	1%
1993	68,931.00	36%	63%	1%
1994	59,991.80	38%	61%	1%
1995	52,775.50	37%	62%	1%
1996	45,667.60	39%	60%	1%
1997	42,356.80	40%	60%	1%
1998	43,013.30	40%	60%	1%
1999	51,238.50	39%	57%	4%
2000	61,882.40	32%	62%	6%
2001	63,171.40	33%	59%	8%
2002	50,199.30	40%	56%	5%
2003	63,073.10	37%	55%	7%
2004	98,928.10	32%	50%	18%
2005	106,606.00	34%	48%	17%
2006	107,616.00	33%	47%	20%
2007	112,029.00	34%	45%	21%
2008	120,278.00	36%	45%	20%
2009	120,333.00	35%	47%	19%
2010	127,855.00	35%	46%	19%
2011	144,050.00	33%	41%	25%
2012	150,981.00	33%	41%	26%
2013	147,198.00	34%	44%	21%
2014	148,256.00	34%	47%	19%

Source: World Bank Database (2018)

4.6.1. Empirical Results

This section presents the empirical results following the methodology and employing data that has been discussed in previous section. This section covers descriptive statistics of the data, for

both Islamic banks and *sukuk* market, and the estimation results based on the method of estimation.

4.6.1.1. Descriptive Statistics

This sub-section provides descriptive statistics, correlation matrix and regression results from the secondary data being employed in this study. Table 4.4 and 4.5 present the descriptive statistics for the dataset of Islamic banks and *sukuk* market respectively. The dataset for Islamic banks consists of 192 Islamic banks in 34 countries from period 1989 until 2016 according to the availability of the data, while the dataset for sukuk market consists of 763 issuers from 25 countries from period 1997 until 2018 that is from the first issuance until mid of 2018.

Table 4.4: Descriptive Statistics – Islamic Banks

Variable	Obs	Mean	SD	Min	Max
lnco2	1,286	10.9208	1.4260	5.2884	13.3026
lngf	1,017	10.3646	1.4913	1.2994	12.1846
lnlf	1,285	10.0746	1.4804	5.2884	12.9318
lnsf	529	8.9411	2.6764	1.2994	12.9448
cons	327	0.1061	0.1464	0	0.7678
agr	327	0.1263	0.1543	0	0.7237
man	327	0.0133	0.0323	0	0.3600
trad	327	0.1507	0.1417	0	0.5579
trans	327	0.2412	0.2542	0	1
real	327	0.0395	0.1025	0	0.6164
bankfin	327	0.2167	0.2037	0	1
pls	470	0.1220	0.2001	0	0.9094
fixed	470	0.8007	0.2707	0	1
lngdpc	1,679	9.4930	1.3490	-0.3748	12.0033
lngdpct1	1,651	8.7195	1.5499	5.5516	11.4779
lnpop	1,384	16.4795	1.8223	10.8766	19.3546
expense	1,678	0.1814	0.1633	0	0.9499
lnoil	1,701	4.1556	0.4496	2.7663	4.5567

Notes: Obs = Observations; SD = Standard Deviation ; Min = Minimum ; Max = Maximum

As for the Islamic banks, the data for sectoral financing and mode of financing is available until 2018 for the aggregate by the country level. However, it is only available until 2012 for the individual bank making it relatively smaller compared to other variables; also there are several Islamic banks that do not have information regarding their distribution of financing, resulting in 15 countries having information regarding sectoral financing and 20 countries having information regarding the mode of financing.

Table 4.5: Descriptive Statistics – *Sukuk* Market

Variable	Obs	Mean	SD	Min	Max
lnco2	10,341	12.0244	0.4237	6.2338	15.5455
lngf	10,336	11.0497	0.3609	1.2994	14.1751
lnlf	10,341	11.1032	0.4945	6.2266	14.6889
lnsf	10,063	10.4414	0.7111	2.6857	14.5547
lnsukuk	11,837	15.8002	2.4354	1.0126	22.9278
sukukgdp	11,711	0.0019	0.0358	0	2.6334
lngdpc	12,771	9.5631	0.7845	6.1290	12.0033
lngdpct1	13,065	8.7741	0.7461	6.0741	11.6407
lnpop	10,374	17.0903	0.6219	10.8766	19.5821
expense	13,077	0.1753	0.1223	0	0.5505
lnoil	12,748	4.1580	0.3492	3.1051	4.5567

Notes: Obs = Observations; SD = Standard Deviation ; Min = Minimum ; Max = Maximum

Table 4.6: Correlation Matrix between Variables – Islamic Banks

	lnco2	*cons*	*agr*	*man*	*trad*	*trans*	*real*	*bankfin*	*pls*	*fixed*	*lngdpc*	*lngdpct1*	*lnpop*	*expense*	*lnoil*
lnco2	1														
cons	-0.0197	1													
agr	-0.1571	0.0941	1												
man	0.2821	0.0777	-0.0239	1											
trad	-0.0333	-0.1205	-0.1442	-0.0158	1										
trans	-0.1672	-0.2505	-0.3562	-0.1936	-0.1656	1									
real	0.3024	-0.074	-0.0002	0.2985	-0.0971	-0.2340	1								
bankfin	-0.0199	-0.288	-0.2472	-0.0457	-0.2182	-0.2315	-0.1072	1							
pls	-0.2582	-0.1055	-0.1447	0.1438	-0.1188	-0.0187	0.3497	0.1807	1						
fixed	0.0645	0.1674	0.2058	-0.1493	0.1771	-0.2081	-0.1974	-0.0366	-0.6292	1					
lngdpc	0.1411	-0.2987	-0.3019	-0.2186	0.3514	0.1322	-0.1772	0.0824	-0.1827	0.1156	1				
lngdpct1	0.1851	-0.2806	-0.3887	-0.2104	0.4281	0.1927	-0.2912	0.0708	-0.2649	0.0795	0.8149	1			
lnpop	0.5933	0.2707	0.1776	0.4013	-0.3342	-0.2751	0.4007	-0.1115	0.1861	-0.3332	-0.5626	-0.6085	1		
expense	0.1313	0.1397	-0.0957	0.0723	0.0944	-0.2640	0.0233	0.0026	-0.0028	-0.0631	0.0483	0.1189	0.1205	1	
lnoil	0.1183	0.1298	-0.1951	0.0761	0.0496	-0.0348	-0.0391	-0.0193	0.1011	-0.0955	-0.1209	0.0912	0.1463	0.0531	1

Table 4.7: Correlation Matrix between Variables – *Sukuk* Market

	lnco2	*lnsukuk*	*sukukgdp*	*lngdpc*	*lngdpct1*	*lnpop*	*expense*	*lnoil*
lnco2	1							
lnsukuk	0.2019	1						
sukukgdp	-0.0119	0.0900	1					
lngdpc	-0.1298	0.3017	0.2005	1				
lngdpct1	0.0654	0.4324	0.1441	0.8993	1			
lnpop	0.8212	0.0234	-0.0880	-0.6403	-0.4396	1		
expense	-0.1070	-0.2526	0.0416	-0.1167	-0.2352	-0.0225	1	
lnoil	0.4259	0.4505	0.0246	0.3528	0.6065	0.1513	-0.1401	1

4.6.1.2.Regression results for sectoral financing

This section presents the regression results for sectoral financing and carbon emissions, depicted through Table 4.8 - 4.11 for the base dataset that is bank-level independent variable and country-level dependent variable.

The findings in Table 4.8 show that financing the trade sector has a negative relationship with carbon emissions, while financing transportation has a positive relationship with carbon emissions. The negative relationship of trade and carbon emission could be due to the descriptive statistics which show that financing towards the trade sector has a decreasing trend, shown in Table 2.3, while the volume of carbon emission keeps increasing over time. As for the positive relationship between financing transportation sector and volume of carbon emissions, it indicates that financing provided on the transportation sector can increase the volume of carbon emissions: the nature of vehicles being currently used results in emitting carbon dioxide in their operation. The transportation sector has been acknowledged to be one of the biggest polluters (Olivier *et al.*, 2017).

Breaking down the sources of fuel, Table 4.9, 4.10 and 4.11 present the regression results for gaseous fuel, liquid fuel and solid fuel respectively. The findings in Table 4.9 shows that financing provided for the consumer durables sector by the Islamic banks has a positive relationship with gaseous fuel as a source of energy. The positive relationship of consumer durables can be due to the fact that house appliances and the development of real estate uses more natural gas as a source of energy, resulting in high carbon emission from gaseous fuel. On the other hand, financing provided for the banking and finance sector has a negative relationship with the volume of carbon emissions: this is probably due to the fact that financing towards banking and financing sector is decreasing, as shown in Table 2.3, while the volume of carbon emissions keeps increasing over time.

As for the liquid fuel source of energy, Table 4.10 shows that financing the trade, banking and finance sectors has a negative relationship with carbon emission from liquid fuel. This can be explained by the fact that the trade and banking-finance sectors do not include activities related with petroleum-based sources of fuel.

Table 4.8: Regression Result – CO_2 Emissions and Sectoral Financing – Bank-level Dataset - PLS

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-0.421						
	(0.357)						
agr		-0.152					
		(0.530)					
man			-0.672				
			(0.527)				
trad				-1.476***			
				(0.367)			
trans					0.361*		
					(0.198)		
real						-0.226	
						(0.401)	
bankfin							0.0521
							(0.262)
lngdpc	8.424***	8.889***	8.742***	8.559***	9.363***	8.740***	8.657***
	(1.770)	(1.983)	(1.687)	(1.674)	(1.941)	(1.691)	(1.733)
lngdpc2	-0.399***	-0.421***	-0.414***	-0.402***	-0.445***	-0.414***	-0.410***
	(0.0875)	(0.0970)	(0.0836)	(0.0829)	(0.0967)	(0.0838)	(0.0863)
lnpop	0.449***	0.439***	0.437***	0.395***	0.457***	0.439***	0.435***
	(0.107)	(0.108)	(0.103)	(0.0966)	(0.0951)	(0.104)	(0.102)
lnoil	0.321	0.289	0.294	0.365*	0.386	0.299	0.294
	(0.227)	(0.231)	(0.233)	(0.200)	(0.233)	(0.231)	(0.232)
fdi	-1.080	-0.980	-1.082	-2.724	-1.528	-1.116	-0.967
	(3.344)	(3.033)	(3.299)	(3.339)	(3.333)	(3.289)	(3.243)
rd	-0.160*	-0.168	-0.129	-0.0782	-0.257**	-0.148	-0.137
	(0.0887)	(0.136)	(0.0926)	(0.0823)	(0.120)	(0.0900)	(0.0941)
Constant	-40.70***	-42.84***	-42.08***	-40.86***	-45.87***	-42.13***	-41.68***
	(9.320)	(10.73)	(9.073)	(8.789)	(10.32)	(9.079)	(9.183)
Observations	118	118	118	118	118	118	118
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.668	0.664	0.665	0.703	0.674	0.664	0.663
Adj R-squared	0.6464	0.6421	0.6432	0.6836	0.6532	0.6423	0.6418

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Table 4.11 presents the relationship between solid fuel consumption and sectoral financing provided by Islamic banks, which shows that there is no significant relationship between the sectoral financing and the volume of carbon emissions coming from solid fuel consumption: this might be due to the low number of observations compared to the other estimations.

Table 4.9: Regression Result – Gaseous Fuel Consumption and Sectoral Financing – Bank-level Dataset - PLS

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	1.246**						
	(0.622)						
agr		0.788					
		(0.674)					
man			2.076				
			(1.314)				
trad				-0.0637			
				(0.712)			
trans					0.242		
					(0.320)		
real						0.463	
						(0.480)	
bankfin							-1.487***
							(0.454)
lngdpc	8.353***	6.574*	7.408**	7.510**	7.956**	7.449**	8.946***
	(2.963)	(3.438)	(3.134)	(3.159)	(3.495)	(3.187)	(2.940)
lngdpc2	-0.372**	-0.287*	-0.327**	-0.332**	-0.355**	-0.329**	-0.407***
	(0.145)	(0.167)	(0.154)	(0.154)	(0.172)	(0.156)	(0.144)
lnpop	0.435***	0.458***	0.472***	0.473***	0.489***	0.469***	0.497***
	(0.138)	(0.141)	(0.135)	(0.136)	(0.132)	(0.135)	(0.125)
lnoil	0.885*	1.001**	0.965**	0.954**	1.010**	0.949**	1.084**
	(0.446)	(0.418)	(0.417)	(0.433)	(0.453)	(0.419)	(0.422)
fdi	-0.146	-0.618	-0.138	-0.279	-0.522	-0.0922	-2.852
	(3.319)	(3.563)	(3.375)	(3.795)	(3.507)	(3.404)	(3.418)
rd	-0.155	-0.0728	-0.249	-0.206	-0.285	-0.197	-0.348**
	(0.166)	(0.201)	(0.160)	(0.149)	(0.203)	(0.152)	(0.153)
Constant	-46.49***	-38.12**	-42.37**	-42.80**	-45.48**	-42.44**	-50.12***
	(15.86)	(18.47)	(16.57)	(16.68)	(18.73)	(16.86)	(15.86)
Observations	118	118	118	118	118	118	118
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.500	0.483	0.485	0.476	0.479	0.477	0.546
Adj R-squared	0.4678	0.4504	0.4517	0.4426	0.4457	0.4441	0.5168

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Looking at the control variables, Tables 4.8 – 4.11 present consistent results in which GDP per capita has a positive relationship with the volume of carbon emissions until a certain value of GDP per capita and then it will have reverse effect. This implies that there is Environmental Kuznets Curve based on the sample being employed in this study that is in line with previous studies (*such as*: Jalil & Feridun, 2011; Ozturk & Acaravci, 2013; Saboori, Sulaiman, & Mohd, 2012; Tamazian & Bhaskara Rao, 2010). The findings indicate that the size of populations is shown to have a positive relationship with the volume of carbon emissions, indicating that more

people eventually increase the volume of carbon emissions that is supported, among others, by Zaman & Moemen (2017).

Table 4.10: Regression Result – Liquid Fuel Consumption and Sectoral Financing – Bank-level Dataset

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	0.162						
	(0.459)						
agr		0.778					
		(0.628)					
man			0.264				
			(0.796)				
trad				-1.510***			
				(0.452)			
trans					0.396		
					(0.259)		
real						0.0956	
						(0.441)	
bankfin							-0.531**
							(0.248)
lngdpc	8.970***	7.930**	8.847***	8.710***	9.580***	8.847***	9.371***
	(2.725)	(3.130)	(2.677)	(2.433)	(2.684)	(2.699)	(2.646)
lngdpc2	-0.416***	-0.366**	-0.411***	-0.401***	-0.448***	-0.411***	-0.438***
	(0.136)	(0.155)	(0.134)	(0.121)	(0.135)	(0.135)	(0.133)
lnpop	0.421***	0.409***	0.425***	0.384***	0.449***	0.425***	0.434***
	(0.130)	(0.133)	(0.128)	(0.124)	(0.116)	(0.129)	(0.123)
lnoil	-0.0713	-0.0136	-0.0609	0.00575	0.0334	-0.0630	-0.0153
	(0.236)	(0.231)	(0.236)	(0.212)	(0.227)	(0.236)	(0.240)
fdi	4.226	3.813	4.227	2.515	3.704	4.242	3.275
	(3.291)	(3.502)	(3.310)	(3.323)	(3.363)	(3.318)	(3.401)
rd	-0.519***	-0.392**	-0.532***	-0.461***	-0.652***	-0.524***	-0.576***
	(0.113)	(0.182)	(0.110)	(0.0997)	(0.138)	(0.113)	(0.110)
Constant	-43.08***	-37.94**	-42.55***	-41.52***	-46.93***	-42.52***	-45.20***
	(13.46)	(15.93)	(13.28)	(12.10)	(13.35)	(13.41)	(13.16)
Observations	118	118	118	118	118	118	118
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.499	0.508	0.499	0.533	0.509	0.499	0.511
Adj R-squared	0.4672	0.4772	0.4668	0.5034	0.4782	0.4667	0.4797

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

As the results demonstrate, oil price, foreign direct investment, and research and development expenditure have different relationship for different dependent variables. When the total volume of carbon emission is taken as the dependent variable, Table 4.8 shows that oil price has a positive relationship with volume of carbon emissions, which relates to oil-producing

countries as higher oil price leads to higher revenue from oil sales and higher growth of the energy intensive sector, which in the end will increase volume of carbon emissions (Nwani, 2017). Considering that the countries in the sample include oil-producing countries, this argument holds.

Table 4.11: Regression Result – Solid Fuel Consumption and Sectoral Financing – Bank-level Dataset – PLS

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	0.0635						
	(1.168)						
agr		-2.960					
		(3.026)					
man			-0.405				
			(1.641)				
trad				0.818			
				(1.348)			
trans					0.0862		
					(1.023)		
real						0.359	
						(1.550)	
bankfin							-0.500
							(0.949)
lngdpc	20.03***	24.18***	19.94***	19.20***	20.25***	19.71***	21.34***
	(4.602)	(7.220)	(4.910)	(5.766)	(7.126)	(5.243)	(4.659)
lngdpc2	-1.107***	-1.311***	-1.103***	-1.069***	-1.120***	-1.092***	-1.180***
	(0.225)	(0.355)	(0.242)	(0.282)	(0.369)	(0.259)	(0.231)
lnpop	0.176	0.339	0.177	0.170	0.168	0.167	0.139
	(0.385)	(0.387)	(0.343)	(0.346)	(0.340)	(0.343)	(0.359)
lnoil	-3.051***	-2.932***	-3.046***	-3.163**	-3.011**	-3.015***	-3.061***
	(1.141)	(1.077)	(1.072)	(1.192)	(1.223)	(1.065)	(1.079)
fdi	5.880	4.902	5.848	6.935	5.769	5.731	5.153
	(5.940)	(5.824)	(5.986)	(6.962)	(6.450)	(6.012)	(6.086)
rd	2.558***	2.229***	2.567***	2.588***	2.528***	2.592***	2.545***
	(0.564)	(0.630)	(0.517)	(0.521)	(0.626)	(0.512)	(0.493)
Constant	-70.80**	-94.82**	-70.37**	-65.89*	-71.79*	-69.24*	-75.82**
	(32.90)	(45.42)	(33.51)	(38.27)	(41.26)	(35.07)	(31.36)
Observations	67	67	67	67	67	67	67
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.541	0.559	0.541	0.544	0.541	0.542	0.546
Adj R-squared	0.4868	0.5071	0.4871	0.4903	0.4869	0.4874	0.4916

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Table 4.12: Regression Result – Carbon Emissions and Sectoral Financing – Bank-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	0.160						
	(0.138)						
agr		0.0437					
		(0.117)					
man			-0.0217				
			(0.153)				
trad				0.0458			
				(0.153)			
trans					-0.0116		
					(0.0554)		
real						-0.126	
						(0.266)	
bankfin							0.00913
							(0.0842)
lngdpc	2.109*	2.077*	2.048*	2.017*	2.031*	2.050*	2.034
	(1.083)	(1.162)	(1.186)	(1.131)	(1.108)	(1.195)	(1.213)
lngdpc2	-0.106*	-0.104*	-0.103*	-0.101*	-0.102*	-0.103*	-0.102*
	(0.0534)	(0.0575)	(0.0586)	(0.0558)	(0.0548)	(0.0590)	(0.0599)
lnpop	0.0616**	0.0623**	0.0621**	0.0612**	0.0614**	0.0613**	0.0618**
	(0.0249)	(0.0280)	(0.0280)	(0.0268)	(0.0258)	(0.0284)	(0.0280)
lnoil	0.264**	0.255**	0.260**	0.259**	0.259**	0.259**	0.260**
	(0.108)	(0.101)	(0.109)	(0.110)	(0.109)	(0.110)	(0.108)
fdi	0.776	0.932	0.889	0.930*	0.905	0.886	0.896
	(0.642)	(0.591)	(0.580)	(0.526)	(0.556)	(0.579)	(0.571)
rd	0.180***	0.197***	0.188***	0.183***	0.188***	0.191***	0.190***
	(0.0471)	(0.0399)	(0.0441)	(0.0467)	(0.0441)	(0.0457)	(0.0398)
Constant	-0.460	-0.261	-0.122	0.0500	-0.0171	-0.122	-0.0483
	(5.669)	(6.160)	(6.251)	(5.942)	(5.802)	(6.299)	(6.379)
Observations	118	118	118	118	118	118	118
Number of banks	36	36	36	36	36	36	36
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.634	0.6293	0.6284	0.6297	0.6285	0.6297	0.6284
Hausman test	0.0224	0.0033	0.0028	0.0077	0.0039	0.0000	0.0047

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Table 4.9 also shows that oil price has a positive relationship with the volume of carbon emissions originating from gaseous fuel, indicating that a higher price of oil can incentivise the use of gaseous sources of energy. On the other hand, Table 4.11 shows that oil price has a negative relationship with the volume of carbon emissions coming from solid fuel, which can be due to the fact that a decrease in oil price leads to more affordable transport of coal, resulting in a higher use of coal.

Foreign direct investment, has a positive relationship with gaseous fuel consumption when applying country-level dataset (*see:* Table 4.21). Considering that most countries included in the sample are developing countries, investment from foreign countries is used to increase production of output which it will increase the volume of carbon emissions (Sapkota & Bastola, 2017; Seker *et al*., 2015; Shahbaz *et al*., 2015).

Table 4.13: Regression Result – Gaseous Fuel Consumption and Sectoral Financing – Bank-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-0.530						
	(0.638)						
agr		0.336					
		(0.373)					
man			0.311				
			(0.349)				
trad				-0.667			
				(0.508)			
trans					0.430		
					(0.272)		
real						-0.144	
						(0.369)	
bankfin							-0.445
							(0.273)
lngdpc	4.185**	4.598*	4.780*	4.664*	4.896*	4.832*	5.399**
	(2.082)	(2.475)	(2.533)	(2.480)	(2.665)	(2.567)	(2.742)
lngdpc2	-0.205**	-0.224*	-0.232*	-0.226*	-0.238*	-0.235*	-0.263*
	(0.103)	(0.121)	(0.124)	(0.121)	(0.131)	(0.126)	(0.134)
lnpop	0.142**	0.134**	0.139**	0.124**	0.153**	0.141**	0.156**
	(0.0706)	(0.0684)	(0.0699)	(0.0602)	(0.0762)	(0.0714)	(0.0750)
lnoil	0.602**	0.578**	0.614**	0.619**	0.656**	0.612**	0.629**
	(0.243)	(0.244)	(0.263)	(0.255)	(0.268)	(0.262)	(0.263)
fdi	1.071	0.944	0.668	0.179	0.285	0.607	0.452
	(1.204)	(0.986)	(1.092)	(0.762)	(0.923)	(1.090)	(1.028)
rd	0.0322	0.0664	0.00400	0.0684	0.0181	0.00419	-0.0530
	(0.0907)	(0.0983)	(0.103)	(0.0827)	(0.0894)	(0.103)	(0.120)
Constant	-15.21	-17.28	-18.43	-17.62	-19.45	-18.70	-21.79
	(12.07)	(14.35)	(14.75)	(14.26)	(15.51)	(14.93)	(15.88)
Observations	118	118	118	118	118	118	118
Number of banks	36	36	36	36	36	36	36
Prob(chi2)	0.0001	0.0015	0.0002	0.0144	0.0049	0.0008	0.0006
R-squared	0.2512	0.3079	0.3063	0.2056	0.2946	0.3004	0.3801
Hausman test	N/A	N/A	N/A	0.9971	N/A	0.9993	N/A

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Table 4.14: Regression Result – Liquid Fuel Consumption and Sectoral Financing – Bank-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	0.421						
	(0.285)						
agr		0.0803					
		(0.233)					
man			-0.0475				
			(0.145)				
trad				0.0296			
				(0.209)			
trans					-0.109		
					(0.0828)		
real						0.581	
						(0.382)	
bankfin							0.0917
							(0.126)
lngdpc	4.154***	3.809***	3.829***	3.869***	3.770***	3.845***	3.682**
	(1.351)	(1.347)	(1.380)	(1.381)	(1.339)	(1.400)	(1.470)
lngdpc2	-0.207***	-0.191***	-0.192***	-0.194***	-0.189***	-0.193***	-0.185**
	(0.0666)	(0.0666)	(0.0682)	(0.0683)	(0.0662)	(0.0692)	(0.0725)
lnpop	0.106***	0.108***	0.109***	0.110***	0.105***	0.109***	0.105***
	(0.0330)	(0.0340)	(0.0343)	(0.0347)	(0.0353)	(0.0343)	(0.0354)
lnoil	0.194	0.180	0.187	0.187	0.175	0.190	0.185
	(0.159)	(0.144)	(0.161)	(0.163)	(0.163)	(0.159)	(0.160)
fdi	0.685	1.050	0.974	1.002	1.098	1.028	1.011
	(1.003)	(1.014)	(0.919)	(0.879)	(0.829)	(0.898)	(0.877)
rd	0.168**	0.204***	0.189***	0.185***	0.184***	0.179***	0.201***
	(0.0685)	(0.0621)	(0.0653)	(0.0636)	(0.0648)	(0.0677)	(0.0604)
Constant	-12.35*	-10.50	-10.63	-10.85	-10.18	-10.74	-9.835
	(6.984)	(7.008)	(7.159)	(7.169)	(6.977)	(7.267)	(7.617)
Observations	118	118	118	118	118	118	118
Number of banks	36	36	36	36	36	36	36
Prob(chi2)	0	0	0	0	0	0	0
R-squared	0.1517	0.1529	0.1474	0.147	0.1455	0.1489	0.1356
Hausman test	0.0835	0.1575	0.1381	0.0692	0.0483	0.2462	0.1808

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Spending on research and development has a positive relationship with the volume of carbon emissions from solid fuel consumption (*see:* Table 4.11 and 4.19), while it has a negative relationship with emission from liquid fuel consumption (*see:* Table 4.10). This can be due to the effort of conducting the research and development to shift the use of petroleum-based fuel towards natural gas although the coal-based fuel is still being consumed considering its low cost (Churchill *et al.*, 2018; Tamazian & Rao, 2010).

Exploring the results through random effect estimation method, suggested by the Hausman test, Tables 4.12-4.15 present that there is no significant relationship between sectoral financing of Islamic banks and the volume of carbon emissions. This result is different from results in Table 4.8-4.11, employing pooled least square, which might be due to the random effect applied on the estimation, taking into account the banking characteristics. As for the control variables, the results in Tables 4.12-4.15 have similar results with Tables 4.8-4.11.

Table 4.15: Regression Result – Solid Fuel Consumption and Sectoral Financing – Bank-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-0.259						
	(0.393)						
agr		-0.129					
		(0.299)					
man			-0.0653				
			(0.239)				
trad				0.259			
				(0.507)			
trans					0.231		
					(0.224)		
real						0.481	
						(0.649)	
bankfin							-0.379
							(0.400)
lngdpc	18.78**	19.43**	19.32**	19.12**	20.16***	18.72**	20.30***
	(7.556)	(7.571)	(7.589)	(7.843)	(7.824)	(7.629)	(7.095)
lngdpc2	-0.979**	-1.013**	-1.007**	-0.995**	-1.054**	-0.976**	-1.058***
	(0.396)	(0.397)	(0.398)	(0.414)	(0.411)	(0.400)	(0.372)
lnpop	0.953***	0.936***	0.941***	0.969***	0.900***	0.919***	0.938***
	(0.165)	(0.164)	(0.164)	(0.152)	(0.170)	(0.147)	(0.156)
lnoil	-0.208	-0.198	-0.201	-0.233	-0.174	-0.193	-0.204
	(0.205)	(0.201)	(0.201)	(0.252)	(0.208)	(0.197)	(0.201)
fdi	5.679***	5.514***	5.549***	5.921***	5.301***	5.606***	5.462***
	(1.264)	(1.282)	(1.287)	(1.845)	(1.354)	(1.289)	(1.139)
rd	1.348***	1.309***	1.331***	1.293***	1.304***	1.357***	1.249***
	(0.266)	(0.262)	(0.250)	(0.225)	(0.283)	(0.254)	(0.247)
Constant	-96.27**	-99.15***	-98.78***	-98.35**	-101.9***	-95.56**	-103.2***
	(37.83)	(37.96)	(38.07)	(38.53)	(38.90)	(38.25)	(35.53)
Observations	67	67	67	67	67	67	67
Number of banks	27	27	27	27	27	27	27
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.4518	0.4515	0.4489	0.4459	0.4526	0.4496	0.4476
Hausman test	N/A	N/A	N/A	0.5619	N/A	N/A	0.8912

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

4.6.1.3. Empirical results with country-level dataset

Examining the robustness of the regression results, Tables 4.16 – 4.19 present the regression results for sectoral financing and carbon emission at the country-level dataset for both dependent and independent variables. Table 4.16 presents that financing consumer durables, manufacturing and trade sectors has negative relationship with volume of carbon emissions.

Table 4.16: Regression Result – Sectoral Financing on CO_2 Emissions – Country-level Dataset – PLS

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-1.711**						
	(0.652)						
agr		-1.210					
		(0.924)					
man			-2.156*				
			(1.253)				
trad				-2.682***			
				(0.744)			
trans					0.438		
					(0.354)		
real						-0.117	
						(1.080)	
bankfin							0.792
							(0.598)
lngdpc	9.701***	11.55***	10.16***	9.200***	10.41***	9.889***	9.633***
	(3.301)	(3.450)	(2.917)	(2.866)	(3.226)	(2.872)	(3.141)
lngdpc2	-0.461***	-0.550***	-0.482***	-0.429***	-0.496***	-0.469***	-0.453***
	(0.163)	(0.171)	(0.145)	(0.143)	(0.161)	(0.143)	(0.157)
lnpop	0.490***	0.462***	0.447***	0.366***	0.468***	0.443***	0.428***
	(0.144)	(0.134)	(0.136)	(0.121)	(0.124)	(0.141)	(0.140)
lnoil	0.661**	0.528*	0.587**	0.650***	0.662**	0.590**	0.520*
	(0.252)	(0.283)	(0.282)	(0.212)	(0.278)	(0.281)	(0.282)
fdi	-4.969	-3.546	-4.907	-7.527*	-5.478	-4.682	-3.025
	(4.692)	(3.306)	(4.450)	(4.444)	(4.580)	(4.468)	(4.216)
rd	-0.0861	-0.222	0.0377	0.105	-0.148	0.000897	0.0680
	(0.151)	(0.218)	(0.158)	(0.143)	(0.214)	(0.159)	(0.163)
Constant	-49.11***	-57.62***	-50.76***	-45.09***	-52.59***	-49.37***	-48.15***
	(16.34)	(17.34)	(14.73)	(14.06)	(16.45)	(14.47)	(15.40)
Observations	57	57	57	57	57	57	57
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.749	0.730	0.721	0.783	0.725	0.716	0.730
Adj R-sq	0.7128	0.6919	0.6813	0.7515	0.6857	0.6756	0.6917

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

As for the gaseous fuel consumption, Table 4.17 shows that financing provided for banking-finance sector has a negative and significant relationship with gaseous fuel consumption, which might indicate that the financing for banking-finance sector is not for activities using natural gas. On the other hand, financing provided for consumer durables and real estate sectors has a positive relationship with the volume of carbon emission coming from gaseous fuel consumption.

Table 4.17: Regression Result – Gaseous Fuel Consumption and Sectoral Financing – Country-level Dataset – PLS

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	2.721*						
	(1.509)						
agr		1.661					
		(1.127)					
man			6.577				
			(4.154)				
trad				1.043			
				(1.369)			
trans					0.294		
					(0.557)		
real						2.960*	
						(1.737)	
bankfin							-3.085***
							(1.016)
lngdpc	11.44*	8.861	10.35	11.39	11.45	11.51	12.17**
	(6.091)	(7.723)	(7.131)	(7.467)	(7.769)	(8.021)	(5.327)
lngdpc2	-0.504*	-0.381	-0.454	-0.507	-0.509	-0.510	-0.557**
	(0.301)	(0.378)	(0.351)	(0.366)	(0.382)	(0.392)	(0.262)
lnpop	0.462*	0.511**	0.522**	0.569**	0.558**	0.491**	0.590***
	(0.239)	(0.237)	(0.228)	(0.245)	(0.220)	(0.229)	(0.189)
lnoil	0.936*	1.134**	1.059**	1.026*	1.098**	1.043**	1.323**
	(0.556)	(0.494)	(0.489)	(0.537)	(0.529)	(0.474)	(0.511)
fdi	-0.414	-2.434	-0.153	0.213	-1.450	-0.403	-7.278*
	(3.987)	(4.426)	(4.243)	(5.041)	(4.402)	(3.943)	(4.252)
rd	-0.111	0.0557	-0.356	-0.294	-0.357	-0.160	-0.502**
	(0.300)	(0.326)	(0.245)	(0.249)	(0.342)	(0.243)	(0.200)
Constant	-65.07**	-53.32	-60.50*	-66.25*	-66.69*	-65.87	-69.54**
	(30.63)	(38.70)	(35.28)	(36.97)	(38.81)	(39.77)	(26.98)
Observations	57	57	57	57	57	57	57
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.596	0.566	0.577	0.556	0.553	0.571	0.669
Adj R-sq	0.5385	0.5036	0.5164	0.4929	0.4891	0.5101	0.6222

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Similar to Table 4.10, Table 4.18 shows that financing the trade sector has a negative relationship with liquid fuel sources of energy, which might be merely indicating that both have contrasting trends. As regards to sectoral financing and solid fuel source of energy, Table 4.19 presents similar results as Table 4.11 in that there is no significant relationship between sectoral financing and the volume of carbon emissions coming from solid fuel consumption.

Table 4.18: Regression Result – Liquid Fuel Consumption and Sectoral Financing – Country-level Dataset – PLS

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-0.154						
	(0.948)						
agr		0.110					
		(0.958)					
man			1.143				
			(2.217)				
trad				-1.882**			
				(0.728)			
trans					0.665		
					(0.406)		
real						0.816	
						(1.162)	
bankfin							-0.790
							(0.529)
lngdpc	13.73***	13.60**	13.61***	13.25***	14.51***	13.86**	14.02***
	(5.027)	(5.573)	(4.994)	(4.599)	(4.593)	(5.201)	(4.446)
lngdpc2	-0.648**	-0.641**	-0.642**	-0.620***	-0.688***	-0.654**	-0.665***
	(0.248)	(0.274)	(0.247)	(0.226)	(0.227)	(0.256)	(0.220)
lnpop	0.431**	0.425**	0.424**	0.374**	0.467***	0.413**	0.439***
	(0.165)	(0.166)	(0.161)	(0.158)	(0.142)	(0.166)	(0.149)
lnoil	0.178	0.177	0.174	0.214	0.281	0.170	0.242
	(0.283)	(0.293)	(0.290)	(0.265)	(0.267)	(0.286)	(0.305)
fdi	0.693	0.620	0.851	-1.289	-0.519	0.858	-0.911
	(4.098)	(3.666)	(4.138)	(4.022)	(4.111)	(4.064)	(4.341)
rd	-0.547***	-0.518*	-0.556***	-0.468***	-0.771***	-0.513***	-0.602***
	(0.166)	(0.258)	(0.154)	(0.144)	(0.187)	(0.165)	(0.152)
Constant	-68.56***	-67.84**	-67.88***	-65.55***	-73.40***	-68.95***	-69.86***
	(24.76)	(27.66)	(24.57)	(22.72)	(22.60)	(25.51)	(21.90)
Observations	57	57	57	57	57	57	57
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.598	0.598	0.600	0.634	0.621	0.601	0.614
Adj R-sq	0.5409	0.5408	0.5424	0.5819	0.5665	0.5442	0.5584

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

As for the relationship between control variables and the volume of carbon emissions, Tables 4.16 – 4.19 have similar results as in Table 4.8 – 4.11 in that there is the existence of the Environmental Kuznets Curve. In addition, in a similar manner, size of populations, oil price, foreign direct investment, and spending on research and development have positive relationships with the volume of carbon emissions.

Table 4.19: Regression Result – Solid Fuel Consumption and Sectoral Financing – Country-level Dataset – PLS

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-0.654						
	(2.341)						
agr		-5.679					
		(5.279)					
man			-2.078				
			(5.166)				
trad				-0.00872			
				(3.765)			
trans					0.777		
					(2.144)		
real						1.695	
						(4.633)	
bankfin							-1.199
							(2.797)
lngdpc	23.38***	32.52***	23.24***	23.48**	26.13**	23.05***	26.94***
	(7.132)	(11.17)	(6.621)	(9.469)	(11.65)	(7.364)	(9.029)
lngdpc2	-1.313***	-1.755***	-1.308***	-1.321***	-1.461**	-1.305***	-1.519***
	(0.362)	(0.549)	(0.336)	(0.458)	(0.603)	(0.371)	(0.500)
lnpop	-0.0776	0.220	-0.150	-0.146	-0.221	-0.245	-0.323
	(0.728)	(0.639)	(0.598)	(0.678)	(0.537)	(0.606)	(0.781)
lnoil	-2.442	-2.561	-2.548	-2.549	-2.331	-2.439	-2.552
	(1.665)	(1.509)	(1.568)	(1.952)	(1.853)	(1.487)	(1.510)
fdi	3.057	0.773	2.620	3.168	1.678	3.067	2.721
	(8.264)	(7.665)	(8.577)	(12.12)	(9.547)	(8.331)	(8.579)
rd	3.149***	2.480*	3.297***	3.245***	2.964**	3.475***	3.318***
	(1.117)	(1.207)	(0.975)	(1.036)	(1.415)	(0.979)	(0.932)
Constant	-82.36*	-133.1*	-79.88*	-81.09	-93.04	-77.31	-92.39**
	(47.91)	(67.74)	(43.74)	(63.95)	(65.71)	(48.15)	(42.46)
Observations	31	31	31	31	31	31	31
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.433	0.475	0.433	0.430	0.434	0.436	0.440
Adj R-squared	0.2599	0.3153	0.2605	0.2571	0.2616	0.2641	0.2689

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Further examining the robustness of the estimation results, Table 4.20 – 4.23 provides the results from random effect estimation, suggested by the Hausman test, for sectoral financing and carbon emissions. Table 4.20 and 4.23 present that there is no significant relationship between sectoral financing and total volume of carbon emissions and emissions coming from solid fuel consumption.

Table 4.20: Regression Result – CO_2 Emissions and Sectoral Financing – Country-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	0.544**						
	(0.257)						
agr		-0.313					
		(0.214)					
man			-0.376				
			(0.606)				
trad				-0.257			
				(0.280)			
trans					0.175		
					(0.115)		
real						0.411	
						(0.396)	
bankfin							0.0154
							(0.137)
lngdpc	2.944***	2.926***	2.606***	3.393***	2.992***	2.558***	2.733***
	(0.917)	(1.129)	(0.821)	(0.907)	(0.990)	(0.807)	(0.876)
lngdpc2	-0.148***	-0.148***	-0.132***	-0.171***	-0.151***	-0.130***	-0.139***
	(0.0428)	(0.0527)	(0.0378)	(0.0428)	(0.0469)	(0.0374)	(0.0406)
lnpop	0.100***	0.104***	0.104***	0.123***	0.113***	0.102***	0.107***
	(0.0148)	(0.0150)	(0.0144)	(0.0188)	(0.0213)	(0.0132)	(0.0149)
lnoil	0.327***	0.341***	0.342***	0.349***	0.342***	0.341***	0.341***
	(0.113)	(0.126)	(0.119)	(0.115)	(0.118)	(0.121)	(0.124)
fdi	0.563	0.273	0.345	0.0205	0.127	0.549	0.446
	(1.217)	(1.351)	(1.159)	(1.190)	(1.048)	(1.275)	(1.319)
rd	0.153*	0.118	0.184***	0.227**	0.194***	0.183**	0.191***
	(0.0829)	(0.0910)	(0.0707)	(0.101)	(0.0686)	(0.0733)	(0.0700)
Constant	-5.680	-5.575	-3.986	-8.300*	-6.124	-3.746	-4.690
	(4.733)	(5.730)	(4.069)	(4.666)	(5.132)	(4.006)	(4.330)
Observations	57	57	57	57	57	57	57
Number of countries	12	12	12	12	12	12	12
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.5144	0.5631	0.5510	0.5823	0.5617	0.5474	0.5530
Hausman test	0.8626	0.7763	0.8346	0.8727	0.9713	0.9428	0.7769

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

However, Table 4.21 and 4.22 present that agriculture and the real estate sectors has a positive relationship with volume of carbon emissions from gaseous and liquid fuel consumption respectively. Activities in agricultural sector can offset the carbon emissions, but it also has contribution on the carbon emissions, particularly when fossil fuels are utilized in the agricultural process (Takle & Hofstrand, 2015). The positive relationship between real estate sector and volume of carbon emissions can be due to the use of liquid fuel in activities related with real estate.

Considering the whole results, it can be inferred that financing consumer durables and the manufacturing sectors have a positive relationship with the volume of carbon emissions from gaseous and liquid fuel consumption. In addition, financing transportation sector has a positive relationship with the volume of carbon emissions, while financing banking-finance sector has negative relationship with the volume of carbon emissions from gaseous fuel consumption.

As for the relationship between control variables and volume of carbon emissions, Tables 4.20 – 4.23 maintain the similar results as in Table 4.8 – 4.11 that there is exist an Environmental Kuznets Curve along with having positive effect of population, oil price, foreign direct investment, and spending on research and development on volume of carbon emissions.

Table 4.21: Regression Result – Gaseous Fuel Consumption and Sectoral Financing – Country-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-2.671						
	(1.867)						
agr		1.329*					
		(0.779)					
man			1.098				
			(1.164)				
trad				-1.062			
				(0.895)			
trans					0.669		
					(0.485)		
real						0.387	
						(0.743)	
bankfin							-0.803
							(0.516)
lngdpc	4.747	5.533	6.554	7.571	7.742	6.733	7.015
	(3.221)	(3.449)	(4.843)	(5.543)	(5.731)	(4.992)	(4.984)
lngdpc2	-0.232	-0.269	-0.315	-0.366	-0.374	-0.325	-0.336
	(0.158)	(0.169)	(0.236)	(0.270)	(0.279)	(0.243)	(0.241)
lnpop	0.146	0.130	0.124	0.140	0.159	0.129	0.148
	(0.0892)	(0.0934)	(0.103)	(0.108)	(0.116)	(0.105)	(0.110)
lnoil	0.669***	0.594***	0.605***	0.618***	0.626***	0.612***	0.642**
	(0.207)	(0.182)	(0.222)	(0.221)	(0.225)	(0.226)	(0.264)
fdi	2.267*	3.590*	2.929	1.435	1.183	2.643	1.725
	(1.210)	(2.032)	(2.809)	(2.048)	(2.165)	(2.660)	(2.084)
rd	0.230	0.357*	0.0601	0.207	0.0502	0.0428	-0.0258
	(0.165)	(0.203)	(0.150)	(0.161)	(0.127)	(0.154)	(0.188)
Constant	-18.61	-22.65	-27.79	-33.07	-34.50	-28.75	-30.66
	(17.92)	(19.55)	(27.02)	(30.42)	(31.63)	(27.82)	(27.90)
Observations	57	57	57	57	57	57	57
Number of countries	12	12	12	12	12	12	12
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.1183	0.2683	0.3214	0.2383	0.3062	0.3136	0.4777
Hausman test	N/A	0.9897	N/A	0.5641	0.7291	0.5549	N/A

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Table 4.22: Regression Result – Liquid Fuel Consumption and Sectoral Financing – Country-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	1.131						
	(0.701)						
agr		-0.436					
		(0.433)					
man			-0.512				
			(0.775)				
trad				-0.296			
				(0.368)			
trans					0.0581		
					(0.212)		
real						0.861*	
						(0.518)	
bankfin							0.325
							(0.263)
lngdpc	3.755*	3.462	3.143	4.456**	3.277	3.633*	2.754
	(1.972)	(2.196)	(1.997)	(2.039)	(2.105)	(2.139)	(2.121)
lngdpc2	-0.189**	-0.176*	-0.161*	-0.225**	-0.167	-0.185*	-0.142
	(0.0958)	(0.106)	(0.0970)	(0.0987)	(0.103)	(0.104)	(0.103)
lnpop	0.113**	0.120**	0.124**	0.155***	0.127**	0.134**	0.116**
	(0.0463)	(0.0500)	(0.0497)	(0.0511)	(0.0530)	(0.0524)	(0.0502)
lnoil	0.250	0.278	0.280	0.284	0.277	0.280	0.281
	(0.164)	(0.185)	(0.180)	(0.177)	(0.183)	(0.179)	(0.184)
fdi	0.599	0.151	0.234	-0.101	0.293	0.506	0.512
	(1.297)	(1.677)	(1.634)	(1.652)	(1.520)	(1.651)	(1.563)
rd	0.116	0.0939	0.184	0.221*	0.193	0.177	0.209*
	(0.124)	(0.154)	(0.119)	(0.125)	(0.119)	(0.122)	(0.116)
Constant	-10.65	-9.142	-7.619	-14.74	-8.358	-10.31	-5.608
	(10.33)	(11.42)	(10.49)	(10.77)	(11.20)	(11.24)	(11.05)
Observations	57	57	57	57	57	57	57
Number of countries	12	12	12	12	12	12	12
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.2099	0.1877	0.1956	0.2295	0.2045	0.2152	0.1602
Hausman test	0.032	0.1993	0.2494	0.0245	0.2733	N/A	0.1851

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

Table 4.23: Regression Result – Solid Fuel Consumption and Sectoral Financing – Country-level Dataset – Random Effects

Variables	*(1)* *cons*	*(2)* *agr*	*(3)* *man*	*(4)* *trad*	*(5)* *trans*	*(6)* *real*	*(7)* *bankfin*
cons	-0.654						
	(3.713)						
agr		-5.679					
		(4.637)					
man			-2.078				
			(6.882)				
trad				-0.00872			
				(6.047)			
trans					0.777		
					(3.654)		
real						1.695	
						(4.903)	
bankfin							-1.199
							(3.786)
lngdpc	23.38*	32.52**	23.24**	23.48	26.13	23.05*	26.94***
	(12.56)	(13.31)	(11.32)	(16.37)	(21.25)	(12.99)	(9.732)
lngdpc2	-1.313**	-1.755***	-1.308**	-1.321*	-1.461	-1.305**	-1.519***
	(0.628)	(0.674)	(0.571)	(0.797)	(1.107)	(0.651)	(0.526)
lnpop	-0.0776	0.220	-0.150	-0.146	-0.221	-0.245	-0.323
	(1.084)	(0.808)	(0.920)	(1.033)	(0.884)	(1.047)	(1.213)
lnoil	-2.442	-2.561	-2.548	-2.549	-2.331	-2.439	-2.552
	(2.598)	(2.052)	(2.358)	(2.927)	(3.017)	(2.090)	(2.197)
fdi	3.057	0.773	2.620	3.168	1.678	3.067	2.721
	(4.401)	(5.127)	(4.718)	(12.21)	(9.406)	(4.814)	(4.398)
rd	3.149**	2.480*	3.297**	3.245**	2.964	3.475**	3.318**
	(1.605)	(1.290)	(1.417)	(1.582)	(2.137)	(1.560)	(1.442)
Constant	-82.36	-133.1	-79.88	-81.09	-93.04	-77.31	-92.39*
	(84.57)	(81.89)	(75.46)	(107.1)	(117.6)	(84.83)	(56.01)
Observations	31	31	31	31	31	31	31
Number of countries	8	8	8	8	8	8	8
Prob(chi2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.4326	0.4750	0.4331	0.4305	0.4339	0.4358	0.4396
Hausman test	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; Column 1 includes consumer durables (*cons*) as determining sector; Column 2 includes agriculture (*agr*); Column 3 includes manufacturing (*man*); Column 4 includes trade (*trad*); Column 5 includes transportation (*trans*); Column 6 includes real estate (*real*); Column 7 includes banking and finance (*bankfin*)

4.6.1.4. Empirical results for mode of financing

Examining the mode of financing and the carbon emissions, Table 4.24 shows that PLS based financing has a positive relationship with carbon emissions. However, it has negative relationship with volume of carbon emission coming from gaseous fuel consumption, while it has positive relationship with solid fuel consumption. Further examining the robustness of estimation using the country-level dataset, Table 4.26 presents the same results as Table 4.24

confirming that financing using PLS has a negative and significant relationship with the volume of total carbon emissions and carbon emissions coming from gaseous fuel, while it has a positive relationship with volume of carbon emissions in general.

Table 4.24: Regression Result – Mode of Financing on CO_2 Emissions – Bank-level Dataset - PLS

Variables	*(1)* *co2*	*(2)* *gf*	*(3)* *lf*	*(4)* *sf*	*(5)* *co2-f*	*(6)* *gf-f*	*(7)* *lf-f*	*(8)* *sf-f*
pls	0.651***	-2.290***	0.0664	4.176***				
	(0.224)	(0.813)	(0.150)	(1.515)				
fixed					-0.423***	0.0740	-0.267**	-0.821*
					(0.115)	(0.296)	(0.119)	(0.487)
lngdpc	11.70***	6.278**	8.228***	24.03***	11.24***	7.256**	8.386***	25.65***
	(1.146)	(3.095)	(1.389)	(5.768)	(1.062)	(3.140)	(1.351)	(5.660)
lngdpc2	-0.552***	-0.270*	-0.376***	-1.279***	-0.529***	-0.314**	-0.384***	-1.378***
	(0.0619)	(0.155)	(0.0756)	(0.285)	(0.0580)	(0.158)	(0.0738)	(0.279)
lnpop	0.498***	0.581***	0.474***	0.451*	0.494***	0.557***	0.469***	0.472
	(0.102)	(0.155)	(0.130)	(0.253)	(0.0994)	(0.154)	(0.128)	(0.365)
lnoil	0.291***	0.710***	-0.0193	0.190	0.361***	0.645**	0.0276	0.677
	(0.110)	(0.234)	(0.131)	(0.359)	(0.112)	(0.266)	(0.133)	(0.526)
fdi	-3.488**	-0.967	2.624	-5.704	-3.930**	0.179	2.524	-9.490*
	(1.592)	(2.425)	(1.700)	(5.123)	(1.552)	(2.649)	(1.670)	(5.652)
rd	-0.183***	-0.233*	-0.498***	3.200***	-0.285***	-0.207	-0.579***	2.944***
	(0.0679)	(0.131)	(0.0796)	(0.439)	(0.0741)	(0.158)	(0.0892)	(0.658)
Constant	-58.89***	-37.40**	-40.83***	-113.3***	-56.24***	-42.28***	-41.50***	-121.0***
	(4.078)	(14.74)	(4.863)	(32.48)	(3.577)	(14.94)	(4.608)	(34.31)
Observations	176	143	176	83	176	143	176	83
Prob-F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.921	0.575	0.821	0.620	0.922	0.528	0.823	0.532
Adj R-sq	0.9179	0.5532	0.8133	0.5843	0.9186	0.5033	0.816	0.488

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

Employing random effect estimation, Table 4.27 confirms that financing using PLS does not have a significant relationship with the volume of carbon emissions. This evidences that providing financing through PLS contract is not supposed to encourage continuous consumption, but it should be used for investment in productive activities. Thus, financing using PLS might not lead towards higher consumption of gaseous fuel, it being generally used for consumption, whereas solid fuel consumption is usually used for industry or more productive activities. Considering this result, it strengthens the notion that Islamic finance has been operating in a similar manner to conventional finance in only supporting industrial and productive activities without taking into account the environmental impact resulting from those activities.

Table 4.25: Regression Result – Mode of Financing on CO_2 Emissions – Bank-level Dataset – Fixed Effect

Variables	*(1)* *co2*	*(2)* *gf*	*(3)* *lf*	*(4)* *sf*	*(5)* *co2-f*	*(6)* *gf-f*	*(7)* *lf-f*	*(8)* *sf-f*
pls	-0.404**	-0.383	-0.364	0.839**				
	(0.152)	(0.281)	(0.237)	(0.305)				
fixed					0.0195	0.0651	-0.184*	-0.159***
					(0.0616)	(0.150)	(0.102)	(0.0446)
lngdpc	6.300***	9.580**	6.084**	-34.40***	7.493***	9.004**	7.906***	-25.23***
	(1.818)	(3.546)	(2.438)	(8.189)	(2.012)	(3.522)	(2.507)	(6.006)
lngdpc2	-0.311***	-0.476**	-0.299**	1.801***	-0.370***	-0.448**	-0.389***	1.322***
	(0.0897)	(0.177)	(0.120)	(0.431)	(0.0993)	(0.176)	(0.123)	(0.316)
lnpop	0.124***	0.226**	0.0966**	2.064***	0.145***	0.219**	0.131***	1.421***
	(0.0314)	(0.0872)	(0.0396)	(0.359)	(0.0350)	(0.0879)	(0.0405)	(0.476)
lnoil	0.233***	0.471***	0.156	-0.0417	0.216**	0.463***	0.162	0.00237
	(0.0801)	(0.0663)	(0.125)	(0.0674)	(0.0885)	(0.0798)	(0.121)	(0.0442)
fdi	0.660	3.352	0.199	2.378***	0.756	3.352	0.369	2.998***
	(0.464)	(2.129)	(0.744)	(0.579)	(0.455)	(2.175)	(0.786)	(0.501)
rd	0.161***	0.220*	0.118	-0.271	0.146**	0.218**	0.0905	0.0613
	(0.0523)	(0.113)	(0.0944)	(0.343)	(0.0654)	(0.104)	(0.105)	(0.233)
Constant	-22.97**	-43.06**	-21.91*	137.9***	-29.25***	-40.03**	-31.48**	105.3***
	(9.312)	(19.04)	(12.55)	(34.77)	(10.36)	(18.94)	(12.96)	(22.53)
Observations	176	143	176	83	176	143	176	83
Number of banks	49	41	49	30	49	41	49	30
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
R-squared	0.746	0.629	0.453	0.566	0.713	0.625	0.446	0.378
Hausman test	N/A	0.0000	0.0004	0.0000	0.0000	0.0000	0.0002	N/A

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

As depicted by the results in Table 4.24, financing using fixed-income instruments has a negative relationship with volume of carbon emissions. Further examining the robustness of the empirical process by employing country-level dataset, Table 4.26 confirms that financing using fixed-income instruments has a negative and significant relationship with the total volume of carbon emissions and emissions coming from liquid fuel consumption, while random effect estimation result shows that there is a negative relationship between fixed-income instruments and volume of carbon emissions coming from liquid fuel consumption that is depicted in Table 4.27.

However, there is a positive relationship between fixed instruments and volume of carbon emissions from gaseous fuel consumption although it is not significant presented ini Table 4.27. Considering the ease and flexibility of fixed financing instruments, it can be used widely for consumption purpose rather than productive or investment activities. Thus, financing using

fixed financing instrument might lead to higher consumption of gaseous fuel consumption including natural gas, whilst those activities might not be related with petroleum-based fuel.

Table 4.26: Regression Result – Mode of Financing on CO_2 Emissions – Country-level Dataset - PLS

Variables	*(1)* *co2*	*(2)* *gf*	*(3)* *lf*	*(4)* *sf*	*(5)* *co2-f*	*(6)* *gf-f*	*(7)* *lf-f*	*(8)* *sf-f*
pls	1.417***	-2.896**	0.0949	3.829				
	(0.488)	(1.131)	(0.272)	(2.312)				
fixed					-0.898***	0.355	-0.589***	-1.524
					(0.220)	(0.555)	(0.210)	(1.019)
lngdpc	12.83***	6.489	9.382***	23.77**	11.80***	7.157	9.759***	31.75***
	(1.770)	(5.117)	(2.013)	(10.33)	(1.476)	(5.506)	(1.960)	(10.65)
lngdpc2	-0.608***	-0.276	-0.437***	-1.292**	-0.560***	-0.302	-0.455***	-1.731***
	(0.0939)	(0.259)	(0.109)	(0.516)	(0.0793)	(0.279)	(0.106)	(0.527)
lnpop	0.449***	0.611**	0.430**	0.163	0.427***	0.608**	0.418**	0.0935
	(0.141)	(0.274)	(0.183)	(0.531)	(0.120)	(0.296)	(0.173)	(0.714)
lnoil	0.283*	0.456*	-0.0440	0.368	0.497***	0.290	0.0778	1.280*
	(0.145)	(0.267)	(0.166)	(0.485)	(0.147)	(0.349)	(0.172)	(0.685)
fdi	-3.621	2.439	2.959	-10.17	-4.989**	5.183	2.644	-14.18*
	(2.475)	(3.340)	(2.748)	(6.645)	(2.410)	(3.857)	(2.631)	(7.273)
rd	0.0171	-0.263	-0.443***	3.914***	-0.206	-0.234	-0.651***	3.694***
	(0.124)	(0.231)	(0.139)	(0.871)	(0.148)	(0.296)	(0.138)	(1.270)
Constant	-63.72***	-38.54	-45.45***	-105.7*	-57.79***	-42.33*	-47.14***	-142.6**
	(6.971)	(23.50)	(7.300)	(55.73)	(5.443)	(24.99)	(6.899)	(62.17)
Observations	80	74	80	43	80	74	80	43
Prob-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.868	0.594	0.742	0.649	0.869	0.510	0.757	0.601
Adj R-sq	0.8552	0.5505	0.7166	0.5791	0.8568	0.4586	0.7332	0.5209

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

The control variables have consistent results which are presented in Tables 4.8 – 4.11 evidence the existence of Environmental Kuznets Curve as well as demonstrating, in a similar manner, positive effect of population, oil price, foreign direct investment, and spending on research and development towards the volume of carbon emissions.

Table 4.27: Regression Result – Mode of Financing on CO_2 Emissions – Country-level Dataset – Random Effects

Variables	*(1)* *co2*	*(2)* *gf*	*(3)* *lf*	*(4)* *co2-f*	*(5)* *gf-f*	*(6)* *lf-f*
pls	-0.280	-0.301	-0.0791			
	(0.235)	(0.245)	(0.314)			
fixed				-0.0331	0.115	-0.318***
				(0.0594)	(0.103)	(0.102)
lngdpc	3.637*	7.887**	6.969***	4.206	8.840*	7.445***
	(1.959)	(3.136)	(2.371)	(2.562)	(4.227)	(2.473)
lngdpc2	-0.181*	-0.380**	-0.347***	-0.209	-0.435*	-0.369***
	(0.0959)	(0.157)	(0.116)	(0.126)	(0.214)	(0.121)
lnpop	0.0899***	0.118	0.185**	0.100**	0.180	0.182***
	(0.0260)	(0.0939)	(0.0721)	(0.0368)	(0.127)	(0.0685)
lnoil	0.291***	0.453***	0.186	0.290***	0.413***	0.241**
	(0.0711)	(0.0560)	(0.143)	(0.0747)	(0.0346)	(0.112)
fdi	0.663	3.050	-0.335	0.684	3.396	-0.411
	(0.682)	(2.478)	(1.315)	(0.636)	(2.783)	(1.174)
rd	0.174***	0.184	0.0691	0.145*	0.210	0.0334
	(0.0572)	(0.171)	(0.180)	(0.0819)	(0.153)	(0.180)
Constant	-9.006	-34.00**	-27.75**	-12.01	-38.95	-30.17**
	(10.08)	(17.00)	(12.71)	(13.30)	(22.64)	(13.17)
Observations	80	74	80	80	74	80
Number of countries	15	14	15	15	14	15
Prob-F	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
R-squared	0.743	0.3222	0.5179	0.724	0.702	0.5210
Hausman test	N/A	0.9959	0.4995	N/A	N/A	0.9960

Notes: *, **, *** represents 10%, 5%, 1% significance level respectively; Standard errors in parentheses; *pls* = profit-loss sharing, *fixed* = fixed instrument

4.6.1.5. Empirical results for *sukuk* market

This sub-section provides the regression results for *sukuk* market, which is presented through Table 4.28 – 4.30. Table 4.28 displays the regression result for the base dataset, in which the *sukuk* issuance is per issuance and the carbon emission is on the country-level. It shows that volume of *sukuk* issuance has a negative relationship with carbon emission regardless the source of energy although the coefficients are very small. This relationship can be due to the fact that countries with relatively high issuance of *sukuk* have a relatively lower volume of carbon emission, and also that *sukuk* has not been issued regularly and it does not have a steady increase over time unlike the volume of carbon emission. In addition, considering the nature of *sukuk* for long-term investment, it has been and will be further used for productive and carbon-conscious activities rather than consumption-based ones.

Table 4.28: Regression Result – *Sukuk* Issuance and CO_2 Emissions – Issuance-level Dataset - PLS

Variables	*(1)* *co2*	*(2)* *gf*	*(3)* *lf*	*(4)* *sf*
lnsukuk	-0.00230***	-0.00844***	-0.00123	-0.0113***
	(0.000852)	(0.00197)	(0.00118)	(0.00233)
lngdpc	5.806***	5.665***	6.632***	27.59***
	(0.372)	(0.953)	(0.678)	(2.272)
lngdpc2	-0.241***	-0.248***	-0.266***	-1.359***
	(0.0179)	(0.0457)	(0.0332)	(0.117)
lnpop	0.855***	0.440***	1.115***	1.571***
	(0.0175)	(0.0441)	(0.0318)	(0.0604)
fdi	-1.666***	-2.210***	-0.333	-3.660***
	(0.375)	(0.701)	(0.248)	(1.329)
rd	-0.0748***	-0.209***	-0.0612**	0.420***
	(0.0170)	(0.0334)	(0.0240)	(0.0923)
lnoil	0.0299**	0.112***	-0.299***	0.514***
	(0.0119)	(0.0284)	(0.0179)	(0.0370)
Constant	-36.29***	-28.20***	-46.10***	-158.4***
	(2.083)	(5.337)	(3.768)	(11.74)
Observations	6,697	6,697	6,697	6,615
Prob-F	0.0000	0.0000	0.0000	0.0000
R-squared	0.945	0.614	0.826	0.802
Adj R-sq	0.9449	0.6136	0.8257	0.8021

Notes: *, **, *** denotes significance at 10%, 5%, and 1% respectively; Standard errors in parentheses

Further examining the robustness of the regression results, this study also constructs the *sukuk* dataset into firm-level annual data with country-level carbon emission. Table 4.29 shows that volume of *sukuk* issuance has negative relationship with carbon emissions regardless of the sources of energy: this is consistent with the results in Table 4.28, except for the relationship with carbon emission coming from liquid fuel consumption.

The same examination for robustness was also conducted by constructing the dataset as country-level for both dependent and independent variables: Table 4.30 shows consistent results in that the volume of *sukuk* issuance has a negative relationship with volume of carbon emissions coming from solid fuel consumption when applying the pooled least square.

As for the control variables, the results in Table 4.28 – 4.30 demonstrate similar results as in Table 4.8 – 4.11 which process the existence of Environmental Kuznets Curve and show positive effect of population on volume of carbon emission. However, the effect of oil price, foreign direct investment, and spending on research and development has different sign from the ones in banking estimation, which might be due to including countries with different political economies in the sample and also due to the differences in the period.

Table 4.29: Regression Result – *Sukuk* Issuance and CO_2 Emissions – Firm-level Dataset

Variables	*PLS*				*FE*			
	co2	***gf***	***lf***	***sf***	***co2***	***gf***	***lf***	***sf***
lnsukuk	-0.0101**	-0.0323***	-0.00228	-0.0216*	0.00395*	0.000625	0.00228	0.0111
	(0.00440)	(0.00699)	(0.00427)	(0.0110)	(0.00206)	(0.00261)	(0.00369)	(0.00906)
lngdpc	5.436***	3.442***	6.042***	25.10***	7.010	-11.04**	13.13**	-86.67***
	(0.352)	(0.739)	(0.897)	(2.081)	(5.591)	(4.878)	(6.090)	(25.86)
lngdpc2	-0.220***	-0.132***	-0.234***	-1.223***	-0.319	0.638***	-0.555*	4.062***
	(0.0172)	(0.0361)	(0.0442)	(0.102)	(0.279)	(0.244)	(0.308)	(1.269)
lnpop	0.936***	0.688***	1.104***	1.572***	-0.0437	-0.0396	-4.837***	21.95***
	(0.0312)	(0.0641)	(0.0435)	(0.114)	(0.391)	(0.482)	(1.191)	(5.429)
fdi	-1.563**	-1.897*	-1.090**	-2.570	-0.327	-3.046***	0.418	1.974***
	(0.698)	(1.147)	(0.522)	(2.075)	(0.209)	(0.221)	(0.295)	(0.662)
rd	-0.130***	-0.148**	-0.154***	-0.308	0.277***	-0.499***	0.797***	-0.790
	(0.0382)	(0.0691)	(0.0423)	(0.195)	(0.0542)	(0.127)	(0.151)	(0.757)
lnoil	-0.00397	0.00164	-0.291***	0.698***	0.115***	0.0951*	0.0578	0.320
	(0.0235)	(0.0416)	(0.0291)	(0.0868)	(0.0327)	(0.0556)	(0.0512)	(0.254)
Constant	-35.76***	-21.00***	-43.06***	-147.1***	-26.05	58.47**	17.51	91.42
	(1.995)	(4.272)	(4.870)	(12.03)	(24.89)	(22.83)	(32.83)	(117.2)
Observations	771	771	771	716	771	771	771	716
Number of firms					401	401	401	355
Prob-F	0.0000	0.0000	0.0000	0.0000	0.000	0.000	0.000	0.000
R-squared	0.925	0.664	0.828	0.771	0.877	0.726	0.668	0.754
Adj R-sq	0.9239	0.6608	0.8262	0.7683				
Hausman test					0.000	0.000	0.000	0.000

Notes: *, **, *** denotes significance at 10%, 5%, and 1% respectively; Standard errors in parentheses

As for the *sukuk* estimation, oil price, foreign direct investment, and spending on research and development all demonstrate a negative relationship with volume of carbon emissions. This may be because foreign direct investment and spending on research and development in this sample are directed towards better technology having higher material and energy intensity resulting in producing less carbon dioxide (*see:* Abbasi & Riaz, 2016; Fernandez Fernandez *et al.*, 2017; Tamazian *et al*., 2009).

Table 4.30: Regression Result – *Sukuk* Issuance and CO_2 Emissions – Country-level Dataset

Variables	*PLS*				*RE*		
	co2	***gf***	***lf***	***sf***	***co2***	***gf***	***lf***
lnsukuk	-0.0178	-0.0533	0.0101	-0.187*	0.00572	-0.00478	0.0114***
	(0.0214)	(0.0361)	(0.0232)	(0.103)	(0.00541)	(0.00459)	(0.00411)
lngdpc	3.623***	0.592	3.518	20.79***	8.996**	-4.421***	7.937***
	(0.681)	(1.700)	(2.364)	(3.585)	(3.819)	(0.887)	(2.237)
lngdpc2	-0.122***	0.0182	-0.106	-0.961***	-0.425**	0.251***	-0.346***
	(0.0354)	(0.0897)	(0.123)	(0.183)	(0.180)	(0.0426)	(0.112)
lnpop	1.044***	0.917***	1.118***	1.981***	0.410*	0.698***	0.976***
	(0.0439)	(0.0939)	(0.0815)	(0.324)	(0.226)	(0.139)	(0.113)
fdi	-0.786	-0.896	-0.978	0.280	0.615	-0.197	-0.624
	(0.546)	(1.081)	(0.727)	(1.582)	(0.513)	(0.293)	(0.401)
rd	-0.215***	-0.245**	-0.106	-2.083***	0.267***	-0.00881	0.137*
	(0.0628)	(0.117)	(0.108)	(0.695)	(0.0867)	(0.0577)	(0.0704)
lnoil	-0.419**	-0.374	-1.052***	0.877	-0.00861	0.0263	-0.396***
	(0.172)	(0.312)	(0.267)	(0.706)	(0.113)	(0.104)	(0.125)
Constant	-27.40***	-9.618	-28.05**	-133.4***	-42.43**	17.84***	-48.83***
	(3.377)	(7.961)	(11.15)	(21.03)	(17.86)	(5.008)	(10.55)
Observations	52	52	52	37	52	52	52
Number of countries					17	17	17
Prob-F	0.0000	0.0000	0.0000	0.0000	0.000	0.000	0.000
R-squared	0.951	0.789	0.870	0.823	0.704	0.6914	0.8008
Adj R-sq	0.9432	0.7554	0.8493	0.7800			
Hausman test					0.0006	0.9615	0.8175

Notes: *, **, *** denotes significance at 10%, 5%, and 1% respectively; Standard errors in parentheses

4.7. CONCLUSION

This chapter discusses the concern over environmental degradation that has been a direct and indirect effect of financial development; this will in turn also affect economic activities. Looking beyond the relation between economic activities, financial development, and environmental degradation, the environment along with natural resources have been continuously exploited to provide the continuous production under the linear economic growth paradigm. In addition to production related causes, consumption has been widely encouraged in order to absorb the output produced from the firms' side, resulting in an increase of waste, including the waste produced by the firms, resulting in further carbon emission.

There seems to be an issue with the concept of continuous or linear economic growth, which is measured by GDP growth in that the monetary value of production and consumption becomes the ultimate goal that needs to be pursued at the expense of all other stakeholders including human being and natural resources. The relationship between natural resources and society, and their economic interactions has been dominated by financial activities: these were

supposed to serve society and incorporate natural resources as the ultimate means, but finance has been at the centre of the economic activities. Linear growth is not sustainable either for the environment or society, and there is a need to get the economy into a steady state: this can be achieved by undergoing degrowth and dematerialization paradigm.

The concept of degrowth is claimed to be necessary considering the current state of the environment and society, which can no longer sustain the continuous growth and is already in a 'critical' condition. The idea of degrowth does not necessarily mean that the economy should grow in a negative direction, but it should involve broader aspects beyond the monetary value of production and consumption; these might include the interest of the environment and socio-economic indicators into the goals that need to be achieved by the society. The ultimate aim is to maintain the social metabolism by ensuring equality and justice for society and the environment by adapting anti-utilitarianism, participatory, sufficiency, and opposition of class-creation as opposed to the capitalist framework. The implementation of a degrowth strategy can start with dematerialization, which suggest that economic activity should pursue material efficiency, energy efficiency, material demand reduction, and pro-ecological behaviours such as recycling and reducing waste.

This study provides a discussion about degrowth and de-materiality and its rationalization under Islamic economic framework, as well as discussing its accentuation through the impact of Islamic financial development on carbon emission. Theoretically, Islamic economics aims to promote a balancing role with equality among the stakeholders on earth: this implies that there should not be any dominance of any one stakeholder over other stakeholders, both human-human and human-nature relationship. Consequently, human beings should not pursue indefinite growth at the expense of the social metabolism of natural resources. Thus, economic and financial activities should not undermine the existence of natural resources and human beings as merely an input in the production process: there should be an equal opportunity for each stakeholders of the earth to reach their own perfection.

In examining the relationship between Islamic financial development and environmental degradation, this study employs sectoral financing extended by Islamic banks and mode of financing from Islamic banks and volume of *sukuk* issuance to observe their relationship with volume of carbon emissions. The results present a mixed relationship between Islamic financial

development and the volume of carbon emission, showing that different sectors have different relationship with carbon emissions and with its sources of energy.

Financing the consumer durable sector has a positive relationship with the volume of carbon emissions from gaseous fuel consumption when employing pooled least square in both bank-level and country-level dataset, while the relationship is negative when applying the random effect estimation in country-level dataset. The positive relationship may be due to the fact that consumer durables are related with household equipment which consumes natural gas. However, the different outcomes when applying random effect estimation indicates that by taking into account the characteristics of country, it has different pattern of relationship.

On the other hand, financing the agricultural sector has positive and significant relationship with gaseous fuel consumption in country-level dataset and when employing random effect estimation. Further, financing the trade sector has a negative relationship with the volume of carbon emissions coming from different sources of energy, which might be due to different trend between the proportion of financing for trade and the volume of carbon emission: the former has decreasing trend while the latter has increasing volume over time.

As for financing for the transportation sector, it has a positive relationship with the volume of carbon emissions and the different sources, which indicates that the transportation sector in the countries being included in this study still use vehicles that emit carbon dioxide rather than promoting more carbon friendly modes of transportation, such as cycling and walking as widely promoted in developed countries. On the other hand, financing of the real estate sector does not have a significant relationship with the volume of carbon emission, which might be due to the low proportion of financing for the real estate sector. The last sector, the banking-finance sector, has a negative relationship with the volume of carbon emission from gaseous and liquid fuel consumption when employing pooled least square. This can be explained due to the different trend between the proportion of financing for banking-finance sector and the volume of carbon emissions from gaseous and liquid fuel consumption.

In addition, an examination is also conducted for mode of financing, for which the results show that the proportion of financing using profit-loss sharing has a positive relationship with the total volume of carbon emissions and emissions from solid fuel consumption, but it has negative relationship with emissions from gaseous fuel consumption. This may be due to the nature of profit-loss sharing financing that is used for financing productive activities, which

might be run on solid fuel or coal. On the other hand, profit-loss sharing financing is not suitable for financing gaseous-related equipment, such as household equipment. However, the proportion of financing through fixed instruments has a negative relationship with liquid fuel consumption, which can be due to different trends between the proportion of fixed financing and petroleum-based fuel since liquid fuel has begun to be replaced with natural gas and coal.

As for *sukuk* market, it has a negative relationship with the volume of carbon emissions and the emissions from different sources of fuel, which may be caused by the countries which issue most of the *sukuk* not having a high volume of carbon emission. Another reason may be the inability of *sukuk* to be traded in secondary markets, resulting in using *sukuk* for long-term investments that will not damage the environment.

As for the control variables, it shows that the argument of Environmental Kuznets Curve holds in the case of this study, and also that size of population and oil price have positive relationships with the volume of carbon emissions. The effect of oil can be due to the fact that countries being included in the sample are oil (fuel) exporters. Foreign direct investment and spending on research and development have positive relationships with the volume of carbon emissions in the Islamic banking related estimation, while they have negative relationship in the *sukuk* related estimation. This may be due to the fact that there are some differences between the countries being included in both estimations.

The results show that the idea of degrowth and Islamic moral economy can be reflected in the implementation of Islamic finance, considering that financing consumer durables can lead to higher material consumption for gaseous-related products. In addition, considering that Islamic finance has been operating under the framework of mainstream economics, financing provided for productive activities will still increase the volume of carbon emissions from solid fuel consumption although it is provided through profit-loss sharing. The reason being that the productive activities under the mainstream economics framework are still focusing on producing more material output from the most affordable energy, and this is coal which has the highest carbon dioxide emitted compared to natural gas and liquid fuel. Further, providing financing through fixed instrument can increase the volume of carbon emissions from gaseous fuel consumption since fixed instrument are less complicated mechanism to finance consumer durables that are normally related the consumption of natural gas.

To conclude, this study finds that Islamic banks have been operating under the linear growth model and mainstream economics framework. It cannot be said that this accentuates the objectives of Islamic economics in which there should be just and equal opportunities for the stakeholders on earth to reach their perfection. Islamic banks, by working with the institutional logic of capitalism, have been focusing on generating higher income and profit by supporting linear production and consumption that is financed through financing consumer durables and the use of fixed instruments financing. However, as shown by the results, *sukuk* market can be a better instrument in representing the objectives of IME: it can be issued as green and/or blue *sukuk* which supports the environmental requirements and protection as well as regeneration.

Chapter 5

DISCUSSION AND CONCLUSION

5.1. SUMMARY

This research consists of three empirical essays, which attempt to explore and examine the relationship between Islamic financial development and sources of growth, socio-economic development, and sustainability in the degrowth and de-materiality framework. The variables of Islamic financial development include Islamic banking variables, such as net interest margin, loan-to-deposit ratio, capital adequacy ratio, non-performing loans, sectoral financing, financing based on types of contracts, and volume of *sukuk* issuance.

The first essay employs sources of growth, namely capital accumulation and total factor productivity growth, as the dependent variables and for which the relevant data was generated from the PennWorld Table (PWT). Utilizing pooled and panel data analysis, the estimation results are divided into four parts: Islamic banking operational variables; volume of *sukuk* issuance; Islamic banking sectoral financing; and financing of Islamic banks based on types of Islamic financing contracts. The independent variables are at bank level, while the dependent variables are at country level. As such, this study incorporates pooled data with different levels for the independent and dependent variables; and panel data by aggregating the bank-level data into the country-level dataset.

The estimations in the first empirical essay, Chapter 2, show that overhead costs have a positive relationship with capital accumulation growth and total factor productivity growth; while capital adequacy ratio and non-performing loans have a negative relationship with the sources of growth. As for the volume of *sukuk* issuance, it has a positive relationship with capital accumulation growth and total factor productivity growth. Examining sectoral financing in bank-level dataset, financing consumer durables has a negative relationship with capital accumulation growth, while financing the real estate sector has a positive relationship. Furthermore, employing the country-level dataset, financing the agricultural sector has a positive relationship with total factor productivity growth, while financing the banking and

finance sector has a negative relationship. According to the types of Islamic financing contracts available, financing using fixed Islamic financial instruments has a positve relationship with capital accumulation growth when employing the bank-level dataset. On the other hand, financing using profit-loss sharing instruments has a negative relationship with capital accumulation growth when employing the bank-level dataset, while it has positive relationship with total factor productivity growth.

The second essay examines the relationship between Islamic financial development and socio-economic development by employing pooled and panel data analysis, as well as quadratic estimation and mediating variable regression. The socio-economic indicators consist of HDI, the education index, the gender development index, the gender inequality index, the gini coefficient, the infrastructure index, and the environmental performance index (EPI), for all of which the data was generated from various resources, including the World Bank Database and EPI Committee. The volume of *sukuk* issuance can be observed directly through the pooled and panel data analysis by using the *sukuk* dataset at the level of issuance, aggregating by firm and by year; and aggregating by country and by year. It is also examined through quadratic estimation, as the relationship may be reversed after a certain volume of *sukuk* issuance. As for the banking variable, it is mediated through the financial inclusion index, since banking operation variables may not directly affect socio-economic development, but rather through greater inclusion of people in financial activities a society can develop its socio-economic conditions.

The empirical process for the second empirical essay, Chapter 3, is divided into three parts: analysis of the linear relationship between the volume of sukuk issuance and socio-economic indices; the quadratic relationship between them; and intermediate variable regression for Islamic banking variables on socio-economic indices through the financial inclusion index. The results of the analysis of the linear relationship show that volume of *sukuk* issuance has a negative relationship with the gender development index and the gender inequality index—these results do not align with the expected relationship. As for the quadratic relationship, the relationship between the volume of *sukuk* issuance and the gender development index and the gender inequality index display the expected relationship. When mediated through the financial inclusion index, the Islamic banking variables have the pre-determined or expected relationship with the socio-economic indices.

The third empirical essay examines the relationship between Islamic financial development and carbon emissions by framing it within the de-materiality and degrowth framework, which can be considered to align with the Islamic moral economy. The dependent variable in this essay is the annual volume of carbon emission by country. It is also segregated into sources of fuel: gaseous fuel, liquid fuel, and solid fuel. This essay also employs pooled and panel data analysis, since the Islamic financial data is at the firm level, which is also aggregated into the country level.

The findings for the third empirical essay, Chapter 4, show that financing the consumer durables sector has a positive relationship with the volume of carbon emission from gaseous and liquid fuel consumption. In addition, the findings show that financing the transportation sector also has a positive relationship with the volume of carbon emissions in general; this is also the case with the other sources of fuel. On the other hand, the findings show that financing the agricultural sector has a positive relationship with the volume of carbon emissions from solid fuel. In addition, financing the trade and banking and finance sectors has a negative relationship with the volume of carbon emissions from gaseous and liquid fuel consumption. As for the types of contract used, financing using profit-loss sharing contracts has a negative relationship with the volume of carbon emissions from gaseous fuel, although it has a positive relationship with the volume of carbon emissions from solid fuel consumption when employing the country-level dataset. On the other hand, financing using fixed instruments has a negative relationship with the volume of carbon emissions from liquid fuel consumption. In exploring the subject through the prism of the *sukuk* market, the findings in Chapter 4 demonstrate that the volume of *sukuk* issuance has a negative relationship with the volume of carbon emissions in general, and with the different sources of fuel in particular.

5.2. CRITICAL REFLECTION ON THE FINDINGS

The estimation results in the first essay explain that Islamic banks, having lower capital adequacy ratios, can support total factor productivity growth in the countries where Islamic banks operate. This implies that banks with less capital will be able to deliver more financing, because their balance sheets are not concentrated on the side of capital. However, low capital can be dangerous for banks if they are unable to cover depositors' money were insolvency to occur. Thus, there is a need to balance the value of a bank's capital adequacy ratio and its loans

so that it can support total factor productivity growth safely. This highlights the importance of liquidity management for Islamic banks.

As for non-performing loans, it is clear that Islamic banks with lower amounts of non-performing loans can support capital accumulation and total factor productivity growth in countries where Islamic banks operate. This suggests that Islamic banks with more stable operational activities can deliver more financing, which can support capital accumulation and total factor productivity. On the other hand, the variable for efficiency, overhead costs, has a positive relationship with capital accumulation growth and total factor productivity growth, indicating that since Islamic banks are considered to be new to the industry, they still need to incur more costs in order to ensure the stability of their operations and compete with other banks in the industry. This suggests that there is a need to formulate a strategy for Islamic banks to reduce costs so that they can deliver more financing to support the sources of growth.

As for the relationship between the volume of *sukuk* issuance and sources of growth, it appears that the *sukuk* market has been able to support capital accumulation and productivity growth although the coefficient is lower for the latter. This indicates that it only contributes to a higher nominal amount of capital, but it has lower impact to the real economy. Examining the sectoral financing provided by Islamic banks, in recent years Islamic banks have massively increased their financing for consumer durables although it apparently does not create capital accumulation. On the other hand, as the results demonstrate, providing financing for the real estate sector can induce capital accumulation, as real estate can be seen as a form of investment that can generate a return in the future. Moreover, the findings show that financing the agricultural sector can help with total factor productivity growth, since financing in agriculture is widely used to purchase and develop tools and equipment that can increase productivity. On the other hand, financing the banking and finance sector does not support productivity growth—as the banking and finance sector is known to be very profitable, putting money into the banking and finance sector is only to secure the funds.

In terms of financing based on types of Islamic business or financing contracts, financing through profit-loss sharing contracts does not support capital accumulation, while financing through fixed instruments has the reverse relationship. On the other hand, financing through profit-loss sharing can support total productivity growth. This indicates that fixed instruments can only support capital accumulation, while profit-loss sharing financing aims to increase

productivity through economic activity. This is an important conclusion, as the Islamic moral economy framework essentialises profit-loss sharing instruments or contracts in economic activities in order to embed the value of labour and society, rather than only locating capital as the centre of the economic process. However, this spirit has not been sufficiently emphasized in the current operational activities of Islamic banks where financing is still widely provided through fixed instruments, rather than profit-loss sharing schemes. This is because profit-loss sharing schemes have a more complicated process and cannot fit into the operational form or the institutional logic of mainstream economic activities. In other words, the existing system cannot essentialise and facilitate the aspirational nature of the Islamic moral economy and Islamic banks have therefore opted to fit into the existing institutional logic by giving up its aspirations.

The estimations in second essay show that the volume of *sukuk* issuance has not been able to support socio-economic development, as evidenced by the proxy indices used through quadratic estimation. The results show that the volume of *sukuk* issuance needs to pass a certain threshold to be able to support the socio-economic indices, such as the gender development index and the gender inequality index. Moreover, the turning point of relationship between *sukuk* issuance and several indices, such as the education index, the gini coefficient, the infrastructure index, and the environmental index, are higher than the average volume of *sukuk* issuance. It implies that there is still a need to increase the volume of *sukuk* issuance to support the development of indices. This result is in line with the results of the first essay, where the *sukuk* market was seen to have higher contribution to the nominal amount of capital, but lower effect to the productivity value.

The results in the third essay show that financing certain sectors will help reduce the volume of carbon emissions, such as agricultural sector financing by Islamic banks and *sukuk*. However, financing the consumer durables and transportation sectors may lead to an increase in the volume of carbon emissions. In addition, financing through profit-loss sharing instruments can reduce the volume of carbon emissions from gaseous fuel, although it can increase the volume of carbon emissions from solid fuel. Financing through fixed instruments has a negative relationship with the volume of carbon emissions from liquid fuel consumption, but it has a positive relationship with gaseous fuel, although it is not significant. It should be noted that the volume of carbon emissions has been experiencing an increasing trend due to human activity, particularly from burning coal and oil for industrial activities; electricity for residences and

offices; transportation; and the destruction of natural environments for buildings to accommodate human activities, such as factories, residential blocks, railroads, and office blocks.

Furthermore, the profit-loss sharing mode of financing used for productive activities will still hamper environmental protection. The reason is that under the mainstream economics framework, productive activities have to produce more material output from the most affordable energy source, currently coal, which has the highest carbon dioxide emissions compared to natural gas and liquid fuel. Thus, profit-loss sharing will not be able to emphasize the primary objective of Islamic economics, namely, to help all stakeholders to achieve perfection, if Islamic banks are still operating within the mainstream economics framework of minimizing costs and locating the environment as an external factor. However, evidence shows that financing through profit-loss sharing has a negative relationship with the volume of carbon emissions from gaseous fuel consumption. This may indicate that the profit-loss sharing mode of financing does not suit consumer durables financing, as the products are connected to an increase in gaseous fuel consumption. The reason is that profit-loss sharing is more complicated than fixed instruments and requires a more thorough examination before financing can be advanced. It also has to be linked to the real economy, with consumers being more responsible and accountable in utilizing the financing by producing and consuming necessary goods and services.

However, financing through fixed instruments is argued to be more straightforward compared to profit-loss sharing, resulting in a large amount of financing being delivered for diverse activities, particularly for the purposes of consumption. Such consumption activities are necessary to keep production processes going, although this will increase the use of energy causing a higher volume of carbon emissions. It is important to note that the ease of fixed instrument financing can create fictitious commodities, since it only requires consumers to pay the agreed price without the necessity of relating the financing to the real economy.

On that note, considering that Islamic banks still deliver most of their financing in sectors that are profitable and have lower risk, such as consumer durables, and using fixed instruments, they have not been able to reflect the spirit of Islamic economics and maintain a balance among stakeholders. Their operational and financial activities still lean towards promoting higher material consumption, such as purchasing house appliances, by charging fixed rates of return

in order to generate higher profits—such activities utilise material resources and produce waste that can harm the environment. In other words, the operational activities of Islamic banks still revolve around maximizing shareholder value without taking into consideration the capability of their consumers, the environmental effects, and the social effects, such as encouraging materialistic behaviour, which eventually creates classes within a society as banks only provide financing for wealthy consumers and poor ones cannot get access due to not being able to provide collateral.

On the other hand, the findings also show that the volume of *sukuk* issuance should be able to reduce the volume of carbon emissions, indicating that *sukuk* might be a better instrument to accentuate the objectives of Islamic economics.

Looking at the results from the three empirical essays, it can be inferred that Islamic financial development, both in the form of Islamic banks and the *sukuk* market, has only been able to support economic growth through contributing towards capital accumulation. In addition, the *sukuk* market has not been able to support socio-economic development either, as measured by the education index, the infrastructure index, the environmental index, and the gender inequality index. These two results indicate that Islamic finance has only been able to be aligned with the mainstream economics framework, which, can be argued, only supports the intermediate ends of the Islamic moral economy, rather than its ultimate goal of achieving *falah*. In attempting to achieve *falah*, several axioms need to be fulfilled that will actualize the intermediate ends: spiritual and moral satisfaction; natural wealth; socio-economic gains; and technological gains. Under the concept of *tawhid* (unity), every creature belongs to Allah, which implies that every living being has the equal (*just*) opportunity to grow and be empowered (*ihsan, ikhtiyyar*) themselves by considering other living beings and without any domination of over another (*tazkiyah, ukhuwah*).

In addition, the Islamic moral economy also emphasizes several aspects that need to be actively safeguarded, namely faith and the human self, including their intellect, progeny, and wealth, which are categorized under *maqashid al-shari'ah*. However, Islamic financial institutions have been growing by conforming to the mainstream economic framework, rather than generating an institutional framework of embeddedness within the objectives of the Islamic moral economy so that development can be achieved. As a result, the current operational activities of Islamic financial institutions have not essentialised the underpinning features of

Islamic moral economy and by choosing capitalist institutional logic, they have relegated the Islamicity of Islamic banks to *riba* or interest prohibition so that the economic gains of the intermediate ends can be achieved, which is only one aspect of *maqasid al-shari'ah* and other intermediate means have been put aside. This means that *falah* or the development paradigm of Islam is still far from the sight.

The findings are further supported by the empirical results of mediating the relationship of banking variables to socio-economic indicators through the financial inclusion index, showing that the banking variables have a positive relationship on the socio-economic indicators. This highlights that financial inclusion is an important factor in providing equal opportunities and access for the wider population of a society, so that the capital accessed from financial institutions can be utilized for participating in socio-economic development. However, this can also strengthen the argument in the mainstream economics framework that access to capital is a prerequisite for obtaining other socio-economic factors, underpinning the dominance of capital.

The ultimate objective within the Islamic moral economy is to achieve *falah*, defined as well-being in the world and hereafter, through providing equal (*just*) opportunity for every stakeholder on earth to reach their perfection (*rububiyyah*), in harmony (*tazkiyah*) with all other stakeholders. This implies that each factor of production has the same level of importance without any domination of one factor over another, as is the case of capital in the neoclassical framework. Accordingly, the Islamic moral economy also aims to re-embed economic and financial activity into the value system of society so that these activities will acknowledge labour, not just as a mere tool for producing goods and services, but as a stakeholder, leading to greater social cohesion. As such, development for all stakeholders in a just manner is the aim. Polanyi (1944) considers social protectionist movements to rescue land, labour, and capital; in the same manner, Islamic moral economy's emergence since the 1960s has aimed at rescuing human beings, land, labour, and capital within a paradigm of justice in which the rights of each of stakeholder, without the dominance of any of them, are achieved.

Examining the sectoral financing delivered by Islamic banks, the empirical results infer that providing financing for sectors in the field of ultimate means, such as agriculture, can support productivity and environmental protection. This can be achieved since agriculture is a sector the products of which are part of the basic necessities in the lives of human beings. This implies

that financing for agriculture can be utilized to increase productivity in the agricultural sector itself, which, in turn, will be able to support productivity in other sectors. In addition, the agricultural sector has its own natural metabolism in order to balance greenhouse gas emissions emitted, implying that financing agricultural sector has a lower probability of accelerating environmental destruction compared to other sectors. However, financing agricultural sector can still degrade the environment if the energy being used for agriculture-related activities is coming from fossil fuel and extracting the environment.

The finding also evidences that providing financing towards unproductive sectors, such as consumer durables and banking and finance, can deter productivity and encourage environmental degradation. Providing financing for the consumer durables and banking and finance sectors can be argued to have a low risk of default and can guarantee returns in accordance with the neoclassical framework of profit maximization. However, these sectors do not encourage productivity from the real economy, since the return is created from the creation of money, particularly in the banking and finance sector, within the institutional logic of finance capitalism or financialisation. In addition, financing for consumer durables can lead to an increase in material consumption, producing higher greenhouse gas emissions and incurring greater production of waste, which is harmful to the environment. Having said this, the statistical data in Chapter 2 shows that Islamic banks have been providing more financing to sectors such as consumer durables and banking and finance. This is not fully in line with the objectives of the Islamic moral economy and the empirical results in Chapter 3—Islamic moral economy, as the foundation of Islamic finance, suggests that financing should be embedded in the real economy. Thus, the results indicate that Islamic banks are operating under the framework of mainstream economics to maximize profits, without considering the development objectives that underpin the Islamic moral economy.

As for the types of contracts being employed by Islamic banks in providing financing for consumers, the empirical results show that contracts proposed by Islamic economics, namely profit-loss sharing, can support productivity and environmental conservation. However, environmental conservation can only happen if productive activities are using environmental-friendly sources of fuel and intensifying the material resources. On the other hand, fixed income financing instruments, such as *murabahah*, *ijarah*, *istisna*, and *salam* can only support capital accumulation by an increased indebtedness in the economy and this deters environmental protection through increased gaseous fuel consumption. The statistical data in

Chapter 2 shows that Islamic banks have been relying on *murabahah* and organised *tawarruq* contracts for their financing, rather than profit-loss sharing contracts, indicating that debt-creating instruments are more straightforward in providing financing. Moreover, considering the nature of debt, it is convenient for people to obtain debt for greater consumption and production, even for the conspicuous and wasteful, since it is not necessarily connected to the real economy as long as people can pay back the principal and interest.

On the other hand, the profit-loss sharing paradigm can discourage people from consuming and producing irresponsibly, as it has to be linked with productivity to share the profit or loss. As mentioned above, the experience of interest-based systems has created an economy in which financial activities are much larger than the real sector, such as the volume of derivative transactions, the value of which can be multiple times that of the physical commodity, and the creation of monetary value from money beyond any underlying assets. In addition, it has also led to an indebted society in which people keep taking out loans to fulfil their material needs and wants because consumers only have to pay the amount being lent out without involving any condition of the real sector and with the only concern of financial institutions being the ability of consumers to repay, regardless of their situation. As a result, the real economy has been overrun by the development of financial activities, which can be seen by the establishment of financial-related businesses by traditional manufacturers and retailers to reap higher profits with lower risks.

It seems that Islamic financial institutions have merely implemented the mainstream economics framework in their business operations, with the help of the Islamisation process facilitated by *Shari'ah* compliancy, which is supposed to emphasize the objectives of the Islamic moral economy rather. Islamic financial institutions need to come to the realization that they need to move away from *'business as usual'*, which has been argued as the way to compete with conventional finance, to a new paradigm in which they should support the broader intermediate means to achieve *falah*—the ultimate goal. This objective can only be achieved by substantiating the value system of Islamic moral economy in the economic and financial activities of Islamic finance. The mainstream economics framework, which is the paradigm currently being followed by Islamic banking and Islamic capital markets, is not able to be the medium of achieving *falah*, since it has a different value system and objective; that of profit maximization.

5.3. THEORETICAL AND PRACTICAL IMPLICATIONS

Economics emerged as a science and discipline to theorize the conditions of household management and its interaction within and between society, focusing on production and consumption, which is formally aggregated into the concept of Gross National Product (GNP) to measure the volume of production and consumption of a country. The economic paradigm is constructed around the exchange between capital, labour, and output, where capital allocation is defined as a financial activity. Financial institutions exist to bridge the relationship between households and firms, providing funds owned by households for firms to finance their economic activities, including innovation. In a broader definition, financial activities can also include capital management in the private and public sectors.

Financial activities are believed to have supported innovation, such as the industrial revolution in the 19th century. Early on, innovation was a means for the betterment of people and society: medicine to cure diseases; lighting and heating *etc*.; and also the acquisition of more wealth. However, with the postulate of continuous or linear growth as part of the modern economy, or as Polanyi (1944) describes it, due to the dis-embedded nature of the economy, firms, and human beings, are required to always innovate and create something new within a short period of time and the role of the human being has been relegated to a means to achieve this, rather than as the receiver of its benefits. It seems that innovation is no longer there to solve problems in society, but has become anything that can be transformed into capital, highlighting the commodified and fictitious nature of the dis-embedded economy (Polanyi, 1944). This is also observed in financial activities, which are closely related to innovation, and have developed to create ever more sophisticated financial instruments without considering the needs of society. Finance for the sake of finance, rather than ‘finance being the art of protecting and financing people’, has been established as the prevailing and pervasive paradigm (Asutay, 2018a).

The central role of finance in neoclassical economics and neoliberal economy is identified by the hegemony of capital over other factors of production, whereby capital becomes dominant and determinant in economic activity, engaging other modes of production to serve capital, a role that should be reversed. This may be due to the quantification of economic activities through GNP, which suggests that everything should, in the end, be able to be measured quantitatively in monetary terms. This shifts the measurement of quality to one of quantity and transforms economics, which is supposed to study society and groups of people who have

distinct and unique characteristics, into a mechanistic system. As argued in the mainstream economics framework, this shift makes GNP, now being replaced by Gross Domestic Product (GDP), the most powerful tool to measure economic activity and the ultimate end becomes its expansion in a trajectory of linear growth, so as to achieve other objectives. This implies that the objective in society has shifted from one of human happiness as the goal of economic activity, to one where human being are made the means for economic activity.

In the linear economic growth model, economic activities in a country should move from agricultural activity into manufacturing and then see an increase in the service sector. It is argued that moving from agricultural labour towards service provision entails higher value-added activity and products; higher innovation; and a reduction in intensive labour. However, people often neglect the notion that agriculture has the highest value, since it provides the ultimate means for the survival of the people, which necessitates the essentialisation and protection of nature and the environment. Additionally, there may be jobs in the service sector that do not create any value for society, although they provide higher economic value.

Considering that GDP does not categorize certain positive and all the negative activities or spill overs, and only includes formal activities, it is not able to reflect the true value of economic activities in a society. Moreover, the condition of linear economic growth is at the expense of other factors, such as environmental sustainability and inequality within and between countries and generations. Such difficulties with the modern growth theory and practice have paved the way for the emergence of sustainable development, which focusses on environmental sustainability and social inclusion in addition to economic growth. It attempts to include other socio-economic indicators to track the social, as well as the economic progress of a society.

Under the mainstream economics framework, finance still has an important role in supporting socio-economic indicators by providing financial aid, and bilateral and multilateral loans for developing countries. This can be seen as a neo-colonialist practice, as it undermines the ability of developing countries to decide what is suitable for them, which may not necessarily be the same as developed countries. In addition, with globalization, it may not be necessary for each country to move towards a developed service sector to be classified as developed country. Instead, each country can be specialized according to its own competitive advantage and capabilities, which can be shared mutually within and between countries.

Re-considering the explanation above, it seems that the mainstream economics framework has become a *status quo* in which further development has to revolve around fitting and patching up the mainstream framework with positive growth as the objective. However, ecologists have been raising awareness that the idea of continuous or linear growth will surpass the capability of the earth to accommodate and manage growth. Some of them suggest that steady state economic growth should be the objective, which can be achieved by implementing policies of degrowth and thereby the ultimate goal should be achieving human well-being—economic growth should be considered an intermediate end. The idea of degrowth has been discussed in Chapter 4, which explains that the assumptions underlying capitalism, such as self-interest and utility maximization, should be reconstituted so that a healthy social metabolism can be restored to society and the environment.

Islamic finance, as the financing tools of Islamic economics, or the Islamic moral economy paradigm, emerged as a counter-hegemony in relation to the established mainstream economic system, as the latter theoretically and practically constitutes the current system and hence the hegemony. However, the current system suffers in terms of theory and policy, some of the weaknesses being verified with the 2008 Global Financial Crisis. Islamic economics, on the other hand, with its distinct ontology and epistemology, differs from mainstream economics in that it suggests an embedded system of economy, so that economic theory and policy can be authentic and according to the social formation of Muslim societies and the disembeddedness created by the market economy can be overcome (Asutay, 2018a).

Despite such claims, Islamic finance, as the articulation of Islamic economics in the financial realm, does not have strong roots on the foundational objectives that need to be achieved. Nevertheless, any theoretical attempt, including Islamic economics and finance, is compared and confined to the conventional framework, and it is argued that it should fit into the established system so that industry can be competitive within the existing institutional logic of capitalism. With such focus on the circulation of capital, as is the concern of the conventional system, Islamic finance has been mimicking conventional finance so as to be accepted into a financial industry that has different theoretical underpinning (Asutay, 2018a). Such dislocated institutional logic results in the current debate prevailing in Islamic finance academic, policy, and professional circles around how Islamic is Islamic finance. In other words, through a process of mimicking and mirroring, Islamic finance operations and institutions, with the pressure of the market economy through fiat money system, the reserve banking system, and

external international organisations, such as the Basel requirements, is being grafted onto the conventional system, as can be seen by the increasingly disembedded nature of their instruments and operation.

The shift to a debt-based system through fixed income instruments, including organised *tawarruq*, demonstrates this grafting process. Therefore, in order to achieve its authentic objectives, including a sharing economy, risk sharing, profit-and-loss sharing, and a definition of capital with the prohibition of *riba*, Islamic finance needs to develop its own institutional logic that is in line with the ideals of Islamic economics, which are based on equity, as opposed to the conventional institutional logic based on efficiency. This implies that the theory and practice of Islamic economics and finance has to be developed to reflect such an authenticity, so that socio-economic development, embedded growth (rather than linear growth), and the rescue of 'human, land, labour and capital' promised by the Islamic moral economy advanced in the 1960s can be achieved.

In summary, it is necessary to build the theoretical framework of Islamic finance based on the foundational objectives of Islamic economics without being confined by the established economic and financial system, if the objective is to achieve socio-economic development as discussed in this research. Conventional financial instruments were developed according to the requirements of capitalism and the market economy, leading to financial activities becoming dominant in the process and resulting in financial capitalism. In order to avoid such a fate, that of Islamic finance falling into the trap of financial capitalism, it has to be re-oriented according to the objectives of Islamic economics so that 'protecting people and financing them' (Asutay, 2018a) can be possible.

The Islamic financial industry had a great start with the *Mith Ghamr* Bank in 1963, which purposively served the needs of the community with the objective of empowering individuals, but there has been a lack of attempts to formulate the theoretical framework. Islamic economics has not provided the theoretical underpinning as to how Islamic financial institutions can contribute to economic growth and development, whether through the support of capital accumulation, productivity, labour, social inclusion, or environmental sustainability. It will be beneficial for policy makers and practitioners to set out the practical implementation of Islamic finance to support economic growth and development within the Islamic economic paradigm of human-centred development by considering the rights of all the stakeholders. Having said

that, it may also be important to note that the theoretical framework of Islamic economics and finance should be able to change dynamically to respond to the needs of society.

In examining the operational activities of Islamic financial institutions, the findings from the three essays presented in this study demonstrate that Islamic financial development has not been able to support any activities beyond capital accumulation and still leans towards activities that are focussed on shareholder value maximisation, beyond the stakeholding paradigm, and have low risks indicating that it work for the market development, rather than for communities and societies. In addition, it has not been able to reflect and accentuate the principles of Islamic economics, such as justice, equality, and growth in harmony. With the recent implementation of the SDGs, this can be the moment when Islamic financial institutions develop to tap into the opportunities of financing relevant programs, despite that fact that SDGs seek mainly to moderate the consequences of the market economy, rather than radically questioning the hegemony of capital (Asutay, 2019).

The SDGs, as a program, can be said to be aligned with the objectives of Islamic finance in promoting human well-being and providing just and equal opportunities for all stakeholders to flourish and seek their own perfection. However, the Islamic moral economy suggests a substantial framework for a just economic system and therefore the operational objectives of Islamic finance should not be relegated to copying the SDGs. Following the results in these essays, Islamic banks should at least widen their customer base so as to increase the financial inclusion, rather than being banks for 'those who have' so that people can empower themselves in achieving socio-economic targets. Moreover, the *sukuk* instrument seems to be most suitable for achieving the SDGs, as it has the nature of long-term financing that can be utilized for infrastructure projects related to socio-economic development.

Further reflecting critically, with the widely discussed concepts of de-materiality and degrowth coming from the ecological field, Islamic finance should create the necessary opportunity space to promote its own conception, putting *falah* (well-being in the world and hereafter) as the ultimate goal by ensuring equal opportunity for all stakeholders without any dominant role for certain factors, such as the dominance of capital in the capitalist framework. It should be taken into account that this domination has led to neglect of the importance of other factors, such as natural resources and labour, as they are seen as inputs in the production process that can be replaced with other factors. Such an understanding does not consider natural resources to be

the ultimate means to generate other derivative processes and to lay the ground for further activities, while labour should be acknowledged as a factor that can conduct operational activities and can provide innovation.

With the growing concern regarding environmental issues, which cannot be solved fully by following the linear economic growth model promoted by the mainstream economics framework, Islamic economics and finance can promote the original objectives of Islamic economics—that of optimal growth being achieved for all stakeholders, as *tawhid* essentialises, including the human beings. By emphasizing the principles of justice, equality, and growth in harmony for all stakeholders, the practical implementation of Islamic finance in line with such ethical objectives can be derived, such as de-centring capital. Moreover, the nature of cooperation and mutuality, or *takaful*, within society should be nurtured as the nature of competition and self-interest has been the main operational framework of capitalism and resulted in the dominant nature of several factors, such as humans being held dominant over nature and capital over other factors.

Additionally, the development of Islamic finance should not only be concerned with the prevailing trend at the moment if it has to forego the foundational objectives of Islamic economics, such as the use of blockchain and bitcoin. With the recent trend of financial technology, there is a wide discussion regarding the use of blockchain and bitcoin in overcoming the issues of poverty and inequality, and even in optimizing the potential of Islamic social finance, such as *waqf* and *zakah*. However, it is being developed at the expense of the environmental sustainability, and may be creating further power generation inequality within and between countries (Nienhaus, 2019). As Islamic economics emphasizes equal opportunities for all stakeholders on earth, there is a need to evaluate the whole effect of new instruments no matter how *fashionable* they are. Furthermore, bitcoin type developments indicate further financialisaton, fictitiousness, and commodification without any reference to real assets.

In summary, as repeated previously, Islamic finance, with its authentic meaning as defined by Islamic economics, promised an alternative paradigm to rescue human, land, labour, and capital. However, its trajectory since the 1990s has been defined by its eagerness to develop hybrid products and institutions in the global financial system, at the expense of developing an authentic paradigm. The SDGs will inform a new turn for Islamic finance to essentialise the

missing link of ethicality, which Islamic economics is built upon. Since conventional finance will develop opportunity spaces for SDGs, Islamic finance will mimic this process, rather than turning to its own authentic processes. Despite ontological differences and aiming to overcome and moderate the consequences of the capitalist economy, the SDGs should be considered in a positive manner for Islamic finance, at least for the short-term (Asutay, 2019).

5.4. LIMITATIONS AND FUTURE WORKS

The established mainstream economics framework has been widely utilized in Islamic finance related research, despite different ontological assumptions. This has led to inconsistencies and criticism. As such, this constitutes the first limitation of this study, as the theoretical framework of Islamic economics is not sufficiently well developed to be utilised in this study and therefore the empirical modelling still relies on the conventional theoretical framework. In addition, Islamic finance has been constructed to fit and revolve around the mainstream economics framework by only providing an alternative implementation for Islamic financial institutions. The research presented in Chapters 2 and 3 is indicative of these shortcomings, as the benchmarks used are not those of Islamic economics, but rather of neoclassical economic growth and development models, which have been utilised to test the impact of Islamic finance. While this should be considered a limitation, on the other hand, this can be rationalised because, at present, Islamic finance institutions and operations have the same consequences and objective function as those of conventional finance. Therefore, consistency is achieved despite the fact that discursive and theoretical criticism based on Islamic economics was used to launch the research in each empirical essay.

Considering that the Islamic finance industry is relatively new compared to the conventional financial sector, this highlights a second limitation in that the number of observations in the datasets are not as great as conventional studies can achieve. This study has been conducted using the best available data, which may not be statistically sufficient, but provides a consistent result. Utilizing more recent datasets, particularly on financing from Islamic banks and macroeconomic variables, has helped to include more observations and capture the most recent condition of the economic and financial system.

The combination of the lack of a fully-formed theoretical framework and availability of the dataset leads to a third limitation, which has resulted in limited exploration in the empirical chapter with an orientation towards replicating and mimicking the empirical studies of

mainstream economics. This highlights the shortcomings in the narrative and conceptual frames for explaining the Islamic finance industry. There have not been many studies examining the relationship between Islamic financial development and socio-economic indicators, which is broader than the co-movement between private credit provided by Islamic banks and GDP growth and HDI, as depicted in Chapter 2 and Chapter 3. Even so, such studies do not provide a deep explanation and the consequences of the co-movement of credit and GDP growth and HDI.

These limitations can be improved in future research by aiming to incorporate a wider dataset and also developing its own methodology that can fit the provided dataset. Furthermore, conceptual studies can be conducted to construct the theoretical framework of growth and development under the Islamic economics framework by combining the qualitative and quantitative components generated from the knowledge base of Islam, along with the historical record and institutions, with the objective of understanding the bigger picture as to how Muslim communities conduct financial transactions and what development objectives are reached in the end. Such an exercise then moves towards their recent application in society to formalize economic and financial activities.

5.5. EPILOGUE

This study aims to examine the relationship between Islamic financial development, sources of growth, socio-economic development, and sustainability issues through the concept of de-materiality and degrowth. Employing several econometrics analysis techniques, the empirical results show that Islamic banks still need to make further efforts towards capital accumulation and total factor productivity growth. In addition, sectoral financing highlights that providing financing for productive sectors, such as agriculture and industry, can support total factor productivity and reduce environmental degradation. The findings indicate that these sectors create a real added value to society compared to wasteful forms of consumption and production. Looking at the types of contracts, financing through profit-loss sharing can support total factor productivity growth and environmental sustainability while avoiding the encouragement of consumptive behaviour. However, fixed instrument financing has only been able to support capital accumulation growth and it does not support human development.

As for the *sukuk* market, this research shows that it has only been able to support capital accumulation growth and environmental sustainability, and it has not been able to support

socio-economic indicators, such as the education index, the infrastructure index, and the gender inequality index. On the other hand, Islamic banking variables can support socio-economic indicators when mediated through the financial inclusion index.

Overall, the empirical results show that the ideal implementation of Islamic finance can support sources of growth and sustainability. However, the current implementation of Islamic finance has shifted away from the ideal through a process of institutional grafting (*see:* Portes, 2010, for the institutional grafting process), as shown by the wide use of fixed income instruments and financing with shareholder value maximisation, which apparently has only been supporting the concept of mainstream economics rather than the objectives of Islamic economics.

In conclusion, as the empirical chapters, with their conceptual and theoretical frames, highlight, this study has fulfilled the aims and objectives set out in Chapter 1. It has rendered a conceptual and empirical contribution to the ongoing debate and burgeoning literature regarding Islamic finance and growth and issues of socio-economic and sustainable development.

REFERENCES

AAOIFI. (2015). AAOIFI Financial Accounting Standard No.33: Investments in Sukuk, shares and similar instruments.

Aassouli, D., Asutay, M., Mohieldin, M., & Chiara Nwokike, T. (2018). Green Sukuk, Energy Poverty, and Climate Change: A Roadmap for Sub-Saharan Africa. *The World Bank Policy Research Working Paper*. Washington, DC: World Bank Group.

Abbasi, F., & Riaz, K. (2016). CO2 emissions and financial development in an emerging economy: An augmented VAR approach. *Energy Policy*, *90*, 102–114.

Abduh, M, & Chowdhury, N. (2012). Does Islamic banking matter for economic growth in Bangladesh. *Journal of Islamic Banking Economics*, *8*(3), 104–113.

Abduh, Muhamad, & Azmi Omar, M. (2012). Islamic banking and economic growth: the Indonesian experience. *International Journal of Islamic and Middle Eastern Finance and Management*, *5*(1), 35–47. https://doi.org/10.1108/17538391211216811

Abdul-Matin, I. (2012). *Green Deen: What Islam Teaches About Protecting The Planet*. Markfield: Kube Publishing Ltd.

Abedifar, P, Hasan, I., & Tarazi, A. (2016). Finance-growth nexus and dual-banking systems: Relative importance of Islamic banks. *Journal of Economic Behavior*, *132*, 198–215.

Abedifar, Pejman, Molyneux, P., & Tarazi, A. (2013). Risk in Islamic Banking Risk in Islamic Banking. *Review of Finance*, *17*(6), 2035–2096.

Abootalebi, A. R. (1995). Democratization in developing countries: 1980-1989. *The Journal of Developing Areas*, *29*(4), 507–530.

Accornero, M., Alessandri, P., Carpinelli, L., & Sorrentino, A. M. (2017). Non-Performing Loans and the Supply of Bank Credit: Evidence from Italy. *Presentation presented in the First ESCB Workshop on Financial Stability*.

Acemoglu, D. (2002). Directed technical change. *The Review of Economic Studies*, *69*(4), 781–809.

Acemoglu, D., & Robinson, J. A. (2013). *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. New York: Crown Books.

Adams-Kane, J., & Lim, J. J. (2016). Institutional Quality Mediates the Effect of Human Capital on Economic Performance. *Review of Development Economics*, *20*(2), 426–422.

Aghion, P., Howitt, P., & Mayer-Foulkes, D. (2005). The Effect of Financial Development on Convergence: Theory and Evidence. *The Quarterly Journal of Economics*, *120*(1), 177–322.

Ahmad, K. (1979). *Economic development in an Islamic framework*. Leicester: The Islamic Foundation.

Ahmad, K. (1994). *Economic Development in an Islamic Framework*. Leicester: The Islamic Foundation.

Ahmad, K. (2003). The Challenge of Global Capitalism: An Islamic Perspective. *Making Globalization Good: The Moral Challenges of Global Capitalism*. Oxford: Oxford University Press.

Ahmad, K. (2004). Islamic Perspectives on Challenge of Global Capitalism. *Policy Perspectives*, *1*(1), 1–29.

Ahmad, K. (2006). The economic development in an Islamic framework. *Development issues in Islam*. Kuala Lumpur: Research Centre, IIUM.

Ahmed, H. (2013). Financial Inclusion and Islamic Finance: Organizational Formats, Products, Outreach, and Sustainability. *Economic Development and Islamic Finance*. Washington D.C.: The World Bank.

Ahmed, H., Mohieldin, M., Verbeek, J., & Aboulmagd, F. (2015). On the Sustainable Development Goals and the Role of Islamic Finance. *The World Bank Policy Reseach Working Paper*. Washington, DC: World Bank Group.

Ahrens, R. (2002). Predicting recessions with interest rate spreads: a multicountry regime-switching analysis. *Journal of International Money and Finance*, *21*, 519–537.

Ahsan, M. (2004). Human Development in the Muslim World: From Theory to Practice The Concept of Human Development. *The Muslim World*, *94*(2), 181–200.

Aidt, T., Jia, L., & Low, H. (2017). Are prices enough? The economics of material demand reduction. *Journal Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160370. https://doi.org/10.1098/rsta.2016.0370

Akiyama, T. (1988). Islamic Perspectives on Science and Technology. *IMES Working Paper*. The Institute of Middle Eastern Studies, International University of Japan.

Al-Jayyousi, O. R. (2012). *Islam and Sustainable Development: New Worldviews*. Surrey: Gower Publishing Limited.

Al-Sadr, M. B. (2010). *The Islamic Economic Doctrine*. London: MECI Ltd.

Alam, M. S., Shahbaz, M., & Paramati, S. R. (2016). The Role of Financial Development and Economic Misery on Life Expectancy: Evidence from Post Financial Reforms in India. *Social Indicators Research*, *128*(2), 481–497. https://doi.org/10.1007/s11205-015-1040-4

Alcala, F., & Ciccone, A. (2004). Trade and Productivity. *The Quarterly Journal of Economics*, *119*(2), 613–646.

Alexander, S. (2015). Simplicity. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

Aliyu, S., Yusof, R. M., & Naiimi, N. (2017). The role of moral transaction mode for sustainability of banking business. *International Journal of Social Economics*, *44*(12), 2238–2256. https://doi.org/10.1108/IJSE-07-2016-0205

Allen, R. C. (2011). *Global Economic History: A Very Short Introduction*. Oxford: Oxford University Press.

Anand, S., & Kanbur, S. M. R. (1993). Inequality and development A critique. *Journal of Development Economics*, *41*(1), 19–43. https://doi.org/10.1016/0304-3878(93)90035-L

Anand, S., & Ravallion, M. (1993). Human Development in Poor Countries: On the Role of Private Incomes and Public Services. *Journal of Economic Perspectives*, *7*(1), 133–150.

Andreucci, D., & McDonough, T. (2015). Capitalism. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

Arora, R. U. (2012). Gender inequality, economic development, and globalization: A state level analysis of India. *The Journal of Developing Areas*, *46*(1), 147–164.

Arrow, K. J. (1962). The Economic Implications of Learning by Doing. *The Review of Economic Studies*, *29*(3), 155–173.

Asutay, M. (2007a). A Political Economy Approach to Islamic Economics: Systemic Understanding for an Alternative Economic System. *Kyoto Bulletin of Islamic Area Studies*, *1*(2), 3–18.

Asutay, M. (2007b). Conceptualisation of the second best solution in overcoming the social failure of Islamic banking and finance : examining the overpowering of Homoislamicus by Homoeconomicus. *IIUM Journal of EEconomics and Management*, *15*(2), 167–195.

Asutay, M. (2012). Conceptualising and locating the social failure of Islamic finance : aspirations of Islamic moral economy vs. the realities of Islamic finance. *Asian and African Area Studies*, *11*(2), 93–113.

Asutay, M. (2015). Islamic Finance: Principles, Institutions and Development. *Trade and Finance*, 4–26.

Asutay, M. (2016). *Lecture Handout 6: Islamic Economic and Human Development*.

Asutay, M. (2018a). *An Introduction to Moral Economy and Rationalising Islamic Moral Economy*. Durham.

Asutay, M. (2018b). *Islamic Political Economy/Moral Economy: Rationale, Foundations and Philosophy*. Durham.

Asutay, M. (2019, April). Reflecting on the SDGs and Islamic Finance Nexus. *I-Fikr Digest*.

Asutay, M., Aysan, A. F., & Karahan, C. (2013). Reflecting on the Trajectory of Islamic Finance: From Mit Ghamr to the Globalisation of Islamic Finance. *Afro Eurasian Studies*, *2*(1&2), 2–14.

Asutay, M., & Yilmaz, I. (2018). Re-embedding Maqasid al-Shariah in the Essential Methodology of Islamic Economics. *Maqasid Al-Shari'ah: Explorations and Implications*, pp. 373–418. Selangor: Islamic Book Trust.

Awaworyi Churchill, S., Inekwe, J., Smyth, R., & Zhang, X. (2019). R&D intensity and carbon emissions in the G7: 1870-2014. *Energy Economics*, *80*, 30–37. https://doi.org/10.1016/j.eneco.2018.12.020

Ayub, M. (2007). *Understanding Islamic finance*. John Wiley & Sons.

Ayubi, N. (1996). *Over-stating the Arab State: Politics and Society in the Middle East*. London: I.B. Tauris.

Azid, T. (2005). The Concept and Nature of Labour in Islam: A Survey. *Review of Islamic Economics*, *9*(2), 93–124.

Baddeley, M. (2011). Civil War and Human Development: Impacts of Finance and Financial Infrastructure. *Cambridge Working Papers in Economics*. Cambridge: Faculty of Economics, University of Cambridge.

Balaguer, J., & Cantavella, M. (2016). Estimating the environmental Kuznets curve for Spain by considering fuel oil prices (1874-2011). *Ecological Indicators*, *60*, 853–859. https://doi.org/10.1016/j.ecolind.2015.08.006

Banerjee, A. V, & Duflo, E. (2003). Inequality and Growth: What Can the Data Say? *Journal of Economic Growth*, *8*(3), 267–299.

Banks, A. S. (1981). An index of socio-economic development 1869-1975. *The Journal of Politics*, *43*(2), 390–411.

Barro, R. J., & Sala-i-Martin, X. (2004). *Economic Growth: Second Edition*. Massachusetts: The MIT Press.

Becchetti, L., & Conzo, P. (2014). The effects of microfinance on child schooling: a retrospective approach. *Applied Financial Economics*, *24*(2), 89–106. https://doi.org/10.1080/09603107.2013.856998

Beck, T., Degryse, H., & Kneer, C. (2013). Is more finance better? Disentangling intermediation and size effects of financial systems. *Journal of Financial Stability*, *10*(1), 1–15. https://doi.org/10.1016/j.jfs.2013.03.005doi.org/10.1016/j.jfs.2013.03.005

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, *12*, 27–49. https://doi.org/10.1007/s10887-007-9010-6

Beck, T., Levine, R., & Loayza, N. (2000). Finance and the sources of growth. *Journal of Financial Economics*, *58*(1–2), 261–300. https://doi.org/10.1016/S0304-405X(00)00072-6

Beckerman, W. (2003). *A Poverty of Reason: Sustainable Development and Economic Growth*. Oakland: The Independent Institute.

Ben Jedidia Khoutem, D. (2014). Islamic banks-Sukuk markets relationships and economic development. *Journal of Islamic Accounting and Business Research*, *5*(1), 47–60. https://doi.org/10.1108/JIABR-07-2012-0054

Bérenger, V., & Verdier-Chouchane, A. (2007). Multidimensional measures of well-being: Standard of living and quality of life across countries. *World Development*, *35*(7), 1259–1276.

Berger, A. N., & Udell, G. F. (1994). Did risk-based capital allocate bank credit and cause a "credit crunch" in the US? *Journal of Money, Credit and Banking*, *26*(3), 585–628.

Berthelemy, J., & Varoudakis, A. (1996). Economic growth, convergence clubs, and the role of financial development. *Oxford Economic Papers*.

BinMahfouz, S., & Ahmed, H. (2014). Shariah Investment Screening Criteria: A Critical Review. *Journal of King Abdulaziz University: Islamic Economics*, *27*(1), 111–145.

Blackburn, K., & Forgues-Puccio, G. F. (2010). Financial liberalization, bureaucratic corruption and economic development. *Journal of International Money and Finance*, *29*(7), 1321–1339. https://doi.org/10.1016/J.JIMONFIN.2010.05.002

Blauwhof, F. B. (2012). Overcoming accumulation: Is a capitalist steady-state economy possible? *Ecological Economics*, *84*, 254–261. https://doi.org/10.1016/J.ECOLECON.2012.03.012

Blejer, M. I. (2006). Economic growth and the stability and efficiency of the financial sector. *Journal of Banking & Finance*, *30*(12), 3429–3432. https://doi.org/10.1016/j.jbankfin.2006.06.001

Blum, J., & Hellwig, M. (1995). The macroeconomic implications of capital adequacy requirements for banks. *European Economic Review*, *39*, 739–749.

Bodenhorn, B., & Ulturgasheva, O. (2017). Climate strategies: thinking through Arctic examples. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160363. https://doi.org/10.1098/rsta.2016.0363

Bolt, J., Inklaar, R., de Jong, H., & van Zanden, J. L. (2018). Rebasing "Maddison": New Income Comparisons and the Shape of Long-run Economic Development. *GGDC Research Memorandum*. Groningen: Groningen Growth and Deveolpment Center.

Booth, D. E. (1998). *The Environmental Consequences of Growth*. London: Routledge.

Borensztein, E., De Gregorio, J., & Lee, J.-H. (1998). *How Does Foreign Direct Investment Affect Economic Growth?* (No. 5057). Cambridge: National Bureau of Economic Research.

Brand-Correa, L. I., & Steinberger, J. K. (2017). A Framework for Decoupling Human Need Satisfaction From Energy Use. *Ecological Economics*, *141*, 43–52. https://doi.org/10.1016/J.ECOLECON.2017.05.019

Bregman, R. (2018). *Utopia for Realists and How We Can Get There*. London: Bloomsbury.

Brennan, G., Tennant, M., & Blomsma, F. (2015). Business and production solutions: closing loops and the circular economy. *Sustainability: Key Issues*. Oxford: Routledge.

Brohman, J. (1995). Economism and critical silences in development studies: A theoretical critique of neoliberalism. *Third World Quarterly*, *16*(2), 297–318. https://doi.org/10.1080/01436599550036149

Buch-Hansen, H. (2018). The Prerequisites for a Degrowth Paradigm Shift: Insights from Critical Political Economy. *Ecological Economics*, *146*, 157–163. https://doi.org/10.1016/J.ECOLECON.2017.10.021

Burkett, P., & Hart-Landsberg, M. (2003). A critique of "catch-up" theories of development. *Journal of Contemporary Asia*, *33*(2), 147–171. https://doi.org/10.1080/00472330380000101

Calderón, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of Development Economics*.

Caporale, G. M., & Helmi, M. H. (2018). Islamic Banking, credit and economic growth: Some empirical evidence. *International Journal of Finance & Economics*, *23*, 456–477. https://doi.org/10.1002/ijfe.1632

Cattelan, V. (Ed.). (2018). *Islamic Social Finance: Entrepreneurship, Cooperation and the Sharing Economy*. New York: Routledge.

Cecchetti, S. G., & Kharroubi, E. (2015). Why does financial sector growth crowd out real economic growth? *BIS Working Papers*. Basel: Bank for International Settlements.

Chapra, M. U. (1985). *Towards A Just Monetary System*. London: The Islamic Foundation.

Chapra, M. U. (1993). *Islam and Economic Development: A Strategy for Development with Justice and Stability*. Islamabad: The International Institute of Islamic Thought.

Chapra, M. U. (2000). *The Future of Economics: An Islamic Perspective*. Leicester: The Islamic Foundation.

Chapra, M. U. (2008a). Ibn Khaldun's theory of development: Does it help explain the low performance of the present-day Muslim world? *The Journal of Socio-Economics*, *37*(2), 836–863. https://doi.org/10.1016/J.SOCEC.2006.12.051

Chapra, M. U. (2008b). *The Islamic Vision of Development in the Light of Maqasid al-Shari'ah*. London: The International Institute of Islamic Thought.

Charfeddine, L., & Ben Khediri, K. (2016). Financial development and environmental quality in UAE: Cointegration with structural breaks. *Renewable and Sustainable Energy Reviews*, *55*, 1322–1335. https://doi.org/10.1016/J.RSER.2015.07.059

Chau, K. W., & Walker, A. (2006). The measurement of total factor productivity of the Hong Kong construction industry. *Construction Management and Economics*, *6*(3), 209–224. https://doi.org/10.1080/01446198800000019

Christopoulos, D. K., & Tsionas, E. G. (2004). Financial development and economic growth: evidence from panel unit root and cointegration tests. *Journal of Development Economics*, *73*(1), 55–74. https://doi.org/10.1016/J.JDEVECO.2003.03.002

Claessens, S., & Laeven, L. (2003). Financial Development, Property Rights, and Growth. *The Journal of Finance*, *58*(6), 2401–2436. https://doi.org/10.1046/j.1540-6261.2003.00610.x

Clemens, M., Kenny, C., & Moss, T. (2007). The trouble with the MDGs: confronting expectations of aid and development success. *World Development*, *35*(5), 735–751.

Çoban, S., & Topcu, M. (2013). The nexus between financial development and energy consumption in the EU: A dynamic panel data analysis. *Energy Economics*, *39*, 81–88. https://doi.org/10.1016/J.ENECO.2013.04.001

Cornett, M. M., McNutt, J. J., Strahan, P. E., & Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics*, *101*(2), 297–312. https://doi.org/10.1016/J.JFINECO.2011.03.001

Coronil, F. (2000). Towards a critique of Globalcentrism: Speculations on capitalism's nature. *Public Culture*, *12*(2), 47.

Cosme, I., Santos, R., & O'Neill, D. W. (2017). Assessing the degrowth discourse: A review and analysis of academic degrowth policy proposals. *Journal of Cleaner Production*, *149*, 321–334. https://doi.org/10.1016/J.JCLEPRO.2017.02.016

Cozzarin, B. P. (2006). Performance measures for the socio-economic impact of government spending on R&D. *Scientometric*, *68*(1), 41–71.

Cutillas, S., Llistar, D., & Tarafa, G. (2015). Debt Audit. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

D'Alisa, Giacomo; Demaria, Federico; Kallis, G. (Ed.). (2015). *Degrowth: A Vocabulary for a New Era*. Routledge.

Daily, G. C., & Ehrlich, P. R. (1992). Population, sustainability and earth's carrying capacity. *BioScience*, *42*(10), 761–771.

Dalgaard, C.-J., & Erickson, L. (2009). Reasonable Expectations and the First Millennium Development Goal: How Much Can Aid Achieve? *World Development*, *37*(7), 1170–1181. https://doi.org/10.1016/J.WORLDDEV.2008.11.003

Daly, H. E. (1972). In Defense of a Steady-State Economy. *American Journal of Agricultural Economics*, *54*(5), 945–954.

Daly, H. E. (1995). On Wilfred Beckerman's critique of sustainable development. *Environmental Values*, *4*(1), 49–55.

Daly, H. E. (2008). Growth and Development: Critique of a Credo. *Population and*

Development Review, *34*(3), 511–518.

Dasgupta, P., & Weale, M. (1992). On Measuring the Quality of Life. *World Development*, *20*(1), 119–131.

de Bondt, G. (2002). Euro area corporate debt securities market: first empirical evidence. *European Central Bank, Working Paper Series*. Frankfurt: European Central Bank: European Central Bank.

Deb, S. (2015). Gap between GDP and HDI: Are the Rich Country Experiences Different from the Poor? *IARIW-OECD Special Conference: "W(h)Ither the SNA?"*

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

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). *The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution*. Washington DC: World Bank Group.

Demirgüç-Kunt, A., & Levine, R. (2009). Finance and Inequality: Theory and Evidence. *Annual Review of Financial Economics*, *1*(1), 287–318. https://doi.org/10.1146/annurev.financial.050808.114334

Démurger, S. (2001). Infrastructure Development and Economic Growth: An Explanation for Regional Disparities in China? *Journal of Comparative Economics*, *29*(1), 95–117. https://doi.org/10.1006/jcec.2000.1693

Derigs, U., & Marzban, S. (2008). Review and analysis of current Shariah-compliant equity screening practices. *International Journal of Islamic and Middle Eastern Finance and Management*, *I*(4), 285–303.

Deriu, M. (2015). Conviviality. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

Diener, E., & Suh, E. (1997). Measuring quality of life: Economic, social, and subjective indicators. *Social Indicators Research*, *40*(1), 189–216.

Dietz, R., & O'Neill, D. W. (2013). *Enough is enough: Building a sustainable economy in a world of finite resources*. Oxford: Routledge.

Djajic, S. (1987). Government Spending and the Optimal Rates of Consumption and Capital Accumulation. *The Canadian Journal of Economics*, *20*(3), 544–554.

Djikstra, G. (2018). Aid and good governance: Examining aggregate unintended effects of aid. *Evaluation and Program Planning*, *68*, 225–232.

Donou-Adonsou, F., & Sylwester, K. (2016). Financial development and poverty reduction in developing countries: New evidence from banks and microfinance institutions. *Review of Development Finance*, *6*(1), 82–90. https://doi.org/10.1016/J.RDF.2016.06.002

Dzombo, G. K., Kilika, J. M., & Maingi, J. (2018). The Mediating Effect of Financial Inclusion on the Relationship between Branchless Banking Strategy and Performance of Commercial Banks in an Emerging market Context: The Case of Kenya. *International Journal of Economics and Finance*, *10*(7), 161–176.

Easterlin, R. A. (1974). Does Economic Growth Improve the Human Lot? Some Empirical Evidence. *Nations and Households in Economic Growth*, 89–125. https://doi.org/10.1016/B978-0-12-205050-3.50008-7

Easterly, W. (2015). The Trouble with the Sustainable Development Goals. *Current History*, *114*(775), 322–324.

Eastin, J., & Prakash, A. (2013). Economic Development and Gender Equality: Is There a Gender Kuznets Curve. *World Politics*, *65*(1), 156–186.

Einhorn, J. (2001). The World Bank's mission creep. *Foreign Affairs*, *80*(5), 22–35.

El-Zein, A., Dejong, J., Fargues, P., Salti, N., Hanieh, A., & Lackner, H. (2016). Who's been left behind? Why sustainable development goals fail the Arab world. *The Lancet*, *388*(10040), 207–210. https://doi.org/10.1016/S0140-6736(15)01312-4

Environmental Performance Index. (2018). *2018 Environmental Performance Index*. Yale Center for Environmental Law & Policy, Center for International Earth Science Information Network, World Economic Forum.

European Commission. (2019). Greenhouse Gas Emissions.

Fanta, A., & Makina, D. (2017). Equity, bonds, institutional debt and economic growth: Evidence from South Africa. *South African Journal of Economics*, *85*(1), 86–97.

Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2015). The Next Generation of the Penn World Table. *American Economic Review*, *105*(10), 3150–3182.

Fernandez Fernandez, Y., Fernandez Lopez, M. A., & Olmedillas Blanco, B. (2017). Innovation for sustainability: The impact of R&D spending on CO2 emissions. *Journal of Cleaner Production*, *172*, 3459–3467. https://doi.org/10.1016/j.jclepro.2017.11.001

Field, A. (1981). The Problem with Neoclassical Institutional Economics: A Critique with Special Reference to the North/Thomas Model of Pre-1500 Europe. *Explorations in Economic History*, *18*, 174–198. https://doi.org/10.1016/0014-4983(81)90025-5

Figini, P., & Görg, H. (2011). Does Foreign Direct Investment Affect Wage Inequality? An Empirical Investigation. *The World Economy*, *34*(9), 1455–1475. https://doi.org/10.1111/j.1467-9701.2011.01397.x

Fink, G., Haiss, P., & Hristoforova, S. (2003). Bond markets and economic growth. *IEF Working Paper*. Vienna: University of Economics and Business Administration Vienna.

Firebaugh, G., & Beck, F. D. (1994). Does economic growth benefit the masses? growth, dependence, and welfare in the thirld world. *American Sociological Review*, *59*(5), 631–653.

Fitchett, J. R., & Atun, R. (2014). Sustainable development goals and country-specific targets. *The Lancet Global Health*, *2*(9), e503. https://doi.org/10.1016/S2214-109X(14)70282-7

Flavin, P., Pacek, A. C., & Radcliff, B. (2014). Assessing the Impact of the Size and Scope of Government on Human Well-Being. *Social Forces*, *92*(4), 1241–1258.

Fletcher, K. (2017). Exploring demand reduction through design, durability and "usership" of fashion clothes. *Philosophical Transactions. Series A: Mathematical, Physical, and Engineering Sciences*, *375*(2095), 20160366. https://doi.org/10.1098/rsta.2016.0366

Fleurbaey, M. (2009). Beyond GDP: The Quest for a Measure of Social Welfare. *Journal of Economic Literature*, *47*(4), 1029–1075.

Foltz, R. C., Denny, F. M., & Baharuddin, A. (Eds.). (2003). *Islam and Ecology*. Cambridge: Harvard University Press.

Ford, R., & Poret, P. (1991). *Infrastructure and Private-sector Productivity* (No. 91). Paris: OECD.

Frenken, K. (2017). Political economies and environmental futures for the sharing economy. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160367. https://doi.org/10.1098/rsta.2016.0367

Frey, B., & Stutzer, A. (2000). Happiness, economy and institutions. *The Economic Journal*, *110*(466), 918–938.

Fukuda-Parr, S., Greenstein, J., & Stewart, D. (2013). How Should MDG Success and Failure be Judged: Faster Progress or Achieving the Targets? *World Development*, *41*, 19–30. https://doi.org/10.1016/J.WORLDDEV.2012.06.014

Furqani, H., & Mulyany, R. (2009). Islamic banking and economic growth: Empirical evidence from Malaysia. *Journal of Economic Cooperation & Development*, *30*(2).

Furuoka, F. (2015). Financial development and energy consumption: Evidence from a heterogeneous panel of Asian countries. *Renewable and Sustainable Energy Reviews*, *52*, 430–444.

Garcia, E. (2012). Degrowth, the past, the future, and the human nature. *Futures*, *44*(6), 546–552. https://doi.org/10.1016/J.FUTURES.2012.03.015

Germeraad, P. W. (1993). Islamic traditions and contemporary open space design in Arab-Muslim settlements in the Middle East'. *Landscape and Urban Planning*, *23*(2), 97–106.

Ghazali, A. (1990). *Development: An Islamic Perspective*. Petaling Jaya, Selangor Darul Ehsan, Malaysia: Pelanduk Publications.

Gheeraert, L. (2014). Does Islamic finance spur banking sector development? *Journal of Economic Behavior & Organization*, *103*(Supplement), S4–S20.

Gheeraert, L., & Weill, L. (2015). Does Islamic banking development favor macroeconomic efficiency? Evidence on the Islamic finance-growth nexus. *Economic Modelling*, *47*, 32–39.

Ghosh, A. (2017). Sector-specific analysis of non-performing loans in the US banking system and their macroeconomic impact. *Journal of Economics and Business*, *93*, 29–45. https://doi.org/10.1016/J.JECONBUS.2017.06.002

Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, financial development, and growth. *Journal of Development Economics*, *90*(1), 144–152.

Goaied, M., & Sassi, S. (2010). Financial development and economic growth in the MENA region: What about Islamic banking development. *Institut Des Hautes Etudes Commerciales*, 1–23.

Gokmenoglu, K., Ozatac, N., & Eren, B. (2015). Relationship between industrial production, financial development and carbon emissions: The case of Turkey. *Procedia Economics and Finance*, *25*, 463–470.

Goldin, I. (2018). *Development: A Short Introduction*. Oxford: Oxford University Press.

Gomanee, K., Morrissey, O., Mosley, P., & Verschoor, A. (2004). Aid, Government Expenditure, and Aggregate Welfare. *World Development*, *33*(3), 355–370.

Gorbiano, M. I. (2019). Indonesia issues US$ 2b global green, regular sukuk.

Gough, I. (2017). Recomposing consumption: defining necessities for sustainable and equitable well-being. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160379. https://doi.org/10.1098/rsta.2016.0379

Graham, D. J. (2007). Agglomeration, Productivity and Transport Investment. *Journal of Transport Economics and Policy*, *41*(3), 317–343.

Grbic, M. (2016). Interaction between financial intermediation efficiency and economic growth. *Economic Horizons*, *18*(3), 241–254. https://doi.org/10.5937/ekonhor1603247G

Greenwood, J., & Jovanovic, B. (1990). Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy*, *98*(5, Part 1), 1076–1107. https://doi.org/10.1086/261720

Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Ohman, M. C., Shyamsundar, P., … Noble, I. (2013). Policy: Sustainable development goals for people and planet. *Nature*, *495*(7441), 305–307.

Grossman, G. M., & Krueger, A. B. (1991). Environmental Impacts of a North American Free Trade Agreement. *NBER Working Papers Series*. New York: National Bureau of Economic Research.

Grossman, M., & Krueger, A. B. (1995). Economic Growth and the Environment. *The Quarterly Journal of Economics*, *110*(2), 353–377.

Gudarzi Farahani, Y., & Dastan, M. (2013). Analysis of Islamic banks' financing and economic growth: a panel cointegration approach. *International Journal of Islamic and Middle Eastern Finance and Management*, *6*(2), 156–172. https://doi.org/10.1108/17538391311329842

Guillaumont Jeanneney, S., Hua, P., & Liang, Z. (2006). Financial development, economic efficiency, and productivity growth: Evidence from China. *The Developing Economies*, *44*(1), 27–52.

Gundogdu, A. S. (2018). An inquiry into Islamic Finance from the perspective of Sustainable Development Goals. *European Journal of Sustainable Development*, *7*(4), 381–390.

Gutowski, T., Cooper, D., & Sahni, S. (2017). Why we use more materials. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160368. https://doi.org/10.1098/rsta.2016.0368

Hachicha, N., & Ben Amar, A. (2015). Does Islamic bank financing contribute to economic growth? The Malaysian case. *International Journal of Islamic and Middle Eastern Finance and Management*, *8*(3), 349–368. https://doi.org/10.1108/IMEFM-07-2014-0063

Hamori, S., & Hashiguchi, Y. (2012). The effect of financial deepening on inequality: Some international evidence. *Journal of Asian Economics*, *23*(4), 353–359. https://doi.org/10.1016/J.ASIECO.2011.12.001

Han, J., & Shen, Y. (2015). Financial Development and Total Factor Productivity Growth: Evidence from China. *Emerging Markets Finance and Trade* , *51*, 261–274. https://doi.org/10.1080/1540496X.2014.998928

Haq, I. U. (1995). *Economic Doctrines of Islam*. Herndon, Va.: International Institute for Islamic Thought.

Haq, M. ul. (1995). Reflections on Human Development. *Human Development Occasional Papers (1992-2007)*. Human Development Report Office (HDRO), United Nations Development Programme (UNDP).

Harvey, C. R. (1989). Forecasts of Economic Growth from the Bond and Stock Markets. *Financial Analysts Journal*, *45*(5), 38–45.

Hasan, Z. (2006). Economic development from the Islamic perspective: Concept, objectives and some issues. *Development issues in Islam*. Kuala Lumpur: Research Centre, IIUM.

Heid, F. (2007). The cyclical effects of the Basel II capital requirements. *Journal of Banking & Finance*, *31*(12), 3885–3900. https://doi.org/10.1016/j.jbankfin.2007.03.004

Hein, E. (2006). Interest, Debt and Capital Accumulation—A Kaleckian Approach. *International Review of Applied Economics*, *20*(3), 337–352. https://doi.org/10.1080/02692170600736128

Helfrich, S., & Bollier, D. (2015). Commons. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

Hermes, N., & Lensink, R. (2003). Foreign direct investment, financial development and economic growth. *The Journal of Development Studies*, *40*(1), 142–163.

Hicks. (1969). *A theory of economic history*. Oxford: Oxford University Press.

Hicks, N., & Streeten, P. (1979). Indicators of development: the search for a basic needs yardstick. *World Development*, *7*(6), 567–580.

Hogendorn, J. S. (1996). *Economic Development*. New York: HarperCollins College.

Hou, J., Walsh, P. P., & Zhang, J. (2015). The dynamics of Human Development Index. *The Social Science Journal*, *52*(3), 331–347.

HSBC. (2017). *Global Real Estate: Trends in the world's largest asset class*. London.

Hu, A., & Liu, S. (2010). *Transportation, Economic Growth and Spillover Effects: The Conclusion Based on the Spatial Econometric Model*. *5*(2), 169–186. https://doi.org/10.1007/s11459-010-0009-0

IIFM (International Islamic Financial Market). (2016). *IIFM Sukuk Report 2016*. Bahrain: International Islamic Financial Market.

IIFM (International Islamic Financial Market). (2018). *IIFM Sukuk Report 2018*. Bahrain: International Islamic Financial Market.

Imam, P., & Kpodar, K. (2013). Islamic Banking: How Has It Expanded? *Emerging Markets Finance and Trade*, *49*(6), 112–137. https://doi.org/10.2753/REE1540-496X490607

Iqbal, Z., & Mirakhor, A. (2013). Islam's perspective on financial inclusion. *Economic Development and Islamic Finance*. Washington D.C.: The World Bank.

Isaksson, A. (2007). *Determinants of Total Factor Productivity: A Literature Review*. Research and Statistics Branch, UNIDO.

Jackson, T. (2009). *Prospertity without Growth: Economics for a Finite Planet*. London: Earthscan.

Jackson, T. (2017). *Prosperity Without Growth: Foundations for the Economy of Tomorrow* (Second). Oxford: Routledge.

Jalil, A., & Feridun, M. (2011). The impact of growth, energy and financial development on the environment in China: A cointegration analysis. *Energy Economics*, *33*(2), 284–291. https://doi.org/10.1016/J.ENECO.2010.10.003

Jan, S., & Asutay, M. (2019). *A Model for Islamic Development: An Approach in Islamic Moral Economy*. Chelsea: Edward Elgar.

Jiménez, G., Ongena, S., Peydró, J.-L., & Saurina, J. (2017). Macroprudential policy, countercyclical bank capital buffers, and credit supply: evidence from the Spanish dynamic provisioning experiments. *Journal of Political Economy*, *125*(6), 2126–2177.

Johanisova, N., Padilla, R. S., & Parry, P. (2015). Co-operatives. *Degrowth: A Vocabulary for A New Era*. Oxon: Routledge.

Johnston, B. F., & Mellor, J. W. (1961). The role of agriculture in economic development. *The American Economic Review*, *51*(4), 566–593.

Johnston, D. L. (2013). *Earth, Empire and Sacred Text: Muslims and Christians as Trustees of Creation*. Sheffield: Equinox Publishing Ltd.

Jokipii, T., & Milne, A. (2008). The cyclical behaviour of European bank capital buffers. *Journal of Banking & Finance*, *32*(8), 1440–1451. https://doi.org/10.1016/j.jbankfin.2007.12.001

Jung, H.-J., Na, K.-Y., & Yoon, C.-H. (2013). The role of ICT in Korea's economic growth: Productivity changes across industries since the 1990s. *Telecommunications Policy*, *37*(4–5), 292–310. https://doi.org/10.1016/J.TELPOL.2012.06.006

Jung, W. S. (1986). Financial Development and Economic Growth: International Evidence. *Economic Development and Cultural Change*, *34*(2), 333–346. https://doi.org/10.1086/451531

Kallis, G. (2017). Radical dematerialization and degrowth. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160383. https://doi.org/10.1098/rsta.2016.0383

Kallis, G., Kerschner, C., & Martinez-Alier, J. (2012). The economics of degrowth. *Ecological Economics*, *84*, 172–180. https://doi.org/10.1016/J.ECOLECON.2012.08.017

Kappel, V. (2010). The effects of financial development on income inequality and poverty. *CER-ETH Economics Working Paper Series*. https://doi.org/10.3929/ethz-a-006032047

Kasser, T. (2017). Living both well and sustainably: a review of the literature, with some reflections on future research, interventions and policy. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095). https://doi.org/10.1098/rsta.2016.0369

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010). The Worldwide Governance Indicators: Methodology and Analytical Issues. *The World Bank Policy Reseach Working Paper*. Washington DC: World Bank Group.

Kerschner, C., & O'Neill, D. W. (2015). Economic growth and Sustainability. *Sustainability: Key Issues*. Oxford: Routledge.

Khan, F. (2010). How "Islamic" is Islamic Banking? *Journal of Economic Behaviour and Organization*, *76*, 805–820.

Khan, M. A. (1984). Islamic Economics: Nature and Need. *Journal of Research in Islamic*

Economics, *1*(2), 51–55.

King, R., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, *108*(3), 717–737.

Kivyiro, P., & Arminen, H. (2014). Carbon dioxide emissions, energy consumption, economic growth, and foreign direct investment: Causality analysis for Sub-Saharan Africa. *Energy*, *74*, 595–606. https://doi.org/10.1016/J.ENERGY.2014.07.025

Klein, N. (2013). Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. *IMF Working Papers*. International Monetary Fund.

Koechlin, V., & Leon, G. (2007). International Remittances and Income Inequality: An Empirical Investigation. *Journal of Economic Policy Reform*, *10*(2), 123–141. https://doi.org/10.1080/17487870701346514

Komal, R., & Abbas, F. (2015). Linking financial development, economic growth and energy consumption in Pakistan. *Renewable and Sustainable Energy Reviews*, *44*, 211–220.

Kopnina, H., & Shoreman-Ouimet, E. (2015). *Sustainability: Key Issues*. Oxon: Routledge.

Kose, M. A., Prasad, E. S., & Terrones, M. E. (2009). Does openness to international financial flows raise productivity growth? *Journal of International Money and Finance*, *28*(4), 554–580. https://doi.org/10.1016/J.JIMONFIN.2009.01.005

Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T., & Aylmer, C. (2013). Beyond GDP: Measuring and achieving global genuine progress. *Ecological Economics*, *93*, 57–68.

Kula, E. (2001). Islam and environmental conservation. *Environmental Conservation*, *28*(1), 1–9. https://doi.org/10.1017/S0376892901000017

Kuran, T. (2003). The Islamic Commercial Crisis: Institutional Roots of Economic Underdevelopment in the Middle East. *Journal of Economic History*, *63*(2), 414–446.

Kuran, T. (2004). Why the Middle East is Economically Underdeveloped: Historical Mechanisms of Institutional Stagnation. *Journal of Economic Perspectives*, *18*, 71–90.

Kuran, T. (2012). *The Long Divergence: How Islamic Law Held Back the Middle East*. Princeton University Press.

Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review*, *45*(1), 1–28.

Latham & Watkins, L. (2015). *THE SUKUK HANDBOOK: A Guide To Structuring Sukuk*. London: Latham & Watkins, LLP.

Latif, Z., mengke, Y., Danish, Latif, S., Ximei, L., Pathan, Z. H., … Jianqiu, Z. (2018). The dynamics of ICT, foreign direct investment, globalization and economic growth: Panel estimation robust to heterogeneity and cross-sectional dependence. *Telematics and Informatics*, *35*(2), 318–328. https://doi.org/10.1016/J.TELE.2017.12.006

Law, S., & Singh, N. (2014). Does too much finance harm economic growth? *Journal of Banking & Finance*, *41*, 36–44.

Lazzarato, M. (2012). *The Making of the Indebted Man: An Essay on the Neoliberal Condition*. London: Semiotexte.

Leichenko, R. M., & Solecki, W. D. (2008). Consumption, Inequity, and Environmental Justice:

The Making of New Metropolitan Landscapes in Developing Countries. *Society & Natural Resources*, *21*(7), 611–624. https://doi.org/10.1080/08941920701744223

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature*, *35*(2), 688–726.

Levine, R. (1999a). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature*, *35*(2), 688–726. https://doi.org/10.1596/1813-9450-1678

Levine, R. (1999b). Law, Finance, and Economic Growth. *Journal of Financial Intermediation*, *8*, 8–35.

Lim, E. K., & Chen, Z. (2012). The impact of trade liberalization in telecommunications services: The case of APEC countries. *Telecommunications Policy*, *36*, 274–281.

Liu, Y., Yue, W., Fan, P., Peng, Y., & Zhang, Z. (2016). Financing china's suburbanization: capital accumulation through suburban land development in Hangzhou. *International Journal of Urban and Regional Research*, *40*(6), 1112–1133. https://doi.org/10.1111/1468-2427.12454

Liverman, D. M. (2018). Geographic perspectives on development goals. *Dialogues in Human Geography*, *8*(2), 168–185. https://doi.org/10.1177/2043820618780787

Lofstrom, A. (2009). *Gender equality, economic growth and employment*. Swedish Ministry of Integration and Gender Equity.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

Malik, M. (2018). *Foundations of Islamic Governance*. London: Routledge.

Mannan, M. A. (1989). *Economic Development and Social Peace in Islam* (1st ed.). Bangladesh: Ta-Ha Publishers Ltd.

Marteau, T. M. (2017). Towards environmentally sustainable human behaviour: targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095). https://doi.org/10.1098/rsta.2016.0371

Matsuyama, K. (1991). Agricultural Productivity, Comparative Advantage, and Economic Growth. *NBER Working Papers Series*. Cambridge: National Bureau of Economic Research.

Mauro, P. (1998). Corruption and the composition of government expenditure. *Journal of Public Economics*, *69*, 263–279.

Mayer, A. E. (1985). Islamic Banking and Credit Policies in the Sadat Era: The Social Origin of Islamic Banking in Egypt. *Arab Law Quarterly*, *1*(1), 32–50.

McNally, D. (2009). From financial crisis to world-slump: Accumulation, financialisation, and the global slowdown. *Historical Materialism*, *17*(2), 35–83.

Mehmet, O. (1990). *Islamic Identity and Development: Studies of the Islamic Periphery*. London: Routledge.

Mehmet, O. (1995). *Westernizing the Thirld World: The Eurocentricity of Economic Development Theories*. New York: Routledge.

Mielnik, O., & Goldemberg, J. (2002). Foreign direct investment and decoupling between

energy and gross domestic product in developing countries. *Energy Policy*, *30*(2), 87–89. https://doi.org/10.1016/S0301-4215(01)00080-5

Migdad, A. M. (2017). CSR practices of Palestinian Islamic banks: contribution to socio-economic development. *ISRA International Journal of Islamic Finance*, *9*(2), 133–147. https://doi.org/10.1108/IJIF-06-2017-0001

Mileva, E. (2007). *Using Arellano – Bond Dynamic Panel GMM Estimators in Stata: Tutorial with Examples using Stata 9.0 (xtabond and xtabond2\0*.

Miller, S. M., & Upadhyay, M. P. (2000). The effects of openness, trade orientation, and human capital on total factor productivity. *Journal of Development Economics*, *63*(2), 399–423. https://doi.org/10.1016/S0304-3878(00)00112-7

Mirakhor, A., & Askari, H. (2010). *Islam and the Path to Human and Economic Development*. New York: Palgrave Macmillan.

Mirakhor, A., & Zaidi, I. (2007). Profit-and-loss sharing contracts in Islamic finance. *Handbook of Islamic Banking*. Edward Elgar.

Moghul, U., & Safar-Aly, S. H. K. (2014). Green Sukuk: The Introduction of Islam's Environmental Ethics to Contemporary Islamic Finance. *Georgetown International Environmental Law Review*, *27*(1), 1–60.

Mongid, A. (2016). Global Financial Crisis (GFC) And Islamic Banks Profitability: Evidence From MENA Countries. *Journal of Emerging Economies and Islamic Research*, *4*(1).

Morgan, P. J., & Pontines, V. (2014). Financial Stability and Financial Inclusion Asian Development Bank Institute. *ADBI Working Paper Series*. Asian Development Bank Institute.

Naceur, S. Ben, Barajas, A., & Massara, A. (2015). Can Islamic Banking Increase Financial Inclusion? *IMF Working Papers*. International Monetary Fund.

Naceur, S. Ben, Blotevogel, R., Fischer, M., & Shi, H. (2017). Financial Development and Source of Growth: New Evidence. *IMF Working Papers*. https://doi.org/10.5089/9781484302637.001

Nafziger, E. W. (1976). A critique of development economics in the. *The Journal of Development Studies*, *13*(1), 18–34. https://doi.org/10.1080/00220387608421605

Nagaoka, S. (2012). Critical Overview of the History of Islamic Economics: Formation, Transformation, and New Horizons. *Asian and African Area Studies*, *11*(2), 114–136.

Naqvi, S. N. H. (1994). *Islam, Economics and Society*. London: Kegan Paul International Ltd.

Nasreen, S., & Anwar, S. (2015). The impact of economic and financial development on environmental degradation: An empirical assessment of EKC hypothesis. *Studies in Economics and Finance*, *32*(4), 485–502.

Natacha Valla, Beatrice Saes-Escorbiac, M. T. (2006). Bank Liquidity and Financial Stability. *Financial Stability Review*. Banque de France.

Neaime, S., & Gaysset, I. (2018). Financial inclusion and stability in MENA: Evidence from poverty and inequality. *Finance Research Letters*, *24*, 230–237. https://doi.org/10.1016/J.FRL.2017.09.007

Neal, L. (2005). Venture shares of the Dutch East India Company. *The origins of value: the financial innovations that created modern capital markets*. New York: Oxford University

Press.

Nelson, R. R. (2000). *The Sources of Economic Growth*. Harvard University Press.

Nienhaus, V. (2019). FinTech Challenges for Islamic Retail Banks and Sharīʿah Scholars: Cases and Conclusions. *Paper presented at the Durham Centre for Islamic Economics and Finance Guest Lecture Series, 20th March 2019. Durham University Business School, Durham, UK.*

Noorbakhsh, F. (1998). A modified human development index. *World Development*, *26*(3), 517–528.

Noorbakhsh, Farhad. (1998). The human development index: some technical issues and alternative indices. *Journal of International Development*, *10*(5), 589–605. https://doi.org/10.1002/(SICI)1099-1328(199807/08)10:5<589::AID-JID484>3.0.CO;2-S

Nordhaus, W. (2013). *The Climate Casino: Risk, Uncertainty, and Economics for a Warming World*. Yale: Yale University Press.

Nwani, C. (2017). Causal relationship between crude oil price,energy consumption and carbon dioxide(CO2) emissions in Ecuador. *OPEC Energy Review*, *41*(3), 201–225.

O'Neill, D. W. (2015a). Gross Domestic Product. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

O'Neill, D. W. (2015b). The proximity of nations to a socially sustainable steady-state economy. *Journal of Cleaner Production*, *108*, 1213–1231. https://doi.org/10.1016/J.JCLEPRO.2015.07.116

Obaidullah, M. (2015). Enhancing food security with Islamic microfinance: insights from some recent experiments. *Agricultural Finance Review*, *75*(2), 142–168. https://doi.org/10.1108/AFR-11-2014-0033

Olivier, J. G. J., Schure, K. M., & Peters, J. A. H. W. (2017). *Trends in Global CO2 and Total Greenhouse Gas Emissions*. PBL Netherlands Environmental Assessment Agency.

Olson, D., & Zoubi, T. (2017). Convergence in bank performance for commercial and Islamic banks during and after the Global Financial Crisis. *The Quarterly Review of Economics and Finance*, *65*, 71–87. https://doi.org/10.1016/j.qref.2016.06.013

Orhangazi, O. (2008). Financialisation and capital accumulation in the non-financial corporate sector:: A theoretical and empirical investigation on the US economy: 1973-2003. *Cambridge Journal of Economics*, *32*(6), 863–886. https://doi.org/10.1093/cje/ben009

Orwell, G. (2000). *Animal Farm*. London: Penguin UK.

Outreville, J. (1999). *Financial Development, Human Capital and Political Stability* (No. 142). United Nations Conference on Trade and Development.

Ozbay, K., Ozmen-Ertekin, D., & Berechman, J. (2007). Contribution of transportation investments to county output. *Transport Policy*, *14*(4), 317–329. https://doi.org/10.1016/J.TRANPOL.2007.03.004

Ozturk, I., & Acaravci, A. (2013). The long-run and causal analysis of energy, growth, openness and financial development on carbon emissions in Turkey. *Energy Economics*, *36*, 262–267. https://doi.org/10.1016/J.ENECO.2012.08.025

Parashar, S. P., & Venkatesh, J. (2010). How did Islamic banks do during global financial crisis?

Banks and Bank System, *5*(4).

Patrick, H. T. (1966). Financial Development and Economic Growth in Underdeveloped Countries. *Economic Development and Cultural Change*, *14*(2), 174–189. https://doi.org/10.1086/450153

Pavoni, S. (2017, September). Will climate change cause the next financial crisis? - Markets -.

Pepinsky, T. B. (2010). *The Demand for Islamic Banking: Piety, Class, and Global Identity*.

Petras, J. (1981). Dependency and World System Theory: A Critique and New Directions. *Latin American Perspectives*, *8*(30–31), 148–155.

Pezzolo, L. (2005). Bonds and government debt in Italian city-states, 1250-1650. *The origins of value: the financial innovations that created modern capital markets*. New York: Oxford University Press.

Pieterse, J. N. (2000). After post-development. *Third World Quarterly*, *21*(2), 175–191. https://doi.org/10.1080/01436590050004300

Polanyi, K. (1944). *The Great Transformation: The Political and Economic Origins of Our Time*. New York: Farrar & Rinehart Inc.

Portes, A. (2010). *Economic Sociology: A Systemic Inquiry*. Oxford: Princeton University Press.

Prabhu, J. (2017). Frugal innovation: doing more with less for more. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095). https://doi.org/10.1098/rsta.2016.0372

Pradhan, R. P., Arvin, M. B., & Hall, J. H. (2016). Economic growth, development of telecommunications infrastructure, and financial development in Asia, 1991–2012. *The Quarterly Review of Economics and Finance*, *59*, 25–38. https://doi.org/10.1016/J.QREF.2015.06.008

Proto, E., & Rustichini, A. (2013). A Reassessment of the Relationship between GDP and Life Satisfaction. *PLoS ONE*, *8*(11), e79358. https://doi.org/10.1371/journal.pone.0079358

Pushner, G. M. (1995). Equity ownership structure, leverage, and productivity: Empirical evidence from Japan. *M. Pushner / Pacific-Basin Finance Journal*, *3*, 241–255.

Rahman, T., Mittelhammer, R. C., & Wandscheider, P. (2005). Measuring the quality of life across countries: A sensitivity analysis of well-being indices. *WIDER Research Paper*. Helsinki: The United Nations University World Institute for Development Economics Research (UNU-WIDER).

Rajabi, E., & Muhammad, J. (2014). The Stock Markets, Banks and Growth Nexus: Asian Islamic Countries. *Economic Notes*, *43*(2), 137–165.

Ram, R. (1982). Composite indices of physical quality of life, basic needs fulfilment, and income: A 'principal component'representation. *Journal of Development Economics*, *11*(2), 227–247.

Renneboog, L., Ter Horst, J., & Zhang, C. (2008). Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking & Finance*, *32*(9), 1723–1742. https://doi.org/10.1016/J.JBANKFIN.2007.12.039

Rewilak, J. (2013). Finance is good for the poor but it depends where you live. *Journal of Banking & Finance*, *37*(5), 1451–1459.

https://doi.org/10.1016/J.JBANKFIN.2012.04.022

Rewilak, J. (2017). The role of financial development in poverty reduction. *Review of Development Finance*, *7*(2), 169–176. https://doi.org/10.1016/J.RDF.2017.10.001

Rezai, A., Taylor, L., & Mechler, R. (2013). Ecological macroeconomics: An application to climate change. *Ecological Economics*, *85*, 69–76. https://doi.org/10.1016/J.ECOLECON.2012.10.008

Richardson, E. (2019). Responsible finance sukuk—can they bring societal value to a value-neutral market? *Capital Markets Law Journal*, *14*(3), 394–428.

Rioja, F., & Valev, N. (2004). Finance and the Sources of Growth at Various Stages of Economic Development. *Economic Inquiry*, *42*(1), 127–140.

Riti, J., Shu, Y., Song, D., & Kamah, M. (2017). The contribution of energy use and financial development by source in climate change mitigation process: a global empirical perspective. *Journal of Cleaner Production*, *148*, 882–894.

Roberts, T., Hope, A., & Skelton, A. (2017). Why on earth did I buy that? A study of regretted appliance purchases. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095). https://doi.org/10.1098/rsta.2016.0373

Robinson, S. (1971). Sources of Growth in Less Developed Countries: A Cross-Section Study. *The Quarterly Journal of Economics*, *85*(3), 391–408.

Rodrik, D. (1999). Where did all the growth go? External shocks, social conflict, and growth collapses. *Journal of Economic Growth*, *4*(4), 385–412.

Roller, L.-H., & Waverman, L. (2001). Telecommunications infrastructure and economic development: a simultaneous approach. *The American Economic Review*, *91*(4), 909–923.

Romano, O. (2015). Anti-utilitarianism. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

Romer, P. M. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy*, *94*(5), 1002–1037.

Rosegrant, M. W., & Evenson, R. E. (1992). Agricultural Productivity and Sources of Growth in South Asia. *American Journal of Agricultural Economics*, *74*(3), 757–761.

Rousseau, P. L., & Wachtel, P. (2011). What is Happening to the Impact of Financial Deepening on Economic Growth? *Economic Inquiry*, *49*(1), 276–288. https://doi.org/10.1111/j.1465-7295.2009.00197.x

Rudnyckyj, D. (2014). Economy in practice: Islamic finance and the problem of market reason. *American Ethnologist*, *41*(1), 110–127.

Rudnyckyj, D. (2019). *Beyond Debt*. Chicago: The University of Chicago Press.

Saboori, B., Sulaiman, J., & Mohd, S. (2012). Economic growth and CO2 emissions in Malaysia: A cointegration analysis of the Environmental Kuznets Curve. *Energy Policy*, *51*, 184–191. https://doi.org/10.1016/J.ENPOL.2012.08.065

Sacco, P., Ferilli, G., & Blessi, G. T. (2014). Understanding culture-led local development: A critique of alternative theoretical explanations. *Urban Studies Journal Limited*, *51*(13), 2806–2821. https://doi.org/10.1177/0042098013512876

Sachs, J. D. (2012). From Millennium Development Goals to Sustainable Development Goals.

The Lancet, *379*(9832), 2206–2211. https://doi.org/10.1016/S0140-6736(12)60685-0

Sadeq, A. M. (Ed.). (2006). *Development issues in Islam*. Kuala Lumpur: Research Centre, IIUM.

Sagar, A., & Najam, A. (1998). The human development index: a critical review. *Ecological Economics*, *25*(3), 249–264.

Sairally, S. (2007). Community development financial institutions: Lessons in social banking for the Islamic financial industry. *Kyoto Bulletin of Islamic Area Studies*, *1*(2), 19–37.

Sapkota, P., & Bastola, U. (2017). Foreign direct investment, income, and environmental pollution in developing countries: Panel data analysis of Latin America. *Energy Economics*, *64*, 206–212. https://doi.org/10.1016/j.eneco.2017.04.001

Sardar, Z. (1985). *Islamic Futures: The Shape of Ideas to Come*. London: Mansell.

Sassi, S., & Goaied, M. (2013). Financial development, ICT diffusion and economic growth: Lessons from MENA region. *Telecommunications Policy*, *37*(4–5), 252–261. https://doi.org/10.1016/J.TELPOL.2012.12.004

Schor, J. (2014). Debating the Sharing Economy. *Journal of Self-Governance and Management Economics*, *4*(3), 7–22.

Schumacher, E. F. (1975). *Small is Beautiful: A study of economics as if people mattered*. London: Abacus.

Schumpeter, J. A., Becker, M. C., & Knudsen, T. (2005). Development. *Journal of Economic Literature*, *43*(1), 108–120.

Seker, F., Ertugrul, H. M., & Cetin, M. (2015). The impact of foreign direct investment on environmental quality: A bounds testing and causality analysis for Turkey. *Renewable and Sustainable Energy Reviews*, *52*, 347–356. https://doi.org/10.1016/J.RSER.2015.07.118

Sekulova, F. (2015). Happiness. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

Sen, A. (1999). *Development as Freedom*. New York: First Anchor Books Edition.

Sen, G., & Mukherjee, A. (2014). No Empowerment without Rights, No Rights without Politics: Gender-equality, MDGs and the post-2015 Development Agenda. *Journal of Human Development and Capabilities*, *15*(2–3), 188–202. https://doi.org/10.1080/19452829.2014.884057

Shahbaz, M., Hye, Q. M. A., Tiwari, A. K., & Leitão, N. C. (2013). Economic growth, energy consumption, financial development, international trade and CO2 emissions in Indonesia. *Renewable and Sustainable Energy Reviews*, *25*, 109–121. https://doi.org/10.1016/J.RSER.2013.04.009

Shahbaz, M., Nasreen, S., Abbas, F., & Anis, O. (2015). Does foreign direct investment impede environmental quality in high-, middle-, and low-income countries? *Energy Economics*, *51*, 275–287. https://doi.org/10.1016/J.ENECO.2015.06.014

Shaikh, S. (2015). Financing Public Infrastructure Using Sovereign Sukuk. *Journal of Islamic Banking and Finance*, *32*(1), 11–22.

Shelton, C. A. (2007). The size and composition of government expenditure. *Journal of Public Economics*, *91*, 2230–2260.

Shiller, R. J. (2012). *Finance and the Good Society*. Princeton: Princeton University Press.

Skidelsky, R., & Skidelsky, E. (2012). *How much is enough? The love of money, the case for the good life*. London: Allen Lane, Penguin Group.

Smaoui, H., & Nechi, S. (2017). Does sukuk market development spur economic growth? *Research in International Business and Finance*, *41*, 136–147.

Smith, S. (2011). *Environmental Economics: A Very Short Introduction*. Oxford University Press.

Smolo, E., & Mirakhor, A. (2010). The global financial crisis and its implications for the Islamic financial industry. *International Journal of Islamic and Middle Eastern Finance and Management*, *3*(4), 372–385. https://doi.org/10.1108/17538391011093306

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, *70*(1), 65–94.

Spratt, S. (2008). *Development Finance : Debates, Dogmas and New Directions*. London: Routledge.

Szirmai, A. (2005). *The Dynamics of Socio-Economic Development*. Cambridge: Cambridge University Press.

Tabash, M., & Dhankar, R. (2014). The flow of Islamic finance and economic growth: An empirical evidence of Middle East. *Journal of Finance and Accounting*, *2*(1), 11–19.

Tabulawa, R. (2003). International Aid Agencies, Learner-centred Pedagogy and Political Democratisation: A critique. *Comparative Education*, *39*(1), 7–26. https://doi.org/10.1080/03050060302559

Tag el-Din, S. I. (2013). *Maqasid Foundations of Market Economics*. Edinburgh: Edinburgh University Press Ltd.

Takle, E., & Hofstrand, D. (2015). Global warming – agriculture's impact on greenhouse gas emissions. *Ag Decision Maker Newsletter*, *12*(6), Article 1.

Tamazian, A., & Bhaskara Rao, B. (2010). Do economic, financial and institutional developments matter for environmental degradation? Evidence from transitional economies. *Energy Economics*, *32*(1), 137–145. https://doi.org/10.1016/J.ENECO.2009.04.004

Tamazian, A., Chousa, J. P., & Vadlamannati, K. C. (2009). Does higher economic and financial development lead to environmental degradation: Evidence from BRIC countries. *Energy Policy*, *37*(1), 246–253. https://doi.org/10.1016/J.ENPOL.2008.08.025

The Banker. (2013). Special Issue:Top Islamic Financial Institutions. *The Banker*. London.

The Banker. (2018). Special IssueTop Islamic Financial Institutions. *The Banker*. London.

Thirlwall, A. P., & Pacheco-Lopez, P. (2017). *Economics of Development* (10th ed.). London: Palgrave.

Thumrongvit, P., Kim, Y., & Soo Pyun, C. (2013). Linking the missing market: The effect of bond markets on economic growth. *International Review of Economics & Finance*, *27*, 529–541. https://doi.org/10.1016/j.iref.2013.01.008

Tlemsani, I., & Al Suwaidi, ---Huda. (2016). Comparative Analysis of Islamic and Conventional Banks in the UAE During the Financial Crisis. *Asian Economic and*

Financial Review, *6*(6), 298–309. https://doi.org/10.18488/journal.aefr/2016.6.6/102.6.298.309

Todaro, M. P., & Smith, S. C. (2011). *Economic Development* (11th ed.). Essex: Pearson Education Limited.

Todd, N. J., & Todd, J. (1984). *Bioshelters, Ocean Arks, City Farming: Ecology as the Basis of Design*. San Fransisco: Sierra Club Books.

Tsai, M.-C. (2007). Does Globalization Affect Human Well-Being? *Social Indicators Research*, *81*(1), 103–126.

United Nations. (2015). *The Millennium Development Goals Report 2015*. New York: United Nations.

United Nations. (2016). *Human Development Report 2016: Technical Notes*. New York: United Nations.

United Nations. (2018). *The Sustainable Development Goals Report 2018*. New York: United Nations.

Usher, A. P. (1934). The Origins of Banking: The Primitive Bank of Deposit, 1200-1600. *The Economic History Review*, *4*(4), 399–428.

Usman, A. S., & Tasmin, R. (2016). The role of Islamic micro-finance in enhancing human development in Muslim countries. *Journal of Islamic Finance*, *5*(1), 053–062.

van den Bergh, J. C. J. M. (2009). The GDP paradox. *Journal of Economic Psychology*, *30*, 117–135.

van den Bergh, J. C. J. M. (2011). Environment versus growth — A criticism of "degrowth" and a plea for "a-growth." *Ecological Economics*, *70*(5), 881–890. https://doi.org/10.1016/J.ECOLECON.2010.09.035

van den End, J. W. (2013). A macroprudential approach to address liquidity risk with the Loan-to-deposit ratio. *DNB Working Papers*. Amsterdam: De Nederlandsche Bank.

Vandemoortele, J. (2002). *Are the MDGs feasible?* New York: United Nations Development Programme Bureau for Development Policy.

VanderWeele, T. J. (2016). Mediation Analysis: A Practitioner's Guide. *Annu. Rev. Public Health*, *37*, 17–32.

Victor, P. A. (2015). Growth. *Degrowth: A Vocabulary for A New Era*. Oxford: Routledge.

Voigtländer, N., & Voth, H.-J. (2006). Why England? Demographic factors, structural change and physical capital accumulation during the Industrial Revolution. *Journal of Economic Growth*, *11*, 319–361. https://doi.org/10.1007/s10887-006-9007-6

Wahba, H., & Elsayed, K. (2015). The mediating effect of financial performance on the relationship between social responsibility and ownership structure. *Future Business Journal*, *I*, 1–12.

Watkins, J. P. (2017). Financialization and Society's Protective Response: Reconsidering Karl Polanyi's Double Movement. *Journal of Economic Issues*, *51*(1), 98–117.

White, H., & Anderson, E. (2001). Growth versus Distribution: Does the Pattern of Growth Matter? *Development Policy Review*, *19*(3), 267–289.

Whitmarsh, L., Capstick, S., & Nash, N. (2017). Who is reducing their material consumption

and why? A cross-cultural analysis of dematerialization behaviours. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095). https://doi.org/10.1098/rsta.2016.0376

Wilson, R. (2007). Islamic Finance in Europe. *RSCAS Policy Paper*. Florence: European University Institute.

Worrell, E., & Carreon, J. R. (2017). Energy demand for materials in an international context. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095). https://doi.org/10.1098/rsta.2016.0377

Wydick, B. (1999). The Effect of Microenterprise Lending on Child Schooling in Guatemala. *Economic Development and Cultural Change*, *47*(4), 853–869.

Yaseen Gada, M. (2014). Environmental Ethics in Islam: Principles and Perspectives. *World Journal of Islamic History and Civilization*, *4*(4), 130–138. https://doi.org/10.5829/idosi.wjihc.2014.4.4.443

Zaghdoudi, T. (2017). Oil prices, renewable energy, CO2 emissions and economic growth in OECD countries. *Economics Bulletin*, *37*(3), 1844–1850.

Zaman, A. (2010). Islamic Economics: A Survey of the Literature. *Islamic Studies*, *49*(1), 37–63.

Zaman, K., & Abd-el Moemen, M. (2017). Energy consumption, carbon dioxide emissions and economic development: Evaluating alternative and plausible environmental hypothesis for sustainable growth. *Renewable and Sustainable Energy Reviews*, *74*, 1119–1130. https://doi.org/10.1016/j.rser.2017.02.072

Zaman, N., & Asutay, M. (2009). Divergence between Aspiration and Realities of Islamic Economics: A Political Economy Approach to Bridging the Divide. *IIUM Journal of Economics and Management*, *17*(1), 73–96.

Zeng, J. (2003). Reexamining the interaction between innovation and capital accumulation. *Journal of Macroeconomics*, *25*, 541–560.

APPENDIX A

Table A.1: List of Countries for Islamic Banks

No	Country	No	Country
1	Algeria	18	Oman
2	Bahrain	19	Pakistan
3	Bangladesh	20	Philippines
4	Brunei Darussalam	21	Qatar
5	Cyprus	22	Saudi Arabia
6	Egypt	23	Senegal
7	Gambia	24	Singapore
8	Indonesia	25	South Africa
9	Iraq	26	Sudan
10	Jordan	27	Syria
11	Kenya	28	Tanzania
12	Kuwait	29	Thailand
13	Lebanon	30	Tunisia
14	Malaysia	31	Turkey
15	Maldives	32	United Arab Emirates
16	Mauritania	33	United Kingdom
17	Nigeria	34	Yemen

Table A.2: List of Countries for *Sukuk* Market

No	Country	No	Country
1	Bahrain	14	Oman
2	Bangladesh	15	Pakistan
3	Brunei Darussalam	16	Qatar
4	France	17	Saudi Arabia
5	Gambia	18	Senegal
6	Hongkong	19	Singapore
7	Indonesia	20	South Africa
8	Jordan	21	Sudan
9	Kuwait	22	Turkey
10	Luxembourg	23	United Arab Emirates
11	Malaysia	24	United Kingdom
12	Netherlands	25	United States of America
13	Nigeria		

Table A.3: Descriptive Statistics – *Sukuk* and Socio-economic Indicators – Issuance-level

Variable	Obs	Mean	Std. Dev.	Min	Max
lnsukuk	11,837	15.8002	2.4354	1.0126	22.9278
hdi	11,033	0.7512	0.0471	0.4440	0.9240
educ	5,563	0.6637	0.0654	0.3550	0.9000
gdi	671	0.9196	0.0489	0.7160	1.0000
gii	5,553	0.3224	0.0695	0.0690	0.6720
gini	2,635	45.0647	3.3157	29.6000	49.1000
infra2	12,682	0.2894	0.1156	0.0719	0.8889
epi	12,220	0.0866	0.0376	0.0000	0.2812
gdpg	12,768	0.0467	0.0234	-0.0734	0.2325
gdpcg	12,768	0.0610	0.0999	-0.3915	0.3228
rd	7,080	0.8936	0.2686	0.0425	2.8223
fdi	13,077	0.0293	0.0202	-0.1588	0.8744
trade	13,077	1.5476	0.5259	0.0000	4.4262
expense	13,077	0.1753	0.1223	0.0000	0.5505
lnrcon	10,374	26.3489	0.5639	21.5004	30.2474
legal	13,077	0.0915	0.3144	0.0000	2.0000
govindex	11,297	0.2626	0.2898	-1.5261	1.6997

Notes: Obs = Number of observations, SD = Standard deviation, Min = Minimum, Max = Maximum

Table A.4: Correlation Matrix – *Sukuk* and Socio-economic Indicators – Issuance-level

	lnsukuk	*hdi*	*educ*	*gdi*	*gii*	*gini*	*infra2*	*epi*	*gdpg*	*gdpcg*	*rd*	*fdi*	*trade*	*expense*	*lnrcon*
lnsukuk	1														
hdi	-0.1141	1													
educ	-0.2267	0.9630	1												
gdi	-0.4254	0.7626	0.8757	1											
gii	0.0793	-0.8060	-0.7829	-0.4776	1										
gini	0.0447	0.3755	0.3608	0.5548	0.0323	1									
infra2	0.2024	0.7290	0.6312	0.3373	-0.7092	0.1830	1								
epi	-0.2159	-0.8214	-0.7430	-0.5798	0.6705	-0.5838	-0.6572	1							
gdpg	0.3973	-0.0978	-0.0680	0.0338	0.1314	0.4184	0.2605	-0.2655	1						
gdpcg	0.5457	-0.4259	-0.4865	-0.6863	0.1709	-0.5709	0.0871	0.2673	0.2035	1					
rd	0.0418	0.7374	0.6069	0.2253	-0.8994	-0.0684	0.7399	-0.6341	-0.2555	-0.0456	1				
fdi	-0.1750	-0.2969	-0.2897	-0.0132	0.4641	0.3810	-0.2764	0.2242	0.0425	-0.1963	-0.3241	1			
trade	0.0395	0.3943	0.4514	0.2714	-0.4746	-0.2348	0.2464	-0.2857	0.0161	0.0212	0.2304	-0.9522	1		
expense	0.2692	-0.4730	-0.5766	-0.8024	0.3294	-0.7388	-0.2280	0.5857	-0.3939	0.6523	-0.0802	-0.2008	-0.0245	1	
lnrcon	-0.2875	0.0586	0.0469	0.2699	0.2689	0.4935	-0.0607	0.0218	-0.1135	-0.3954	-0.1230	0.9086	-0.8217	-0.2799	1
legal	0.2294	-0.7601	-0.8060	-0.9252	0.3261	-0.7775	-0.3848	0.6839	-0.1611	0.6690	-0.1709	-0.0650	-0.1622	0.7718	-0.3658
govindex	-0.2279	0.9095	0.9430	0.7299	-0.8634	0.0368	0.6304	-0.6270	-0.2009	-0.2954	0.6986	-0.4653	0.5790	-0.3545	-0.1462

Table A.5: Descriptive Statistics – *Sukuk* and Carbon Emissions – Firm-level

Variable	Obs	Mean	Std. Dev.	Min	Max
lnco2	1,224	12.06849	0.650829	6.233848	15.5455
lngf	1,220	11.08893	0.532988	1.299374	14.17512
lnlf	1,224	11.13657	0.771606	6.226627	14.68886
lnsf	1,117	10.39978	1.166923	2.685668	14.55469
lnsukuk	1,500	20.04106	2.429247	6.907755	31.36869
lngdpc	1,625	9.76718	0.707254	6.128986	12.00331
lnpop	1,250	17.05573	1.000464	10.87663	19.58211
fdi	1,693	0.031569	0.033818	-0.15882	0.874426
rd	843	0.929402	0.359108	0.04249	2.82226
lnoil	1,622	4.218038	0.32152	3.10513	4.556673

Notes: Obs = Observations; SD = Standard Deviation ; Min = Minimum ; Max = Maximum

Table A.6: Correlation Matrix – *Sukuk* and Carbon Emissions – Firm-level

	lnco2	*lnsukuk*	*lngdpc*	*lnpop*	*fdi*	*rd*	*lnoil*
lnco2	1						
lnsukuk	0.1389	1					
lngdpc	0.0236	-0.1530	1				
lnpop	0.6655	0.2714	-0.6740	1			
fdi	-0.2408	-0.0712	0.1924	-0.2038	1		
rd	0.1466	-0.2535	0.2382	-0.0280	0.2445	1	
lnoil	0.2790	0.1035	0.2932	0.0237	0.0897	0.3358	1

Table A.7: Descriptive Statistics – *Sukuk* and Carbon Emissions – Country-level

Variable	Obs	Mean	Std. Dev.	Min	Max
lnco2	111	11.55388	1.573013	6.233848	15.55598
lngf	107	10.72888	1.468954	1.299374	14.15198
lnlf	111	10.58122	1.700321	6.226627	14.69098
lnsf	71	9.644667	2.520298	2.685668	14.55745
lnsukuk	152	20.70368	3.011709	6.90776	27.2185
lngdpc	162	9.811184	1.316723	6.12899	12.0033
lnpop	117	16.5013	2.093089	10.8766	19.5821
fdi	178	0.036214	0.085475	-0.15882	0.874426
rd	56	0.917586	0.771958	0.04249	2.82226
lnoil	165	4.191074	0.338151	3.105129	4.556673

Notes: Obs = Observations; SD = Standard Deviation ; Min = Minimum ; Max = Maximum

Table A.8: Correlation Matrix – *Sukuk* and Carbon Emissions – Country-level

	lnco2	*lnsukuk*	*lngdpc*	*lnpop*	*fdi*	*rd*	*lnoil*
lnco2	1						
lnsukuk	-0.1962	1					
lngdpc	-0.1076	-0.4844	1				
lnpop	0.7673	0.1523	-0.6818	1			
fdi	-0.1661	-0.1117	0.1865	-0.1552	1		
rd	0.2462	-0.5365	0.2543	0.1184	0.2656	1	
lnoil	-0.0180	0.0870	0.1946	-0.0507	0.0584	0.1679	1

Table A.9: Descriptive Statistics – Islamic Banks and Carbon Emissions – Country-level

Variable	Obs	Mean	Std. Dev.	Min	Max
lnco2	342	10.64	1.74	5.29	13.30
lngf	270	9.76	2.13	1.30	12.18
lnlf	341	9.97	1.55	5.29	12.93
lnsf	174	8.26	3.04	1.30	12.94
cons	140	0.09	0.10	0.00	0.53
agr	140	0.16	0.15	0.00	0.68
man	140	0.01	0.03	0.00	0.20
trad	140	0.13	0.11	0.00	0.46
trans	140	0.24	0.24	0.00	1.00
real	140	0.05	0.10	0.00	0.47
bankfin	140	0.21	0.15	0.00	0.73
pls	201	0.10	0.17	0.00	0.91
fixed	201	0.80	0.29	0.00	1.00
lngdpc	438	9.40	1.40	-0.37	12.00
lnpop	387	16.32	1.78	10.88	19.35
lnoil	443	4.01	0.54	2.77	4.56
fdi	434	0.03	0.05	-0.04	0.41
rd	141	0.64	0.58	0.03	2.62

Notes: Obs = Observations; SD = Standard Deviation ; Min = Minimum ; Max = Maximum

Table A.10: Correlation Matrix – Islamic Banks and Carbon Emissions – Country-level

	lnco2	*cons*	*agr*	*man*	*trad*	*trans*	*real*	*bankfin*	*pls*	*fixed*	*lngdpc*	*lnpop*	*lnoil*	*fdi*	*rd*
lnco2	1														
cons	0.0858	1													
agr	-0.1713	0.2132	1												
man	0.1961	0.0464	-0.0925	1											
trad	-0.5491	0.0907	-0.0480	-0.0157	1										
trans	-0.0003	-0.5066	-0.3863	-0.0558	-0.1409	1									
real	0.1231	0.0439	0.0451	0.4539	-0.0280	-0.2929	1								
bankfin	0.2247	-0.1073	-0.2144	-0.2032	-0.3872	-0.3576	-0.0489	1							
pls	0.2796	-0.2131	-0.3322	-0.0503	-0.4391	-0.1102	0.2470	0.6378	1						
fixed	-0.5515	0.3602	0.4970	-0.1346	0.5401	-0.4836	-0.0230	-0.1659	-0.5218	1					
lngdpc	-0.2842	-0.3966	0.0472	-0.1486	0.5481	0.3269	-0.2183	-0.4844	-0.5129	0.3026	1				
lnpop	0.7321	0.4096	-0.0961	0.2716	-0.5714	-0.1901	0.2625	0.2806	0.3449	-0.4684	-0.6332	1			
lnoil	0.3780	0.2013	-0.2426	0.0968	-0.1684	-0.1055	0.0401	0.1642	0.1210	-0.1329	-0.2653	0.3212	1		
fdi	0.2182	0.0158	0.1368	0.0542	-0.3578	0.1986	-0.0736	-0.2692	-0.0707	-0.3025	-0.0967	0.2550	0.2554	1	
rd	0.5361	0.0304	-0.4824	0.3357	-0.2226	0.3688	-0.0768	-0.0719	0.0307	-0.6669	-0.2443	0.5387	0.3366	0.3174	1

APPENDIX B GLOSSARY

Adalah (‘adl)	: justice
Ahsan	: excellence
Amanah	: trust
Falah	: salvation in this world and in the hereafter
Fard	: responsibility
Fiqhi	: Islamic jurisprudence
Haqq	: right
Hurriyah	: freedom
Ihsan	: beneficence for equilibrium
Ikhtiyar	: free-will
Imar	: development
Islah	: reform
Kharaj	*:* land tax
Khilafah (khalifah)	: God’s vicegerent
Khilkiyyah	: affirmed behaviour
Maqasid-al shari’ah	: objectives of the *Shari’ah*
Mizan	: balance
Rububiyyah	: process towards perfection in line with the development path
Tawhid	: unitarity and complementarity
Tazkiyah	: purification and growth implying growth in harmony
Ukhuwwah	: solidarity
Ushr	: tax on agriculture product
Waqf	: pious trusts or foundations
Zakah	: compulsory alms giving after certain threshold of wealth and income
Zuhd	: simplicity or sufficiency