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Critical Essays in Islamic Banking and Finance

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Doctor of Philosophy



Critical Essays in Islamic Banking and Finance

Wahyu Jatmiko

Abstract

This thesis contributes to the socio-economic development of the majority Muslim countries by scrutinizing Islamic banking and finance (IBF). It consists of four papers focusing on the most prominent IBF institution and instrument: Islamic bank (IB) and Islamic securitization (*sukūk*). The first part of this study (Chapters 2 and 4) empirically investigates the IBF performance on materializing the ethical objectives of Islamic law (*Maqāsid al-Sharī'ah*). The second part of it (Chapters 3 and 5) theoretically recommends how to disrupt (improve or rebuild) IBF architecture in light of the *Maqāsid al-Sharī'ah*.

Chapters 2 and 4 derive the ethical framework behind the prohibition of *ribā* and *gharar*. The former embodies financial decoupling and unjust price gouging, while the latter involves asymmetric information and excessive risk-taking. We then apply these notions to investigate the socio-economic performance of IBs and *sukūk* empirically. We document that the unethical issues of *ribā* and *gharar* are still prevalent in IBs' most utilized financing of the debt-based mark-up *Murabaha* and its variants. This result also holds for *sukūk*, where we establish the positive nexus between its development and income inequality led by *ribā* and *gharar*.

Chapters 3 and 5 theoretically propose improved structures of IBs and *sukūk*. We reconstrue the IBs *Murabaha* facility as trade credit instead of bank credit and integrate it within a modified Universal Banking architecture. It mitigates financial fragility by transforming the debt claim into a risk-sharing one and offering more competitive financing rates. We also disrupt infrastructure *sukūk* by amalgamating the literature on project financing, charitable endowment, and development finance. We mathematically model the proposed structure emulating the Continuous Workout Financing and Participating Facilities to offer fragile-free infrastructure financing that alleviates financialization and inequality.

Declaration

This thesis is based on research carried out at the Department of Economics and Finance in Durham University Business School, United Kingdom. No material contained in it has previously been submitted elsewhere for any degree or qualification. The whole part of this thesis is my work unless indicated to the contrary in the text. Materials presented in Chapter 5 were written in collaboration with Dr. Novriana Sumantri of Bandung Institute of Technology, Indonesia, where her main endeavor was in mathematical model development (Section 5.6). Overall, I contributed approximately 70 percent of the work in Chapter 5.

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Dedicated to

my parents: *Siti Nadhirah* and *Suratman*,
and my wife: *Nadiyah Amatul Haq*,
without whom all this would not be possible

and to my little one: *Maryam Kaina Wajida*,
in the hope that she will enjoy
a more just socio-economic system.

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Contents

Abstract	ii
Declaration	iii
Acknowledgments	v
List of Figures	xii
List of Tables	xiv
List of Abbreviations	xvi
Glossary of Arabic Terms	xix
1. Introduction	1
2. Is Islamic Banking Truly Ethical	9
2.1. Introduction	9
2.2. The Ethical Framework of IBs	13
2.3. <i>Ribā</i> in IBs.....	18
2.3.1. <i>Ribā</i> and the Moral Objectives of Islamic Rulings	18
2.3.2. Hypothesis Development: Is the Pricing Employed by IBs Ethical?	21
2.3.2.1. The First Element of <i>Ribā</i>	23
2.3.2.2. The Second Element of <i>Ribā</i>	25
2.3.3. Empirical Evidence of IIBR’s Unethicality.....	25
2.3.3.1. The Long-run Equilibrium Between the IIBR and LIBOR.....	26
2.3.3.2. Causality between the IIBR and LIBOR.....	32
2.3.3.3. Connection with the Real Economy	34
2.3.3.4. Price Gouging.....	37
2.4 <i>Gharar</i> in IBs	38
2.4.1. Unethicality of <i>Gharar</i>	38

2.4.2.	Do IBs Restrain the Unethical Issue of <i>Gharar</i> ?	40
2.4.2.1.	The Asset Side of the IBs	40
2.4.2.2.	The Liability Side of IBs	47
2.5	The Role of SSB on IBs' Ethicality	48
2.6	Conclusion	49
3.	Advancing Islamic Banking	52
3.1	Introduction	52
3.2	The Institutional Framework	60
3.2.1.	The Islamic Perspective on Plain Vanilla Debt Financing	60
3.2.2.	Is Islamic Banking a New Paradigm?	62
3.2.3.	The Role of TC and the Classic <i>Murabaha</i>	62
3.2.3.1.	Financing Advantage Perspective	63
3.2.3.2.	Price Discrimination Perspective	63
3.2.3.3.	Product Warranty Perspective	64
3.2.3.4.	Transactions Costs Perspective	64
3.3	The Way Forward	65
3.3.1.	Reconstruing the Classic <i>Murabaha</i> Facility as a TC	65
3.3.2.	Modeling the TC- <i>Murabaha</i> Facility in the <i>Real</i> Sector of the Economy	68
3.3.2.1.	Modeling the Supply-side	69
3.3.2.2.	Modeling the Demand-side	72
3.3.2.3.	Market Clearing Condition	75
3.4	Results and Discussion	76
3.4.1.	Key Result	76
3.4.2.	Proof of Proposition Employing Numerical Simulation	78

3.4.2.1.	The Effect of Price Elasticity on the Optimum TC- <i>Murabaha</i> Discount Rate	78
3.4.2.2.	Comparative Static Analysis: The Effect of Variation in the Opportunity Costs on the Optimal TC- <i>Murabaha</i> Rate	80
3.4.2.3.	Robustness Check: Relaxing the Assumption of k	82
3.4.2.4.	Robustness Check: Relaxing the Assumption of γ	83
3.4.3.	Implications of the Results on the Financial Architecture	85
3.5	Conclusion	88
4.	Does <i>Sukūk</i> Aggravate Income Inequality?	90
4.1.	Introduction	90
4.2.	Islamic Ethics of <i>Sukūk</i>	95
4.2.1.	The Economic Implication of <i>Ribā</i> and its Links with the Literature	97
4.2.2.	The Economic Implication of <i>Gharar</i> and its Links with the Literature	100
4.3.	Hypothesis Development of <i>Sukūk</i> -Income Inequality Nexus	102
4.4.	Methodology and Data	106
4.4.1.	Empirical Strategy	106
4.4.2.	Data	107
4.4.3.	Description of Data	109
4.5.	Empirical Results	113
4.5.1.	Panel Data Model Selection	113
4.5.2.	Regression Results	115
4.5.2.1.	<i>Sukūk</i> Issuance and Income Inequality	115
4.5.2.2.	Some Other Variables	117
4.5.2.3.	Robustness Checks: Interaction Variables Regression	119
4.5.2.4.	Robustness Checks: GMM	122

4.5.2.5. Robustness Check: OIC Only Regression.....	124
4.6. Discussions of Our Results	125
4.7. Conclusions.....	129
5. Can Culture Mitigate the Ill-Effects of Infrastructure Financialization?	132
5.1. Introduction	132
5.2. Infrastructure and PPPs	135
5.3. Imperfections in Infrastructure Financialization	141
5.3.1. Agency (<i>Ribāwi</i>) Issues of Infrastructure Financialization	141
5.3.2. Asymmetric Information (<i>Gharar</i>) in Infrastructure Financialization ...	144
5.4. Can <i>Sukūk</i> be a Solution for Infrastructure Development?	145
5.4.1. Asset-Backed vs. Asset-Based <i>Sukūk</i>	146
5.4.2. Other Structural Flaws.....	147
5.4.3. Rent Extraction by <i>Shari'ah</i> Scholars	148
5.4.4. Pricing Problem	149
5.5. The Way Forward.....	149
5.5.1. Reducing <i>Gharar</i> by Integrating <i>Sukūk</i> with PPP	150
5.5.2. Reducing Uneven Geographies of Development through Charitable Endowments	153
5.5.3. Mitigating <i>Ribā</i> through Participating Preferred Financing (PPF).....	155
5.6. Modeling the Financing of Infrastructure by a Charitable Endowment (Waqf)	159
5.6.1. Institutional Details	160
5.6.2. Revenue Dynamics and Ensuing Economic Benefits to Society at Large	162
5.6.2.1. Pricing the Payments to Motivate the Developer-Operator	163

5.6.2.1.1.	The Developer-Operator’s Payoffs for a Low-Quality Construction.....	163
5.6.2.1.2.	The Developer-Operator’s Payoffs for a Medium-Quality Construction.....	165
5.6.2.1.3.	Pricing the Payment to the Developer-Operator for a High-Quality Construction	167
5.6.2.1.4.	Instigating the Developer-Operator to Build a High-Quality Product	169
5.6.2.2.	Integrating the Payoffs of the <i>Sukūk</i> with its Pricing	169
5.6.2.2.1.	The Payoffs of the <i>Sukūk</i>	169
5.6.2.2.2.	Pricing the <i>Sukūk</i>	171
5.6.2.3.	The Economic Viability of the Infrastructure	172
5.6.2.4.	Controlling for Risk-shifting from the <i>Waqf</i> to the <i>Sukūk</i> Holders	174
5.6.2.5.	Controlling for the Underinvestment Issue Curtailing the <i>Waqf</i> from Investing in New Projects.....	175
5.7.	Conclusion.....	177
6.	Conclusion	180
	Bibliography	184
	Appendix A	216

List of Figures

1.1.	Research flow chart	3
2.1.	Domination of debt-based financing in IBs across territories	12
2.2.	Ethical framework for Islamic financial institutions	14
2.3.	Risk-shifting	20
2.4.	Underinvestment.....	21
2.5.	Banking <i>murabaha</i> , <i>inah</i> , and organized <i>tawarruq</i>	22
2.6.	Time series plots	28
2.7.	GARCH-BEKK dynamic correlations between IIBR and real estate indices.....	35
2.8.	GARCH-BEKK dynamic correlations between IIBR and CPIs.....	36
2.9.	Schematic flow of asset transformation in Islamic bank balance sheet.....	42
2.10.	The decrease in allocative efficiency of the default-free <i>Murabaha</i> facility.....	44
2.11.	<i>Gharar</i> escalates the problem of <i>ribā</i>	47
3.1.	Geography of Islamic banks by total assets.....	53
3.2.	Risk-shifting	61
3.3.	Underinvestment.....	61
3.4.	TC- <i>murabaha</i> financing mechanism illustrating links between a supplier and buyers.	66
3.5.	Optimum TC- <i>murabaha</i> rates across various price elasticities.....	79
3.6.	The impact of opportunity costs of capital (k) on TC- <i>murabaha</i> rates m_y^* for various price elasticities.	80
3.7.	Universal Islamic banking architecture	86
4.1.	Ethical framework for <i>sukuk</i>	96
4.2.	Risk-shifting	98

4.3.	Underinvestment.....	99
4.4.	Share of the top 1 percent income group (1995-2019).....	111
4.5.	<i>Sukūk</i> issuance over GDP (1995-2019).....	112
5.1.	Simplified structure of a PPP.....	137
5.2.	<i>Sukūk</i> payoffs for fragile (i.e., plain-vanilla risky) loan.....	142
5.3.	Risk-shifting in the risky collateralized loan facility.....	143
5.4.	Underinvestment problems of the plain-vanilla debt.....	144
5.5.	Simplified structure of a revamped <i>sukuk</i>	151
5.6.	<i>Sukūk</i> payoffs for Continuous Workout Financing (CWF) facility with no risk-shifting	157
5.7.	Risk-sharing feature of CWF	157
5.8.	Participatory Financing (PF) facility	158
5.9.	Comparing a PPF facility with a CWF	159
5.10	Infrastructure timeline	160
5.11.a	The payoff flows of the developer for a low-quality infrastructure in the managing and terminal phase, $t \in (0, N]$	164
5.11.b	The payoff flows of the developer for a medium quality infrastructure in the managing phase, $t \in (0, K)$, where time K is decided by the independent auditor	165
5.11.c	The lump-sum payoff of medium quality infrastructure developer in the late managing and terminal phases, $t \in [K, N]$, where time K is designated by the auditor	166
5.11.d	The payoff flows of developer for a high-quality infrastructure in the managing and terminal phase, i.e., $t \in [0, N]$	168
5.12.	The payoffs of <i>sukūk</i> holders $t \in [0, N]$	170

List of Tables

2.1. Definition of <i>ribā</i>	18
2.2. Optimal lag length and Vector Error Correction Model (VECM) results.....	27
2.3. Johansen Cointegration Test of IIBR and LIBOR	30
2.4. Johansen Cointegration Test of IIBR and local interest rate benchmarks.....	31
2.5. Toda-Yamamoto causality results	32
2.6. Toda-Yamamoto Test of IIBR and local interest rate benchmarks.....	33
2.7. Average GARCH-BEKK dynamic correlations.....	36
2.8. Paired difference tests.....	38
3.1. Optimum annual TC- <i>murabaha</i> rates under various elasticities.....	79
3.2. Cases where the optimum annual TC- <i>murabaha</i> rates are lower than the opportunity costs of capital	81
3.3. Optimal annual TC- <i>murabaha</i> (m_y^*) rates under various opportunity costs of capital	82
3.4. Robustness checks for optimum TC- <i>murabaha</i> rates with different γ values	84
4.1. Selected empirical literature on differences between <i>sukūk</i> and bonds	103
4.2. Variable definitions and data sources.....	107
4.3. Descriptive statistics.....	109
4.4. Top 1% and <i>sukūk</i> issuance by country.....	110
4.5. Correlation matrix	113
4.6. Model specification tests	115
4.7. Regression results.....	116
4.8. Robustness check: Regression with intersections results.....	121
4.9. Robustness check: GMM results	123

4.10	Robustness check: OIC only regression results.....	124
5.1.	Pros and Cons of PPP.....	138
5.2.	Total PPP investments across developing Muslim countries (\$ millions) (January 1990 – June 2018)	140

List of Abbreviations

Abbreviation	Definition
AAOIFI	Accounting and Auditing Organization for Islamic Financial Institutions
ABS	Asset-Backed Securities
ACF	Autocorrelation Function
AIC	Akaike Information Criterion
ARDL	Autoregressive Distribution Lag
ARMA	Autoregressive Moving Average
BHIBOR	Bahraini Interbank Offered Rate
BIBOR	Bangkok Interbank Offered Rate
BOT	Build, Operate, and Transfer
CAIBOR	Cairo Interbank Offered Rate
CBs	Conventional Banks
CIBAFI	The General Council for Islamic Banks and Financial Institutions
CPI	Consumer Price Index
CSR	Corporate Social Responsibility
CWF	Continuous Workout Financing
DJ	Dow Jones
DO	Debt Obligation
EAPR	East Asia and Pacific Region
ECA	Europe and Central Asia
EGLS	Estimated Generalized Least Squares
EIBOR	Emirates Interbank Offered Rate
ESG	Environmental, Social, and (Corporate) Governance
EU	European Union
FE	Fixed Effect
FONC	First Order Necessary Condition
FTSE	Financial Times Stock Exchange Group
GBM	Geometric Brownian Motion
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GLB	Gramm-Leach-Bliley
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
HIEF	Historical Index of Ethnic Fractionalization
IBF	Islamic Banking and Finance

IBL	The Islamic Bank Ltd of South Africa
IBs	Islamic banks
IDB	Islamic Development Bank
IF	Islamic Finance
IFH	Ihlas Finance House of Turkey
IIB	Islamic International Bank of Denmark
IIBR	Islamic Interbank Benchmark Rate
JIBAR	Johannesburg Interbank Average Rate
JIBOR	Jakarta Interbank Offered Rate
KFH	Kuwait Finance House
KIBOR	Karachi Interbank Offered Rate
KLIBOR	Kuala Lumpur Interbank Offered Rate
LIBOR	London Interbank Offered Rate
LTV	Loan To Value
ME	Maximum Eigenvalues
MENA	Middle East and North Africa
MNEs	Multinational Enterprises
MSME	Micro, Small, and Medium-sized Enterprises
NOI	Net Operating Income
NPSV	Net Present Social Value
NPV	Net Present Value
NWC	Net Working Capital
OIC	Organization Islamic Cooperation
OLS	Ordinary Least Squares
PACF	Partial Autocorrelation Function
PF	Participating Financing
POLS	Pooled Ordinary Least Square
PPF	Participating Preferred Financing
PPP	Public-Private Partnership
PSIA	Profit-sharing Investment Account
QIBOR	Qatar Interbank Offered Rate
RE	Random Effect
REE	Rational Expectations Equilibria
SAF	Shared Appreciation Facility
SAIBOR	Saudi Arabian Interbank Offered Rate
SAU	Saudi Arabia
SEF	Shared Equity Facility
SIBOR	Singapore Interbank Offered Rate

SIF	Shared Income Facility
SLIBOR	Sri Lanka Inter Bank Offered Rate
SOEs	State-owned Enterprises
SPV	Special Purpose Vehicle
SSA	Sub-Saharan Africa
SSB	<i>Sharī'ah</i> Supervisory Board
TC	Trade Credit
TRLIBOR	Turkish Lira Interbank Offered Rate
UAE	United Arab Emirates
UIB	Universal Islamic Bank
UK	United Kingdom
UMP	Uniformity Most Powerful
USA	United States of America
VaR	Value-at-Risk
VAR	Vector Autoregression
VBI	Value-Based Intermediation
VECM	Vector Error Correction Model
VIFs	Variance Inflation Factors
WBL	The Women, Business, and the Law
WWII	World War II

Glossary of Arabic Terms

<i>Aḥādīth</i>	Plural of <i>Hadīth</i>
<i>Awqāf</i>	Plural of <i>Waqf</i>
<i>‘Ayn</i>	Tangible asset
<i>Bay al-dayn</i>	the sale of debt
<i>Dayn</i>	Loan or debt
<i>Falāh</i>	Success in the world and hereafter
<i>Fiqh</i>	Islamic jurisprudence
<i>Gharar</i>	The sale of probable items whose existence or characteristics are uncertain due to the risky nature that makes the trade akin to gambling
<i>Hadīth</i>	A tradition of Prophet Muhammad
<i>Halal</i>	Permitted by Islamic law
<i>Haram</i>	Prohibited by Islamic law
<i>Ihsan</i>	Beautification
<i>Ijara</i>	Leasing or rent contract (usually in the form of sale and leaseback)
<i>Inah</i>	Sale and buy-back arrangement
<i>Istibdal</i>	Replacing an existing unproductive waqf asset for a productive one
<i>Istisna</i>	A contract where the buyer asks a project developer to construct/manufacture a tailored asset
<i>Maqāsid al-Sharī’ah</i>	Objectives of Islamic law
<i>Mudharaba</i>	Trust partnership
<i>Mugharasa</i>	Agricultural/plantation partnership
<i>Murabaha</i>	Cost-plus financing
<i>Musaqa</i>	Irrigation partnership
<i>Musharaka</i>	Joint partnership
<i>Muzara’ah</i>	Sharecropping partnership
<i>Ribā</i>	A surplus of a commodity without counter-value in a commutative transaction of property for property
<i>Salam</i>	Forward sale
<i>Sharī’ah</i>	Islamic law
<i>Sukūk</i>	Certificates of equal value representing undivided shares in ownership of tangible assets, usufruct, and services or (in the ownership of) the assets of projects or special investment activity
<i>Takaful</i>	Islamic insurance
<i>Tawarruq</i>	Reverse <i>Murabaha</i> : a buyer buys a commodity on a deferred payment basis and sells it to a third party on a spot payment basis
<i>Tawhid</i>	Oneness of God

<i>Wa'ad</i>	Unilateral promise
<i>Wakala</i>	Agency contract
<i>Wakala bil Istithmar</i>	Agency contract for investment purposes
<i>Waqf</i>	Islamic charitable endowment

Chapter 1

Introduction

The goal of this thesis is to advance the socio-economic development of the Muslim world, taking into account its culture. The 57 Muslim-majority countries in the world are relatively underdeveloped. The recent figure from the World Bank Database shows that their contribution to the global economy is only 13.75% despite making up 24.41% of the world population. In contrast, the 27 countries in the European Union (EU) plus the United Kingdom (UK), constituting only 6.70% of the world population, share 18.10% of the world economy. The Organization Islamic Cooperation (OIC) countries also suffer from stark income disparity. The World Income Database illustrates that the top 1% earners in the second and the third biggest OIC economies, Turkey and Saudi Arabia, possess 23.35% and 18.86% of national income. On the contrary, Europe becomes the least unequal region. The Netherlands' highest 1% income group, for instance, claims only 6.97% of population earnings.¹

The emergence of Islamic Banking and Finance (IBF) is supposed to redress the above underdevelopment by focusing on socio-economic justice (Chapra, 1992). Naqvi (1992) elaborates this by stating that the ethical values of IBF are rooted in the Qur'ān (i.e., Muslim holy book) and the authentic traditions of Prophet Muhammad (i.e., *aḥādīth*). They are aimed at preventing harm and promoting human/ social welfare (i.e., *falāh*) (Naqvi, 1981).

However, whether IBF can truly improve the current economic situation of the Muslim world is a subject of academic debate. The literature has extensively criticized the lack of

1 All figures are based on the 2019 data. The economic contribution is measured by the Gross Domestic Product (GDP) at PPP (current \$), retrieved from: <https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD> while the Population figure is obtained from <https://data.worldbank.org/indicator/SP.POP.TOTL>. Please refer to <https://wid.world/> for the income inequality database. The data are accessed on May 10, 2021.

innovation in the IBF industry (Khan, 2010; Kuran, 2018; Gözübüyük et al., 2020). IBF is accused of merely a form of inefficient mimetic isomorphism of the existing system (Kuran, 1995; Bassens et al., 2013). One of the wide-mentioned reasons behind this is the reliance on Islamic rulings, which have been static for the past twelve to thirteen hundred years (Ebrahim and Sheikh, 2018). This view is also supported by Rafe Haneef (2009, p. 17), who states that “It is undoubtedly clear that the foundation of the Islamic finance industry....is still weak...” The focus of this thesis is thus to reinforce and to theorize the restructuring of financial instruments and institutions in accordance with the ethical objectives of Islamic law (*Maqāsid al-Sharī'ah*).

This thesis thus offers a way forward by first empirically testing whether Islamic financial institutions and instruments comply with the objectives of Islamic law. We then proceed to theoretically recommend structures that are efficient and adhere to the same (see Figure 1.1). Here, we focus on the contemporary most common structures, namely that of Islamic banks (IBs) and Islamic asset securitization (*sukūk*). The first part of this study (Chapter 2 and Chapter 4) empirically evaluates whether they adhere to the ethical objectives of the religion. If this is not the case, then the second part of our study (Chapter 3 and Chapter 5) theoretically postulates how to improve the current IBF architecture.

In Chapter 2, we empirically evaluate the ethicality of IBs. The literature suggests that ethical objectives play an essential role in IB product innovation (Haniffa and Hudaib, 2007). However, studies on IBs' morality are scant. The majority of them emphasize a meager application of ethics in corporate social responsibility (CSR) rather than IBs' core business (Aribi and Arum, 2015; Platonova et al., 2018). Some researchers have tried to examine the gulf between the ideal and the disclosed moral identity of IBs (Haniffa and Hudaib, 2007; Mergaliyev et al., 2019). However, over-reliance on corporate annual reports, which are prone

to window dressings, allows these studies to touch only the surface of IBs integrity without necessarily uncovering its actual ethical performance (Hillier et al., 2008).

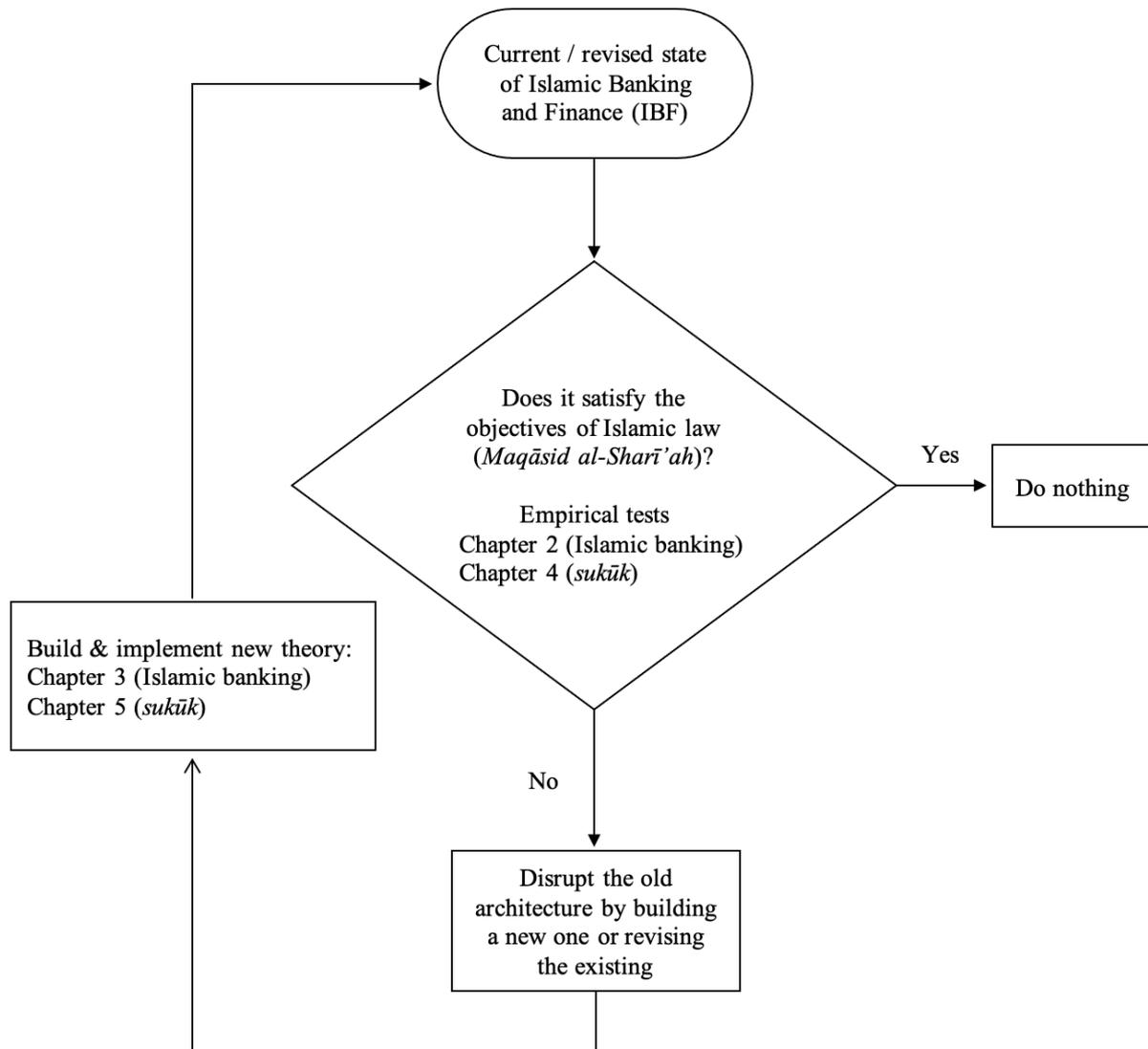


Figure 1.1: Research flow chart

We seek to address this gap in the literature by first establishing our moral framework of IBs in Chapter 2. We do this by employing the ethical objectives of Islamic law and connecting them to the mainstream theories of Teleology, Deontology, and Virtue (Collier, 1998; Solomon, 2003). This allows us to reconstrue the two primary prohibitions of IBF, namely *ribā* and *gharar*, within the context of ethics. An Arabic term *ribā* lexically means increase or growth (Thomas, 2006). From Islamic jurisprudence (*fiqh*) point of view, Wahba al Zuhayli

documents that one of the juridical meanings of *ribā* is “a surplus of commodity without counter-value in commutative transaction of property for property” (Thomas, 2006, 25). On the other hand, the Arabic term *gharar* denotes deceiving or confounding the mind (Thomas, 1995). El-Gamal (2001: 33) endorses Mustafa al-Zarqa’s legal definition of *gharar* as “the sale of probable items whose existence or characteristics are not certain, due to the risky nature which makes the trade similar to gambling.”

Employing Islamic ethical framework, this study attributes *ribā* to financial decoupling-led risk-shifting and unjust price gouging-led underinvestment. Previous studies convey the rationale behind the prohibition of *ribā* to unjust exchanges in the business transactions that leads to the wrongful expropriation of counter parties’ assets. This notion is consistent with *Sharī’ah*’s objectives emanating from the Qur’ānic verse (4:161). This covers unjustified profit (Coulson, 1984), excessive price (Choudhury and Malik, 1992; Chapra, 2000), trading in credit as unbundled commodities (El-Gamal, 2006), and expropriation of counterparty’s assets (Ebrahim et al., 2016). We also link the prohibition of *gharar* to asymmetric information and excessive risk-taking behavior (El-Gamal, 2006; Ebrahim et al., 2016). This, according to Ibn Taimīyah, “leads to dispute, hatred, and devouring others’ wealth wrongfully” (El-Gamal, 2006, p. 59). Therefore, the two injunctions (*ribā* and *gharar*) are closely related as the latter is barred to prevent the ill effects of the former.

We then apply our ethical framework to empirically and theoretically examine the moral identity of IBs. However, unlike the previous studies, we focus on examining the products offered by the IBs in light of their actual (instead of disclosed) performance. We focus on the practical issues of the debt-based mark-up facility of *Murabaha* and its variants, namely the simultaneous asset ‘sale’ and ‘buy-back’ arrangement of *Inah* and the synthetic loan facility of *Tawarruq*. This is because IBs have been hitherto dependent on these contracts (Baele et al., 2014). Our findings suggest that the unethical issues of *ribā* and *gharar* are still prevalent in

the IBs' implementation of those modes of financing, despite the *Shari'ah*-compliant endorsement of religious scholars.

Chapter 3 follows up the empirical results from the previous chapter by theoretically proposing a way forward for practical deviation of IBs' most utilized facility of *Murabaha* financing (rather than the ones theorized by IBF scholars and standards bodies). The literature is relatively silent on this issue. Many have only centralized their queries around the convergence of IBs with their conventional counterparts (see Abedifar et al., 2013; Beck et al., 2013; Mollah and Zaman, 2015; Alandejani et al., 2017; Alqahtani et al., 2017). We seek to fill this gap in the literature by comparing the *Murabaha* banking offered by IBs with that of Trade Credit (TC—hereafter) in Corporate Finance. The implementation of the *Murabaha* contract and its variations (*inah* and *tawarruq*) have received a lot of criticism for replicating interest-bearing debt facilities. These structures are inefficiently set up to make the transaction seemingly conform to Islamic law (El-Gamal, 2006; Gözübüyük et al., 2020). In practice, it fails to sustain the true transfer of ownership and makes the contract susceptible to fragility (Visser, 2009; Khan, 2010).

In this chapter, we illustrate that TC is a more efficient alternative to bank loans not only for small and financially constrained companies but also large and investment-grade ones (Ge and Qiu, 2007; Murfin and Njoroge, 2015). It offers a number of financial advantages (Ng et al., 1999; Nilsen, 2002; Giannetti et al., 2011; Albuquerque et al., 2015; Shenoy and Williams, 2017; Yang and Birge, 2018), competitive pricing (Brennan et al., 1988; Petersen and Rajan, 1997; Chod et al., 2019), product warranties (Long et al., 1993; Emery and Nayar, 1998; Giannetti et al., 2011; Chod et al., 2019), and lower transaction costs (Ng et al., 1999; Nilsen, 2002). The primary difference between the two is that TC is conducted in the *real* sector of the economy, while bank loans are provided in the *financial* sector. Surprisingly, IBs have treated the *Murabaha*, which originally emulates the concept of TC, as a substitute for bank credit in

the *financial* sector. This is the root of the practical difficulties of banking *Murabaha* to maintain the real transfer of ownership and the close link with the real sector of the economy (Visser, 2009; Khan, 2010). We thus theoretically reconstrue the *Murabaha* facility as TC one in the *real* sector of the economy and integrate it within a modified Universal Banking architecture. Our results suggest that construing the *Murabaha* facility employed by IBs within the TC framework can redress the above issues of banking *Murabaha*. Our TC-*Murabaha* model not only transforms the debt claim into a risk-sharing one but also offers more competitive financing rates and mitigates financial fragility.

In Chapter 4, we empirically evaluate whether *sukūk* satisfies the objectives of Islamic law. Here, we focus on its link with income redistribution. *Sukūk* is considered an innovative financing structure in contrast to mainstream bonds. *Sukūk* should incorporate property rights and thereby promote a more just socio-economic development (Sidani and Ariss, 2015). However, it may not be a coincidence that *sukūk* coexists with the upsurge in income inequality of the respective issuing countries (Alvaredo et al., 2018). The literature has expressed a growing concern on public and corporate bonds' negative impact on income redistribution (Dwyer, 2018; Mian et al., 2020). However, most studies in IBF mainly focus on the positive role of IBs (Gheeraert and Weill, 2015; Abedifar et al., 2016; Imam and Kpodar, 2016) and *sukūk* (Smaoui and Nechi, 2017; Yildirim et al., 2020; Smaoui et al., 2021) on economic growth. Abedifar et al. (2016) establish a negative link between IBF and inequality but within the scope of IBs. The link between *sukūk* and inequality is left unexplored.

To shed light on this literature gap, we first construct the ethical framework of *sukūk* in light of socio-economic justice employing the *Maqāsid al-Sharī'ah*. We argue that *sukūk* development should incorporate property rights issues of *ribā* and *gharar* to redeem the fundamental flaws of interest-bearing bonds, hence improving income redistributions. We then investigate the link between *sukūk* development and income inequality by evaluating 22 *sukūk*

issuing countries over 1995-2019. Our empirical models benefit from the finance-inequality literature (Clarke et al., 2006; Beck et al., 2007; Kim and Lin, 2011; Jaumotte et al., 2013, Jauch and Watzka, 2016; De Haan and Sturm, 2017; Ghossoub and Reed, 2017). We examine our empirical strategy employing various panel regression models, including Pooled Ordinary Least Square (POLS—hereafter), Fixed Effect (FE—hereafter), Random Effect (RE—hereafter), Generalized Least Squares (GLS—hereafter), FE GLS, and Generalized Method of Moments (GMM—hereafter). We document in Chapter 4 that *sukūk* issuance increases the disparity in income redistributions proxied by the Top 1% earners, suggesting that the deeper meanings of *ribā* and *gharar* are still persistent in the Islamic securitization.

Finally, Chapter 5 offers solutions for the positive link between contemporary *sukūk* and inequality found in Chapter 4. Despite the proponents of IBF, who speak highly of *sukūk* being a panacea for infrastructure funding gaps (Bacha and Mirakhor, 2018; Smaoui et al., 2021), little is known about its most efficient configuration. A few researchers have attempted to fill this gap. Ebrahim et al. (1995) and Ebrahim and Bashir (1999) advocate hybrid structures that share appreciation and income of the project, while Ebrahim and Khan (2002) propagate a project-based (*istisna*) *sukūk*. Wilson (2008), Baaquie (2018), Bacha and Mirakhor (2018) focus on detaching *sukūk* pricing from interest-based benchmarks and instead propose the GDP indexed return benchmark. Nonetheless, these proposals have yet to account for the property rights issues of *ribā* and *gharar* in *sukūk*, nor considering their impacts on equitable income redistributions.

We theoretically propose *sukūk* design for infrastructure that is not only fragile-free but also reduces the uneven geography of development. We first revisit the common misconception of considering *sukūk* as an alternative to bonds. Instead, we integrate the *sukūk* design with the project financing literature to maintain its asset centrality feature (Syrett and Bertotti, 2012; Knight and Sharma, 2016). Second, we amalgamate an Islamic charitable endowment (*waqf*)

with a *sukūk* structure to alleviate uneven geographies of development caused by project financing (Siemiatycki, 2011; Tan, 2012; Pollard et al., 2016). Finally, we mathematically model our intricate *sukūk* structure emulating development finance literature of the Continuous Workout Financing (CWF—hereafter, Shiller et al., 2019) and Participating Financing (PF—hereafter, Shackleton and Wojakowski, 2011). We find that integrating *sukūk* with project financing framework, *waqf*, and a combination of CWF and PF can offer fragile-free infrastructure financing. This also alleviates the detrimental impact of financialization and overcomes the uneven geographies of development.

The remainder of this thesis is arranged as follows. Chapter 2 examines whether Islamic banking is genuinely ethical. We then propose an innovative solution for the unethicity of the IBs' widely used *Murabaha* facility in Chapter 3. Chapter 4 evaluates a specific feature of IBF ethics, i.e., promotion of socio-economic justice, within the context of *sukūk*. A potential innovation for *sukūk* is offered in Chapter 5. Chapter 6 concludes this thesis.

Chapter 2

Is Islamic Banking Truly Ethical?

2.1. Introduction

The 2007-2009 global financial crisis (GFC) has exposed the unethical risk-taking behavior of conventional banks (CBs) (Schoen, 2017). This allowed CBs to generate excessive profits for themselves while transferring the downside risk to society-at-large, i.e., via taxpayers' bailout. This crisis has provided a unique opportunity for Islamic banks (IBs) to market themselves as an ethical alternative to CBs.¹ Despite the mixed empirical findings of the comparative performance of IBs vis-à-vis CBs during the crisis,² IBs have promoted themselves as being ethically oriented (Muhamad et al., 2012). Their claim is rooted in Islamic ethics banning the interest-based transaction of *ribā* and the excessive risk-taking behavior of *gharar*.

Nonetheless, the buzzword of 'ethical' banking has not gone beyond IBs' marketing campaign. The Malaysian Central Bank has recently introduced Value-Based Intermediation (VBI) as a correction mechanism for this deficiency (Bank Negara Malaysia, 2018). In the United Kingdom, one of the biggest IBs, Al Rayan Bank, obtains a much lower ethical score (11.5/20) than the leading conventional "B Corporation" banks such as Charity Bank (16/20), Ecology Bank (15.5/20), and Triodos Bank (15.5/20). IBs especially fall short of environmental responsibility, animal welfare, corporate ethos, and product sustainability.³

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- 1 The higher engagement with Corporate Social Responsibility (CSR) seems to bestow firms with superior performance and stability during the GFC (Lins et al., 2017). While CSR is not a perfect substitute for firms' ethicality, managers and owners recognize the interdependencies and interrelationships of the two concepts (Fassin et al., 2011).
 - 2 Studies such as Hasan and Dridi (2011) and Alqahtani et al. (2017) document superior growth and efficiency of the IBs while others, including Abedifar et al. (2013), refute any difference in the stability of IBs versus CBs.
 - 3 This is based on the 2018 Ethical Consumer ranking on the ethical savings account. See the full ranking: <https://www.ethicalconsumer.org/money-finance/shopping-guide/savings-accounts> (accessed on June 7, 2020). This is worth noting that, while ethics are multidimensional, this study focuses only on *ribā* and

These results are expected as IBs focus mainly on delivering the *Sharī'ah* (Islamic law) compliant versions of financial facilities offered by CBs (Khan, 2010). The *Sharī'ah* Supervisory Board's (SSB) role, as a distinct governance feature of IBs, merely signals their strategy to finance legitimate businesses by avoiding the proscribed elements of *ribā*, and *gharar* (Ullah et al., 2018). However, they do not necessarily incorporate the religious ethos associated with the higher objectives of Islamic law (*Maqāsid al-Sharī'ah*).⁴ IBs, from the perspective of our study, fail to construe the prohibition of *ribā* and *gharar* from the ethical philosophy of Islam. Here, we attribute *ribā* to the unethical behavior of financial decoupling-led risk-shifting and price gouging-led underinvestment and link *gharar* to excessive risk-taking behavior.

Engagement with excessive risk-taking behavior (*gharar*), which in turn also entices elements of *ribā* as shall be discussed in this study, may contribute to financial fragility. This is exemplified by cases of IBs' distress (and even collapses) across the world.⁵ Kuwait Finance House (KFH) experienced financial distress in 1984 due to considerable exposure to the construction industry (Hasan and Dridi, 2011). Denmark's Islamic International Bank (IIB) lost 30% of its equity between 1985 and 1986 due to its vulnerability to a single borrower (Grais and Pellegrini, 2006). The Islamic Bank Ltd (IBL) of South Africa defaulted in 1997

gharar-related moral elements of IBs. Unlike conventional ethical banks, IBs do not permit charging interest due to its prohibition of *ribā* (and *gharar*). Both institutions may share similar ethical dimensions, such as environmental responsibility and animal welfare. However, the latter has additional ethical dimensions derived from the prohibitions of *ribā* and *gharar*. We rationalize those Islamic legal prohibitions within the framework of ethics. In the terminology of the Ethical Consumer, this falls under the product sustainability dimension (please see https://www.ethicalconsumer.org/sites/default/files/inline-files/ethical_consumer_guide.pdf).

- 4 The objectives of Islamic law are to ensure the preservation of faith, intellect, lineage, and wealth of human beings (see Kamali, 1991). This issue is critical as it induces intellectual means to reform and revive society. The five objectives are not independent, as the preservation of wealth impacts the remaining objectives. Therefore, scholars trained only in Islamic law may find it difficult to grasp and pass judgment on issues related to wealth and, thus, life, lineage, and intellect of economic agents.
- 5 Indeed, this issue is not restricted only to IBs. Any CBs or even ethical banks undertaking unethical *ribā* and *gharar* in their business can lead to financial fragility.

because of unsecured insider lending and allocating no provisions for non-performing loans (Nathie, 2010). Ihlas Finance House (IFH) of Turkey was liquidated in 2001 due to its unethical lending and reckless expansion (Graiss and Pellegrini, 2006). Muamalat Bank of Indonesia has been under severe strain since 2015, primarily because of excessive exposure to the mining industry (Maulia, 2019).

Our paper, therefore, seeks to shed light on the de facto ethicality of IBs. Studies on the morality of IBs remain scarce. Many of them focus mainly on the application of CSR in IBs. Aribi and Arum (2015) uncover that IBs' managers have fallen flat on implementing Islamic ethics into CSR. Platonova et al. (2018) show the positive relationship between CSR and the future performance of IBs. A few studies have gone further by examining the uprightness of IBs using their Islamic ethical index. Haniffa and Hudaib (2007) and Mergaliyev et al. (2019) document vast discrepancies between the ideal and the disclosed moral identity of IBs. However, these studies fail to incorporate the actual integrity of IBs as they rely on corporate annual reports that are prone to window dressings (Hillier et al., 2008).

Our study differs from the above literature as we focus on the financing offered by the IBs and examine it in light of their actual (instead of communicated) ethical performance. In particular, this study employs the framework derived from the *Maqāsid al-Sharī'ah* to evaluate the rectitude of the debt-based mark-up facility of *Murabaha* and its variants, namely the simultaneous asset 'sale' and 'buy-back' arrangement of *Inah* and the synthetic loan facility of *Tawarruq* (Baele et al., 2014).⁶ These three facilities have been the dominant contractual financing agreements employed by IBs worldwide, with supposedly few exceptions illustrated in Figure 2.1. The literature (Khan, 2010, Kuran, 2018) casts doubt on the 'other' financing modes employed by IBs involving quasi-equity facilities. We ignore them as their overall proportion is relatively low.

⁶ These contracts are discussed further in Section 2.3.

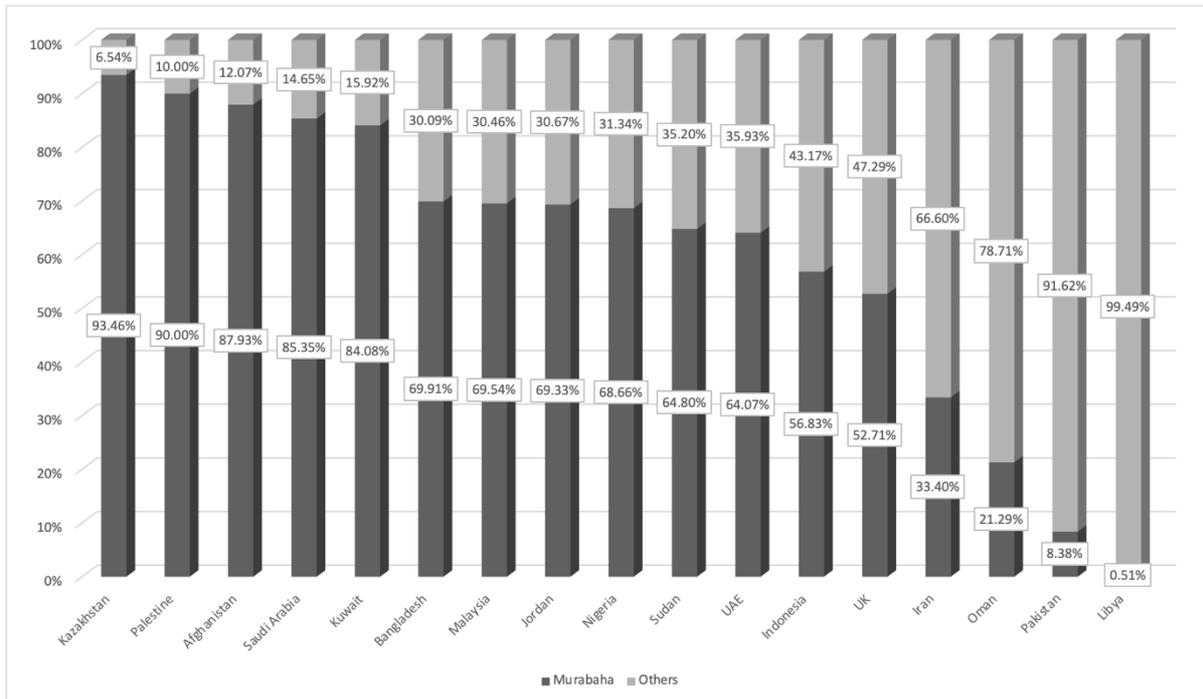


Figure 2.1: Domination of debt-based financing in IBs across territories

Notes: The figure illustrates the percentage of IBs financing by type of contract worldwide. The dark bar represents the debt-based *Murabaha*, *Inah* and *Tawarruq* facilities. The light one supposedly captures ‘quasi-equity’ facilities doubted by Khan (2010) and Kuran (2018). We employ the latest data reported by the Islamic Financial Services Board, where the period ranges from the second quarter of 2018 to the second quarter of 2020. The data is available via https://www.ifsb.org/psifi_03.php (accessed on December 9, 2020).

Our study contributes to the literature as follows. First, we advance the moral framework of IBs by harmoniously integrating ethics, Islamic law, and the economic rationale of the prohibition of *ribā* and *gharar*. Here, we derive values from the *Maqāsid al-Sharī’ah* and link them to the mainstream theories of ethics such as Teleology, Deontology, and Virtue (Collier, 1998; Solomon, 2003). This allows us to offer a deeper meaning of *ribā* and *gharar*, encompassing the economic rationale and ethics. Second, we examine whether the Islamic Interbank Benchmark Rate (IIBR) used in banking has encroached on immoral *ribāwi* issues of financial decoupling and price gouging. Here, we employ parametric and non-parametric paired differences, Johansen cointegration, Toda-Yamamoto, and GARCH-BEKK tests. Third, we theoretically audit IB’s idiosyncratic balance sheet structure to see if it outperforms that of CBs in alleviating the unscrupulous *gharar* issues of asymmetric information and excessive

risk-taking. Here, we integrate our study with theories of financial market frictions (Stiglitz and Weiss, 1981) and bank runs (Diamond and Dybvig, 1983). We finally highlight the SSB's flaws in reinforcing the ethical issues of *ribā* and *gharar* in IBs. This leads us to question the need for SSB in contrast to Hayat et al. (2013) and Ullah et al. (2018).

The rest of this paper proceeds as follows. The next section constructs the ethical framework of IBs. This is then applied to scrutinize the morality of IBs in the light of *ribā* in Section 2.3 and *gharar* in Section 2.4. Section 2.5 elucidates the institutional weakness of the SSB. Section 2.6 concludes our study.

2.2. The Ethical Framework of IBs

Testing the organizational ethicality is intricate due to the complex theoretical underpinning and lack of data. This is even more prevalent within the context of IBs, where the institutional values are far from settled. We thus derive our moral framework by integrating the *Maqāsid al-Sharī'ah* with business ethics literature, as shown in Figure 2.2.

Two strands of the theory are commonly outlined during the discussion about normative ethics (see Collier, 1998). The first one emphasizes actions as the moral standard, including Teleology (Consequentialism) and Deontology. Teleology argues that deeds should be adjudicated based on the consequences of one's actions. Conduct is deemed right if it generates the best possible outcome. This approach endorses any activities that satisfy one's future interest (egoism) or shed benefits to the highest number of individuals (utilitarianism). On the other hand, Deontology argues that morality is a function of contractual duties and responsibilities rather than outcomes. It rejects the idea of exceptions before the law in the name of greater benefits (Macdonald and Beck-Dudley, 1994).

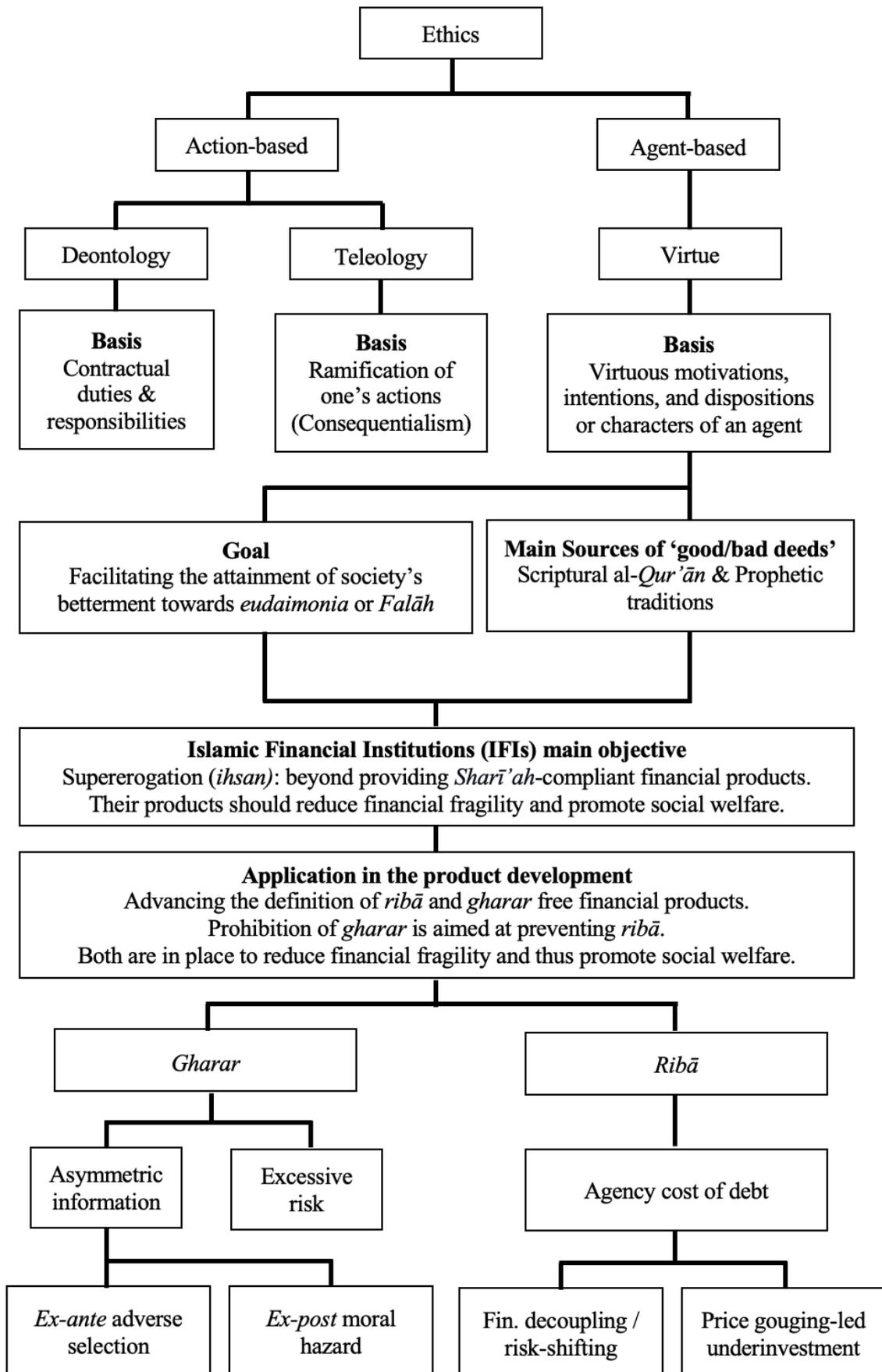


Figure 2.2: Ethical framework for Islamic financial institutions

The second theory focuses on a principled agent instead of actions. The so-called Virtue Ethics relies on the motives, disposition, and character of righteous persons (Solomon, 2003). Beyond the codes of ethics, uprightness is determined by individual intention and virtuousness. This emerging theory is often hailed for its patronage of sustainability, inclusivity, and environmental parity in business (Whetstone, 2001). Here, profit maximization is no longer the sole goal of business, as it puts more weight on the attainment of the public interest (*eudaimonia*). Contrarily, the action-based approach has long been criticized for opening the gate of ‘moral schizophrenia’ in business (Duska, 2000). Based on this theory, economic agents may compromise their values in exchange for the firms’ economic efficiency.

Islamic ethics are derived from the scriptural source of the Holy Qur’ān and the authentic Prophetic traditions (*ahadith*). Beekun (1997) illustrates how those two ethical sources differentiate Islamic ethics from action-based ones. First, the intention (substance) plays a pivotal role in making good behavior in the former. The Prophetic tradition says that “The reward of deeds depends upon the intentions, and every person will get the reward according to what he has intended.”⁷ While the fulfillment of the legal (contractual) aspect is essential as required by the Qur’ān (5:1), the ethicality of the transaction also relies on its righteous motives. The other way around is also true, however. A mere decent intention does not make a legally prohibited (*haram*) action permissible (*halal*). Moral actions should be transmitted into public interest through the combination of good intentions and virtuous deeds. Second, unlike utilitarianism, Islamic ethics “is not a numbers game” (Beekun, 1997, p. 20). The Qur’ān (5: 32) mentions that “...whoever kills a soul unless for a soul or for corruption [done] in the land – it is as if he had slain mankind entirely...” Finally, the concept of egoism is also alien in Islamic ethics. Islamic value system encourages the attainment of social welfare rather

7 This is as reported in various books of *hadith*, including the Sahih al-Bukhari, Volume 1, Book 1, *Hadith* no. 1.

than mere individual interest (Kamali, 1991). The Prophet said, “No one of you becomes a true believer until he likes for his brother what he likes for himself.”⁸

We thus argue that conceptualizing business ethics from the lens of the agent-based framework, consistent with Wade (2010), Ali (2014), and Bucar (2018), is more compatible with the values edified by the above two sources. Islamic ethics focuses on the betterment of moral agents and their society. The Prophet himself said that “I was sent to perfect good character.”⁹ Such virtuous is rooted in the axioms of unity (*tawhid*), justice, and equilibrium (or parity) (Rice, 1999). Islamic ethics advocates equity within the interaction of production factors and places the market as an integral part of a value-loaded society. Therefore, businesses exist for purposes beyond profit, consistent with the agent-based approach (Sidani and Ariss, 2015). Instead of mere utility maximization, the Islamic value system guides individuals towards attainment of *falāh* (Chapra, 1992), which in terms of Virtue Ethics is referred to as social *eudaimonia*.¹⁰

The above discussions show that agent-based ethics is in harmony with the *Maqāsid al-Sharī’ah* that aimed at achieving *falāh* by preserving human beings’ benefits both in the world and in the hereafter (al-Raysumi, 2005). Five essentials are prioritized by al-Juwaini, al-Ghazali, and al-Shatibi, namely religion, human life, progeny, wealth, and intellect (see al-Rasyumi, 2005). Ibn ‘Ashur (2006) also includes freedom and equity on top of the five dimensions. This study focuses on the wealth dimension of the *Maqāsid* in light of IBs product development.¹¹

8 This Prophetic saying is narrated by al-Bukhari and Muslim in Riyad as-Salihin, *Hadith* no. 183.

9 Narrated by al-Bukhari in al-Adab al-Mufrad, Book 14, *Hadith* no. 273.

10 The concept of *falāh*, however, is broader than *eudaimonia*, as the former includes well-being in the hereafter.

11 We are fully aware of the dimensional complexity of institutional ethos. This study focuses only on the morality of IB’s financing. Other dimensions of corporate philosophy, including environment, social, and employees, are beyond the scope of this paper.

The agent-based theory implies that the compliance of the IBs to the Islamic jurisprudence or *fiqh* (form) does not necessarily imply the righteousness of their operation. However, the motivation behind the development (substance) of those financial products is the primary determinant of IBs principles. They are expected to engage in ‘supererogation’ (*Ihsan*) by offering beyond *Sharī’ah*-compliant products. This is consistent with the prominent Muslim philosopher Abu Hamid Al-Ghazali (d. December 19, 1111), who defines *Ihsan* in business transactions as “something beyond mere adherence to legal and market requirements” (Sidani and Ariss, 2015, p. 853). In the context of our study, IBs are supposed to contribute to the betterment of society by providing an improved financing product to alleviate the endemic problems of resource expropriation (price gouging), financial fragility (or risk-shifting), and financial exclusion. This can be conducted by incorporating *Maqāsid al-Sharī’ah* into the product development process.

Ibn ‘Ashur (2006, p. 271) argues that “the protection of the community’s wealth as an aggregate depends on the protection of its particular components consist of individual property and wealth.” Among the crucial *Sharī’ah* injunctions to protect property rights are the prohibitions of *ribā* and *gharar*. Ibn ‘Ashur maintains that the *Maqāsid al-Sharī’ah* of Islamic financial product development is to promote (i) marketability, (ii) equity, (iii) transparency, (iv) preservation, and (v) durability. We conceptualize those aspects as the ethical objectives of the prohibitions of *ribā* and *gharar*. Section 2.3 construes *ribā* as agency cost of debt, where financial decoupling-led risk-shifting prevents marketability and price gouging-led underinvestment neglects equity principle. Section 2.4 defines *gharar* as asymmetric information arising from the lack of transparency (ex-ante adverse selection and ex-post moral hazard) and excessive risk ensuing from the absence of preservation and durability.

2.3. *Ribā* in IBs

2.3.1. *Ribā* and the Moral Objectives of Islamic Rulings

Narrowly interpreting the word *ribā* as merely interest is an ignorance fallacy. While its literal meaning stems from the Arabic term *rabā*, implying increase or growth (see Thomas, 2006), the philosophy of its prohibition goes beyond an interest-based transaction. Prior literature conveys the rationale behind its inhibition to unjust exchanges of assets, commodities, or barter in a medieval economy. This concept may appear in various forms, including unjustified gain or profit (Coulson, 1984), excessive price over the market value (Choudhury and Malik, 1992; Chapra, 2000), trading in credit as unbundled commodities (El-Gamal, 2006), and expropriation of counterparty's assets (Ebrahim et al., 2016) (see Table 2.1 for more definitions of *ribā*). This paper endorses the view of Ebrahim et al. (2016), reinforcing property rights. This definition is consistent with *Sharī'ah*'s objectives and emanates from the Qur'ānic verse (4:161), reproving the wrongful expropriation of others' assets. This perspective is supported by early jurists like Ibn Rushd (Averroes—d. December 11, 1198), Ibn Taimīyah (d. September 26, 1328), and Ibn Qayyim (d. September 15, 1350). However, this view was deemphasized for political reasons when the later jurists were co-opted by absolute monarchs (Chapra, 2008).

Table 2.1: Definition of *ribā*

Definitions of <i>Ribā</i>	Reference
Increase, addition, expansion or growth	Literal meaning
Unjustified gain	Coulson (1984)
Excessive price (as compared to the market one)	Choudhury and Malik (1992)
Expropriation of counterparty's assets	Choudhury and Malik (1992), Ebrahim et al. (2016)
Trading in credit as unbundled commodities	El-Gamal (2006)
Absence of asset-based collateralization	El-Gamal (2006)
Injustice transactions (inequity prices)	Chapra (2000), El-Gamal (2006)

The above conceptual definitions reveal at least two critical provisions for *ribā*-free transactions. First, the product (or credit agreement) should involve a real transaction. This arrangement is made to prevent the decoupling of the *financial* sector from the *real* economy. It supposedly mitigates the issue of risk-shifting as it protects the lender's (seller's) capital from being usurped by the borrower (buyer) in a strategic default when the equity is negative (see Figure 2.3). In the worst-case scenario, financial decoupling may imbue financial fragility and exacerbate systemic risk, thereby negatively impacting the real sector of the economy.

Second, *ribā*-free transactions should deliver the so-called 'just price'¹² to protect the borrower ('buyer' of an asset) from the underinvestment issue. Here, the lender ('seller' of an asset) claims most of the wealth increase from the project (or asset's utilization) by charging excessive fixed payments, i.e., price gouging.¹³ This incentivizes the borrower (buyer) to reject profitable (i.e., positive net present value) projects when its Net Operating Income (NOI) is lower than the debt obligation (DO), as illustrated in Period 3 in Figure 2.4. In the worst-case scenario, price gouging behavior can lead to financial exclusion of the poor and underprivileged. This negatively impairs a section of society and may lead to disenfranchisement and social unrest.

12 Debates on the definition of 'just price,' which is equivalent to the *justum pretium* in the terminology of Thomas Aquinas (Elegido, 2009), are far from settled. Neoclassical economists defend the self-regulating market price as the true reflection of the just price (Elegido, 2015), while Marxian scholars rather favor the cost-covering price (De Roover, 1958). This study emulates the medieval jurist Ibn Taimīyah, who argues that the 'price of equivalent,' his idiom for the just price, can only be achieved "by forces of supply and demand" in the real sector of the economy (Islahi, 1988, p. 83). However, unlike the neoclassical economics approach that regards society as a subordinate of the market (Polanyi, 2001), Ibn Taimīyah contends that the market is only a part of a value-loaded society. Therefore, the price revealed by supply and demand is not necessarily 'just' should Islamic values be absent from the market.

13 The self-regulating market fails to rule out the unethical price gouging behavior from its definition of just price. Escalating the price for the most needed customers (such as those in the coronavirus pandemic) is deemed reasonable by neoclassical economists as long as it is determined through the market mechanism, i.e., the interaction between the high demand and the shortage of supply (Elegido, 2015). This behavior is, however, not acceptable within the deliberation of Islamic values. The expropriation of the counter party's assets makes this 'market price' unjust and unethical, aggravating the underinvestment issue (Koehn and Wilbratte, 2012; Ebrahim et al., 2016).

Therefore, from the perspective of *Shari'ah's* objectives, the prohibition of *ribā* is in place to maintain the financial products' connection with the *real* sector of the economy. It thus curtails the negative impact of financialization stemming from the agency costs of debt, i.e., risk-shifting (including financial fragility) and underinvestment (including financial exclusion).

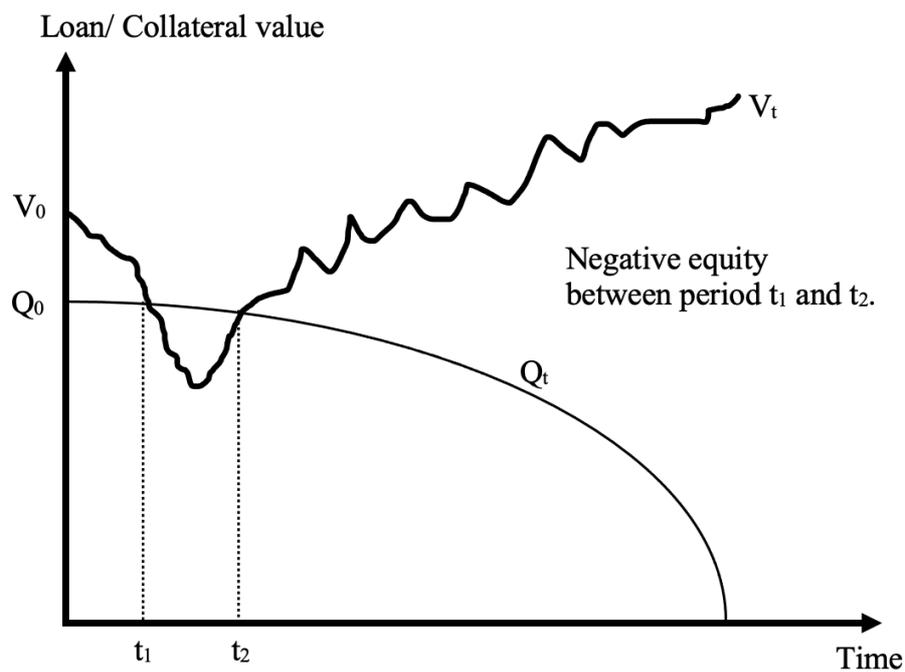


Figure 2.3: Risk-shifting

Notes: Risk-shifting is the first element of *ribā*. It is a form of expropriation where the borrower transfers the downside risk of the asset to the financier when the equity is negative. That is, when the value of the asset (V_t) is lower than the debt obligation (Q_t), as observed in the interval (t_1, t_2). (see also Wojakowski et al., 2019, p. 143).

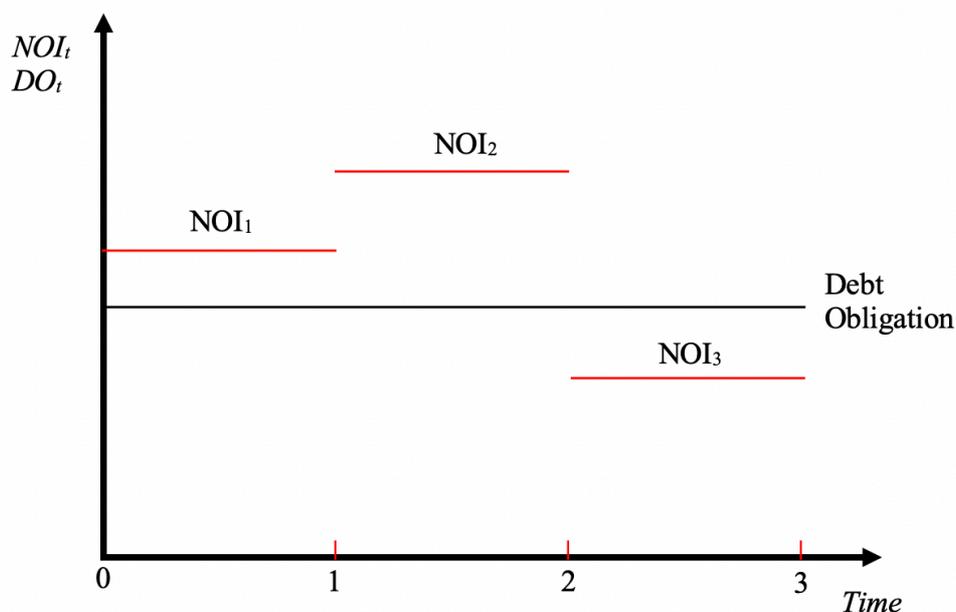


Figure 2.4: Underinvestment

Notes: Underinvestment is the second element of *ribā*. Here, the borrower tends to reject profitable (i.e., the positive net present value - NPV) projects when its incremental wealth mainly accrues to the financier. This occurs when the Net Operating Income (NOI_t) of the borrower is lower than its Debt Obligations (DO), as illustrated in Period 3. (see also Wojakowski et al., 2019, p. 143).

2.3.2. Hypothesis Development: Is the Pricing Employed by IBs Ethical?

Drawing on the above notions of *ribā*, we examine the morality of IBs by delving deeper into the pricing of their prominent debt facilities. These include the: (i) *Murabaha*, which is structured as a buy-sell agreement where the IB purchases an ordered real asset (or commodity) and sells it immediately to the buyer (borrower) at a ‘profit’ deemed ethical (see Figure 2.5A); and (ii) *Inah* and (iii) *Tawarruq*, which are widely used in the Middle East and Malaysia, where the collateralized asset is no longer part of the transaction, making the contract a synthetic plain vanilla loan (see Figures 2.5B and 2.5C).¹⁴

We first examine whether the pricing employed by IBs truly reflects the underlying real transaction, reducing the risk-shifting (and thus financial fragility). We then investigate the possibility of underinvestment (or price gouging, i.e., expropriation) of the above three

¹⁴ Despite the absence of collateral, both *Inah* and *Tawarruq* may have recourse to borrowers’ personal assets making them quite similar to the *Murabaha* facility.

facilities if the initial test displays convergence between the IB pricing and the interest-based benchmark.

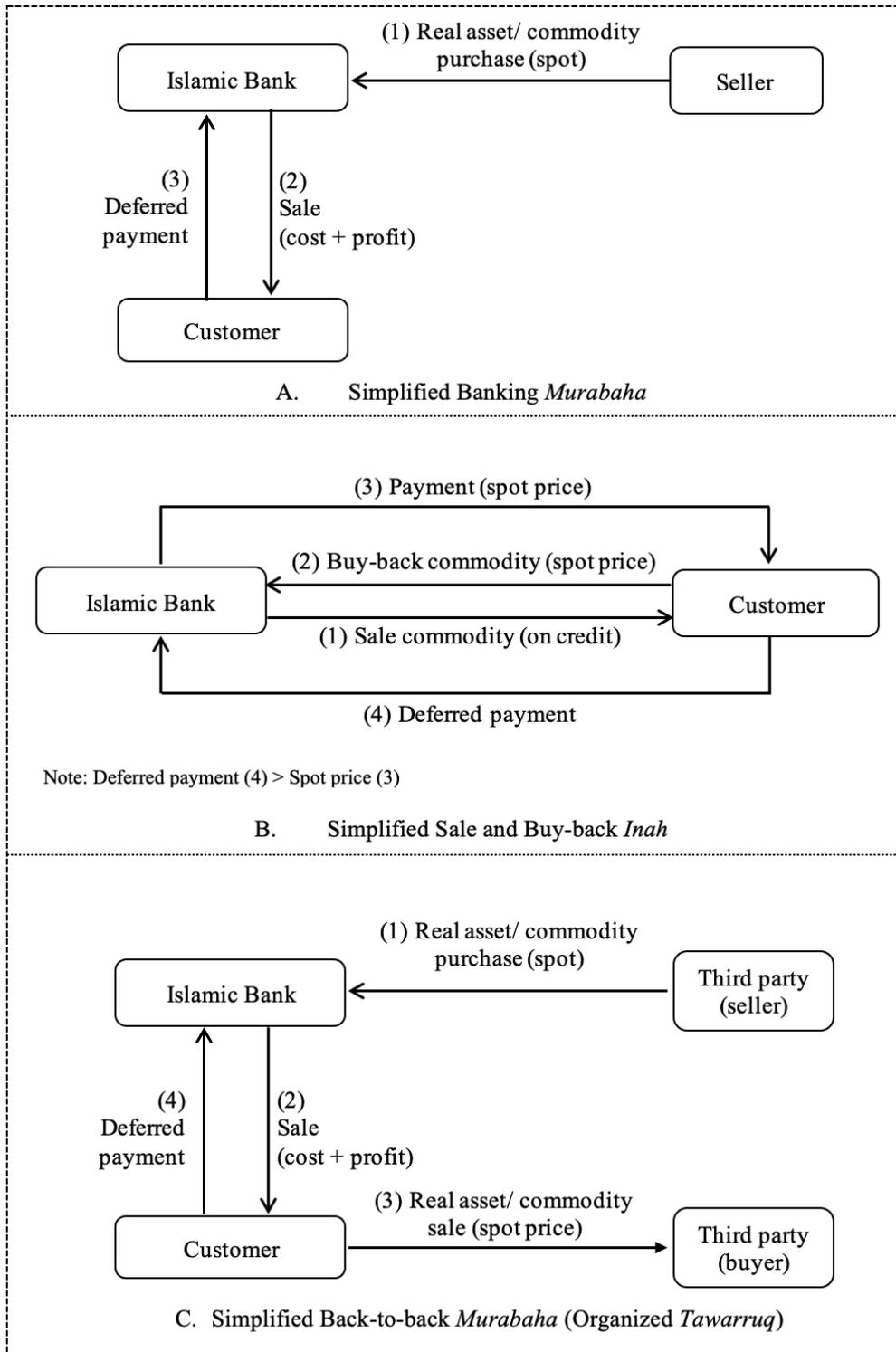


Figure 2.5: Banking *murabaha*, *inah*, and organized *tawarruq*

2.3.2.1. *The First Element of Ribā: Financial Decoupling-led Risk-shifting*

Our first *ribā*-free component requires the pricing of *Murabaha* to be revealed through the supply and demand mechanism of the tangible asset in the *real* sector of the economy. However, IBs are critiqued for pricing their facilities identically to their conventional counterparts by employing an interest-based benchmark such as the London Interbank Offered Rate (LIBOR). This is despite the difference in the underlying transactions between sale-based financing of IBs and interest-based loans of CBs.

Many rationalize this practice on the basis of the market competition faced by IBs (Chong and Liu, 2009; Azmat et al., 2020). The mimetic isomorphism theory predicts that operating within the same market with their conventional competitors drives IBs to emulate existing products and pricing offered by CBs for the sake of efficiency (Bassens et al., 2013). The highly regulated nature of the financial sector also among the top reasons to extenuate the convergence between the two (Haniffa and Hudaib, 2010). Some religious scholars also justify the validity of this practice, even though it should only be a temporary solution in the current rudimentary stage of Islamic Finance development (Usmani, 1998).

This study by no means underestimates the difficulties arising from market competition and regulation. However, those challenges should not annul IBs responsibility to deliver its ethical values. First, while a complete market separation is not feasible, IBs can offer sustaining or disruptive innovations. The former appeals to the existing customers by improving the product offered in the market. The latter targets the unserved customers by providing more suitable functionality products (often at a lower price) before extending them to the mainstream market (Christensen, 1997). Second, while financial regulations are sometimes sticky, they are not unchangeable. The rise of financial technology (fintech) is a compelling example. Regulatory bodies tend to accommodate the disruption posed by the fintech industry (Restoy, 2019) due to its significant improvement in efficiency, reduction of

asymmetric information, and higher customer centricity (Gomber et al., 2018). This is despite the dark sides of fintech, especially in terms of its adverse contribution to aggregate risk in the economy (see Di Maggio and Yao, 2020). Finally, the half-century experimentation of the Islamic banking industry can no longer be deemed ‘nascent’ that deserves exceptions from delivering its promises. It is an ethical matter for IB managers to adhere to Islamic values and link their products to the real economy.

To disentangle the pricing of the facility, Usmani (1998) proposed the creation of the IIBR, which became a reality in 2011. The IIBR is a daily average of rates contributed by 18 international IBs, mainly operating in the Middle East region. The rate is allegedly independent of LIBOR as its construction is based on the ‘profit’ rates of the IBs instead of interest rates.

Nonetheless, employing a methodology similar to that of LIBOR, the proposed Islamic benchmark may not fundamentally alter the pricing mechanisms of the contributing IBs. As long as they link their ‘profit’ rate to the CBs’ one, the IIBR is nothing more than an aggregation of the interest benchmark plus a ‘piety’ premium. The consequences are apparent. First, the long-run convergence between the IIBR and LIBOR is highly expected. This is because the pricing activates rational investors to exploit any arbitrage opportunity and thus induce financial markets to be *perfectly* integrated (Chen and Knez, 1995; Carrieri et al., 2007). Second, efficient financial markets also predict the causality of the two series. That is, the past movements of LIBOR, as the ‘original benchmark,’ can explain the variation of the IIBR. Finally, the IIBR movement decouples with that of the real sector of the economy as the pricing misleadingly detaches the real asset’s supply and demand.

According to the above discussions, we propose the following hypotheses.

H1: The IIBR does not connect with the performance of the underlying assets (of the *Murabaha* transaction) in the real sector of the economy.

H1a: The IIBR has a long-run relationship with the interest rate benchmark LIBOR.

H1b: The past movement of LIBOR can explain the variation in the IIBR.

H1c: The IIBR has low correlations with the performance of tangible assets (comprising of real estate and consumer durables) in the real sector of the economy.

2.3.2.2. *The Second Element of Ribā: Price Gouging-led Underinvestment*

We further inspect whether the IIBR is expropriative. That is, does the IIBR embody an element of price gouging that aggravates the underinvestment issue? We argue that the price gouging in the context of our study applies when IBs monopolize the religious-led demand for financing by offering products that are indistinguishable from the conventional ones at a higher cost. The religiously conservative clients of IBs reject conventional financial services, thus endowing IBs market power.

The higher price of Islamic financial products *vis-à-vis* their conventional counterparts has become traditional wisdom. The industry blames the distinct underlying risk of the ‘Islamic’ products to justify this practice (Ahmed, 2011). IBs also need to embody the certification process for their products, involving religious scholars whose service comes at a steep cost (Hayat et al., 2013; Nawaz, 2019). However, these arguments contradict the evidence from studies showing that IBs offer similar financing products to conventional ones (El-Gamal, 2006; Khan, 2010; Kuran, 2018). Accordingly, we posit the following hypothesis.

H2: The pricing of IIBR is higher than that of LIBOR

2.3.3. Empirical Evidence of IIBR’s Unethicality

The development of the IIBR does not absolve ‘Islamic’ banking from criticism of its immoral (‘*ribāwi*’-linked) pricing model. First, we empirically confirm the convergence between the IIBR and LIBOR by examining the long-run relationship between the two series employing

the well-known Johansen (1991) cointegration test (Hypothesis 1a).¹⁵ Second, the LIBOR-like methodology leads to the movement dependence between the IIBR and LIBOR's past variance (Hypothesis 1b). We investigate this by testing the Granger non-causality between the series using Toda and Yamamoto (1995) methodology. We test and generalize our cointegration and causality findings to the 14 countries where Islamic banking is currently being practiced.¹⁶ Third, we portray the IIBR detachment from the real sector of the economy employing the GARCH-BEKK Dynamic Correlations (Baba et al., 1990) (Hypothesis 1c). Finally, we use a set of paired difference tests to prove that the IIBR rate is consistently higher than that of LIBOR across maturities (Hypothesis 2).

2.3.3.1. *The Long-run Equilibrium between the IIBR and LIBOR*

We retrieve the IIBR, LIBOR, and the local interest rate benchmarks data from Datastream, covering November 14, 2011 (the establishment date of the IIBR) to July 1, 2020. However, we exclude the observations beyond April 16, 2012, and November 30, 2015, as the IIBR is mistakenly reported in the bid price before the period and suspended by Thomson Reuters afterward (see Figure 2.6).¹⁷ We also omit Friday and Sunday observations to address the mismatch bias stemming from the Middle East's distinct weekend period where the IIBR

15 Azad et al. (2018) document the existence of the long-run equilibrium between the IIBR and LIBOR but stop short of investigating the relationship's stability and the series' causality.

16 Those countries can be subsumed into **(i) the Middle East**, i.e., BHIBOR (Bahrain), SAIBOR (Saudi Arabia), EIBOR (UAE), QIBOR (Qatar) and KIBOR (Kuwait); **(ii) Muslim non-Middle East**, i.e., KLIBOR (Malaysia), TRLIBOR (Turkey), JIBOR (Indonesia), KIBOR (Pakistan) and CAIBOR (Egypt); and **(iii) non-Muslim countries**, i.e., SLIBOR (Sri Lanka), JIBAR (South Africa), SIBOR (Singapore) and BIBOR (Thailand). This enriches Nechi and Smaoui's (2018) analysis, which is limited only to the contributing countries of the IIBR in the Middle East, viz. Bahrain, Saudi Arabia, UAE, Qatar, and Kuwait.

17 It is no coincidence that the reporting of the IIBR discontinued from August 18, 2016. (After which Thomson Reuters reports flat rates for all maturities of the IIBR). This was in the dawn of the Financial Services Authority (FSA) decision to phase out LIBOR by December 2021 due to a series of unethical scandals involving the conventional benchmark rate (Aldohni, 2018). The adoption of LIBOR methodology that is prone to manipulations signifies the lack of vision of the IIBR's proponents.

contributors operate. Apart from overnight, other maturities, namely 1-week, 1-month, 2-month, 3-month, 6-month, and 1-year, are also examined to achieve a more robust inference.

Table 2.2: Optimal lag length and Vector Error Correction Model (VECM) results

Maturity	Lag	Speed of Adjustment (Π)		Long-run Coefficient
		IIBR	LIBOR	
Overnight	4	-0.132*** (0.02)	-0.003 (0.01)	0.685*** (0.08)
1-week	4	-0.137*** (0.02)	-0.005* (0.00)	1.252*** (0.11)
1-month	3	-0.187*** (0.02)	-0.006*** (0.00)	2.214*** (0.12)
2-month	5	-0.128*** (0.02)	-0.004*** (0.00)	1.908*** (0.14)
3-month	5	-0.075*** (0.02)	-0.003*** (0.00)	1.596*** (0.17)
6-month	7	-0.080*** (0.02)	-0.004*** (0.00)	1.235*** (0.11)
1-year	5	-0.074*** (0.02)	-0.011*** (0.00)	1.047*** (0.09)

Notes: The optimal lag length is determined using the Akaike Information Criterion (AIC). This approach offers more conservative lag length recommendations and produces better autocorrelation-proof data generating processes than the other information criteria. The VECMs incorporate drift in the short- and long-run equations. The IIBR is ordered first in the equations consistent with the conventional wisdom that the well-established LIBOR has a greater influence on the IIBR than vice versa. While the models are robust from autocorrelation, the values in the parentheses () depict the Generalized Least Squares (GLS) standard errors of the VECM coefficients to address the issue of Heteroscedasticity. All models have stable roots of the characteristic polynomial. Long-run coefficients depict the long-term marginal effect of LIBOR on the IIBR. The notations ***, ** and * respectively represent significance at 1%, 5% and 10% of the one-tailed t -statistics.

After ensuring that all the data satisfy the necessary condition of the Johansen cointegration test, i.e., $I(1)$,¹⁸ we employ Akaike Information Criterion (AIC) to derive the optimal lag length. The results vary across different maturities from 3 to 7 lags, as illustrated in Table 2.2. The coefficients of cointegration (Π), which indicate the cointegration stability and the speed of adjustment to the short-run shocks in the system, are also persistently negative within the stable range 0 and -1.

¹⁸ We do not report our unit root test in this paper for brevity. It is, however, available upon request.

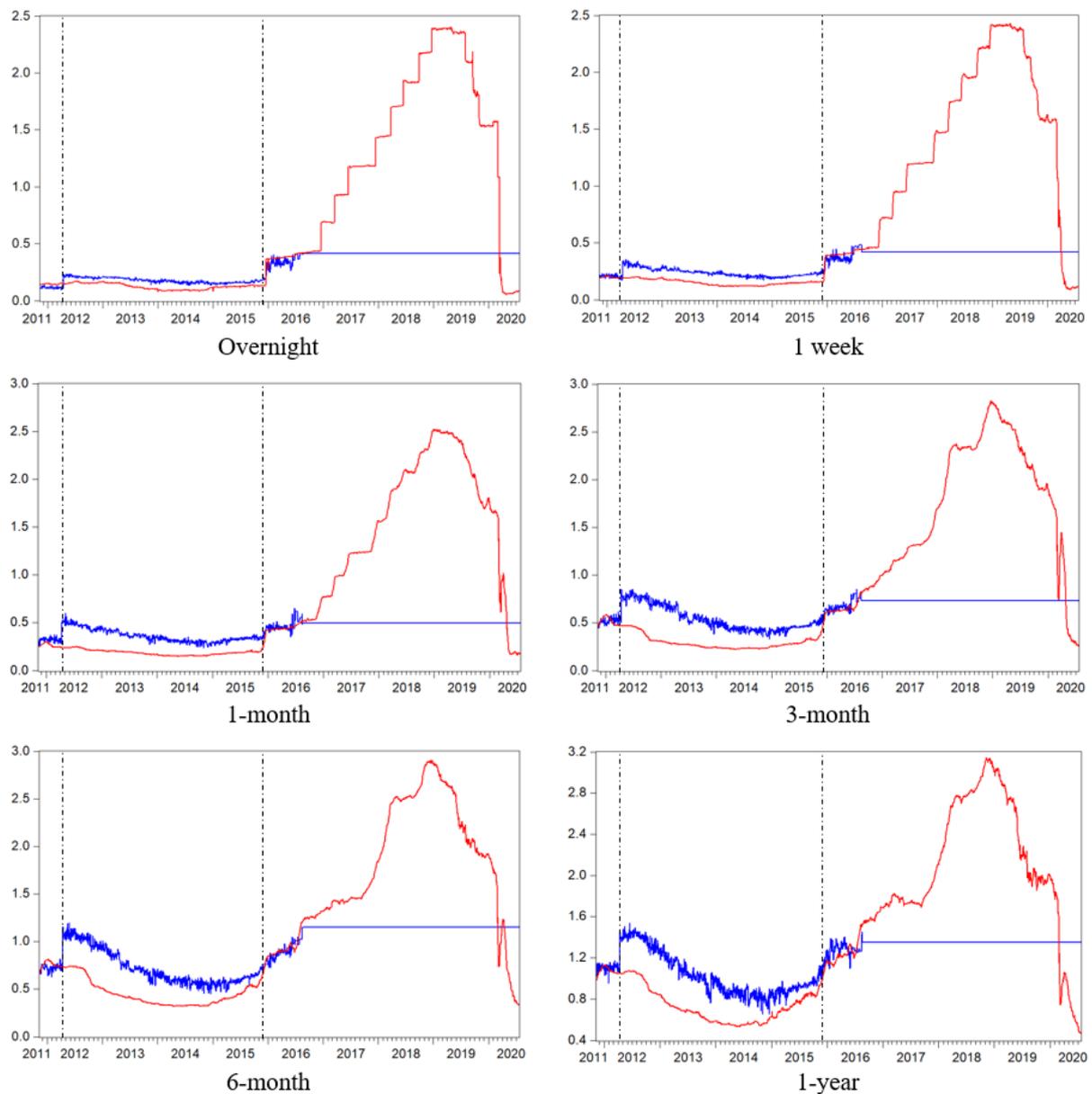


Figure 2.6: Time series plots

Notes: The blue (thick) and the red (thin) lines measure the IIBR and LIBOR in percentage. The captions below the figures depict their maturity.

Table 2.3 exhibits the Johansen cointegration test results for the IIBR and LIBOR. Both λ_{max} and *Trace* statistics reject the first null hypothesis of no cointegration between the two series at 1% level for the whole unit analysis across the maturities. Both tests are also robust in the second hypothesis testing, where they fail to reject the null hypothesis of cointegration between the series at any significant level.

Replacing LIBOR with local benchmark interest rates generally yields similar conclusions (see Table 2.4). This holds across different maturities except for Qatar, where the long-run relationship only appears in the overnight maturities. The global financial market integration forces an efficient arbitrage-free condition where one country's rates are linked to other countries (Nechi and Smaoui, 2018).

Overall, our results reveal robust evidence for Hypothesis 1a that the IIBR does not significantly delink with an interest-based benchmark. The IIBR is not independent of interest-based indices as the two series move together over time.¹⁹ It thus invalidates its main motive to disengage IBs pricing rates from those of CBs. Indeed, it is not plausible to expect the IIBR to be independent of LIBOR as long as the contributing IBs pricing methods converge with their conventional counterparts in the financial sector of the economy. The arbitrage theory mentioned earlier predicts two rates of similar financial products to converge in the integrated financial markets (Chen and Knez, 1995; El-Gamal, 2006; Carrieri et al., 2007). The issue is that the financial benchmark like LIBOR is no longer suitable to proxy the real economy (Ashton and Christophers, 2015). LIBOR is subject to be replaced by the end of 2021, one of them, due to its failure to reflect significant transactions in the market (Hughes, 2019). The decoupling hypothesis suggests that the financial sector is no longer here to support the real economy as “events on the financial markets correspondingly follow their own logic, and the real economy has to adapt itself to the consequences of this.” (Menkhoff and Tolksdorf, 2000, p. 1). Therefore, the only way for Islamic finance to have an independent rate from LIBOR, or other interest benchmarks, is to account for the supply and demand in or performance of the real sector of the economy in its pricing method.

19 The findings are also robust to the inclusion of Friday observations.

Table 2.3: Johansen Cointegration Test of IIBR and LIBOR

Alternative Hypothesis	Overnight		2-month		1-year	
	Trace	Max-Eigen	Trace	Max-Eigen	Trace	Max-Eigen
$H_1: r > 0; [H_1: r = 1]$	45.46***	43.99***	56.44***	52.57***	46.04***	42.40***
$H_2: r > 0; [H_2: r = 2]$	1.47	1.47	3.88	3.88	3.64	3.64
	1-week		3-month			
$H_1: r > 0; [H_1: r = 1]$	49.67***	46.37***	43.89***	37.40***		
$H_2: r > 0; [H_2: r = 2]$	3.30	3.30	6.49	6.49		
	1-month		6-month			
$H_1: r > 0; [H_1: r = 1]$	169.18***	166.16***	40.69***	35.82***		
$H_2: r > 0; [H_2: r = 2]$	3.02	3.20	4.87	4.87		

Notes: The table shows the result of the Johansen Cointegration test of IIBR and LIBOR. The test is conducted on the assumption that all series have nonzero short- and long-run drift without a trend. (There is no statistical evidence justifying the linear and quadratic trend in our models). The lag lengths of the models vary, following the result in Table 2.2. Both Trace statistics and Maximum Eigenvalues are reported. r stands for rank cointegration. The hypotheses in the square brackets [] are for Maximum Eigenvalue, while the ones without bracket are for Trace statistics. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

Table 2.4: Johansen Cointegration Test of IIBR and local interest rate benchmarks

Countries	Coin. Eq(s)	Overnight		1-week		1-month		3-month		6-month		1-year	
		T	ME	T	ME	T	ME	T	ME	T	ME	T	ME
Bahrain	1	149.63***	142.39***	55.67***	50.02***	18.41**	18.38**	21.23***	21.23***	17.42**	15.63**	21.39***	18.52***
	2	7.24	7.24	5.65	5.56	0.02	0.02	0.10	0.10	1.79	1.79	2.87*	3.29*
Qatar	1	37.31***	36.61***	11.01	10.35	7.17	6.15	5.85	4.74	4.37	4.04	9.62	9.46
	2	0.70	0.70	0.66	0.66	1.02	1.02	1.11	1.11	0.33	0.33	0.16	0.16
UAE	1	n.a	n.a	101.96***	97.43***	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*
	2	n.a	n.a	4.53	4.53	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*
KSA	1	n.a	n.a	n.a	n.a	22.71***	21.19***	17.44**	16.27**	6.44	5.86	58.67***	50.53***
	2	n.a	n.a	n.a	n.a	1.52	1.52	1.17	1.17	0.58	0.58	8.14	8.14
Kuwait	1	n.a	n.a	n.a	n.a	169.18**	166.16***	79.82**	78.20***	76.05***	75.29***	77.28***	75.74***
	2	n.a	n.a	n.a	n.a	3.02*	3.02*	1.63	1.63	0.76	0.76	1.54	1.54
Malaysia	1	82.81***	77.23***	27.31**	24.91***	32.91***	32.41***	27.96***	25.51***	22.03	18.92*	22.72	19.43**
	2	5.58	5.58	2.40	2.40	0.49	0.49	2.44	2.44	3.10	3.10	3.29	3.29
Turkey	1	23.97***	20.98***	15.81**	13.57*	16.53**	14.53**	15.60**	12.69*	14.09*	11.17	12.74	9.79
	2	2.99	2.99	2.24	2.24	2.00	2.00	2.91	2.91	2.92	2.92	2.95	2.95
Indonesia	1	133.79***	126.72***	49.56***	44.66***	44.42***	42.84***	29.25**	28.07***	23.85*	22.30**	22.50	20.89**
	2	7.07	7.07	4.90	4.90	1.58	1.58	1.18	1.18	1.55	1.55	1.61	1.61
Pakistan	1	n.a	n.a	42.52***	37.86***	33.69***	32.15***	28.06**	27.12***	25.12*	24.26***	21.58	20.53**
	2	n.a	n.a	4.66	4.66	1.54	1.54	0.94	0.94	0.87	0.87	8.86	8.86
Egypt	1	n.a	n.a	17.18**	15.99**	20.31***	19.45***	9.31	8.42	7.23	6.19	8.09	6.92
	2	n.a	n.a	1.19	1.19	0.86	0.86	0.89	0.89	1.04	1.04	1.17	1.17
Sri Lanka	1	103.81***	96.39***	40.10***	36.19***	44.23***	37.93**	29.31***	20.05**	38.64***	28.88***	29.**	20.63**
	2	7.43	7.43	3.91	3.91	6.30	6.30	9.27	9.27	9.76	9.76	8.86	8.86
S. Africa	1	n.a	n.a	n.a	n.a	51.22***	40.26***	31.94***	23.43**	25.88**	16.96*	22.30	15.85
	2	n.a	n.a	n.a	n.a	10.96	10.96	8.52	8.52	8.92	8.92	6.45	6.45
Singapore	1	n.a	n.a	n.a	n.a	118.27***	114.13***	66.57***	62.68***	47.13***	43.84***	51.07***	46.56***
	2	n.a	n.a	n.a	n.a	4.14	4.14	3.89	3.89	3.28	3.28	4.50	4.50
Thailand	1	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*	26.73**	17.17*	20.99	13.50	17.23	10.07
	2	n.a*	n.a*	n.a*	n.a*	n.a*	n.a*	9.56	9.56	7.49	7.49	7.15	7.15

Notes: The table shows the result of the Johansen Cointegration test of IIBR and 14 local interest rate benchmarks. Both Trace (T) statistics and Maximum Eigenvalues (ME) are reported. n.a means the country has no data in a particular maturity. n.a* denotes that the cointegration test is not applicable to the series due to the stationarity condition. In this case, we focus only on the Toda Yamamoto analysis. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

2.3.3.2. Causality between the IIBR and LIBOR

Our Toda-Yamamoto causality test suggests three one-directional causality relationships between LIBOR and the IIBR, stemming from overnight, 2-month, and 3-month maturities (see Table 2.5). For these maturities, the modified Wald test substantiates that LIBOR Granger causes the IIBR and not vice versa, supporting our Hypothesis 1b.

Table 2.5: Toda-Yamamoto causality results

Maturity	Chi-Sq. Excluded Variable		Direction
	LIBOR	IIBR	LIBOR \Leftrightarrow IIBR
Overnight	9.29***	1.56	\Rightarrow
1-week	1.67	0.29	\times
1-month	2.32	0.97	\times
2-month	3.15*	0.03	\Rightarrow
3-month	5.17*	2.64	\Rightarrow
6-month	1.80	1.58	\times
1-year	3.03	0.47	\times

Notes: This table shows the results of the modified Wald test for the Toda-Yamamoto causality test. The right arrow [\Rightarrow] represents that LIBOR causes the IIBR and vice versa. [\times] indicates that there is no directional causality between the paired series. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

Our findings from the country-based interest rate benchmarks also suggest that some interest-based indices can explain future movements of the IIBR. Table 2.6 demonstrates one-directional Granger causalities from at least 9 out of 14 local rates. In our sample of the non-Middle Eastern Muslim countries, Malaysia and Indonesia, the conventional benchmarks Granger cause the IIBR, particularly in the short-term maturities. Finally, Sri Lanka and Thailand are among the non-Muslim countries where their interest rate benchmarks Granger cause the IIBR. Some bi-directional relationships appear in the case of the former.

Table 2.6: Toda-Yamamoto Test of IIBR and local interest rate benchmarks

Countries	Overnight		1-week		1-month		3-month		6-month		1-year	
	Local	IIBR	Local	IIBR	Local	IIBR	Local	IIBR	Local	IIBR	Local	IIBR
Bahrain	36.94***	11.19	31.61***	7.41	0.52	3.67	1.56	1.94	0.16	0.67	0.66	0.77
Qatar	10.37	6.25	4.00	7.31	2.34	2.36	0.33	3.57	0.16	0.67	0.67	3.98
UAE	n.a	n.a	6.12	2.58	152.3***	5.47	110***	6.05	119***	4.41	64.1***	5.42
KSA	n.a	n.a	n.a	n.a	11.38**	7.62	5.94	2.93	10.27	7.71	7.89	4.48
Kuwait	n.a	n.a	n.a	n.a	0.08	7.63	7.28	4.37	3.09	4.68	18.55**	8.99
Malaysia	11.37**	6.45	7.08*	3.24	5.36	3.08	0.97	3.05	0.74	4.83	1.12	5.97
Turkey	0.90	2.98	1.89	3.47	1.60	1.13	3.43	12.56**	2.35	5.81	1.75	1.47
Indonesia	15.32***	3.98	0.75	0.66	0.86	0.71	1.29	1.95	1.13	1.27	1.35	1.81
Pakistan	n.a	n.a	5.23	3.13	0.66	0.30	0.73	0.74	2.53	0.75	3.27	3.40
Egypt	n.a	n.a	12.52*	12.84*	0.29	0.26	6.15	6.09	2.73	6.08	2.38	8.79
Sri Lanka	20.00***	4.97	68.46***	19.04***	77.43***	28.71***	5.71	10.99	22.76***	23.76***	27.56***	36.10***
S. Africa	n.a	n.a	n.a	n.a	3.96	1.50	5.64	2.00	6.30	6.69	6.21	6.41
Singapore	n.a	n.a	n.a	n.a	1.11	1.60	0.83	4.34	1.09	4.44	1.73	2.22
Thailand	10.11**	3.32	16.15***	3.00	15.90***	1.18	14.25	3.77	4.58	2.48	9.74**	1.55

Notes: The table shows the Chi-square values of the Toda-Yamamoto test between IIBR and 14 local interest rate benchmarks. The terms below maturities represent the excluded variables. n.a means the country has no data in a particular maturity. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

2.3.3.3. *Connection with the Real Economy*

We then test whether the IIBR genuinely represents the equilibrium rates derived from the supply and demand of tangible assets in the real sector of the economy. To this end, we proxy the real sector of the economy with two real estate indices of FTSE and Dow Jones (DJ hereafter) and countries' Consumer Price Index (CPI).²⁰ Real estate and consumer durables are the main sectors funded by IBs.²¹ We illustrate the dynamic correlation between IIBR and the respective series by employing the GARCH-BEKK methodology after ensuring their stationary process. While there is no single multivariate GARCH model that excels others in all dimensions, the BEKK-GARCH is employed due to its superiority in modeling the joint estimation of the entire covariance (Caporin and McAleer, 2012, 2014). The covariance models are preferred to correctly evaluate volatilities and correlation dynamics without the need for separate estimators (Zumbach, 2011). We determine the optimal lag length for the ARMA (mean equation) following the standard Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) methods.²²

Figures 2.7 and 2.8 illustrate the dynamic correlations between the IIBR and our indicators for the real sector, namely real estate indices and CPIs, respectively. Figure 2.7 shows that the IIBR has relatively low time-varying correlations with both FTSE and DJ. The correlations range between -0.2 and 0.53 for the IIBR-FTSE and from -0.21 to 0.34 in the

20 The CPIs of four countries hosting IIBR contributing banks are employed, namely Bahrain, UAE, Saudi Arabia, and Malaysia.

21 Real estate (including mortgage) and consumer durables (including trading and manufacturing) constitute 63.08% of the 12 IIBR contributing banks' total assets in 2018, according to Datastream. The banks include Ahli United, Al Salam (Bahrain), Dubai Islamic Bank, Noor Bank, Al Hilal, Sharjah (UAE), Qatar Islamic Bank, Barwa, Al Rayan (Qatar), Alinma, National Commercial Bank (Saudi Arabia), and RHB Bank (Malaysia).

22 This study does not examine whether the relative price of IIBR is significantly higher (or lower) than that of the real sector of the economy (proxied by real estate indices and CPI). Instead, we seek to establish the connection between the IIBR itself and the two proxies of the real economy. This is to confirm our results regarding the link between IIBR and LIBOR in the previous subsections. Therefore, the comparative descriptive statistics between real estate indices/CPI and IIBR becomes less meaningful.

IIBR-DJ case. The former has an average of 0.06, while that of the latter is 0.05. These numbers are consistent across different maturities of the IIBR and are statistically insignificant, as shown in Table 2.7.

Figure 2.8 also depicts the divergence of the overnight IIBR from the contributing counties' CPI. In general, CPI has a virtually zero correlation with the IIBR, with an average value of -0.05 . As far as the overnight IIBR is concerned, the three Middle Eastern countries' CPI have identical correlations with the IIBR. Contrarily, the relationship between Malaysia's CPI and the IIBR is negative and deviates from that of the above countries. Table 2.7 confirms that our results and analysis are consistent across various maturities. All the correlations are statistically insignificant, supporting our Hypothesis 1c that the IIBR has no correlations with the real economy.

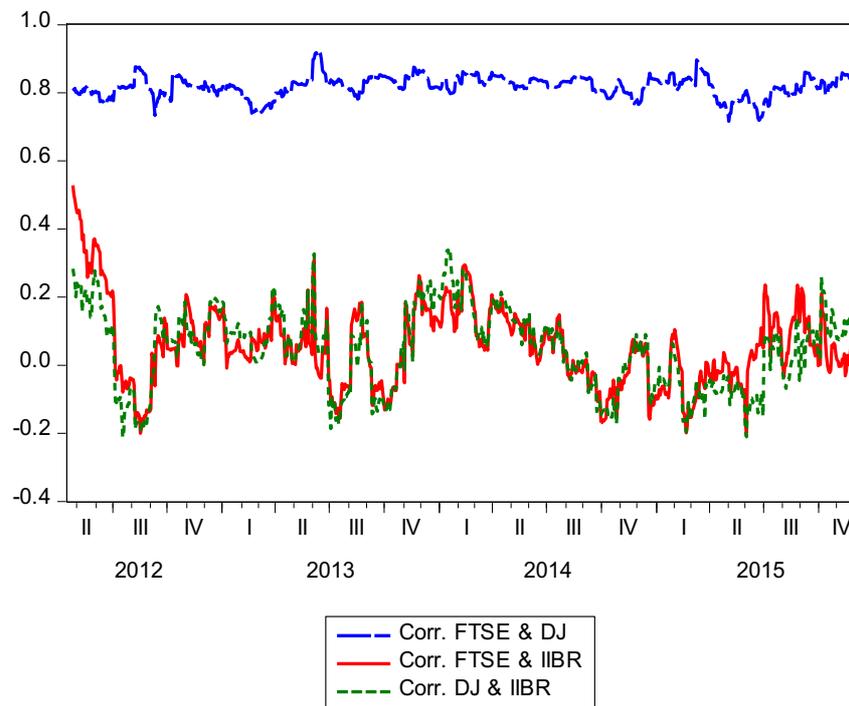


Figure 2.7: GARCH-BEKK dynamic correlations between IIBR and real estate indices

Notes: The figure depicts daily dynamic correlations between the overnight IIBR and real estate indices of the FTSE and DJ. The Friday observations are excluded for time consistency.

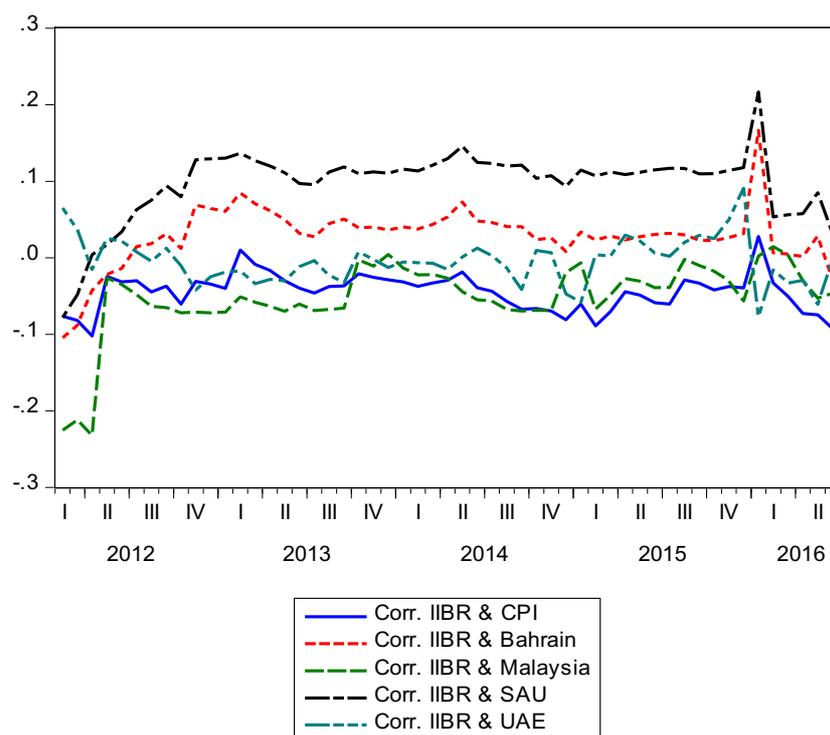


Figure 2.8: GARCH-BEKK dynamic correlations between IIBR and CPIs

Notes: The figure depicts monthly dynamic correlations of the overnight IIBR and the Consumer Price Index of a set of countries such as Bahrain, Malaysia, Saudi Arabia (SAU), and the United Arab Emirates. The index average over these countries is denoted as the CPI.

Table 2.7: Average GARCH-BEKK dynamic correlations

IIBR	FTSE	DJ	CPI	CPI Bah	CPI UAE	CPI SAU	CPI MAL
Overnight	0.056 (0.881)	0.046 (0.740)	-0.045 (0.983)	0.029 (0.992)	-0.005 (0.996)	0.097 (0.975)	-0.052 (0.974)
1-week	-0.006 (0.767)	0.019 (0.728)	-0.034 (0.947)	-0.009 (0.983)	0.038 (0.964)	0.037 (0.980)	-0.017 (0.996)
1-month	0.017 (0.555)	0.004 (0.729)	-0.007 (0.999)	-0.057 (1.000)	-0.015 (0.997)	-0.045 (1.000)	0.001 (0.999)
2-month	-0.008 (0.873)	-0.011 (0.989)	-0.195 (1.000)	-0.015 (1.000)	-0.013 (1.000)	-0.019 (1.000)	-0.357 (1.000)
3-month	-0.003 (0.858)	0.003 (0.893)	-0.0971 (1.000)	-0.0069 (1.000)	0.0034 (1.000)	-0.0144 (1.000)	-0.2499 (1.000)
6-month	-0.012 (0.716)	-0.002 (0.767)	-0.252 (0.991)	-0.032 (0.993)	-0.072 (0.999)	0.221 (0.924)	-0.275 (0.998)
1-year	0.027 (0.354)	0.009 (0.669)	-0.315 (0.987)	-0.029 (0.993)	-0.016 (0.990)	0.027 (0.958)	-0.443 (0.996)

Notes: The table presents the: (i) average daily dynamic correlations between IIBR across various maturities and real estate indices (FTSE and DJ); and (ii) monthly dynamic correlations between IIBRs and Consumer Price Index (aggregate, Bahrain, UAE, Saudi Arabia, and Malaysia). The dynamic coefficient of correlations is estimated by employing GARCH-BEKK. The values in the parentheses () depict the probability of z-statistics.

2.3.3.4. Price Gouging

Finally, this section examines whether IIBR involves the unethical practice of price gouging. The price gouging only holds if one offers a similar product (structure and risk profile, in our case) at a significantly higher price. If, for instance, the Johansen Cointegration, Toda-Yamamoto, and BEKK-GARCH tests done before showed a high connection of IIBR with the real sector of the economy, the difference in price (i.e., high IIBR) between IIBR and LIBOR did not imply price gouging. However, the three tests suggest that the IIBR has no significant link with the real sector of the economy and is highly connected to LIBOR. Therefore, the higher price offered by IIBR indicates the presence of price gouging.

Our results suggest that IIBR statistically converges to the conventional interest-based benchmark (LIBOR) and diverges from the real sector of the economy. In the ethical context, IIBR should be similar to that of LIBOR. However, Figure 2.6 indicates a premium (i.e., positive incremental value) of the IIBR over LIBOR. This illustrates inefficiency in the IB's pricing mechanism of making the aggregate 'borrowing' rate more expensive.

Here, we employ the parametric z and t -statistic as well as the non-parametric Wilcoxon signed-rank test. Table 2.8 displays the positive mean difference between the IIBR and LIBOR across different maturities. The spread between the two tends to increase as maturity increases. They range from 5.5 bps in the overnight to 30.4 bps in the case of 1-year maturity. All the tests confirm the 1% significant difference between the two series across the seven maturities. In other words, the IIBR is priced at a significantly higher rate than its conventional counterpart (i.e., LIBOR), which is consistent with Hypothesis 2.

To sum up, this section has provided sufficient evidence of IBs' negligence in the context of the prohibition of *ribā*. We illustrated that the pricing used by them still embeds the two elements of *ribā*, namely (i) the risk-shifting stemming from the detachment of the underlying

real transactions and (ii) underinvestment ensuing from the unjust price in the form of price gouging. We thus conclude that *ribā* (agency cost of debt) is still pervasive in the Islamic banking system, which is against its religious ethos. This is despite the presence of the SSB, which is supposed to curtail it.

Table 2.8: Paired difference tests

Maturity	Mean (%)		Diff.	z-Test	t-Test	Wilcoxon
	IIBR	LIBOR				
Overnight	0.179	0.124	0.055	44.791***	84.210***	0.000***
1-Week	0.237	0.151	0.087	55.231***	121.684***	0.000***
1-Month	0.363	0.187	0.177	67.268***	108.751***	0.000***
2-Month	0.445	0.239	0.206	54.443***	91.858***	0.000***
3-Month	0.542	0.291	0.251	47.548***	79.357***	0.000***
6-Month	0.723	0.449	0.274	33.956***	79.357***	0.000***
1-Year	1.034	0.730	0.304	31.580***	73.682***	0.000***

Notes: The table depicts various paired difference tests between the various maturities of IIBR and LIBOR. We employ both parametric (z- and t-statistic) and non-parametric (Wilcoxon signed-rank) test. The null hypothesis for all of them is that the difference between IIBR and LIBOR is higher than zero (one-tailed positive). The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

2.4. *Gharar* in IBs

2.4.1. Unethicality of *Gharar*

The second primary prohibition of Islamic finance, *gharar*, stems from the trilateral Arabic root *ghrra*, which denotes deceiving or confounding the mind (Thomas, 1995). The literature defines *gharar* in financial contracting as emanating from either asymmetric information or excessive risk (El-Gamal, 2006; Ebrahim et al., 2016). Here, we establish the close connection between *gharar* and *ribā*, where the ethical objective of the former's prohibition is to prevent the latter's adverse impact (see again Figure 2.2). This is consistent with the well-known jurist Ibn Taimīyah, who argues that *gharar* is not allowed as “it leads to dispute, hatred, and devouring others' wealth wrongfully” (El-Gamal, 2006, p. 59). The GFC is an ideal example

of how *gharar* in the high-leverage finance created “massive destruction of wealth....allowing some to get very rich at the expense of others” (Nielsen, 2010, p.300).

The above definition is supported by mainstream banking literature. First, the literature attributes the *gharar* issue to the market frictions stemming from ex-ante and ex-post information asymmetry (i.e., adverse selection and moral hazard, respectively - Stiglitz and Weiss, 1981). CBs [IBs] make collateralized, i.e., tangible asset-backed loans [*Murabaha*] as elaborated in Subsection 2.4.2. The real-asset backed nature of these facilities help banks mitigate adverse selection as the ‘seller’ of assets (i.e., the IBs) [or facility provider in case of CBs] conducts a thorough due diligence process before releasing the funds in the escrow process when the title of the tangible asset changes hands (Ebrahim et al., 2016).²³ Banks also address the ex-post change in behavior of borrowers, which gives rise to moral hazard. Banks deter moral hazard by mandating the following in the indenture of their loan (‘buy-sell’) contract: (i) minimum maintenance of the tangible collateral; (ii) payment of taxes; and (iii) adequate insurance coverage of the collateral (Smith and Warner, 1979).²⁴ Bankers’ ability to uncover borrower characteristics is documented in the empirical literature (James, 1987).

Second, excessive risk-taking behavior is pertinent in banks’ structure as they employ tenure arbitrage (i.e., underwrite long-term facilities and borrowing against short-term deposits) to make profits. This, in essence, involves the use of an upward sloping yield curve (Bagus and Howden, 2010). Diamond and Dybvig (1983) argue that banks’ nature is prone to the crisis as it embodies excessive risk-taking by transforming long-term illiquid assets into short-term liquid liabilities. While this mechanism allows risk-sharing among depositors with

23 Banks (i.e., CBs and IBs) face asymmetric information in judging a borrower’s creditworthiness. CBs [IBs] use the interest [‘profit’] rate as an ex-ante ‘screening’ device for granting loans. This helps to address adverse selection as those willing to accept a higher interest (or ‘profit’) rate are most likely risky borrowers, who accept the high cost of borrowing due to their poor repayment rate (Stiglitz and Weiss, 1981).

24 A high-interest (‘profit’) rate leads borrowers to invest their money in the high-risk project with a lower probability of success but higher payoffs at termination (Stiglitz and Weiss, 1981). This necessitates extensive monitoring of borrower or having guarantors co-sign the facility to deter moral hazard.

different time-preference of consumption, it aggravates bank runs caused by liquidity mismatch.²⁵ This is because the coordination failure incentivizes significant ‘impatient’ depositors to withdraw their money simultaneously, regardless of the economic condition. Those who would otherwise be happy with keeping their money in banks for future consumption get carried away in the panic to make withdrawals. However, other scholars like Allen and Gale (1998) believe that bank runs only occur when depositors have clear information about the poor fundamentals of the banking system. Goldstein and Pauzner (2005) take an intermediate position arguing that bank runs happen when depositors’ panic behavior mingles with the poor fundamentals.

This paper argues that the long-term nature of banking facilities exacerbates the agency cost of debt, i.e., risk-shifting, to be more precise. This is attributed to the increase in the collateral risk under a Geometric Brownian Motion (or a Lognormal Random Walk - Fama, 1970; and Gau, 1987). Our view contrasts the literature, which assumes asymmetric information to subsume agency cost of debt. This issue is elaborated on in the subsections below.

2.4.2. Do IBs Restrain the Unethical Issue of *Gharar*?

We apply the above definition of *gharar* to examine the ethicality of IBs by putting forth a question: Does Islamic banking resolve the problems of excessive risk-taking behavior that aggravate the agency cost of debt?

2.4.2.1. *The Asset Side of the IBs*

The schematic balance sheet of IBs deviates from that of CBs, as illustrated in Figure 2.9. On the asset side, the majority of financing is conducted via the collateral-based *Murabaha*

25 IBs distinguish themselves from CBs by linking their asset side with their liabilities by employing the medieval *Mudharaba* (profit-sharing) contract. This enables them theoretically to forgo paying their depositors in the poor state of the economy when they are not profitable. This is elaborated further in Subsection 2.4.2.

contract. This helps to avert the asymmetric information as elaborated in Subsection 2.4.1.²⁶ This result implies a Symmetric Information (or Rational Expectations) Equilibria involving the tradeoff of either a: (i) default-free financial claim; or (ii) default-prone claim. This is depicted at the top of Figure 2.9.

The default-free *Murabaha* claim involves state-contingent free payoffs of the facility, while the default-prone claim denotes the contract's state-contingent nature. It also illustrates the inability of the 'buyer' of the collateral (i.e., the borrower) to meet his/ her debt obligation in states OZ. This is because the payoffs AB are insufficient as compared to P_d . This discourages the borrower from maintaining the collateral leading to its deterioration to A'B'. The quadrilateral ABB'A' represents the costs of risk-shifting. It also indicates an embedded Put option to default that is increasing in the money.

26 This feature is not present in the case of *Inah* and *Tawarruq*. This makes the contracts mimic plain vanilla loans (see again Figures 2.5B and 2.5C).

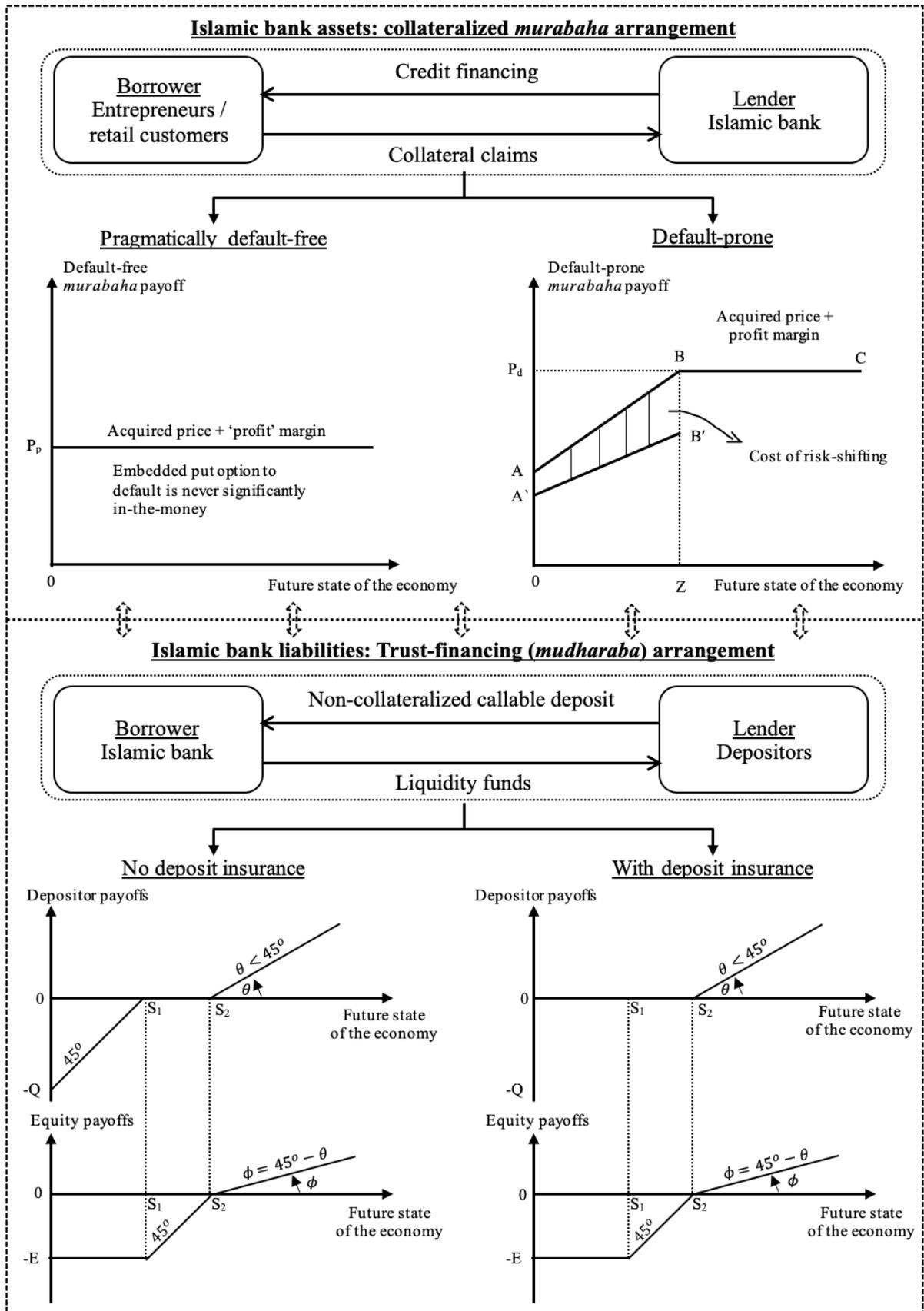


Figure 2.9: Schematic flow of asset transformation in Islamic bank balance sheet

Four related issues are pertinent in multi-period symmetric information *Murabaha* equilibria. They are elaborated in the proposition below.

Proposition 1: *The multi-period Murabaha Rational Expectations Equilibria (REE) display the following features when the loan's underlying collateral follows a Geometric Brownian Motion (GBM). One, the risk of the underlying collateral increases over time, thereby inducing the borrower's equity to become negative (as illustrated in Figure 2.3). Two, the allocative efficiency of a default-free equilibrium vis-à-vis a default-prone one decreases with increasing time. Three, this prompts borrowers to opt for a default-prone facility. Four, this induces instability in the asset side of banks.*

Proof:

- 1) The increase in the risk of banks' underlying collateral over time is a property of a GBM and is described in Fama (1970) and Gau (1987).
- 2) The increase in the risk of the underlying collateral over time makes the loan-to-value (LTV) ratio (and thus the allocative efficiency) of a default-free loan to be lower than a default-prone one (Wojakowski et al., 2019 - see also Figure 2.10).
- 3) The increase in LTV (along with the cost of the facility) spurs the borrowers to prefer a default-prone facility over a default-free one as they do not have to allocate more down payment to 'purchase' the asset (Wojakowski et al., 2019).
- 4) The *tilt* of the banks towards default-prone loans induces instability on the asset side of the same.

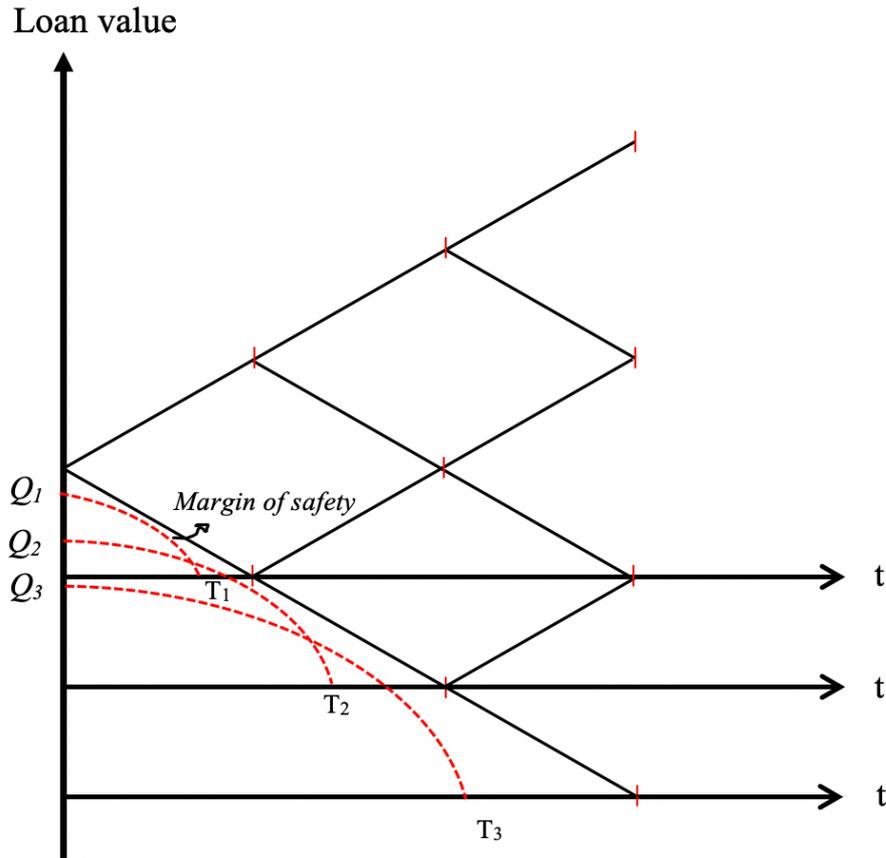


Figure 2.10: The decrease in allocative efficiency of the default-free *Murabaha* facility

Notes: As the tenure (t) increases, the allocative efficiency of the default-free *Murabaha* facility decreases. This implies that as t increases, the *Murabaha* loan becomes more fragile, i.e., prone to rupturing default

The above result is linked to that of the *Inah* and *Tawarruq* facilities equilibria as given below.

Lemma 1: *The Multi-period Inah/ Tawarruq REE is no better than that of the above Murabaha one.*

Proof:

Theoretically, the underlying equity in an *Inah/ Tawarruq* contract without any recourse to the borrower's personal assets (or guarantees) is immediately negative at the onset of a loan. This situation is akin to Figure 2.3 with $t_1 = 0$ as $Q_0 > V_0 = 0$. That is, $Equity_0 = V_0 - Q_0 < 0$. In other words, an *Inah/ Tawarruq* contract aggravates risk-shifting. However, with personal guarantees, it is no better than the above *Murabaha* one.

An increase in the tenure of IB's debt facilities exacerbates agency costs of debt, thereby jeopardizing the financial architecture's systemic risk. Proposition 2 below elaborates on this from the perspective of *Murabaha* finance. This result is extended to the case of *Inah/Tawarruq* in Lemma 2 given below.

Proposition 2: *The escalation in the probability of risk-shifting or/and underinvestment with the increase in the term to maturity of the Murabaha facility aggravates the downside risk (and thus the systemic risk) of the 'Islamic' banking system, hence increasing the fragility of the system. This is illustrated by the following mathematical conditions.*

$$\lim_{t \rightarrow \infty} \text{Prob}(V_t < Q_t) = \lim_{t \rightarrow \infty} y_t \rightarrow 1$$

or/ and

$$\lim_{t \rightarrow \infty} \text{Prob}(NOI_t < DO_t) = \lim_{t \rightarrow \infty} \zeta_t \rightarrow 1$$

where V_t , Q_t , y_t and ζ_t respectively represent the value of the underlying collateral, the amortized value of the *Murabaha* facility, the probabilities of risk-shifting and underinvestment at the time 't.' NOI_t and DO_t , respectively imply the Net Operating Income and Debt Obligation at the time 't.'

Proof:

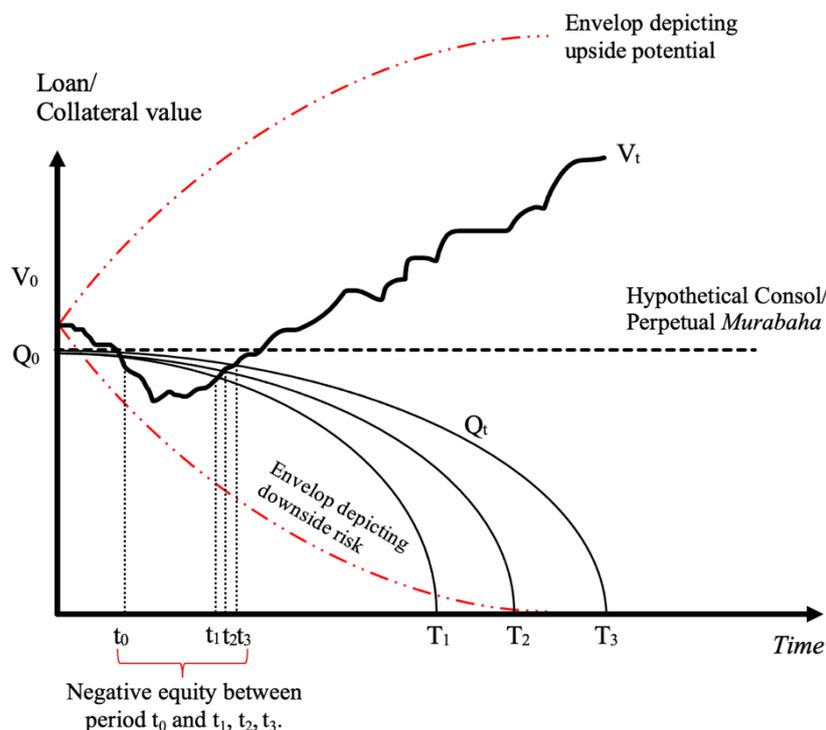
Figure 2.11A contrasts the 'random walk' of the underlying collateral with the value of the *Murabaha* facility with increasing tenure, i.e., when $T_n > T_n - 1 > \dots > T_2 > T_1$. The asset value (V_t) is bounded on the lower and upper side by an envelope, incorporating its drift and the random movements around it with risk increasing with time (i.e., $\sigma\sqrt{t}$ to be more precise) (Fama, 1970; and Gau, 1987). The *Murabaha* facility (Q_t) intersects the asset value twice, i.e., when the asset is declining and rebounding from its lows. The region between the two points of intersection denotes the equity trading negative leading to default. As the tenure of the facility is increased, this area of 'negative

equity' increases. This increases the probability of default with increasing term culminating in a maximum of 1. Figure 2.11B illustrates the increasing cost of debt (DO_t) with increasing tenure (T), leading to increased hardship and, thus, underinvestment issue for the borrower. This result stems from an upward sloping yield curve (Bagus and Howden, 2010). The probability here, too, culminates to a maximum of one.

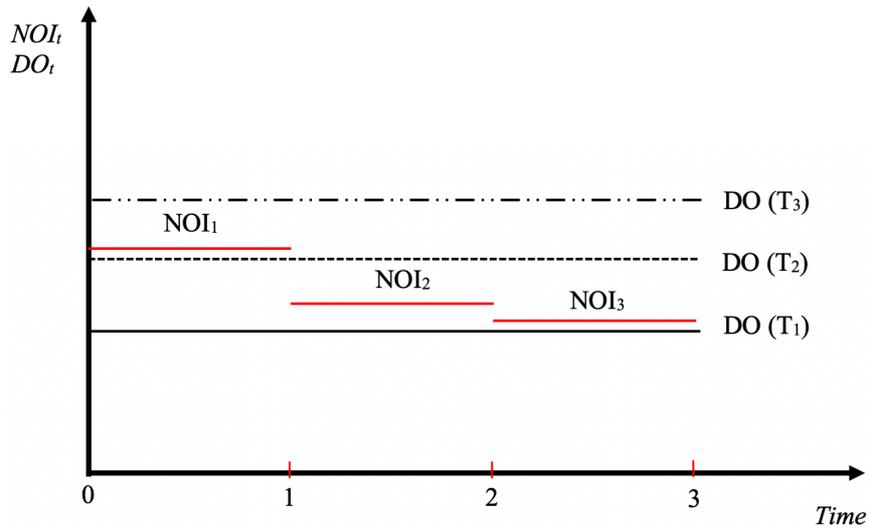
Lemma 2: *The increase in the tenure of an Inah/ Tawarruq facility heightens the downside risk (and hence the systematic risk) of the 'Islamic' banking system, thereby increasing its fragility.*

Proof:

The financial system instability in *Inah/ Tawarruq* is deduced from Lemma 1, which states that the corresponding REE of these two facilities is not better than that of a *Murabaha* REE.



A. Risk-shifting



B. Underinvestment

Figure 2.11: *Gharar* escalates the problem of *ribā*

Notes: Figure 2.11A depicts how an increase in the term to maturity enlarges the area where the equity is negative escalating the probability of risk-shifting. Figure 2.11B illustrates how an increase in the contract period increases the debt obligations, thereby intensifying the underinvestment issues.

2.4.2.2. *The Liability Side of IBs*

The Profit-sharing Investment Account (PSIA) is the norm on the IBs' liability side. This is unlike CBs' interest-bearing deposit. The PSIA comprises an equity-based medieval facility of *Mudharaba*. Here, the depositors' payoffs are contingent on the performance of IB's portfolio. This feature is alleged to make IBs more stable and less fragile than CBs, as it links its assets with its liabilities (Abedifar et al., 2013). However, the PSIA requires depositors to bear the loss in the poor states of the economy, i.e., in the region OS_1 when the IB has no deposit insurance (see the left-hand side of the lower part of Figure 2.9). The situation is the opposite when the IB has deposit insurance (see the right-hand side of the lower part of Figure 2.9). That is, the depositors are absolved of their losses by the government. The profit-sharing kicks in after state S_2 when both the depositors and the IB break even. The depositors are granted a fraction ($\tan \theta$) of the profits, while the IB retains $(1 - \tan \theta)$ of the profits.

Nonetheless, the negative equity of the IB in states S_2 in both the cases (with or without the deposit insurance) spooks the depositors into making a run on the IB. This result of ours ensues from agency issues (in a Rational Expectations framework) stemming from the assumption of GBM of the underlying collateral of the assets. It complements the results of Diamond and Dybvig (1983). This result is elaborated in Proposition 2.

To conclude, we state that *gharar* (excessive risk stemming from the agency cost of debt) ensues from the asset side of the Islamic banking system to infect the whole system. This is despite the presence of the SSB, which is supposed to curtail it.

2.5. The Role of SSB on IBs' Ethicality

The two preceding sections raise a crucial query about SSB's role in keeping IBs on track to fulfilling their ethical promises. The SSB is a distinguishing feature of IBs. This board is responsible for enhancing the *Shari'ah* governance through its advisory and supervisory roles. An SSB mandates that at least three scholars trained in Islamic law must sit on the bank's board to be legally labeled 'Islamic' (Al Mannai and Ahmed, 2019). This additional layer of governance is claimed to positively impact IBs' performance (Mollah and Zaman, 2015) and reduce managers' risk-taking behavior (Mollah et al., 2017). However, these studies have not examined the SSB's part in ensuring IBs' ethicality. Quite the contrary, our research shows that SSB has yet to bring about superior performance and stability as far as the IBs' moral identity is concerned. Specifically, ethical considerations are missing in the product development process. This raises a pressing question regarding their institutional efficiency.

It is true that the current structure of SSB bestows it with quite a limited power and lack of communication with other stakeholders (Hasan, 2014). Their role in reinforcing *Shari'ah* compliance conflicts with managers who strive to maximize shareholders' profit (Ullah et al., 2018). The fact that SSB members are hired and paid by the bank weakens their bargaining power and compromises their independence (Al Mannai and Ahmed, 2019).

Nonetheless, the above reasonings reveal only the veneer of the problem. Hasan (2014) documents that the root cause of the issue is the lack of trust towards SSB members' ability to integrate economic, Islamic law, and ethical aspects during the product development process. This is why SSB members are treated as mere outsiders by IBs, hence the agency problem (Ullah et al., 2018). Their expertise in Islamic law is necessary, but it is not sufficient without integrating the economic and ethical dimensions. Developing ethical Islamic banking products requires a deep understanding of the technicality of financial instruments, institutions, and markets (Hasan, 2014). Many of the SSB members even have a narrow perspective in defining ethics as a mere investment in permissible sectors (Ullah et al., 2018). Unfortunately, SSB members are reluctant to allow people trained in other disciplines on the board to fill this gap (Hasan, 2014). Even worse is that many of them sit across different SSBs to the extent that the top 20 of them monopolize the certification for roughly half of the market (Hayat et al., 2013). It is, therefore, not surprising that the select group of scholars construed as the "gatekeepers of the Islamic financial circuits" has failed to optimize their role in the innovation process of IBs (Bassens et al., 2012; Gözübüyük et al., 2020).

2.6. Conclusion

This study examines the morality of IBs by integrating the rich literature in ethics, Islamic law, and banking. We initiate our study by constructing the IBs' philosophy through the objectives of Islamic law. We integrate this with the Virtue Ethics of Solomon (2003), Wade (2010), Ali (2014), and Bucar (2018). This is conducted in harmony with the banking literature (Stiglitz and Weiss, 1981; Diamond and Dybvig, 1983; Ebrahim et al., 2016). This allows us to reconstrue the definitions of *ribā* and *gharar*, thereby addressing the conflict between profiteering and the high-principles of IBs. We construe: (i) *ribā* as wrongful expropriation of others' assets emanating from financial decoupling and unjust price gouging; and (ii) *gharar* as asymmetric information or excessive risk-taking.

With respect to *ribā*, our findings document financial decoupling in the debt contracts employing IIBR. The IIBR-based pricing displays the long-run cointegration between the IIBR and LIBOR. Furthermore, we also observe, with a slightly lower confidence interval, the LIBOR's past movement predicting the contemporaneous pattern of IIBR employing the Toda-Yamamoto approach. The GARCH-BEKK method also shows very low dynamic time-varying correlations between the various maturities of IIBR and proxies of the real economy, namely the real estate and consumer goods indices.

Our findings also suggest price gouging in the pricing of the debt-based *Murabaha*, *Inah*, and *Tawarruq*. We employ both parametric and non-parametric paired difference tests to conclude that the IIBR is persistently priced higher than LIBOR. As the IB's loan pricing mechanism is indistinguishable from the conventional one, its 'piety' premium indicates the price gouging behavior leading to the underinvestment issue. This practice substantiates IBs' strategy of offering an excess payoff to their savings account holders. Consequently, 'pious' entrepreneurs or borrowers need to pay a higher borrowing rate to compensate for the IBs' extensive liabilities (The Economist, 2018).

With respect to *gharar*, we theoretically examine whether IB's unique balance sheet structure can alleviate the problems of asymmetric information and excessive risk-taking. On the asset side, the collateral-based *Murabaha* contract mitigates the ex-ante and ex-post asymmetric information due to: (i) meticulous due diligence; and (ii) underwriting iron-clad contracts deterring borrowers from changing their behavior (Smith and Warner, 1979; Ebrahim et al., 2016). However, the 'random-walk' feature of the collateral destabilizes the asset side of the IB as it allows for the asset values to drift lower than the residual value of the *Murabaha* facility. This leads to negative equity and provokes the default of the borrower. The equity-feature of PSIA, on the liability side of the IBs, bestows instability to it as the depositors bear the risk of IBs' collapse. This aggravates bank runs and the systemic risk in the financial

system. This result complements that of Diamond and Dybvig (1983) but from an agency costs perspective.

The implications of our findings question the SSB's role in safeguarding the morality of IBs. The SSB endorsement allows the industry to inundate the market with products tainted with *ribā* and *gharar* that aggravates financial fragility. The idiosyncratic financial difficulties faced by KFH of Kuwait, IIB of Denmark, IBL of South Africa, IFH of Turkey, and Muamalat Bank of Indonesia substantiate our results. Those cases of IBs' distress may be prevented, should they incorporate the deeper ethical meaning of *gharar* (for instance, by making well-diversified financing to avoid risk-taking behavior) and *ribā* (such as linking the payoff of both asset and liability sides to the real sector of the economy to evade financial decoupling).

The way forward can only be achieved by conceptualizing product design beyond *Sharī'ah*-compliance. Here, virtuous principles should be incorporated at the two stages of product development. After ensuring that the proposed product is legally acceptable from a religious perspective, it should also be examined in light of its impact on society and the various dimensions of sustainability. In doing so, the SSB should be fundamentally overhauled.

Chapter 3

Advancing Islamic Banking

3.1. Introduction

General dearth of academic work on Islamic finance stands in contrast with the increasing importance that Islamic banking has in many Muslim countries in Asia and in Africa.

(Thorsten Beck, Asli Demirgüç-Kunt, and Ouarda Merrouche, 2013, p. 434)

Islamic banks (IBs - hereafter) finance activities of a wide range of businesses and have experienced exponential growth over the last decade or so (Abuzayed et al., 2018). For example, Datastream reports that the total assets of IBs, which were US\$947 billion in 2008, have grown by more than 110.14% to US\$1.99 trillion in 2019. More importantly, they not only operate in the majority Muslim countries but also in the minority ones, such as the United Kingdom, Cyprus, the USA, Australia, Thailand, and South Africa (see Figure 3.1). In addition, their services are not exclusive to Muslims only. In the UK, for instance, the demographics of IBs' consumers show that they are primarily non-Muslims (Moore, 2011; The Economist, 2018).

Unlike conventional banks, IBs flee away from interest-based facilities due to the prohibition of *ribā* (and *gharar*) in the Islamic scriptural sources of the Holy Qur'ān and the authentic Prophetic traditions (*ahadith*) (Al-Zuhayli, 2003). IBs, instead, offer a mark-up facility termed as the '*murabaha* to the purchase orderer' (also known as the banking or contemporary *murabaha*). The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI's) Financial Accounting Standard No. 28 defines it as "a sale and purchase transaction where the purchaser makes an order and confirmed his order with a promise (*Wa'ad*) to purchase the specified subject matter from the intended seller on agreed

Murabaha terms” (AAOIFI, n.d., p. 8). This facility accounts for the majority of financing employed by IBs (Baele et al., 2014).

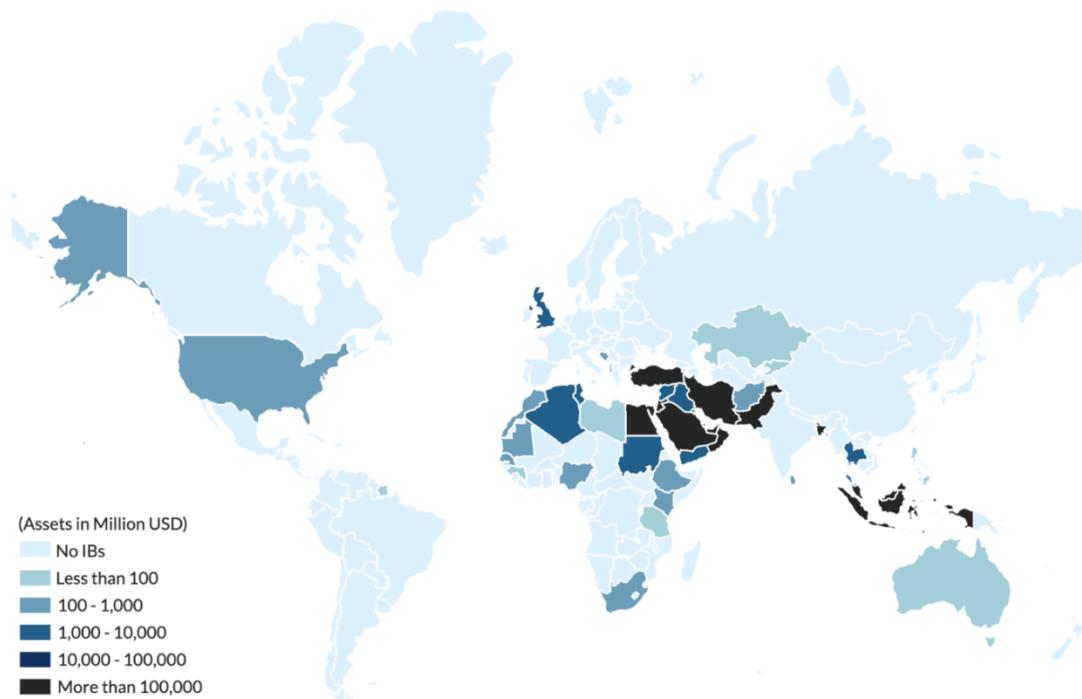


Figure 3.1: Geography of Islamic banks by total assets

Notes: This figure exhibits the spread of IBs’ total assets across the world in 2019. The data is obtained from Datastream.

The majority of contemporary religious scholars has widely accepted the above conceptual definition of the banking *Murabaha* (Haron et al., 2015). However, the practice in the banking industry often deviates from the theory (El-Gamal, 2006; Khan, 2010).¹ This causes some significant criticisms towards the practice of banking *Murabaha*. Among the most mentioned in the literature are discussed below. The first critical issue in the legitimization of

1 This is worth noting that the ‘banking’ *Murabaha* differs from the ‘classic’ *murabaha* transaction in the medieval period of Islam, which is akin to a fiduciary forward (i.e., mark-up) sale at a stated profit margin organized in the *real* (i.e., business) sector of the economy. On the contrary, ‘banking’ *murabaha* is conducted in the *financial* sector, where IBs act as intermediaries. IBs purchase the requested intermediate or final goods from the market and then sell them on credit to the client after the ownership of the assets was transferred to the banks.

banking *Murabaha* is the promise (*Wa'ad*) to buy. Usmani (1998) argues that the contract is invalid should the promise has a legal consequence. Unfortunately, in the market, the promise is usually binding (Moore, 1997). The second critical procedure of banking *Murabaha* is the real transfer of ownership. IBs are not permitted to sell anything that is not in their possession. In practice, the real transfer of ownership from the seller to the bank to the debtor hardly occurs. Instead, IBs delegate the debtor to buy the pertinent goods herself using the agency (*Wakala*) contract (Visser, 2009; Shah and Niazi, 2019). In some jurisdictions, including Iran, IBs give the money directly to customers who can show them commodity invoices (Zandi et al., 2012). It is also not uncommon to have all the documents of the transaction, including selling from IBs to the customer, at once, i.e., before IBs own the ordered product (Usmani, 1998). Finally, the pricing of banking *Murabaha* is also linked to the interest benchmark rate such as LIBOR or Islamic benchmark such as IIBR, which does not represent the asset's supply and demand as well as its performance in the real sector of the economy (see El-Gamal, 2006; Chapter 2). The practice of banking *murabaha* is, therefore, criticized as an ineffective replication of a debt facility. This operational inefficiency results from the complex set-ups put in place to make the transactions conform to Islamic law (El-Gamal, 2006; Gözübüyük et al., 2020).

The inefficiency of IBs is of utmost interest to academics, practitioners, and policymakers for the following reasons. First, IBs are interconnected with the global banking network, allowing them to transmit systemic risks² to the international financial system (Alandejani et al., 2017; Alqahtani et al., 2017; Mohammad et al., 2020). Second, previous studies have consistently evidenced the poor risk management of large IBs, leading to even higher contagion risk to the economy (Čihák and Hesse, 2010; Abedifar et al., 2013). This is especially true in the current economic environment, though not specific to IBs, where the sudden suspension of

2 Systemic risk is defined as the risk of severance in the flow of financial services that is (i) induced by the deterioration of all (or parts) of the financial system; and (ii) has the potential to negatively impact on the businesses in the real sector of the economy (Acemoglu et al., 2015; Pappas et al., 2017).

business activity designed to arrest the spread of coronavirus has led to an acute decline of global growth since the Great Depression. This crisis comes in the aftermath of years of lax financial conditions that encouraged businesses to lever up. The extraordinary increase in debt by businesses greater than their earnings growth and cash balances has aggravated their risk of default, thereby threatening the well-being and stability of the global banking system (see Kashkari, 2020). Thus, rejuvenating the banking *murabaha* as IBs' most employed contract is the need of the hour. This is because replacing a fragile long-term debt facility with a short-term risk-sharing one has the potential to alleviate the burdensome loan obligations on businesses and help them expand their activities to lead to a global economic recovery.

Proposals for improving the rudimentary Islamic banking system are scarce. Existing studies are mainly empirical and focus on evaluating the convergence of IBs with their conventional counterparts (see Abedifar et al., 2013; Beck et al., 2013; Mollah and Zaman, 2015; Alandejani et al., 2017; Alqahtani et al., 2017). Our paper is a unique theoretical study constructively critiquing the current practice of Islamic banking by addressing the following question. Can the *murabaha* financing offered by IBs be improved upon by the disruptive technology conferred by business trade credit (TC - hereafter)?

Ferris (1981, p. 243) defines TC as a type of short-term financing offered by suppliers, where "...the trader [supplier] who is delivering goods will simultaneously grant credit to the trader [buyer] receiving the goods." It also serves as "an indispensable external source for inventory financing" in addition to bank credit (Yang and Bridge, 2018, p. 3667). Unlike trade finance, which is widely used by CBs and to a lesser extent by IBs, TC is undertaken through a direct lending relationship between suppliers and buyers in the real sector of the economy without financial intermediaries.³ This source of corporate funding is widely used by not only

3 Islamic trade finance is akin to banking *Murabaha* but commonly employed to facilitate international trade (CIBAFI, 2018). The fact that it is done in the financial sector of the economy makes the issues of promise to buy, real transfer of ownership, and interest-based pricing still prevalent in the contract.

financially constrained but also investment-grade companies (Murfin and Njoroge, 2015). TC can endow efficiency to businesses, thereby revitalizing society and ultimately helping it to progress economically (Ge and Qiu, 2007).⁴ An excellent example of this premise is that of Amazon Inc., whose shares have phenomenally skyrocketed more than 80,000% after two decades of listing on the stock exchange. The unique and disruptive business model of the retailing giant employs a substantial amount of account payable period, which is estimated to be around 80 days. This bestows it with an overwhelming cash float for investment in profitable projects (Powell, 2018). This is not an isolated case as Walmart too uses TC more than bank loans. In 2019, TC for Walmart was 14.5 times the capital amount invested by shareholders (Walmart, 2020). Amazon's and Walmart's enormous growth are ideal examples of how effective TC is crucial to not only its success but also that of the USA.

The TC literature has the potential to redeem the inherent weaknesses of the contemporary *murabaha*, thereby enhancing the efficiency of the financial system (Blejer, 2006). We argue that the problems mentioned above arise due to the inefficiency of conducting the mark-up 'sale' transaction in the financial sector. The issues of promise to buy and real transfer of ownership stem from the banking regulatory restriction on holding real assets (inventories) for business purposes (Grais and Pellegrini, 2006). The interest-based pricing benchmark is inevitable as IBs compete in the highly efficient financial sector (El-Gamal, 2006). This forces the banking *murabaha* rate to converge to the ongoing market interest rate (see Chapter 2). Unlike the banking *murabaha*, the mark-up sale facility in the medieval Islamic era incorporated the concept of contemporary TC. Despite the link between the two facilities, IBs have treated the issue of TC (which should be in the *real* sector of the economy)

4 This rationale ensues from Coase (1937) and Alchian (1950), who hypothesize that businesses evolve to the form that helps them survive the competitive environment by delivering products and services demanded by their customers at the lowest prices by mitigating transaction costs (including financing costs).

as a substitute for bank credit (which is in the *financial* sector) without deliberating on the nonfinancial reasons behind this issue.

We, therefore, theoretically structure the mark-up credit sale facility in its original (i.e., historical) context, that is, providing TC in accordance with the economic intuition of facilitating trade.⁵ This is because *murabaha* in early Islam was employed to increase the demand for goods sold on credit and to complete the markets (Goyal, 1985; Sen, 1998). Our approach involves relating this facility to the well-known TC literature (Dass et al., 2015). By incorporating *Murabaha* within the TC framework, the promise to buy is not necessary, and the transfer of ownership is easily maintained as the supplier possesses the assets before selling them to buyers. The interest benchmark pricing is no longer an issue as the products or services are priced according to the supply and demand mechanism in the real economy.

We then price the TC-*murabaha* (i.e., classic *murabaha* employed in the *real* sector of the economy) consistent with the objectives of Islamic law.⁶ We propose a simple yet meaningful model to show the economic efficiency of TC-*murabaha* in contrast with the contemporary IB mark-up. This is conducted by extending the Rashid and Mitra (1999) (R&M) analysis to illustrate the *murabaha* discount rate as being lower than interest rates in periods of monetary tightening or financial crisis when banks curtail credit to businesses.⁷ For instance,

5 The *Qur'anic* verse (2:275) segregates trade-based financing (in the *real* sector of the economy) from debt financing (in the *financial* sector). It encourages the employment of the former while admonishing the use of the latter.

6 The objectives of Islamic law are to ensure the preservation of faith, intellect, life, lineage, and wealth of human beings (see Kamali, 1991). This subject is considered to be the most important intellectual means for reform and renewal of the Muslim world. This is because it can induce fresh ideas dynamically. The five objectives are not independent, as the preservation of wealth impacts on the remaining objectives. The deep insight into economic theory is thus crucial for the understanding of the objectives. In other words, scholars trained in Islamic law may find it difficult to grasp and pass judgments on issues relating to wealth and thus life, lineage, faith, and intellect of economic agents.

7 R&M model TC in a partial equilibrium setting by employing an optimizing model. That is, they analyze a firm (i.e., business) selling goods to a buyer in the *real* sector of the economy. They incorrectly term this as a demand-side one instead of a supply-side one. Their results are flawed as they use negative elasticities in their numerical simulations. In contrast, we model the supply chain comprising of a selling firm and multiple buying ones, thereby incorporating the respective supply as well as the demand-side. We also incorporate positive elasticity of supply for the selling firm and negative elasticity of demand for the buying ones. This

assuming the opportunity costs of financing and borrowing (i.e., banking *Murabaha* rate) are equally 11%, the optimum TC-*murabaha* rate of elastic goods/ services market is 10.64%. When the banking *Murabaha* rate increases to 16%, the TC-*murabaha* rate also increases but at a lower scale of 12.87%.

Our findings extend not only the research on IBs but also contribute to the broad business working capital (i.e., TC) literature. Consistent with Nilsen (2002), Ge and Qiu (2007), Fabbri and Menichini (2010), Klapper and Randall (2011), Chod (2017), Sautner and Vladimirov (2018), and Yang and Birge (2018), we uncover that retailers (borrowers) (regardless of their sizes and financial constraints) prefer TC (TC-*murabaha*) over bank financing (*murabaha* banking), especially during the distress periods (such as the current coronavirus one) for financial (cost) and liquidation advantages. It is, however, contradictory to Wu et al. (2014), who assert that TC entails additional financing costs to retailers. This is also contrary to Ng et al. (1999), Cuñat (2007), and Klapper et al. (2012), who document no empirical evidence for financial, price discrimination, and liquidity advantages of TC. Instead, they attribute the utilization of TC to the product quality motive.

Our findings also provide valuable policy-related insights on the debate regarding the most appropriate banking system in the post-coronavirus era. We provide further theoretical support for Al-Jarhi (2005), who advocates implementing Islamic banking within the universal banking system. We argue that a modified universal banking architecture offers a more efficient developmental sphere for IBs. We amalgamate our results to a universal Islamic banking (or financial conglomerate) architecture by employing: (i) the Japanese concept of *keiretsu* (Miwa and Ramseyer, 2002; Santos and Rumble, 2006; Sueyoshi et al., 2010);⁸ and

makes our analysis quite rich in integrating the conflict of interest between the two competing economic agents.

8 *Keiretsu* is defined by Santos and Rumble (2006, p. 424) as “groups of Japanese firms [businesses] from the nonfinancial and financial sectors that are connected by interlocking shareholdings.”

(ii) an altered universal banking concept commonly observed in some European countries (Neuhann and Saidi, 2018; Colonnello, 2021).⁹ While these financial architectures are not particularly welcomed in the market economy such as the USA due to the potential of higher monopoly power, interrelated companies' conflict of interest, and systematic risk stemming from interconnection vertical and horizontal networks (Kroszner and Rajan, 1994; Miwa and Ramseyer, 2002), they also offer some critical advantages. First, it benefits from economies of scale and scope. Second, it enhances corporate governance. Third, it mitigates systemic risk and, thus, financial fragility. Finally, it advances the underlying businesses' supply chain and inventory management. These results are coherent with those of Berglöf and Perotti (1994), Petersen and Rajan (1995), Berlin et al. (1996), Gorton and Schmid (2000), Chod (2017), and Devalkar and Krishnan (2019).¹⁰

The rest of the paper is organized as follows. First, we discuss our institutional framework by integrating the Islamic value system with the TC literature in Section 3.2. Second, we develop our pricing theory of the TC-based *murabaha* facility in Section 3.3. To this end, we employ motivations from vendor financing, and, as a result, we substantially contribute to the business working capital literature. We then numerically test our theory and assimilate our results to realize a universal Islamic banking architecture in Section 3.4. Finally, we conclude our study in Section 3.5.

9 The focus of our paper is not on regulations. We therefore implicitly assume that the proposed universal Islamic banking architecture (or a financial conglomerate) adheres to the local, national and international regulations such as the Basel III accord. See Bitar et al. (2021) for more information on this issue.

10 In countries with the specialized banking system, a financial conglomerate structure akin to that of Goldman Sachs is the next best alternative to the universal banking architecture.

3.2. The Institutional Framework

The classic *murabaha* facility is a forward sale and is related to TC.¹¹ We first discuss the intricacies of the Islamic value system (in Subsections 3.2.1 and 3.2.2) and link the same to the TC literature (in Subsection 3.2.3).

3.2.1. The Islamic Perspective on Plain Vanilla Debt Financing

Islamic law condemns “*trading two goods of the same kind [genus] in different quantities, where the increase is not a proper compensation*” (El-Gamal, 2006, p. 49). According to this terminology, a debt that exchanges money for money is considered a prohibited transaction. Ebrahim et al. (2017) employ a rational expectations framework to rationalize the prohibition of debt to the potential harm ensuing from the: (i) expropriation of either borrower’s or lender’s wealth resulting from either risk-shifting (see Figure 3.2) or underinvestment (see Figure 3.3); (ii) fragility of macroeconomy; and (iii) financial exclusion of the poor.

As interest-bearing debt is banned, the Islamic Finance (IF) industry is purported to develop products without embodying any increase (or excess) in receipt over the payment of the same genus (as currency). The use of the contemporary *murabaha* facility is designed to circumvent the proscription of this form of debt. This is conducted by supposedly construing a credit sale facility as a substitute for bank debt through the ‘sale’ of real (or tangible) assets (which do not share the same genus as currency) for money later. This is rationalized as permissible in accordance with the *Qur’ānic* injunction “...*God has permitted trade and forbidden debt-based transactions...*” (Q2:275).¹²

11 The religious scholars impose a precondition on the asset reputedly being sold on credit. It should not constitute a medium of exchange in terms of being a currency or a commodity in medieval Islam (Al-Zuhayli, 2003).

12 This injunction is akin to that highlighted in Deuteronomy (23: 19-20), Exodus (22: 25), and Leviticus (25: 36-37).

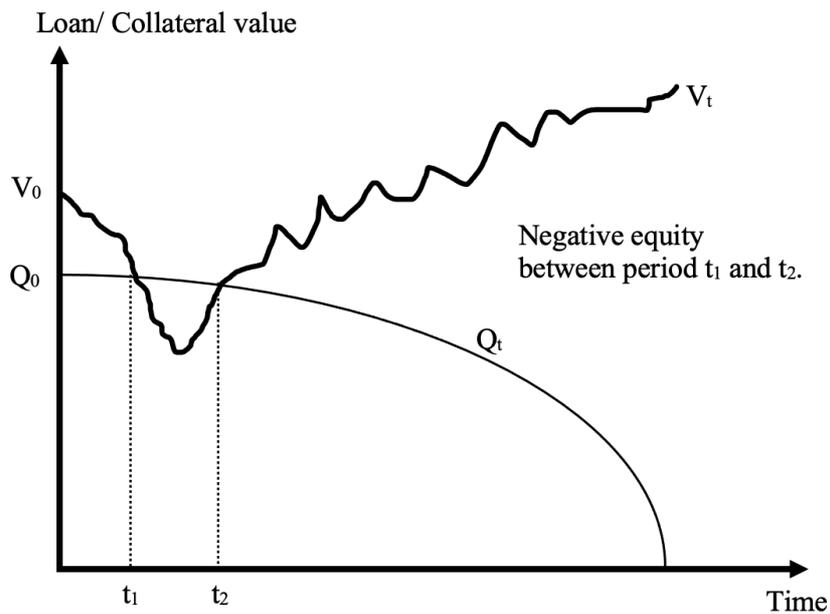


Figure 3.2: Risk-shifting

Notes: Risk-shifting refers to the transfer of the downside risk by the borrower to the financier when the former's equity is negative. That is, when the value of a company's asset (P_t) is lower than its debt obligation (Q_t) as observed in the interval (t_1, t_2) . Source: Wojakowski et al. (2019).

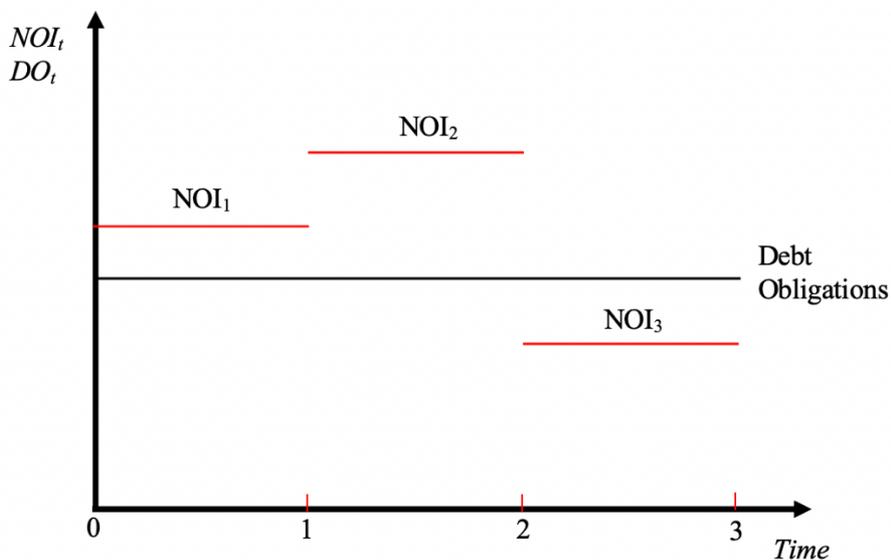


Figure 3.3: Underinvestment

Notes: Underinvestment refers to the tendency of borrowers to reject profitable (i.e., the positive net present value - NPV) projects if the increase of wealth mainly benefits the financiers. This yields the condition where the Net Operating Income (NOI) of the borrower is lower than its Debt Obligations (DOs) as illustrated in Period 3. Source: Wojakowski et al. (2019)

3.2.2. Is Islamic Banking a New Paradigm?

Islamic banking was conceived by Uzair (1976) as employing the medieval profit-sharing facility. This financial structure relied on a quasi-equity-based (i.e., risk-sharing) model endowing growth and stability to develop the economy. The implementation of this model was believed to be a breakthrough to stem the tide of the underdevelopment of the Muslim world. However, this model did not work in practice due to asymmetric information and transaction costs in conjunction with a poorly functioning legal infrastructure (Khan, 2010). Some adjustments were needed to make IF more pragmatic and competitive to its conventional counterpart. These endeavors thus yielded the legal device of contemporary *murabaha* proposed by the Islamic Development Bank (IDB) laureate Sami Hamoud in 1976 (Kahf, 2013). That device modified the concept behind the medieval credit sale facility of classical *murabaha*, which supposedly initiated a new paradigm in banking. The contemporary *murabaha* facility is currently employed for liquidity management, Islamic bond issuance, and credit-sale transactions. Although this facility is not inconsistent with the legal-based rulings, it has unfavorable implications in the context of the objectives of Islamic law.¹³

3.2.3. The Role of TC and the Classic *Murabaha*

TC plays a vital role in short-term financing. Here we highlight various reasons why TC is deemed as an alternative to bank loans.

13 Ebrahim and Sheikh (2018) alleges the static nature of Islamic rulings as one of the causes of why Muslim-majority countries lack efficient financial intermediaries and thus tend to be economically underdeveloped in contrast to the rest of the world. These rulings have been static as the deductive basis employed by the Islamic scholars has been from a purely legal perspective instead of the objectives of Islamic law stemming from economic rationale. The legally based rulings are most likely to be conducted through analogical reasoning, restricted to very limited situations. In contrast, the ones based on the economic rationale are yet to be developed. This not only considers the meaning of the text but also contemplates the Lawgiver's intent in the scriptural source (Kamali, 1991).

The issue of underdevelopment of Muslim economies has been insinuated earlier by Max Weber (in his well-known book *The Protestant Ethic and the Spirit of Capitalism* (1904-5/1958)) to its cultural doctrines and the lack of dynamic review of the same over changing intellectual and socio-economic conditions.

3.2.3.1. Financing Advantage Perspective

Suppliers offering credit to buyers enjoy numerous financing advantages over financial institutions (Ng et al., 1999; Nilsen, 2002; Giannetti et al., 2011; Albuquerque et al., 2015; Shenoy and Williams, 2017; Yang and Birge, 2018). This is especially true given a weak rule of law and firms not having legal recourse in case of defaults (Burkart and Ellingsen, 2004). In addition, suppliers, as providers of TC, may operationalize these effects better than financial institutions. For example, first, suppliers may be able to decipher information about their buyers quickly and at a lower cost than that by the financial institutions (see Smith, 1987; Brennan et al., 1988; Ng et al., 1999; Chod, 2017). These reasons, coupled with establishing a long-term buyer-supplier relationship, may supersede an additional operational cost incurred by financial institutions originating from the credit risk evaluation (Biais and Gollier, 1997; Giannetti et al., 2011; Kim and Shin, 2012; Itzkowitz, 2015). Second, suppliers may have an advantage over financial institutions in providing TC to buyers as they may threaten to stop future sales of intermediate goods, especially in cases where there are few suppliers (Cuñat, 2007). Third, TC provision confers an advantage to suppliers in salvaging the value of assets in case of buyer's default (Fabbri and Menichini, 2010; Sautner and Vladimirov, 2018). This is because the supplier may reclaim the goods supplied and resell these at a lower cost, given that it already has a network for selling its products. We believe that this ability to restore the value of goods in default alleviates risk-sharing plaguing long-term debt. From the buyer's point of view, TC can also be an effective channel for signaling the firm's quality to investors (Aktas et al., 2012).

3.2.3.2. Price Discrimination Perspective

TC allows vendors to price-discriminate their buyers based on their credit history, especially when the supplier concentration is high (Chod et al., 2019). TC may be advanced even if the supplier does not have a financing advantage over financial institutions (Brennan et al., 1988;

Petersen and Rajan, 1997). An alternative view of this is that the supplier may not provide TC to a risky buyer solely because of short-term goals. Still, it may have a long-term objective in the survival of the buying firm, thereby protecting the value of its implicit equity stake (Wilner, 2000). We believe that this long-term relationship in the business supply-chain helps alleviate the underinvestment issue afflicting long-term debt. This is because TC is cyclical with the economy. That is, it increases with economic expansion and decreases (but does not cease) with the subsequent contraction. This does not constrain businesses in contrast to long-term debt. The supplier may also discriminate and subsidize risky buyers with low-financing rates so that they may take the future advantage of charging higher rates to the firms that survived.

3.2.3.3. Product Warranty Perspective

Some industries may require TC to serve as a guarantor of product quality (Long et al., 1993; Emery and Nayar, 1998). This is particularly true for differentiated input products or services (Giannetti et al., 2011; Chod et al., 2019). Accordingly, the supplier may willingly provide credit for products that need more quality assurance for their inputs, e.g., high-technology or newly developed products, to allow sufficient time for the buyer to test the product (Long et al., 1993).

3.2.3.4. Transactions Costs Perspective

TC exists to reduce the transaction costs of paying bills on delivery (Ng et al., 1999; Nilsen, 2002). Depending on the nature of the products, transaction costs for some industries may be higher as they may need more frequent deliveries of inputs or have to build up extensive inventories to maintain smooth production cycles than others. Instead of making a payment every time goods are delivered or stored, a buyer might want to pay for them only periodically.

We conclude this subsection by emphasizing that TC is a viable alternative to the contemporary banking *murabaha* based debt facility. We link the same to the classic *murabaha* facility in restructuring an Islamic financial architecture, as elaborated in Section 3.3 below.

3.3. The Way Forward

This section first discusses the idea behind reforming Islamic banking by reconstruing the contemporary *murabaha* facility as a TC offered by a seller of a specialized intermediate good in the *real* (i.e., business) sector of the economy. Our study thus integrates the TC literature to suggest theoretical pricing of the classic *murabaha* facility and, subsequently, a financial architecture.

3.3.1. Reconstruing the Classic *Murabaha* Facility as a TC

Conceptualizing working capital financing with the contemporary *murabaha* facility within the *financial* sector is inappropriate (Khan, 2009). This is because arbitrage forces any so-called ‘Islamic’ benchmark rate to converge to the conventional rates, as illustrated in Chapter 2. An alternative is to hypothesize the classic *murabaha* facility as a TC in the *real* sector of the economy. This tantamounts to reinstating its original economic rationale, i.e., to increase the demand for the goods sold on credit and help complete the market (Sen, 1998). To this end, we restore the classic *murabaha* facility in the working capital framework. This necessitates connecting our model with that of TC or vendor financing (see Brennan et al., 1988; Shenoy and Williams, 2017) and entails pricing the demand and supply of the same in our working capital setting.

Figure 3.4 illustrates the gist of our TC-based *murabaha* financing model where identical firms (i.e., businesses) ($Firm_0$) each selling their intermediate (final) goods (or services) on credit using this risk-sharing facility to Z identical buying firms ($Firm_i, i \in [1, Z]$) in the *real* sector of the economy and prices it in equilibrium in accordance with supply and demand

mechanism, instead of employing an interest rate benchmark.¹⁴ The selling (buying) firm will record the goods sold as accounts receivable (accounts payable) and receive (pay) the payments at some date later. It is thus equivalent to working capital financing offered by a selling firm to buying firms.

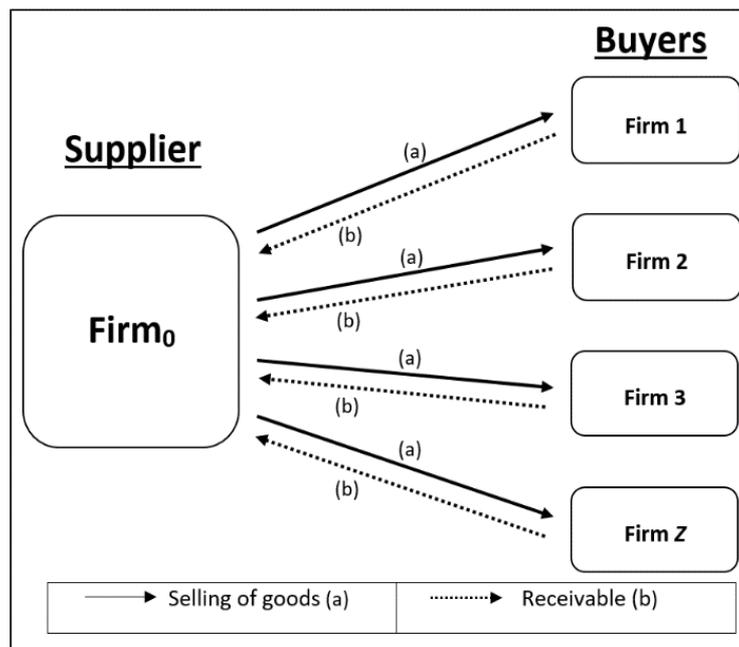


Figure 3.4: TC-*murabaha* financing mechanism illustrating links between a supplier and buyers.

Our proposed TC-*murabaha* model has several advantages over the contemporary *murabaha* approach. First, from the selling firm’s perspective, TC ensuing from our classic *murabaha* leads to the firm’s value optimization as it is an integral part of its working capital policy. Our proposal is consistent with Aktas et al. (2015). They find an optimum level of net working capital (NWC) in US corporations at a level where firms improve their operating performance and market value. In the same vein, Ben-Nasr (2016), in a sample of 54 countries, illustrates a U-shaped relationship between NWC and the value of a firm. The channels of the

14 It should be noted that the selling can involve tangible assets as well as intangible services. This expands the scope of the selling firm. To elaborate, instead of a firm (i.e., business) buying information technology equipment and hiring technicians, the firm can subcontract these services to another. This expands the scope of TC to intangibles.

relationship between NWC and firm performance can be perceived in many ways, as discussed in Subsection 3.2.3. In addition, the TC-*murabaha* can also stabilize product demand in the recessionary period (Emery, 1987) and thus enhance the long-term relationship between the selling and buying firms (Summers and Wilson, 2002).

Second, from the buying firms' point of view, TC is an alternative to short-term financing and a means of offering a warranty for product quality, also discussed in Subsection 3.2.3. The TC-*murabaha* facility can accommodate both of these perspectives.

Finally, from a religious (and hence cultural) standpoint, the TC-*murabaha* remedies chronic issues of contemporary *murabaha* financing ensuing from the: (i) ownership of the tangible goods; and (ii) fragile facility with benchmark pricing issue. The former is easily tackled, as the intermediate goods/services sold come from the selling firm's inventory (or capacity to deliver the requisite service). The latter is solved using the pricing model, as illustrated by the supply and demand mechanism in the following subsection. This solution thus re-embeds the TC-*murabaha* within the *real* sector of the economy and hence mitigates the fiduciary risk, impairing the reputation of the Islamic banking industry. This is because the model complies with the form as well as the substance of the law as the financing is conducted in the *real* sector of the economy.

However, selecting the TC-*murabaha* facility as a resource allocation alternative necessitates a higher amount of capital (Kieschnick et al., 2013) as the selling firm is exposed to a higher financing cost and credit risk (Aktas et al., 2015). This requires a trade-off between the TC-*murabaha* financing and other value-enhancing investment and entails higher opportunity costs (Ben-Nasr, 2016). Therefore, once a selling firm has decided to provide TC, it must do so at an optimum level of NWC, as suggested by Aktas et al. (2015) and Ben-Nasr (2016). It must also meticulously price the TC-*murabaha* facility to ensure a value-enhancing price for both the selling and buying firms. The following subsection elaborates on this issue.

3.3.2. Modeling the TC-*Murabaha* Facility in the *Real* Sector of The Economy

Here, we develop an equilibrium model to evaluate the TC-*murabaha* discount (profit) rate, m^* , incorporating the price elasticities of the product from the perspective of the selling Firm₀ (ϵ_S), as well as that of the buying (Firm_{*i*}) (ϵ_B).¹⁵ We do this by extending the R&M model and integrating the selling firm (i.e., supply) side optimization function in addition to the buyers' (i.e., demand) side to solve for the equilibrium TC rate.¹⁶

We assume a single-period setting where each Firm₀ sells Q units of a product to several buyers. The goal of the selling firm is to set the terms of its credit (i.e., *murabaha*) sale as α_S and a net period of n . That is, $\alpha_S\%$ discount for immediate payment or full payment at the end of n days. The selling firm faces a variable cost of v per dollar of sales and sells at a price P to its credit buyers at time n . Production is assumed instantaneously taking place at the time of sale.

We assume further that a portion θ of buyers decide to buy the goods/services on the spot, while a portion $(1 - \theta)$ buy the same on credit. Of the buyers who opt for credit, a proportion ω pay in one lump sum on time at n , while $(1 - \omega)$ default. This $(1 - \omega)$ term incorporates risk-sharing in our pricing model. We further assume that k_S and k_B represent the opportunity costs of capital for the selling firm and buying firms, respectively.

In developing our analysis, we first model the optimal TC rate from the selling firm's perspective, followed by that of the buying ones. The two models are then simultaneously solved to determine the equilibrium TC rate. This is then linked to the equilibrium *murabaha*

15 The TC-*murabaha* discount rate (m) is linked to that of the trade credit rate (α) as illustrated in Appendix A.1 as follows: $m = \alpha/(1 - \alpha)$.

16 We implicitly assume that the intermediate (or final) goods or services sold via TC have a (i) meaningful use; and (ii) commercial value.

rate derived in Appendix A.1. Finally, we illustrate our model solution with numerical simulations.

3.3.2.1. Modeling the Supply-side

This subsection models the selling firm.¹⁷ The objective of this Firm₀ is to maximize the present value of its future cash flow, V_S , with respect to the firm's TC rate (α_S)

$$\max_{\alpha_S} V_S(\alpha_S) , \quad (3.1)$$

subject to the following constraint

$$V_S = \theta p Q + (1 - \theta) \omega P Q (1 + k_S)^{\frac{n}{360}} - v P Q, \quad (3.2)$$

where Q is the total quantity supplied and

$$p = (1 - \alpha_S) P \quad (3.3)$$

is the discounted price offered to cash customers. The terms on the right-hand side (RHS) of Equation (3.2) illustrate: (i) payments made by cash buyers; (ii) present value (PV) of payments made by credit buyers; and (iii) costs incurred by the selling firm.

To maximize V_S with respect to α_S we evaluate the usual First Order Necessary Condition (FONC)

$$\partial V_S(\alpha_S) / \partial \alpha_S = 0 . \quad (3.4)$$

Dividing the resulting expression by P gives

$$(1 - \alpha_S - \omega \beta) Q \frac{\partial \theta}{\partial \alpha_S} + (1 - \theta) \beta Q \frac{\partial \omega}{\partial \alpha_S} - \theta Q + ((1 - \alpha_S) \theta + (1 - \theta) \omega \beta - v) \frac{\partial Q}{\partial \alpha_S} = 0 , \quad (3.5)$$

¹⁷ This Subsection, 3.3.2.1, emulates the R&M analysis on the supply-side, while Subsections 3.3.2.2 and 3.3.2.3 extend the same to the demand-side and impose the market-clearing conditions respectively. We advance R&M's perspective in our numerical simulation Subsection 3.4.2.

where we used notation β for the discount factor $(1 + k_S)^{-\frac{n}{360}}$, with k_S representing the opportunity cost of capital of the selling firm. This is a function of the partial derivatives $\frac{\partial \theta}{\partial \alpha_S}$, $\frac{\partial \omega}{\partial \alpha_S}$, and $\frac{\partial Q}{\partial \alpha_S}$. We rationalize the three derivatives as follows.

R&M classify the above first two derivatives as relating to the behavior of the buyers. The first one specifies the proportion (θ) of cash buyers in our setting. It is argued that as the discount rate, α , increases, buyers avoid buying on credit. That is, they seek alternative sources of financing and opt to pay cash for their purchases. This implies that¹⁸

$$\frac{\partial \theta}{\partial \alpha} > 0 . \quad (3.6)$$

To derive the optimum TC rate, α^* , the relationship between α and θ needs to be further simplified. It must be such that when $\alpha = 0$, then $\theta = 0$ and when α is very high then $\theta = 1$. This implies that θ is an increasing function of α and is between the two extremes. A simple relationship capturing this is a linear one given as follows

$$\theta = \gamma \alpha , \quad (3.7)$$

where $\gamma > 0$ is a positive constant. Furthermore, since $\alpha = \gamma^{-1}$ implies that 100% of buyers switch to cash purchase ($\theta = 1$), the following range must be observed for meaningful α 's

$$0 < \alpha < \bar{\alpha} = \min\{1, \gamma^{-1}\} . \quad (3.8)$$

The second derivative refers to the proportion (ω) of credit buyers who do not default. Unlike that of θ , the relationship of ω with respect to change in α is not straightforward. Two opposing effects are feasible. They are described as follows. First, consistent with the impact on θ , an increase in α encourages buyers to purchase with cash instead of using the TC facility. This lowers the number of credit buyers who pay on time. Second, the higher the number of buyers making cash payments reduces the number of those who default. We argue that these

18 Because the specification of θ and ω are the same for supply-side as well as for the demand-side, we do not use subscripts S in the discount factor α in this and the next paragraph, where ω is defined.

two offsetting effects cancel each other, resulting in a coefficient ω which remains stable through the process of changing α . This yields

$$\frac{\partial \omega}{\partial \alpha} = 0 . \quad (3.9)$$

Finally, a specification of $\frac{\partial Q}{\partial \alpha}$ must be incorporated into our analysis. The supply-side is conceptualized by linking the quantity supplied (Q) to the elasticity of supply ϵ_S . From the perspective of the supplier, a higher discount rate α_S has an enhanced negative impact on cash sales $S = pQ$. That is, a higher discount rate α_S results in a lower unit price $p = (1 - \alpha_S)P$. Furthermore, a lower unit price (p) results in a smaller quantity (Q) supplied by the selling firm. Introducing the elasticity of supply

$$\epsilon_S = \frac{\partial Q}{\partial p} \frac{p}{Q} > 0 , \quad (3.10)$$

we can write

$$\frac{\partial Q}{\partial p} > 0 \Rightarrow \frac{\partial S}{\partial \alpha_S} = -PQ - Pp \frac{\partial Q}{\partial p} = -PQ(1 + \epsilon_S) < 0 . \quad (3.11)$$

Since elasticities of supply are generally positive $\epsilon_S > 0$, a decrease in price $\partial p < 0$ coupled with lowered quantity offered ($\partial Q < 0$, on the supply-side) yields a lower sales figure. Equivalently, an increase in offered discount, $\partial \alpha_S > 0$, yields a decrease in the quantity offered ($\partial Q < 0$) by the supplier, negatively impacting sales S .¹⁹

Furthermore, we have

$$\frac{\partial Q}{\partial \alpha_S} = \frac{\partial Q}{\partial p} \frac{\partial p}{\partial \alpha_S} = -\frac{\partial Q}{\partial p} \frac{p}{Q} P = -\epsilon_S \frac{Q}{1 - \alpha_S} . \quad (3.12)$$

Substituting Equations (3.7), (3.9), and (3.12) back into Equation (3.5) and dividing by Q we obtain

19 In contrast to our assumptions, R&M postulate a specification for sales net of discount, $S(\alpha)$, before introducing the corresponding elasticity ϵ . They then incorporate negative elasticities in their numerical simulation. This includes the case $\epsilon < 1$, which would have a positive impact on sales $\partial S(\alpha)/\partial \alpha > 0$. This approach is problematic because negative elasticities correspond to elasticities of demand. This renders the R&M analysis of supply-side inconsistent with economic theory.

$$(1 - \alpha_S - \omega\beta)\gamma - \gamma\alpha_S - ((1 - \alpha_S)\gamma\alpha_S + (1 - \gamma\alpha_S)\omega\beta - v) \frac{\epsilon_S}{1 - \alpha_S} = 0 . \quad (3.13)$$

Multiplying both sides by $1 - \alpha_S$ gives a quadratic equation in α_S

$$a_S\alpha_S^2 + b_S\alpha_S + c_S = 0 , \quad (3.14)$$

where

$$a_S = \gamma(\epsilon_S + 2) , \quad (3.15)$$

$$b_S = -\gamma(\epsilon_S + 3 - \beta_{S,n}\omega(\epsilon_S + 1)) , \quad (3.16)$$

$$c_S = \gamma + v\epsilon_S - \beta_{S,n}\omega(\epsilon_S + \gamma) , \quad (3.17)$$

and $\beta_{S,n} = (1 + k_S)^{-n/360}$. The root of the above quadratic Equation (3.14), which falls within the valid range, as in Equation (3.8), i.e., $(0, \bar{\alpha}_S)$, is

$$\alpha_S^* = \left(-b_S - \sqrt{b_S^2 - 4a_Sc_S} \right) / 2a_S . \quad (3.18)$$

3.3.2.2. Modeling the Demand-side

The objective of the buying firms is also to maximize the present value of their future cash flow with respect to the discount rate, α_B . The aggregate present value of future cash flows for all buyers is given as follows

$$\max_{\alpha_B} V_B(\alpha_B) , \quad (3.19)$$

subject to the following constraint

$$V_B(\alpha_B) = \tau PQ - \theta pQ - (1 - \theta)\omega PQ\beta_{B,n} , \quad (3.20)$$

where α_B is a discount rate offered to buyers,

$$p = p(\alpha_B) = P(1 - \alpha_B) \quad (3.21)$$

is the discounted price, and

$$\beta_{B,n} = (1 + k_B)^{-\frac{n}{360}} \quad (3.22)$$

is the buyers' discount factor, where k_B is the buyers' opportunity cost of capital. The first term of the Equation (3.20) represents the perceived worth of the goods (or services) purchased by

the buyers. The value of τ is positive and equals one (i.e., unity) if the goods are valued at par. Their worth may also be less or more than one if they are valued at a discount or premium, respectively. The second term represents the spot price paid (net of discount) by the cash buyers. Finally, the last term reflects the discounted cost paid by credit buyers.

The necessary steps to derive the optimal buyers' discount rate follow those employed for deriving the optimal supplier's discount rate. First, to maximize V_B with respect²⁰ to α_B we compute the demand-side FONC

$$\partial V_B(\alpha_B)/\partial(\alpha_B) = 0 . \quad (3.23)$$

Dividing the resulting expression by P yields

$$(\tau - \theta(1 - \alpha_B) - (1 - \theta)\omega\beta_{B,n})\frac{\partial Q}{\partial\alpha_B} + (\omega\beta_{B,n} + \alpha_B - 1)Q\frac{\partial\theta}{\partial\alpha_B} - (1 - \theta)\beta_{B,n}Q\frac{\partial\omega}{\partial\alpha_B} + \theta Q = 0 . \quad (3.24)$$

The buyers' side reflects the same assumptions as those of the supplier in terms of $\theta(\alpha_B)$ and ω (see again Equations (3.7) and (3.9)). Furthermore, consistent with the supply-side analysis, the total quantity demanded (Q) is assumed to be a function of the effective spot price p (i.e., discounted price P). The elasticity of demand is given below

$$\epsilon_B = \frac{\partial Q}{\partial p} \frac{p}{Q} \leq 0 . \quad (3.25)$$

The impact of a higher discount rate α_B on the spot price of the product is contingent on its price elasticity, ϵ_B . We can express this as a reaction to an increase in α_B on sales S as given below

$$\frac{\partial S}{\partial\alpha_B} > 0 \Leftrightarrow -PQ - Pp\frac{\partial Q}{\partial p} > 0 \Leftrightarrow \frac{\partial Q}{\partial p} < 0 \Leftrightarrow -\frac{Q}{p} < 0 . \quad (3.26)$$

That is, sales increase only if the quantity demanded increases sufficiently enough $\partial Q > 0$ following a decrease in price $\partial p < 0$. Incorporating the price elasticity of demand translates into

20 Similar to V_S , the buyers' present value V_B is also a function of P, k_B, τ , and n .

$$\frac{\partial S}{\partial \alpha_B} > 0 \Leftrightarrow \epsilon_B < -1 . \quad (3.27)$$

The demand for an elastic product ($\epsilon_B < -1$) responds to the changes in α_B more extensively. That is, an increase in α_B leads to an increase in sales S . On the other hand, the demand for an inelastic product ($-1 < \epsilon_B$) is less sensitive to a change in price. That is, an increase in α_B leads to a decrease in sales S

$$\frac{\partial S}{\partial \alpha_B} < 0 \Leftrightarrow \epsilon_B > -1 . \quad (3.28)$$

Finally, a unitary elastic good (or service) does not affect the level of sales S

$$\frac{\partial S}{\partial \alpha_B} = 0 \Leftrightarrow \epsilon_B = -1 . \quad (3.29)$$

After incorporating the earlier behavioral assumptions, as in Equations (3.7) and (3.9), and the elasticity of demand (ϵ_B) into Equation (3.24), we multiply both sides of the resulting equation by $-(1 - \alpha_B)/Q$. This yields

$$\tau\epsilon_B - \gamma(\alpha_B(2 + \epsilon_B) - 1)(1 - \alpha_B) - \beta_{B,n}\omega(\gamma(1 - \alpha_B) + \epsilon_B(1 - \gamma\alpha_B)) = 0 . \quad (3.30)$$

As before, to solve for α_B , we simplify this as a quadratic equation in α_B

$$a_B\alpha_B^2 + b_B\alpha_B + c_B = 0 , \quad (3.31)$$

where

$$a_B = \gamma(\epsilon_B + 2) , \quad (3.32)$$

$$b_B = -\gamma(\epsilon_B + 3 - \beta_{B,n}\omega(\epsilon_B + 1)) , \quad (3.33)$$

$$c_B = \gamma + \tau\epsilon_B - \beta_{B,n}\omega(\epsilon_B + \gamma) , \quad (3.34)$$

and $\beta_{B,n} = (1 + k_B)^{-n/360}$. We then select the root of the above quadratic Equation (3.31), which falls within the valid range (3.8), i.e., $(0, \overline{\alpha_B})$. That is

$$\left(-b_B - \sqrt{b_B^2 - 4a_Bc_B}\right)/2a_B . \quad (3.35)$$

Compared to the quadratic Equation (3.14) for suppliers, the quadratic Equation (3.31) for buyers incorporates the demand-side price elasticity $\epsilon_B < 0$, the buyers' opportunity cost of capital k_B (via the buyers' discount factor $\beta_{B,n}$), as well as the buyers' perceived worth of goods τ . The coefficients $\{a_B, b_B, c_B\}$, structurally mirror those for the suppliers, $\{a_S, b_S, c_S\}$. However, there is a change in sign in the elasticities reflecting the demand-side.

3.3.2.3. Market Clearing Condition

For markets to clear, the bid (α_B) and the ask (α_S) prices of TC should equal, along with the respective quantities bought on credit. This yields:

$$\alpha_S = \alpha_B = \alpha . \quad (3.36)$$

Since prices of financial facilities and discount rates are inverse of each other, the above equation implies that the bid price equals the highest buy order, while the ask price equals the lowest sell order. The above requirement can be combined with conditions as in Equations (3.14) and (3.31) for the supplier's side and buyers' side, respectively. In general, when $k_S \neq k_B$, $\epsilon_B < 0$, and $\epsilon_S > 0$, these two quadratic equations can be integrated to isolate the common market-clearing TC rate (α). We accomplish this by subtracting Equation (3.14) from Equation (3.31) to get

$$a\alpha^2 + b\alpha + c = 0 , \quad (3.37)$$

where the quadratic equation's coefficients are simplified as follows

$$a = a_B - a_S = \gamma(\epsilon_B - \epsilon_S) , \quad (3.38)$$

$$b = b_B - b_S = -\gamma \left(\epsilon_B - \epsilon_S - \beta_{B,n}\omega(\epsilon_B + 1) + \beta_{S,n}\omega(\epsilon_S + 1) \right) , \quad (3.39)$$

$$c = c_B - c_S = \tau\epsilon_B - v\epsilon_S - \beta_{B,n}\omega(\epsilon_B + \gamma) + \beta_{S,n}\omega(\epsilon_S + \gamma) . \quad (3.40)$$

This quadratic equation provides an optimal equilibrium value of the TC-*murabaha* rate involving the product price elasticity of the selling firm and the buying ones. Thus, the optimal α^* can be obtained in the range $(0, \bar{\alpha})$ by solving Equation (3.37), as given below²¹

$$\alpha^* = (-b - \sqrt{b^2 - 4ac})/2a . \quad (3.41)$$

The above rate is used to evaluate the optimal TC-*murabaha* discount rate (derived in Appendix A.1) as follows

$$m^* = \frac{\alpha^*}{1-\alpha^*} . \quad (3.42)$$

Thus, our result given by Equation (3.42) is in the spirit of Lam and Chen (1986, p. 1146), who state that “*For a value-maximizing firm, the optimality condition for pricing requires equating the marginal value of accounts receivable to the marginal value of the cost of production...*”

3.4. Results and Discussion

3.4.1. Key Result

Proposition. *The TC-*murabaha* discount rate is a function of not only the prevailing opportunity costs of capital of both the selling firm and the buying firms but also incorporates the price elasticities of the product. This has the potential to offer a ‘*murabaha*’ rate even lower than the opportunity costs of capital of not only the financiers but also the buyers, especially in periods of monetary contractions. Since the elasticities of buyers are heterogeneous in the real world, this allows the selling firm to price-discriminate among their buyers. This feature enables the TC-*murabaha* to curtail the deadweight loss stemming from market inefficiencies and thus induces welfare gains for the society.*

The above result is derived in a competitive market framework. Nonetheless, we are of the view that our general conclusion may not deviate under other market structures as they are obtained under the economies of scale and scope of businesses (i.e., trading or commercial

21 We ignore the higher value of α as it is greater than 100% and does not make economic sense.

organizations) operating in the *real* sector of the economy.²² Our result also exemplifies the deeper meaning of *trade* or *commerce* and sets it apart from subterfuges employed by the Islamic banking industry in the *financial* sector of the economy. This result has ramifications beyond the working capital environment of businesses.²³ This is illustrated with numerical simulations in Subsection 3.4.2 below.

Our result is consistent with the economic intuition of credit sales in helping complete the market as espoused in Sen (1998). However, our findings contradict the contemporary *murabaha* rate derived from the simple textbook formula of the market interest rate plus a risk premium. The reason for our improved result is attributed to the optimization of the welfare of both competing businesses (i.e., buyer and seller), leading to the economies of scale and scope in the *real* sector of the economy. This contrasts with the contemporary IB, which operates in the highly efficient *financial* sector where arbitrage forces it to offer market-driven rates.²⁴

Furthermore, the above innovative proposition responds to the call for advancing IB by re-embedding the economic rationale and, thus, the objective of Islamic law. Our results have significant ramifications, especially in the current coronavirus crisis, as they do not burden businesses with long-term debt and yield a very efficient and resilient financial architecture, as elaborated in Subsection 3.4.3.

22 This highlights the concern of bankers who contend that they are not able to offer significantly lower financing rates than the captive finance companies of manufactures as they have been subsidized by their parent firm (see Sen, 1998).

23 Our result has implications on the structuring of Islamic financial architecture. This is discussed in Subsection 3.4.3 below.

24 One might argue that the lower TC-*murabaha* rate will invite rational investors to exercise arbitrage opportunities in the *real* sector of the economy. This is not feasible for two reasons. First, the literature on TC illustrates how suppliers can comparatively decipher information on their buyers quickly and at a lower cost than that by financial institutions (see again Smith, 1987; Brennan et al., 1988; Ng et al., 1999). This includes information on the capacity of the buyers. They can then ‘ration’ their intermediate goods to the buyer to deter the buyer from becoming a competitor by resorting to arbitrage. Second, buyers would face transaction costs while transferring ownership from themselves to secondary buyers. The fact that TC is predominantly used for procuring intermediate goods for production, where the products are not generic, making the market for them to be inexistent.

3.4.2. Proof of Proposition Employing Numerical Simulation

3.4.2.1. The Effect of Price Elasticity on the Optimum TC-Murabaha Discount Rate

Our model numerical simulation assumes the following exogenous parameters: $\omega = 97\%$; $k_S = k_B = 15\%$; $v = 75\%$; $\tau = 1$; $n = 90$ days; and $\gamma = 30$.²⁵ Table 3.1 and Figure 3.5 summarize the respective annualized discount rates α_y^* 's and m_y^* 's²⁶ obtained from Equations (3.41) and (3.42) for demand and supply price elasticities in the range $\epsilon_B \in [0, -2]$ and $\epsilon_S \in [2, 0]$, respectively. We compute a grid of optimal values of the discount coefficient for elasticities spaced at equally distant nodes, i.e., $\Delta\epsilon_B = \Delta\epsilon_S = 0.5$. Our results illustrate the generally negative relationship between the levels of price elasticity and the optimum TC-*murabaha* discount rate. This effect is most prominent in the case of the price elasticity of supply. The lowest TC-*murabaha* rate is achieved when the price elasticity of supply and demand is high (2 and -2 , respectively). In this case, the optimum annualized TC rate is 11.41%, which is equivalent to 12.87% of the optimum annualized TC-*murabaha* mark-up rate, m_y^* . In contrast, the highest rate occurs when the product price elasticity of both supply and demand is equal to zero (i.e., inelastic case). In this situation, the equilibrium TC rate is 13.28%, equivalent to 15.31% of the TC-*murabaha* mark-up rate.

These results also confirm our proposition that the TC-*murabaha* rate can be even lower than the opportunity cost of capital. This is because in our simulation, almost all annualized optimum TC rates, α_y^* , and mark-up rates, m_y^* , as computed for different elasticities, are lower than $k = 15\%$. All m_y^* are lower than k except when ϵ_S equals to zero.²⁷ It is worth noting

25 We employ a more conservative assumption of $\gamma = 30$. This is in contrast to Hill and Riener (1979) and R&M who respectively assume $\gamma = 1$ and $\gamma = 10$. Nonetheless, our simulation results are still robust for the lower levels of γ , as illustrated in Subsection 3.4.2.4.

26 In our notation, the subscript y represents a calendar year. The derivations of both α_y^* and m_y^* are illustrated in Tables 3.1 and 3.4.

27 See again Figure 3.5, where most of the optimal mark-up rates (m_y^* 's) lie below the opportunity cost of capital $k = 15$. The latter is represented as a translucent horizontal surface.

that, in the case of contemporary *murabaha*, the opportunity cost of capital, k_S , from the perspective of the selling firm, is equal to the minimum rate charged by banks to their debtors. In practice, however, IBs charge even a higher rate than this opportunity cost, i.e., opportunity cost plus a risk (i.e., a ‘piety’) premium.

Table 3.1: Optimum annual TC-*murabaha* rates under various elasticities

ϵ_S	ϵ_B									
	0		-0.5		-1		-1.5		-2	
	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*
2	11.65	13.19	11.59	13.11	11.53	13.03	11.47	12.95	11.41	12.87
1.5	12.06	13.71	11.59	13.63	11.93	13.55	11.87	13.47	11.81	13.39
1	12.46	14.23	12.40	14.15	12.34	14.07	12.27	13.99	12.21	13.91
0.5	12.87	14.77	12.80	14.68	12.74	14.60	12.68	14.52	12.62	14.44
0	13.28	15.31	13.21	15.22	13.15	15.14	13.09	15.06	13.02	14.97

Notes: The variable ϵ_B expresses price elasticity of demand, while ϵ_S represents the price elasticity of the supply. Furthermore, α_y^* is annualized optimum TC rate, i.e., $\alpha_y^* = [(1 + \alpha^*)^{\frac{360}{n}} - 1]$, while m_y^* represents annualized optimum TC-*murabaha* rate, where $m_y^* = \alpha_y^*/(1 - \alpha_y^*)$. All rates (α_y^*, m_y^*) are expressed in percentages per annum. The exogenous parameters assumed here are: $\omega = 97\%$; $k_S = k_B = 15\%$; $v = 75\%$; $\tau = 1$; $n = 90$ days; and $\gamma = 30$.

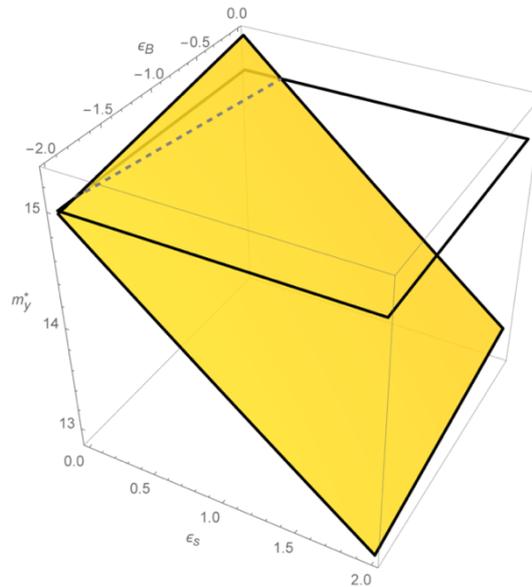


Figure 3.5: Optimum TC-*murabaha* rates across various price elasticities.

Notes: The variables m_y^* , ϵ_B , and ϵ_S represent the optimum annualized TC-*murabaha* mark-up rate and the respective elasticities of demand and supply. The above figure illustrates: (a) the TC-*murabaha* rate, m_y^* can be lower than the opportunity cost of capital (represented as a horizontal translucent surface at the $k = 15\%$ level) for most of the price elasticity levels (ϵ_B, ϵ_S); (b) a negative relationship between the levels of price elasticity (ϵ_B, ϵ_S) and optimum TC-*murabaha* discount rate m_y^* ; (c) the minimum and maximum TC-*murabaha* rates of $m_y^* = 12.87\%$ and $m_y^* = 15.31\%$, respectively are derived using the highest and lowest price elasticities for the selling and buying firms (i.e., $\epsilon_B = 2, \epsilon_S = -2$ and $\epsilon_B = \epsilon_S = 0$, respectively).

3.4.2.2. Comparative Static Analysis: The Effect of Variation in the Opportunity Costs on the Optimal TC-Murabaha Rate

Figure 3.6 illustrates the impact of different levels of the opportunity cost of capital (k 's) on m_y^* .²⁸ The figure suggests that the relationship between k 's and m_y^* 's is an increasing quasilinear function. An increase in k leads to a rise in m_y^* due to the time value of money. The price elasticities (ϵ_S and ϵ_B) have almost no effect on the slope of the curve. However, different values of ϵ shift the curve downward for the more elastic product and upward for the less elastic one.

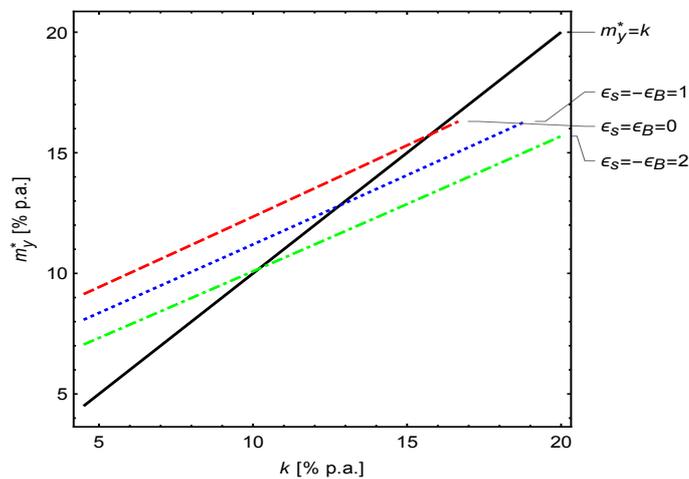


Figure 3.6: The impact of opportunity costs of capital (k) on TC-*murabaha* rates m_y^* for various price elasticities.

Notes: The variables m_y^* , k , ϵ_B , and ϵ_S represent the optimum annualized TC-*murabaha* mark-up rate, the opportunity cost of capital, and the respective elasticities of demand and supply. The above figure illustrates that the more elastic is the product (from the perspective of both selling firm and buying ones), the higher is the possibility of obtaining a TC-*murabaha* discount rate lower than the opportunity cost of capital (i.e., $m_y^* < k$).

Furthermore, Table 3.2 depicts cases (highlighted in **bold**) where m_y^* 's are lower than k . These occur when (i) k and/or (ii) ϵ increase. In the base case, when k equals 11%, m_y^* is always higher than k for all values of ϵ_S and ϵ_B , except when ϵ_S equals to 2. However, when k increases to 12%, then m_y^* for the lower elasticity of supply of the product, i.e., $\epsilon_S = 1.5$,

28 Assuming that $k_S = k_B = k$.

also becomes lower than k for all levels of elasticity of demand, ϵ_B . Finally, when k increases to 16%, then m_y^* becomes lower than k for all combinations of elasticity levels. Thus, the higher the value of discount rate k , the lower is the feasibility of the TC-*murabaha* pricing rate, i.e., $m_y^* < k$. This shows that m_y^* is more stable than k , especially in the case where k increases rapidly, such as in an inflationary environment.

Table 3.2: Cases where the optimum annual TC-*murabaha* rates are lower than the opportunity costs of capital

		$k = 11$					$k = 12$				
		ϵ_B					ϵ_B				
ϵ_S		0	-0.5	-1	-1.5	-2	0	-0.5	-1	-1.5	-2
2		10.93	10.86	10.79	10.72	10.64	11.50	11.42	11.35	11.27	11.20
1.5		11.42	11.35	11.28	11.20	11.13	11.99	11.92	11.84	11.77	11.69
1		11.92	11.85	11.77	11.70	11.62	12.50	12.42	12.35	12.27	12.19
0.5		12.43	12.35	12.28	12.20	12.13	13.01	12.93	12.86	12.78	12.70
0		12.94	12.86	12.79	12.71	12.64	13.53	13.45	13.37	13.30	13.22
		$k = 13$					$k = 14$				
		ϵ_B					ϵ_B				
ϵ_S		0	-0.5	-1	-1.5	-2	0	-0.5	-1	-1.5	-2
2		12.06	11.99	11.91	11.83	11.76	12.63	12.55	12.47	12.39	12.31
1.5		12.57	12.49	12.41	12.33	12.26	13.14	13.06	12.98	12.90	12.82
1		13.08	13.00	12.92	12.84	12.76	13.65	13.57	13.49	13.42	13.34
0.5		13.59	13.52	13.44	13.36	13.28	14.18	14.10	14.02	13.94	13.86
0		14.12	14.04	13.96	13.88	13.80	14.71	14.63	14.55	14.47	14.39
		$k = 15$					$k = 16$				
		ϵ_B					ϵ_B				
ϵ_S		0	-0.5	-1	-1.5	-2	0	-0.5	-1	-1.5	-2
2		13.19	13.11	13.03	12.95	12.87	13.76	13.68	13.60	13.52	13.43
1.5		13.71	13.63	13.55	13.47	13.39	14.28	14.20	14.12	14.04	13.96
1		14.23	14.15	14.07	13.99	13.91	14.81	14.73	14.65	14.57	14.48
0.5		14.77	14.68	14.60	14.52	14.44	15.25	15.27	15.19	15.10	15.02
0		15.31	15.22	15.14	15.06	14.97	15.90	15.82	15.73	15.65	15.56

Notes: This table assumes $k_S = k_B = k$. The numbers highlighted in bold are solutions yielding $m_y^* < k$. All rates (m_y^*) are expressed in percentages per annum. The exogenous parameters assumed here are $\omega = 97\%$; $v = 75\%$; $\tau = 1$; $n = 90$ days; and $\gamma = 30$.

The latter condition, for instance, might be observed by taking into account the case of α_y^* for $k = 14\%$. In this case, m_y^* for inelastic supply, i.e., $\epsilon_S = 0$, is still higher than k . However, for unitary or elastic supply, i.e., $\epsilon_S \geq 1$, m_y^* becomes lower than k . In addition, for less elastic supply, i.e., $\epsilon_S = 1/2$, m_y^* is higher than k , particularly when the demand is inelastic, $\epsilon_B = 0$. When the demand gets more elastic, i.e., $\epsilon_B < 0$, then m_y^* becomes lower

than k . Thus, the more elastic is the product (from the perspective of both supply and demand), the higher is the possibility of $m_y^* < k$. We conclude that the above supports our proposition that there is potential to offer TC-*murabaha* rates below the opportunity costs of capital, i.e., when k and/ or ϵ are high.

3.4.2.3. Robustness Check: Relaxing the Assumption of k

Table 3.3: Optimal annual TC-*murabaha* (m_y^*) rates under various opportunity costs of capital

ϵ_S	ϵ_B	$k_B(k_S = 11\% \text{ p. a.})$					$k_S(k_B = 11\% \text{ p. a.})$				
		11	12	13	14	15	11	12	13	14	15
0	0	12.94	13.23	13.53	13.82	14.11	12.94	13.23	13.53	13.82	14.11
0.5	0	12.43	12.72	13.01	13.30	13.59	12.43	12.72	13.01	13.30	13.59
1	0	11.92	12.21	12.50	12.78	13.07	11.92	12.21	12.50	12.78	13.07
1.5	0	11.42	11.71	11.99	12.28	12.56	11.42	11.71	11.99	12.28	12.56
2	0	10.93	11.22	11.50	11.78	12.06	10.93	11.22	11.50	11.78	12.06
0	-0.5	12.86	13.16	13.45	13.74	14.02	12.86	13.16	13.45	13.74	14.03
0.5	-0.5	12.35	12.64	12.93	13.22	13.51	12.35	12.64	12.93	13.22	13.51
1	-0.5	11.85	12.13	12.42	12.70	12.99	11.85	12.14	12.42	12.71	12.99
1.5	-0.5	11.35	11.63	11.92	12.20	12.48	11.35	11.64	11.92	12.20	12.48
2	-0.5	10.86	11.14	11.42	11.70	11.98	10.86	11.14	11.42	11.70	11.98
0	-1	12.79	13.08	13.37	13.66	13.95	12.79	13.08	13.37	13.67	13.96
0.5	-1	12.28	12.56	12.85	13.14	13.43	12.28	12.57	12.86	13.14	13.43
1	-1	11.77	12.06	12.34	12.63	12.91	11.77	12.06	12.35	12.63	12.92
1.5	-1	11.28	11.56	11.84	12.12	12.40	11.28	11.54	11.84	12.13	12.41
2	-1	10.79	11.07	11.34	11.62	11.90	10.79	11.07	11.35	11.63	11.91
0	-1.5	12.71	13.00	13.29	13.58	13.87	12.71	13.00	13.30	13.59	13.88
0.5	-1.5	12.20	12.49	12.77	13.06	13.35	12.20	12.49	12.78	13.07	13.35
1	-1.5	11.70	11.98	12.26	12.55	12.83	11.70	11.99	12.27	12.56	12.84
1.5	-1.5	11.20	11.48	11.76	12.04	12.32	11.20	11.49	11.77	12.05	12.33
2	-1.5	10.72	10.99	11.27	11.54	11.82	10.72	11.00	11.28	11.56	11.83
0	-2	12.64	12.92	13.21	13.50	13.79	12.64	12.93	13.22	13.51	13.80
0.5	-2	12.13	12.41	12.70	12.98	13.26	12.13	12.42	12.70	12.99	13.28
1	-2	11.62	11.91	12.19	12.47	12.75	11.62	11.91	12.20	12.48	12.76
1.5	-2	11.13	11.41	11.68	11.96	12.24	11.13	11.41	11.70	11.98	12.26
2	-2	10.64	10.92	11.19	11.46	11.74	10.64	10.92	11.20	11.48	11.76

Notes: The opportunity cost of capital of the selling firm (buying firm), $k_S(k_B)$, is fixed at 11% p.a., while that of the buying ones (selling ones), $k_B(k_S)$, varies between 11 to 15 % p.a. All rates (m_y^*) are expressed in percentages per annum. The numbers highlighted in bold are solutions yielding $m_y^* < k_B$ ($m_y^* < k_S$). The exogenous parameters assumed here are $\omega = 97\%$; $v = 75\%$; $\tau = 1$; $n = 90$ days; and $\gamma = 30$.

Our proposition still holds even when we relax the assumption of $k = k_S = k_B$. Table 3.3 shows m_y^* for different values of k_S and k_B .²⁹ That is, (i) when $k_S = 11\%$ while k_B is

29 Since $\frac{\partial m_y^*}{\partial k_B} \approx \frac{\partial m_y^*}{\partial k_S}$, the results for $m_y^* = f(k_B|k_S = 11\%)$ and $m_y^* = f(k_S|k_B = 11\%)$ in Table 3.3 are virtually identical.

varied between 11% and 15%, and (ii) when $k_B = 11\%$, while varying k_S . The table points out a congruent result where the condition $m_y^* < k_S$ and $m_y^* < k_B$ holds in all the various price elasticities when k_S or k_B increase above 11%.

3.4.2.4. Robustness Check: Relaxing the Assumption of γ

Our numerical simulation initially assumes the value of $\gamma = 30$, which links the TC-*murabaha* rate (m) to the proportion θ of buyers who buy the goods on the spot (see Equation (3.7)). Our results are robust to even significant reductions in γ . Table 3.4 illustrates the optimum TC-*murabaha* rate under various demand and supply elasticities levels when γ equals 10 and 20 in Panels 1 and 2, respectively. With the lower values of γ , the numbers of m_y^* that are higher than the opportunity cost, k , ($m_y^* > k$) drop to only one case, in contrast to 4 cases in our base case numerical simulation illustrated in Table 3.1. Therefore, reducing the assumption of γ improves our results by lowering the optimum TC-*murabaha* rate to the values provided in Table 3.1. This is consistent with our proposition.

Furthermore, our results also suggest that elasticities play a significant role in explaining the variability of m_y^* under lower values of γ . This can be inferred from the increase in spreads between the highest and the lowest value of m_y^* in our simulation with lower γ values.³⁰ These spreads between the two m_y^* for γ values of 30, 20, and 10, respectively, are 2.44%, 3.60%, and 6.87%. Thus, a lower level of γ selected in our numerical simulation yields more robust results. This is because a higher value of the discount-demand parameter γ weakens the effect of ϵ_S and ϵ_B on m_y^* , thereby yielding a higher possibility of $m_y^* > k$.

In conclusion, our numerical implementation generates optimum TC-*murabaha* rates that are a function of not only short-run costs of capital but also product price elasticities and the other parameters. That is, $m^* = f(k_S, k_B, \epsilon_S, \epsilon_B, v, \tau, \omega, \gamma)$. Our numerical experimentations

30 The highest m_y^* occurs when $\epsilon_S = \epsilon_B = 0$, while the lowest one occurs when $\epsilon_S = 2$ and $\epsilon_B = -2$.

show that there is potential to offer TC-*murabaha* rates below the opportunity cost of capital of the selling firm. This supports the argument that vendor financing (or TC-*murabaha*) is superior to a bank loan (or contemporary *murabaha*). This is consistent with the fact that the TC-*murabaha* can provide a more stable credit rate over time in contrast to a lending facility with varying interest rates (see Ng et al., 1999). Constrained buyers shift to vendor financing, particularly in periods of monetary contractions, when banks may not offer credit with competitive rates.

Table 3.4: Robustness checks for optimum TC-*murabaha* rates with different γ values

Panel 1: $\gamma = 10$										
ϵ_S	ϵ_B									
	0		-0.5		-1		-1.5		-2	
	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*
2	8.95	9.82	8.66	9.48	8.37	9.13	8.07	8.78	7.78	8.44
1.5	10.00	11.11	9.71	10.75	9.42	10.39	9.12	10.04	8.83	9.69
1	11.08	12.45	10.78	12.08	10.49	11.71	10.19	11.35	9.90	10.98
0.5	12.17	13.85	11.87	13.47	11.57	13.09	11.27	12.71	10.98	12.33
0	13.28	15.31	12.97	14.91	12.67	14.51	12.37	14.12	12.07	13.73

Panel 2: $\gamma = 20$										
ϵ_S	ϵ_B									
	0		-0.5		-1		-1.5		-2	
	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*	α_y^*	m_y^*
2	10.97	12.32	10.85	12.17	10.73	12.02	10.61	11.86	10.49	11.71
1.5	11.54	13.04	11.42	12.89	11.30	12.73	11.17	12.58	11.05	12.43
1	12.11	13.78	11.99	13.62	11.87	13.47	11.75	13.31	11.63	13.16
0.5	12.69	14.54	12.57	14.38	12.45	14.22	12.33	14.06	12.20	13.90
0	13.28	15.31	13.15	15.14	13.03	14.98	12.91	14.82	12.79	14.66

Notes: The parameter ϵ_B denotes price elasticity of demand, while ϵ_S represents the price elasticity of supply. Furthermore, α_y^* is annualized optimum TC rate, i.e., $\alpha_y^* = [(1 + \alpha^*)^{\frac{360}{n}} - 1]$, while m_y^* represents annualized optimum TC-*murabaha* rate, where $m_y^* = \alpha_y^*/(1 - \alpha_y^*)$. All rates (α_y^*, m_y^*) are expressed in percentages per annum. The numbers highlighted in the bold font are solutions yielding $m_y^* > k$. The exogenous parameters assumed here are: $\omega = 97\%$; $v = 75\%$; $k_S = k_B = k = 15\%$; $\tau = 1$; and $n = 90$ days.

Our results are contradictory to Cuñat (2007), Klapper et al. (2012), and Wu et al. (2014). They argue that TC has a higher implicit interest rate than bank credits because suppliers require insurance and default premia to remunerate borrowers' financial constraints. This is not the case for our analysis. On the flip side, suppliers benefit from better collateral asset liquidation, information acquisition, and demand risk-sharing. This result is consistent with

Nilsen (2002), Ge and Qiu (2007), Fabbri and Menichini (2010), Sautner and Vladimirov (2018), and Yang and Birge (2018). Apart from this, the advantage of TC-*murabaha* is observed in the real world with market imperfections. That is, where there is endemic asymmetric information and where the borrowing is higher than the lending rate. Our modeling, however, also allows the selling firm to have advantages even when they operate in an efficient financial system through price discrimination involving the price elasticity of both supply and demand. In this respect, our results reconcile with Brennan et al. (1988).

3.4.3. Implications of the Results on the Financial Architecture

Fundamentally, our findings imply the employment of the universal Islamic banking architecture (see Figure 3.7) instead of the contemporary Islamic commercial banking one to avail of the advantages of TC and to conform to the objectives of the Islamic law. This is due to the following reasons. First, the Universal Islamic Bank (UIB) architecture allows a financial intermediary to own an equity or a quasi-equity stake in a selling firm (i.e., $Firms_{1-z}$).³¹ This is consistent with the spirit of risk-sharing in Islam and endows resilience to the financial system (see Ebrahim et al., 2017). The UIB's investment in the selling firms is akin to the medieval profit and loss form of financing.

Second, the selling firm owned by the UIB can sell its products on credit, employing the TC-*murabaha* facility to buying firms in the *real* sector of the economy. It remedies the chronic ownership and the fragile long-term debt of contemporary *murabaha*. The former is easily tackled as the UIB no longer needs to pre-own the goods 'sold'—they are pre-owned by its

31 The equity/quasi-equity link between a UIB and the selling firms distinguishes itself from a purely German or a Japanese financial architecture where banks have debt along with equity stakes in their interlinked firms. Our UIB structure aligns the goals of the main bank with that of the interlinked firms. In contrast, the debt link in the German/Japanese system can aggravate fragility, especially when the agency issues between the two are exacerbated (Xie, 2007).

inter-linked selling firms.³² The latter is solved by substituting the risk-sharing mechanism of TC in the *real* sector of the economy (see again Subsection 3.3.2).

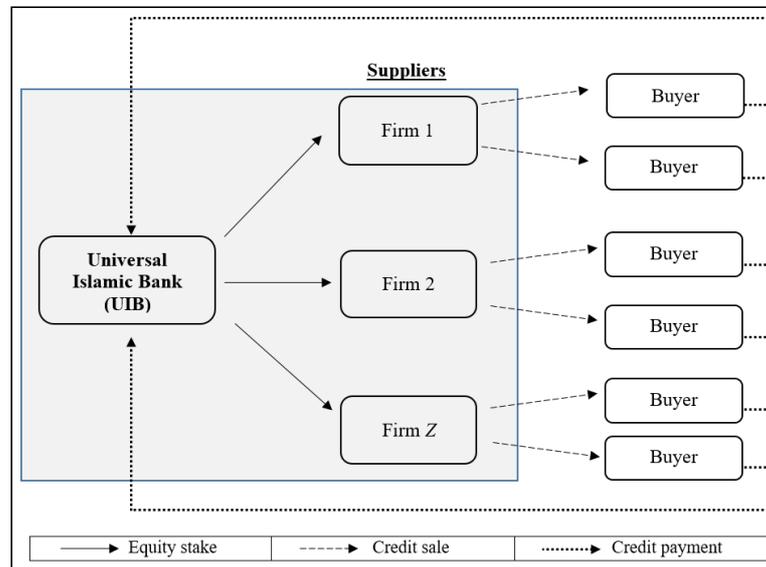


Figure 3.7: Universal Islamic banking architecture

Notes: In countries that do not allow universal banking, the UIB above can be substituted by a Global Markets and Asset Management of a Financial Conglomerate.

Third, a UIB serves a crucial role as a receivable collector. While a selling firm is better at evaluating and enforcing the contract (Petersen and Rajan, 1997; Cuñat, 2007), a UIB is better at collecting account receivables as it has a more established network system. Thus, the UIB architecture has the potential to alleviate the cost of payment collection in the TC finance as expressed by Biais and Gollier (1997).

Although the above intuitive model is theoretically appealing, a number of conditions need to be addressed to implement it in the real world. The main challenge comes from the regulatory constraints³³ in some countries that would subject the overall holding company of the universal bank to capital adequacy, leverage ratio, and liquidity requirements.

32 Here, the firm need not be selling only tangible goods. It can also be a service provider like an accountant, lawyer, etc. In this case, our UIB also increases the economies of scope.

33 These regulatory constraints would include those levied at the local (such as county/ state) or national or global (such as the Basel Standards) levels. See again Bitar et al. (2021).

Nonetheless, the proposed model best fits within a modified universal banking system of Germany where the banks are permitted to have an equity stake in addition to loans, with voting rights and even placing their representative on the board of directors of the firms they serve (Boyd et al., 1998; Guinnane, 2002; Neuhann and Saidi, 2018).³⁴ The model may also be implemented within an altered Japanese main banking system, which resembles Germany's. This is despite the post-WWII regulation, which does not permit Japanese banks to have an equity position in the non-bank firms of more than 5 percent, akin to that of the USA. In emulating the German financial system, Japan's financial architecture resembles the *keiretsu* system, where companies are related to each other and the main bank by mutual shareholding (Benston, 1994; Miwa and Ramseyer, 2002; Sueyoshi et al., 2010). This structure endows universal banks: (i) the economies of scale and scope; (ii) to be active in corporate governance; and (iii) to be resilient to financial distress (Berglöf and Perotti, 1994; Berlin et al., 1996; Gorton and Schmid, 2000). Thus, we envision an improved version of Germany and Japan's universal banking models to be more appropriate to accommodate the proposed Islamic banking architecture.

In the extreme case, where national regulations do not allow a universal banking model, our proposal can still be implemented within a financial conglomerate structure where the Global Markets and Asset Management Divisions of the Islamic financial services company owns an equity (or quasi-equity) stake in selling firms. Our assertions are confirmed in the specialized banking system such as that of the USA, where the Gramm-Leach-Bliley (GLB or the Financial Modernization) Act of 1999 allows the consolidation of commercial banks, investment banks, securities firms, and insurance companies (Broome and Markham, 2001). This Act has created financial behemoths of the likes of Bank of America Corporation,

34 Representation in the board of directors of firms mitigates asymmetric information between a UIB and the firms (Kroszner and Strahan, 2001).

Citigroup Inc., Goldman Sachs Group Inc., JP Morgan Chase and Company, Morgan Stanley Inc., etc. The USA is not an isolated case. Other countries, too, allow financial conglomerates. This includes Australia, Canada, France, Italy, the United Kingdom, etc.

3.5. Conclusion

This paper proposes the refining of Islamic banking. The increase in long-term debt of businesses, such as that in the post coronavirus environment, can slow the economic recovery as loan obligations force firms to defer expanding their respective businesses. TC illustrates the collaborative efforts of businesses to help each other on a short-term basis. It is cyclical based on the phase of the economy and alleviates both agency costs of debt (i.e., risk-shifting and underinvestment). TC can redeem the ill-suited *murabaha* financing offered by IBs in the *financial* sector of the economy. We recommend an efficient financial intermediation system in line with the objectives of Islamic law.

We propose a TC mechanism in a working capital setting of businesses. This revives the spirit of the classic *murabaha* facility within the *real* sector as opposed to the banking *murabaha* conducted in the *financial* sector of the economy. We then price the credit sale facility by extending the TC literature (Shenoy and Williams, 2017; Yang and Birge, 2018). Our parsimonious model illustrates that the classic *murabaha* (in a TC framework) can offer more competitive rates than the banking *murabaha*. This is consistent with prominent literature such as Nilsen (2002), Ge and Qiu (2007), Fabbri and Menichini (2010), Klapper and Randall (2011), Chod (2017), Sautner and Vladimirov (2018), and Yang and Birge (2018).

The ramifications of our findings go beyond adopting the TC concept into the classic *murabaha* financing. Instead, we also reconstrue the architecture of Islamic banking into universal banking to offer economies of scale and scope (Carvallo and Rossi, 2002; Guinnane, 2002; Miwa and Ramseyer, 2002; Santos and Rumble, 2006; Sueyoshi et al., 2010; Neuhann and Saidi, 2018). Combining TC-*murabaha* with universal banking can address the transfer of

ownership problems and disengage the facility's pricing from the market rates. It also facilitates optimum supply chain management and active corporate governance of the related firm, thereby alleviating financial fragility as illustrated in Berglöf and Perotti (1994), Berlin et al. (1996), Gorton and Schmid (2000), Chod (2017), and Devalkar and Krishnan (2019). In countries where the regulations impose barriers on banking, securities, and insurance businesses, the next best alternative is a financial conglomerate structure emulating Goldman Sachs Group Inc. in the USA.

We believe that our results will stimulate a rethink of contemporary Islamic banking, thereby increasing its efficiency. We argue that such a reassessment will enable it to dissipate systemic risk better and thus make the financial system more resilient to shocks. This will further the expansion of businesses worldwide, enhancing global growth.

Chapter 4

Does *Sukūk* Aggravate Income Inequality?

4.1. Introduction

There is no fundamental reason why we should believe that growth is automatically balanced. It is long since past the time when we should have put the question of inequality back at the center of economic analysis...

(Thomas Piketty, 2017, p. 20)

The empirical literature unambiguously documents an upsurge in income disparity across the world, particularly in the Muslim majority countries (Alvaredo et al., 2018). According to the World Income Database, the top 1% earners in the oil-rich Saudi Arabia and Qatar claim 18.86% and 18.95% of the respective nations' total income in 2019. These are higher than 1995's figures of 18.58% and 18.51%, respectively. This issue is even worse in Turkey that experienced quite a significant rise in income disparity from 21.99% in 1995 to 23.35% in 2019. The least unequal region of Europe is not an exception (Alvaredo et al., 2018). For instance, the Netherlands' highest 1% income increased from 5.77% in 1995 to 6.97% in 2019.

This problem persists in the Islamic finance (IF - hereafter) experimentation initiated in the predominantly Muslim economies. Some western countries like the UK and the Netherlands have followed suit primarily by employing *sukūk* (loosely translated as Islamic bonds). However, unlike bonds, *sukūk* is a financial certificate representing an undivided claim in ownership of permissible assets, usufructs, or services. It mainly comprises of facilities ranging from those using (i) debt-based mark-up vehicle involving a buy-sell agreement (*Murabaha*), (ii) financial leasing in the form of sale-leaseback-buyback (*Ijara*), (iii) a portfolio of assets yielding a stream of income akin to a mutual fund (*Wakala bil Istithmar*), and (iv)

quasi-equity medieval vehicle of trust financing (*Mudharaba*). The ethical axiom of IF predicts that *sukūk* should strengthen property rights and thereby promote a more just socio-economic advancement (Sidani and Ariss, 2015). This raises an intriguing question of whether *sukūk* development truly contributes to inequality reduction?

This paper seeks to examine the link between *sukūk* development and income inequality. Our analytical framework mainly benefits from finance-inequality nexus theory. Financial development can have a remarkable role in ensuring a well-functioning financial system by improving financial access, depth, efficiency, and stability. This is a crucial recipe for more inclusive growth. However, a poorly managed financial development can also exacerbate inequalities when the progress is only expropriated by the elite leaving behind the rest of the society (Čihák and Sahay, 2020). In this case, the process turns into a mere ‘financialization,’ decoupling finance from the real sector of the economy (Krippner, 2005).

The theory offers conflicting predictions about the relationship between finance and inequality. Banerjee and Newman (1993) and Galor and Zeira (1993) theorize a positive impact of better-developed financial markets on income redistributions. Beck et al. (2007) and Ghossoub and Reed (2017) are among the proponents of this view, providing empirical proof on the negative relationship between finance and inequality. Greenwood and Jovanovic (1990) theoretically derive finance-inequality nexus from the Kuznets’ inverted U-curve as financial development is closely associated with economic growth. The empirical works of Clarke et al. (2006) and Kim and Lin (2011) support this view. In the long-run, inequality decreases as finance advances, but it may increase in the rudimentary stage of financial sector development. Piketty (2017) advocates for the linear positive finance-inequality relationship by showing that the inverted U-curve pattern holds only because of major structural breaks in the first half of the 20th century, i.e., the Great Depression and the two world wars. Controlling for these

anomalies offers a robust positive association between finance and inequality as far as the rate of return on capital exceeds that of the economic growth (Piketty, 2017). Jaumotte et al. (2013), Jauch and Watzka (2016), and De Haan and Sturm (2017) are in harmony with Piketty's findings.

The literature, however, is silent on the interaction between *sukūk* development and inequality. Most studies focus on the role of Islamic banks (IBs) on economic growth. Gheeraert and Weill (2015), Abedifar et al. (2016), and Imam and Kpodar (2016) unanimously report that the IB development is conducive for economic growth. Abedifar et al. (2016) go the extra mile by evaluating a negative link between IBs advancement and inequality. In the context of *sukūk*, Smaoui and Nechi (2017), Yildirim et al. (2020), and Smaoui et al. (2021) also document its constructive role in development, while Echchabi et al. (2018) suggest no relationship between the two. However, its link with inequality is left unexplored despite the growing concern on the adverse impact of public and corporate bonds on income redistribution (Dwyer, 2018; Mian et al., 2020). This study seeks to shed light on this literature gap.

To the best of our knowledge, our study is the first one to examine the nexus between *sukūk* development and income inequality. We first develop the ethical framework of *sukūk* in the context of socio-economic justice. We, next, empirically evaluate the connection between the yearly *sukūk* issuance and the income share of the top 1% earners in 22 *sukūk* issuing countries. Our sample covers not only the Organization of Islamic Cooperation (OIC - hereafter) members but also the Muslim minority countries such as Ireland, the Netherlands, Singapore, Switzerland, and the UK where the *sukūk* market has developed. Our analysis also examines other critical determinants of income inequality, including financial development, globalization, gender equality, ethno-fractionalization, and economic development stages. Our sample bestows us with a unique setting to perform a comparative analysis between the

emerging OIC economies and the relatively developed financial system of the non-OIC countries. We perform a set of panel data analyses to execute our empirical strategy employing Pooled Ordinary Least Square (POLS - hereafter), Fixed Effect (FE - hereafter), Random Effect (RE - hereafter), Generalized Least Squares (GLS - hereafter), and FE GLS. The Generalized Method of Moments (GMM - hereafter) is also used to deal with the endogeneity issue prevalent in the finance-inequality nexus (Beck et al., 2007).

Our findings suggest a significant positive link between *sukūk* issuance and income inequality. This is agnostic to regression methods employed in our study. The magnitude of the marginal effect of *sukūk* issuance on income inequality is also economically meaningful. This ranges between 0.027 and 0.032, i.e., a 1% hike in the proportion of *sukūk* issuance against GDP enlarges the claim of the top 1% income group over the population earning by 2.7 to 3.2 basis points (bps). This result provides further evidence for the assessment of the IF industry. This fast-growing sector has been developed solely based on the literal interpretations of the primary sources of the Islamic law (i.e., *Sharī'ah* - described below) but falls short of fulfilling the ethical objectives of Islamic law (*Maqāsid al- Sharī'ah*). That is, *sukūk* (imitating corporate or public debt) fails to rectify for endemic agency costs of debt (*ribā* – elaborated in Subsection 4.2.1) and excessive risk transfer by the issuer (*gharar* – elaborated in Subsection 4.2.2). Our regression results also indicate a non-monotonic effect of financial development on inequality. Financial development increases income inequality in the OIC countries while reduces it in the non-OIC countries. A 1% increase in the loan provided by the financial sector leads to a 2-2.7 bps higher income disparity in OIC countries. It, however, reduces the share of the top 1% earning group by -0.4 to -0.7 bps. We also document that the country's openness, the opportunity for women, ethnic diversity, and economic development stages can explain the variations in income redistributions.

Our study enhances the policy-oriented literature on the effects of IF on socio-economic development. Several studies advocate the favorable roles of IBs and *sukūk* on development (Gheeraert and Weill, 2015; Abedifar et al., 2016; Imam and Kpodar, 2016; Smaoui and Nechi, 2017; Yildirim et al., 2020; Smaoui et al., 2021). According to Smaoui and Nechi (2017), this positive link is established as *sukūk* progression leads to greater access to finance for religious agents who otherwise are self-excluded from the financial market. However, the socio-economic issues are not only about economic growth. Inequality is among the oldest inquiries in the literature. As far as bonds are concerned, Mian et al. (2020) document an adverse effect of public debt on income redistributions. Higher government bonds are associated with the more concentrated savings for the rich and bigger household debts for laypeople. Our findings concur with Mian et al. (2020) in the context of *sukūk*. We highlight that meticulous design of *sukūk* extricating the ill-effects of excessive risk transfer and agency costs of debt is needed to deliver the ethical promise of *sukūk*.

Our paper also contributes to the broad debate on the ‘Islamization’ of the financial services industry. Most studies document the ethical gaps in the IF industry (Haniffa and Hudaib, 2007; Mergaliyev et al., 2019). Khan (2010) argues that the drawback of the industry lies in its lack of deliberation and implementation of the ethical objectives of the law. We provide an ethical framework of *sukūk* in light of the law’s objective of attaining socio-economic justice. Here, we reconstrue the poorly interpreted religious injunctions (described above) within the framework of economic theory as implying property rights. We establish the link between the two endemic problems in IF and inequality. Our empirical findings indicate that the IF industry has yet to extricate itself from the above injunctions to instill socio-economic justice in order to reduce inequality.

Finally, our analyses also add to extensive studies of finance-inequality nexus. Our findings are close to those advocating the non-monotonic relationship between finance and inequality (Greenwood and Jovanovic, 1990; Clarke et al., 2006; Kim and Lin, 2011). Unlike the previous literature, however, our results suggest that this inverted U-curve relationship is not driven by different stages of economic development between OIC and non-OIC countries. This is because the adverse impact of financial market progression on income redistributions is also observed in the rich OIC countries. Instead, the primary divergence between them and the developed non-OIC countries in our study lies in economic and political institutions. The existence of extractive institutions deters inclusive growth in the OIC territories, consistent with Acemoglu et al. (2002).

The remainder of this paper is arranged as follows. Section 4.2 discusses the Islamic ethics of *sukūk*. Section 4.3 establishes our hypothesis of the link between *sukūk* development and income disparity. We then proceed with the methodology and data in Section 4.4. In section 4.5, we examine the empirical results, followed by a thorough discussion in Section 4.6. Section 4.7 concludes our study.

4.2. Islamic Ethics of *Sukūk*

The Islamic moral system is highlighted in the Qur'ān (i.e., Muslim holy book) and the authentic traditions of Prophet Muhammad (i.e., *aḥādīth*). The objectives of the Islamic law are to prevent harm and promote human/ social welfare (i.e., *falāh*) (Naqvi, 1981). The literature suggests that the main goal of the Islamic economic system is social justice (Chapra, 1992; Rice, 1999).¹ This entails safeguarding property rights in the realm of the economic

¹ This goal is alluded to in the Qur'ānic verse (2:143), characterizing Muslims as following the middle (non-extreme) path of justice and equity.

system. In the context of *sukūk*, this implies the alleviation of mainly *ribā* (agency costs of debt—elaborated below in Subsection 4.2.1) and *gharar* (asymmetric information or excessive risk transfer—elaborated below in Subsection 4.2.2), as encapsulated in Figure 4.1.

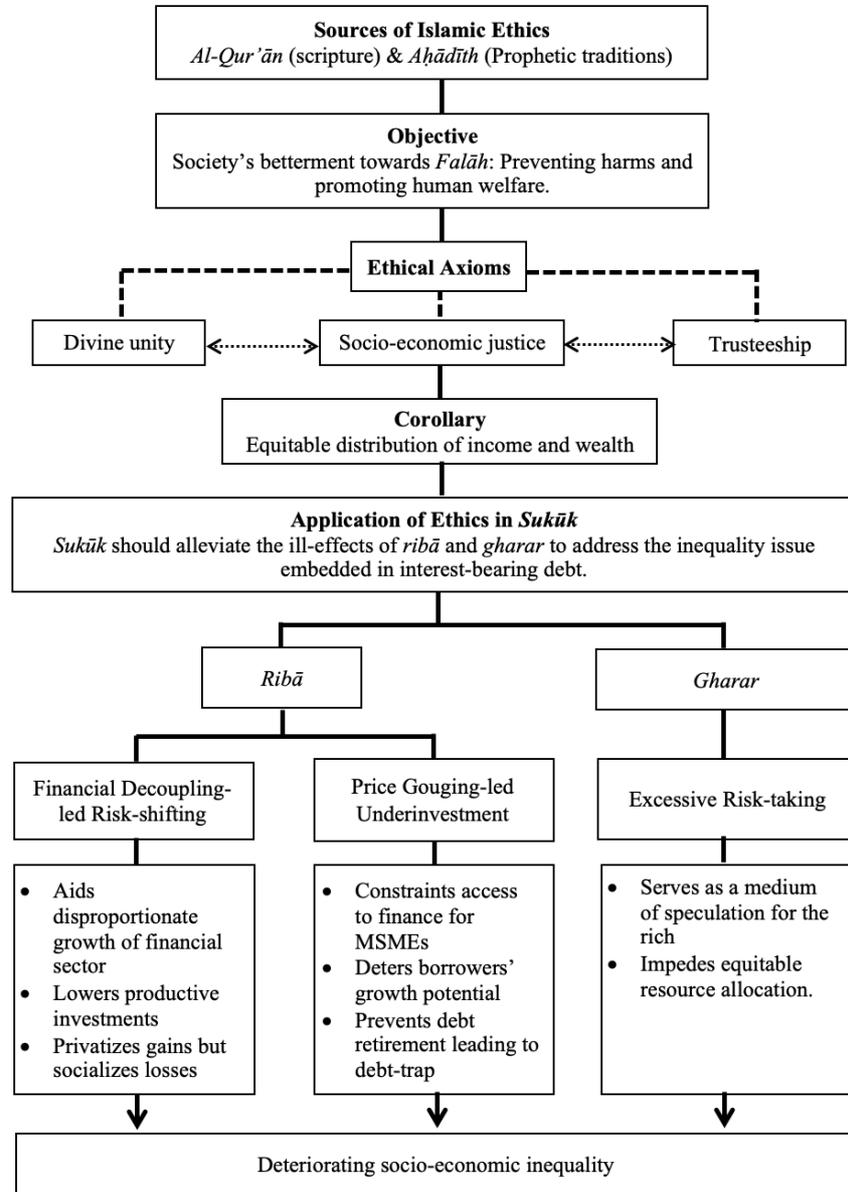


Figure 4.1: Ethical framework for *sukūk*

The global financial crisis of 2007/8 exemplifies how the liquidity of debt securities was impaired by its toxicity stemming from asymmetric information and agency issues. This structural deterioration at the origination of these securities led to the freezing of the secondary

market for debt and the failure of institutions holding them as collateral (Ebrahim et al., 2016).² This had a devastating impact on not only the global economy but also aggravated inequality in the U.S., as roughly a million American families lost their homes. This decimated their meager live savings in the form of their home equity (Economist 2007, Gapper, 2007). The adverse impact of a highly leveraged economy is suggested by numerous studies as implicating debt with income inequality (Piketty, 2017; Dwyer, 2018; Mian et al., 2020). We argue that moderating the ill-effects of the twin issues of *ribā* and *gharar* in the *sukūk* origination process can promote equitable resource distributions. However, this cannot be accomplished without deeply understanding the objectives of the Islamic law. In so doing, we extend Chapter 2 economic equivalence of *ribā* and *gharar*.

4.2.1. The Economic Implication of *Ribā* and its Links with the Literature

In Chapter 2, we argue that the deeper meaning of *ribā* goes beyond the layman's terminology of interest.³ We rather decipher this concept to the agency cost of debt attributed to the unethical behavior of financial decoupling-led risk-shifting and price gouging-led underinvestment. In risk-shifting, the borrower strategically defaults when the equity is negative, as illustrated in Figure 4.2. The negative equity occurs when the value of the (collateral) asset drops below the borrower's obligation (between t_1 and t_2). Indeed, the financier may seize the collateral asset and sell it to offset its losses. However, the collateral does not recoup all the losses even after putting a margin of safety in the contract due to the

2 The finance literature attributes the lack of meticulous pricing of debt securities at origination to the capital structure puzzle (Graham and Leary, 2011; Graham et al., 2015). This is because the capital structure theories have yet to discuss the technical means to alleviate information opacity and the agency costs of debt. One also needs to account for 'managerial miscalibration' (Ben-David et al., 2013).

3 This terminology stems from the Arabic word *rabā*, derived from the root of the word *ribā* implying an increase or growth (Al-Zuhayli, 2006).

destruction of the assets (Ebrahim et al., 2016; Shiller et al., 2019). In underinvestment, the onerous financial obligations do not allow the borrower to undertake any positive NPV project as the benefits are expropriated by the financier, as depicted in Figure 4.3. These two intertwined misconducts are connected with the issue of income inequality as risk-shifting [underinvestment] by the borrower [financier] harms the financier [borrower].

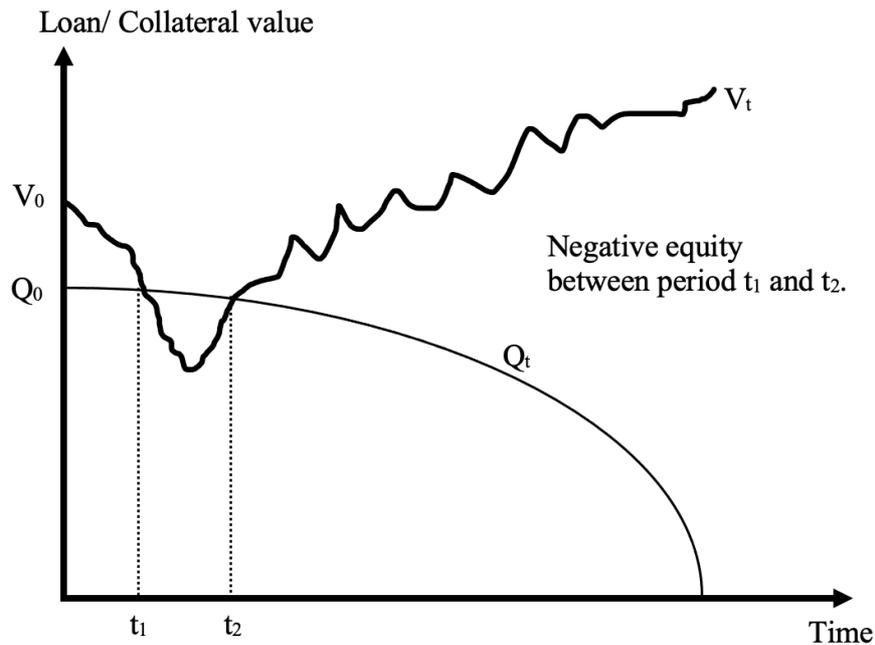


Figure 4.2: Risk-shifting

Notes: The negative equity occurs when the value of the asset (V_t) is lower than the debt obligation (Q_t), as observed in the interval (t_1, t_2). This leads the borrower to default by transferring the downside risk of the asset to the financier. (see also Chapter 2).

Financial decoupling is a plausible consequence of financialization, where the high dependence on the debt-based financial market leads to its divergence from the real sector of the economy (Davis and Kim, 2015). While the mechanism is complex, three possible scenarios of the links between financialization and inequality are documented in the literature. First, the disproportionate increase in the financial institutions has a direct impact on the intersectoral wage inequality. In the last three decades, employees in financial services earn a significantly higher income than other industries (Kaplan and Rauh, 2010). Second,

financialization also induces a high concentration on investment in the debt-based financial sector rather than the real sector of the economy. This decrease in the productive investment leads to the slow growth of the non-financial companies and hence stagnancy in the real wage (Stockhammer, 2004; Van der Zwan, 2014). Finally, the financialization fueled by the plain vanilla debt contributes to the inequality by sharing only the downside risk of the investment to the whole society while keeping the unlimited upside potential gains solely for the top earners who own the financial assets (Stiglitz, 2012; Volscho and Kelly, 2012).

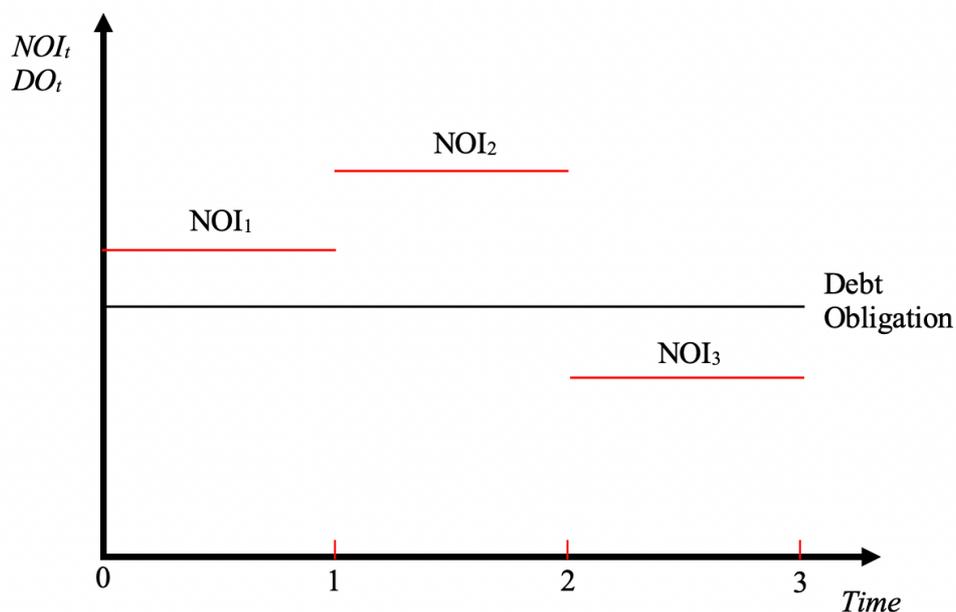


Figure 4.3: Underinvestment

Notes: Underinvestment occurs in Period 3 when the borrower's Net Operating Income (NOI_t) is lower than its Debt Obligations (DO). Here, the borrower rejects profitable (i.e., the positive net present value - NPV) projects as the additional wealth mainly accrues to the financier. (see also Chapter 2).

Price gouging is related to the failure of interest-bearing debt transactions to discover 'just price.'⁴ Lenders capitalize their greater market power to charge onerous fixed payments to borrowers and claim most of the projects' cash flow (Ebrahim et al., 2016). It forms

4 See Chapter 2 for a terse debate on the definition of just price from neoclassical, Marxian and Islamic economic perspectives. We endorse the definition of the medieval jurist Ibn Taimīyah, referring the just price to an equilibrium price in the market where Islamic values are upheld.

inequality along multiple pathways. First, it impedes the access to finance of a significant portion of skilled entrepreneurs as their businesses possess no assets for collateral (Claessens, 2006; Honohan, 2006). Subsequently, the size effect occurs, where the lenders favor financing large companies and ignore micro, small, and medium-sized enterprises (MSME) (Beck and Demirguc-Kunt, 2006). This is why, among other reasons, the fixed-income capital market that can facilitate MSME's direct access to public financing remains virtually inexistence (Sunak, 2017; World Bank Group, 2020). Second, the unjust price of debt also deters the borrowers' growth potential (Ebrahim et al., 2016). Piketty (2017) argues that world inequality will last as long as the required rate of return in the financial sector of the economy is higher than the economic growth rate ($r > g$). Finally, it prevents debt retirement (Mian et al., 2020). The exaggerated cost of borrowing serves as an impediment to borrowers' growth as it limits their ability to secure sufficient cash flow for paying back their debt. They thus need to refinance thereby adding on more debt. In other words, the borrowers succumb to a debt trap in the economy.

4.2.2. The Economic Implication of *Gharar* and its Links with the Literature

In Chapter 2, we also reconstrue the definition of *gharar*⁵ as involving information opacity or excessive risk-taking behavior. This meaning is also endorsed by El-Gamal (2006) and Ebrahim et al. (2016). We argue that information opacity or risk-taking behavior can also contribute to the earning inequality in the economy as follows.

A large number of studies illustrate that asymmetric information enlarges the gap of access to finance between the rich and the poor and ultimately escalates income disparity (de Mendonça and Esteves, 2018; Lei, 2019; Tchamyoun, 2019). This relationship is predicted by

5 *Gharar* stemming from the trilateral Arabic root *gharra* means to deceive or fog the mind (Thomas, 1995).

Akerlof's (1970) classic paper 'The Market for Lemons.' Lack of transparency increases the cost of borrowing as the lender assumes that the issued debt is backed by a 'bad' project. It thus incentivizes the borrower to issue unsecured debt to the public while keeping the secured one limited to relationship lending (Duqi et al., 2017). This mechanism opens the door to the underinvestment issue (*ribā*) and aggravates income inequality even further (see again Subsection 4.2.1). Islamic ethics offer the remedy for this issue by differentiating between the concept of '*ayn* (tangible assets such as building, projects, usufruct) and '*dayn* (debt including loan and liabilities). The securitization is only permissible in the former, as it mitigates the ill-effect of information asymmetry through at least two ways. First, it takes advantage of asset-backed financing structures, where the lender has recourse to the underlying assets in the event of default. Second, the historical (ex-post) payoffs (returns) and risks of tangible assets are observable, allowing the market to estimate (or extrapolate) these risks and returns in the future (i.e., ex-ante). On the contrary, the securitization of the latter (i.e., the sale of debt - *bay al-dayn*) is prohibited, as it aggravates the illiquidity stemming from asymmetric information (Ebrahim et al., 2016).

The strands of the empirical literature ordinarily place inequality as a cause of excessive risk-taking (credit booms) leading to the financial and real crisis (see Rajan, 2011; Bordo and Meissner, 2014; Van Treeck, 2014; Kumhof, 2015). However, studies such as Stiglitz (2012), Fligstein and Goldstein (2015), and Bazillier and Hericourt (2017) document the reverse relationship, where the excessive risk-taking embedded in the use of debt also contributes to the inequality. One way to look at its underlying mechanism is through the potential speculation feature of the unsecured debt, which dominates the world economy (Chatterjee et al., 2007). Lanidier and Plantin (2017) show that the endogenous increase in inequality can be attributed to the risk-taking behavior of the rich, placing their money into unsecured debt. The

phenomenon of the rise of super-rich produced by hedge funds and subprime derivatives offers compelling evidence of this argument (Stockhammer, 2015). In the context of public debt, the highly unsecured leveraged economy can lose its growth potential and thus lack to perform equitable resource allocation (Stiglitz, 2012).

4.3. Hypothesis Development of *Sukūk*-Income Inequality Nexus

The next plausible question is: does *sukūk* practically have the ability to mitigate the adverse impact of debt on income redistribution? The last three decades have witnessed the significant role of *sukūk* on government and corporate financing. While the instrument domiciles mostly in the OIC territories, some Muslim minority countries such as Singapore, the Netherlands, the UK, Switzerland, and Ireland also welcome it as a means of generating income and as a source of diversification. *Sukūk* supposedly incorporates the Islamic ethical system discussed in Section 4.2 to overcome the issues of *ribā* and *gharar* embedded in the plain vanilla debt. It should promote a more sustainable development paradigm by reducing income inequality through the elimination of financial decoupling, price gouging, and excessive risk-taking behavior. However, whether *sukūk* is *de facto* distinct from bonds and incorporates the above ethical values has been a subject of ongoing debate in the literature as described below.

Many comparative empirical studies suggest that *sukūk's* performance is distinct from bonds and thus provide an avenue for diversification (Cakir and Raei, 2007; Maghyereh and Awartani, 2016; Naifar et al., 2017; Haque et al., 2017; Hassan et al., 2018; Bhuiyan et al., 2019, 2020; Hossain et al., 2020). On the contrary, Azmat et al. (2017) and Ahmed and Elsayed (2019) document similarities between the two assets by examining their co-movements (see Table 4.1 for a terse summary of these studies). One should construe those mixed empirical findings with cautions as they may not truly reflect the underlying mechanism of the *sukūk* design (Alzahrani, 2019). For instance, the different market reaction towards *sukūk* and bonds

does not necessarily suggest their structural distinction (Godlewski et al., 2013). As explained by Klein et al. (2017) and Shafron (2018), investors can have distinct perceptions towards similar assets.

Table 4.1: Selected empirical literature on differences between *sukūk* and bonds

Author(s)	Period	Sample	Methodology	Main Findings
Hossain et al. (2020)	2010-2016	Malaysian <i>sukūk</i> and bonds portfolio	Autoregressive Distribution Lag (ARDL)	The performance of <i>sukūk</i> is not related to that of bonds. However, <i>sukūk</i> offers less risk-adjusted return than its conventional counterparts.
Bhuiyan et al. (2020)	2010-2015	Global <i>sukūk</i> and bond and indices	Value-at-Risk (VaR)	<i>Sukūk</i> offers lower VaR than bonds. Combining it into bond index reduces the overall portfolio risk.
Ahmed and Elsayed (2019)	2007-2017	Malaysian <i>sukūk</i> and bonds	Vector Autoregression (VAR)	<i>Sukūk</i> market is closely interconnected with bonds. <i>Sukūk</i> is the highest net receiver of the Malaysian capital market spillovers.
Bhuiyan et al. (2019)	2010-2015	Malaysian <i>sukūk</i> and bonds indices (US, UK, Australia, Canada, Germany, and Japan).	Wavelet Coherence and multivariate-GARCH.	Combining <i>sukūk</i> with bonds can be an efficient portfolio diversification, yielding a lower unconditional correlation and weak co-movement.
Shafron (2018)	2005-2013	Malaysia <i>sukūk</i> and bonds	Fama & French (2007)	Investors' tastes imply different demand distributions of <i>sukūk</i> and conventional bonds. Investor preference to the <i>Shari'ah</i> investment products lowers their price in contrasts to the conventional counterparts.
Hassan et al. (2018)	2010-2014	Europe, US, Emerging markets.	Multivariate GARCH	<i>Sukūk</i> can be a potential diversification instrument for bond investors as their correlation with bonds indices is relatively low. However, this diversification opportunity diminishes in high uncertainty periods.
Azmat et al. (2017)	2002-2010	458 <i>sukūk</i> from 83 issuers in Malaysia.	Ordered Probit	The determinant of <i>sukūk</i> rating converges to that of conventional bonds except for the characteristics of <i>sukūk</i> .
Haque et al. (2017)	2007-2013	Malaysian government <i>sukūk</i> and bonds.	Continuous Wavelet Transform	The cost of capital of <i>Sukūk</i> and their return are distinct from that of bonds. The former is relatively more costly than the latter.
Klein et al. (2017)	2000-2013	2140 <i>sukūk</i> and bonds issuances from 133	Event study and multivariate	During Ramadan, investors penalize the issuance of bonds but appreciate that of <i>sukūk</i> . The benefit of issuing

		issuers in Malaysia.	OLS	<i>sukūk</i> disappears when the firm also issues bonds at the same time.
Naifar et al. (2017)	2010-2014	Dow Jones (DJ) & Malaysian <i>sukūk</i> indices; DJ Asia & Malaysia corporate bond indices.	Quantile regression	<i>Sukūk</i> diverges from the conventional bonds in terms of co-movement profile with both global and regional economic uncertainty.
Maghyereh and Awartani (2016)	2005-2014	Dow Jones Citigroup <i>Sukūk</i> and Bonds Index, Dow Jones Global and Islamic stock market index.	VAR and DCC-GARCH	Diversification opportunity exists between <i>sukūk</i> and bonds, for they have different transmission mechanism. The former is a net receiver of spillovers from both equity and bond markets.
Godlewski et al. (2013)	2002-2009	Malaysian public listed companies (77 <i>sukūk</i> , 93 bonds).	Event study	The stock market is neutral to the announcements of conventional bond issuance while it reacts negatively to that of <i>sukūk</i> .
Cakir and Raei (2007)	1999-2007	Malaysia, Pakistan, Qatar, and Bahrain	VaR	Adding <i>sukūk</i> into the international bond portfolio yields a lower VaR and thus diversifies a portfolio.

In theory, the primary difference between *sukūk* and bonds lies in the former's asset centrality (El-Gamal, 2006). In its *Sharī'ah* Standard No. 17, AAOIFI identifies 14 types of *sukūk* representing undivided claims in ownership of tangible assets, usufruct, services, or projects. Generally, they can be categorized into (i) *Ijara*-based,⁶ (ii) Debt-based,⁷ and (iii) Partnership-based *sukūk*.⁸ *Sukūk* should be structured as asset-backed instead of asset-based security to maintain their asset centrality feature.⁹ It should incorporate income-generating underlying assets from which the issuer can pay the coupon and the principal back to the

6 This includes certificates of (1) ownership in leased assets; (2) ownership of usufructs of existing assets; (3) ownership of usufructs of described future assets; (4) ownership of services of a specified party; and (5) ownership of described future services.

7 This comprises of (6) *Salam* or forward sale; (7) *Istisna'* or purchase order; and (8) *Murabahah* certificates.

8 This consists of (9) *Musharaka* or joint partnership; (10) *Mudharaba* or trust financing; (11) *Wakala* or investment agency; (12) *Muzara'ah* or sharecropping; (13) *Musaqa* or irrigation; and (14) *Mugharasa* or agricultural/plantation certificates.

9 The notable discrepancy between asset-backed and asset-based *sukūk* lies in the event of default. The former bestows recourse to the underlying assets, while the latter does not.

holders. This feature will allow the payoffs to be contingent on the assets' performance. For the debt-based contracts, such as *Murabahah*, *Salam*, and *Istisna'*, their assets shall also act like collateral that secures the contract. It should thus mitigate the issues of *ribā* and *gharar* and hence income disparity. However, many studies cast doubt on whether *sukūk*'s asset centrality holds practically (see Khan (2010) and Kuran (2018) for concise summaries of this issue).

Take the most utilized contract of cost-plus *Murabaha sukūk* (and their financially engineered versions – described below) as an example. In early March 2021, this type of asset accounts for 41.76% of outstanding *sukūk* in the world, according to the Bloomberg database.¹⁰ Here, the Special Purpose Vehicle (SPV) receives *sukūk* proceeds from the holders (investors). It uses the money to acquire an ordered asset in cash and immediately sell it to the issuer on credit. Ideally, the issuer should use the asset to generate income from which the differed payments (coupons) to the *sukūk* holders are made. However, in reality, the issuer sells the asset on the spot market and keeps the proceeds.¹¹ Not only does this deprive the source of cash flow for the holders, but it also makes the contract unsecure. This transforms the asset-backed *sukūk* into an asset-based one exacerbating its risk (see Chapter 5). Unlike the former, the latter has no recourse to the underlying asset, leading to financial fragility. The same data from Bloomberg suggests that 72.98% of *sukūk* are unsecure, backed by no collaterals.

The literature also critiques the pricing issue of *sukūk*. The coupon of *sukūk* is often linked to interest-based indices such as LIBOR (Kuran, 2018). This makes the payments of *sukūk* deviate even further from the underlying performance of the originator. The new

10 The majority of them are issued in Malaysia, where the trading of debt (*Murabaha sukūk*) is permissible. Most countries forbid this practice.

11 The originator can sell the asset back to the supplier (in an *inah* sale, i.e., a sale and buy-back arrangement) or to a third party (in a *tawarruq* or a reverse *Murabaha*, i.e., a synthetic loan) (see Chapter 2).

development of the Islamic Interbank Benchmark Rate (IIBR) does not remedy this issue. In Chapter 2, we suggest that the IIBR is closely linked to the LIBOR in the short and long terms. The Islamic rate is also significantly higher than its conventional counterparts without evidence of its embeddedness to the underlying real asset. This raises the ethical issue of *ribā* in the forms of financial decoupling and price gouging (see Chapter 2).

In light of the above discussions, we thus argue that *sukūk* is not fundamentally distinct from interest-bearing debt-based transactions. It is unlikely to remedy the positive nexus of debt and income inequality caused by *ribā* and *gharar*, as shown in Figure 4.1. Therefore, we derive our hypothesis as follows.

Hypothesis 1: The development of *sukūk* has an adverse impact on income redistribution.

4.4. Methodology and Data

4.4.1. Empirical Strategy

We examine the above hypothesis by emulating the empirical techniques of the key studies in the area. These include Clarke et al. (2006), Beck et al. (2007), Ang (2008), Čihák and Sahay (2020), and World Bank (2020). Our panel data regressions employ income inequality proxied by the Top 1% of the highest earners in the country as the dependent variable and *sukūk* issuance as the primary independent one. We control our models using the remaining variables listed in Table 4.2. Our regression analysis begins with evaluating panel data specifications. We conduct the following tests: Redundant Fixed Effects, Honda, and Hausman to uncover the fitness of POLS, FE, and RE methods. While the above tests can offer a useful prediction on the most favorable panel data model, we report the findings from the various methods for the sake of robustness. This includes POLS, GLS, FE, FE GLS, and RE GLS. Even more, we utilize the GMM to address the potential endogeneity issue. Here, the immediate first lags of the right-hand-side variables are used as instruments, following Beck et al. (2007).

Table 4.2: Variable definitions and data sources

Variable name	Definition	Source
Top 1%	Income inequality: the share of the top 1% income group over the total income of the population.	World Inequality Database
<i>Sukūk</i>	The <i>sukūk</i> development: the proportion of annual <i>sukūk</i> values issued by the government and the corporate sectors as a percentage of GDP.	Bloomberg, World Bank
Private Credit	Financial development: the financial institutions' claim on the private sector as a percentage of GDP.	World Bank
GDP per capita growth	The annual growth rate of the GDP.	World Bank
Inflation	The annual percentage changes of the Consumer Price Index.	World Bank
Population growth	The annual percentage changes of the midyear estimated population.	World Bank
Telephone	The yearly subscriptions per 100 people of fixed telephone, voice-over-IP, fixed wireless local loop, ISDN voice-channel equivalents, and fixed public payphones.	World Bank
Gender Equality	The Women, Business and the Law (WBL): A 1-100-scale index gauging how institutions promote women's economic opportunity.	World Bank
Globalization Index	The KOF Globalization Index: An aggregate index measuring the <i>de facto</i> and <i>de jure</i> level of globalization in the trade, financial, interpersonal, informational, cultural, and political dimensions.	KOF Swiss Economic Institute
Ethno-fractionalization	Historical Index of Ethnic Fractionalization: The likelihood of two randomly selected individuals in the same country come from a different ethnic group.	Harvard Dataverse
OIC	A dummy of 0 for the OIC countries and 1 for otherwise.	https://www.oic-oci.org/states/?lan=en
Income category	A categorical variable: low (0), low-middle (1), upper-middle (2), and high-income country (3).	World Bank

4.4.2. Data

Table 4.2 summarizes the operational variables and data sources used to examine our hypothesis. The dependent variable, Top 1%, represents the claims of the highest 1% earners over the total income of the country. We retrieve this data from the World Inequality Database.

Our independent variable of *Sukūk* measures the Islamic fixed income market's progression by dividing the country's yearly government and corporate *sukūk* issuance with the Gross Domestic Product (GDP). The numerator and denominator are obtained from Bloomberg and the World Bank, respectively. Our proxy of financial development Private Credit is measured as a proportion of the domestic financial institutions' financing and loans over the GDP. This data is also derived from the World Bank database, like the rest of the other variables shown in Table 4.2 except for the Globalization Index, Ethno-fractionalization, and OIC. The Globalization Index data is obtained from the KOF Swiss Economic Institute. This covers not only the economic but also interpersonal, informational, cultural, and political aspects of globalization. Historical Index of Ethnic Fractionalization (HIEF) data is employed to represent the country's ethnic diversity. This data is made available by Harvard Dataverse. The categorical variable of OIC follows its official website information.

Our dataset includes all *Sukūk* issuing countries recorded by Bloomberg between 1995 and 2019.¹² However, we exclude countries with only one-off issuance (such as Morocco, Kazakhstan, and South Africa), the British Overseas Territories (including Bermuda, British Virgin Island, and Cayman Island), and the Crown Dependencies (i.e., Jersey and Guernsey). Luxemburg is also omitted as it has no HIEF data. It is worth noting that the HIEF data terminated in 2013. We extrapolated seasonally adjusted missing HIEF data to forecast it as its trend is clearly observable. Our final sample covers 22 countries, namely (1) Bahrain; (2) Bangladesh; (3) Gambia; (4) Indonesia; (5) Ireland; (6) Ivory Coast; (7) Jordan; (8) Kingdom of Saudi Arabia; (9) Kuwait; (10) Malaysia; (11) Netherlands; (12) Nigeria; (13) Oman; (14)

12 The data represents the value of *sukūk* issued (instead of listed) in every country in our sample.

Pakistan; (15) Qatar; (16) Senegal; (17) Singapore; (18) Switzerland; (19) Turkey; (20) United Arab Emirate (UAE); (21) United Kingdom (UK); and (22) Yemen.

4.4.3. Description of Data

We summarize the descriptive statistics of our variables in Table 4.3. Our balanced-panel dataset encompasses 550 observations across 22 countries within the 1995-2019 period. The dependent variable representing the inequality shows a quite large income disparity. That is, the top 1% group of income, on average, claims 15.51% of the whole population's earnings. In the worst-case scenario, 23.35% of the population's total income is enjoyed by only a small fraction of elites.

Table 4.3: Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Top 1%	550	15.505	3.570	5.770	23.350
<i>Sukūk</i>	550	1.222	3.938	0.000	37.971
Private Credit	550	58.017	46.299	1.385	192.592
GDP Per Capita Growth	550	5.150	12.101	-56.384	91.350
Inflation	550	5.407	10.172	-4.863	89.113
Population Growth	550	2.667	2.467	-3.219	19.138
Telephone	550	19.474	18.900	0.072	74.988
Gender Equality	550	53.996	23.288	17.500	97.500
Globalization Index	550	64.978	14.664	34.445	90.984
Ethno-fractionalization	550	49.587	26.128	2.266	85.400
OIC	550	0.225	0.418	0	1
Income Category	550	2.091	1.041	0	3

Note: All variables are presented in percentage (%) except for Telephone, Gender Equality, OIC, and Income Category. The variable definitions follow Table 4.2.

The OIC countries generally have a higher inequality level than their non-OIC counterparts, as shown in Figure 4.4 and Table 4.4 (Panel A). The top 1% of the former's income taxpayers possess an average of 15.03% to 20.63% of the countries' total earnings. Indonesia and Nigeria are the only exceptions, where their proportions resemble the non-OIC countries, in which the disparity ranges between 6.57% and 13.25%. Turkey is the most uneven

income inequality country in the sample, followed by Qatar and Saudi Arabia, while the Netherlands, Ireland, and Switzerland are the least unequal ones. The time-varying income inequality trend is mixed. Some nations have experienced an increase in income disparity. This includes Turkey, Pakistan, the UK, and Singapore. Others, such as Gambia and Senegal, seem to reduce the shares of the top 1% income group over time.

Table 4.4: Top 1% and *sukūk* issuance by country

No	Country	Panel A: Top 1% (in %)				Panel B: <i>Sukūk</i> (in %)			
		Mean	Min.	Max.	St. Dev.	Mean	Min.	Max.	St. Dev.
1	Turkey	20.63	16.28	23.35	2.17	0.69	0.04	2.02	0.56
2	Qatar	18.73	18.05	19.75	0.43	1.75	0.38	5.40	1.34
3	Saudi Arabia	18.73	18.31	18.93	0.17	1.08	0.21	3.01	0.93
4	Gambia	18.34	13.41	21.14	2.89	1.41	0.31	2.51	0.79
5	Ivory Coast	18.26	16.29	21.03	1.40	0.34	0.26	0.49	0.13
6	Bahrain	18.13	17.12	18.91	0.43	6.25	1.11	12.71	2.91
7	Oman	17.88	17.61	18.17	0.15	2.38	0.17	7.25	2.72
8	Kuwait	17.57	16.87	18.86	0.39	0.12	0.04	0.29	0.10
9	Malaysia	17.05	14.55	19.97	1.75	12.24	0.01	37.97	9.27
10	UAE	16.93	16.03	18.23	0.79	0.54	0.03	3.25	0.81
11	Pakistan	16.93	15.33	18.43	1.07	8.27	1.15	34.00	8.74
12	Jordan	16.92	15.61	21.71	1.46	0.34	0.26	0.49	0.13
13	Bangladesh	15.67	15.17	16.12	0.22	0.02	0.00	0.05	0.02
14	Senegal	15.11	13.04	19.08	2.67	1.17	1.04	1.29	0.18
15	Yamen	15.03	14.70	15.36	0.17	0.62	0.05	1.15	0.55
16	Singapore	13.25	9.74	15.00	1.47	0.08	0.01	0.20	0.07
17	Nigeria	12.90	11.19	15.25	1.25	0.05	0.01	0.07	0.03
18	UK	12.85	10.33	14.89	1.21	0.005	0.00	0.01	0.01
19	Indonesia	11.25	10.25	12.44	0.66	0.95	0.01	2.67	0.91
20	Switzerland	11.11	9.06	13.27	0.98	0.004	0.00	0.00	0.00
21	Ireland	10.95	8.95	13.19	1.16	0.14	0.08	0.20	0.09
22	Netherlands	6.57	5.77	7.75	0.49	0.03	0.02	0.04	0.01

Note: Top 1% represents the share of the top 1% income group over the total income of the whole population. *Sukūk* corresponds to the proportion of annual *sukūk* issuance over GDP. The periods range from 1995 to 2019. We exclude years with zero *Sukūk* issuance for Panel B.

Table 4.3 also depicts that the average of our primary independent variable (i.e., *sukūk* issuance) remains small compared to the economy (% of GDP). However, its role in public and private financing has become crucial over time. On average, the country's yearly *sukūk* issuance is equal to 1.22% of its economy, with the highest issuance of 37.97%. Figure 4.5 and

Table 4.4 (Panel B) illustrate the dynamic of *sukūk* issuance across countries from 1995 to 2019. The rapid development of *sukūk* as the government and corporate financing alternatives has been pioneered by Malaysia. Its market penetration has been impressive over the past three decades. The peak was in 2012 when the *sukūk* issuance of the Southeast Asian Country reached 37.97% of its GDP. Pakistan is the only country coming close to this figure with 34% *sukūk* issuance over GDP in 2016. However, it is unsurprising that the *sukūk* issuance in non-OIC countries is relatively small compared to their economic sizes.

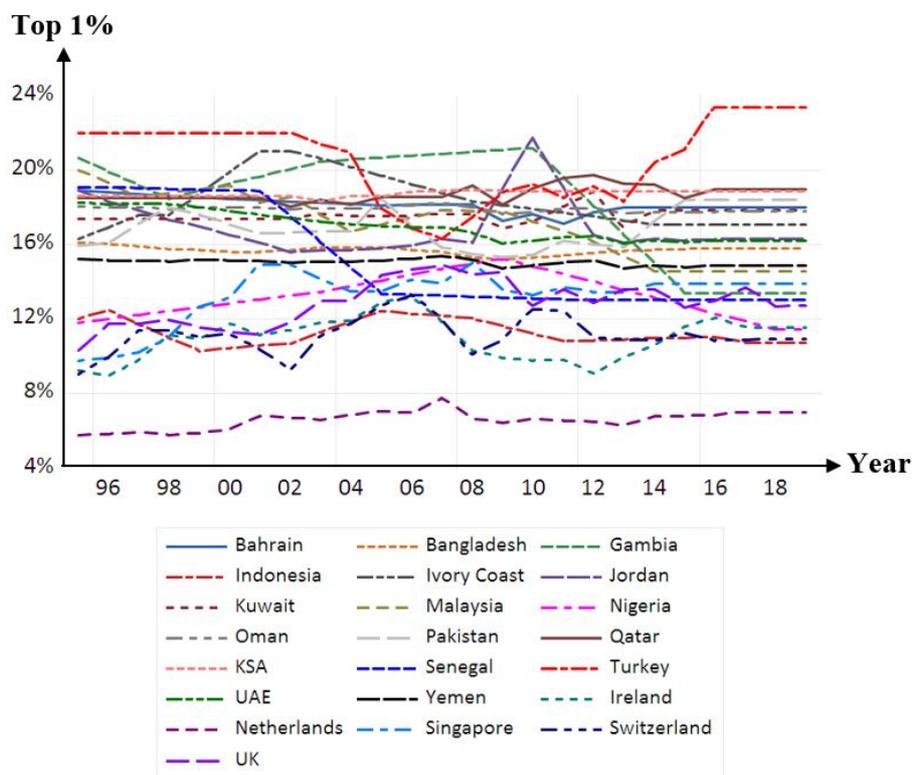


Figure 4.4: Share of the top 1 percent income group (1995-2019)

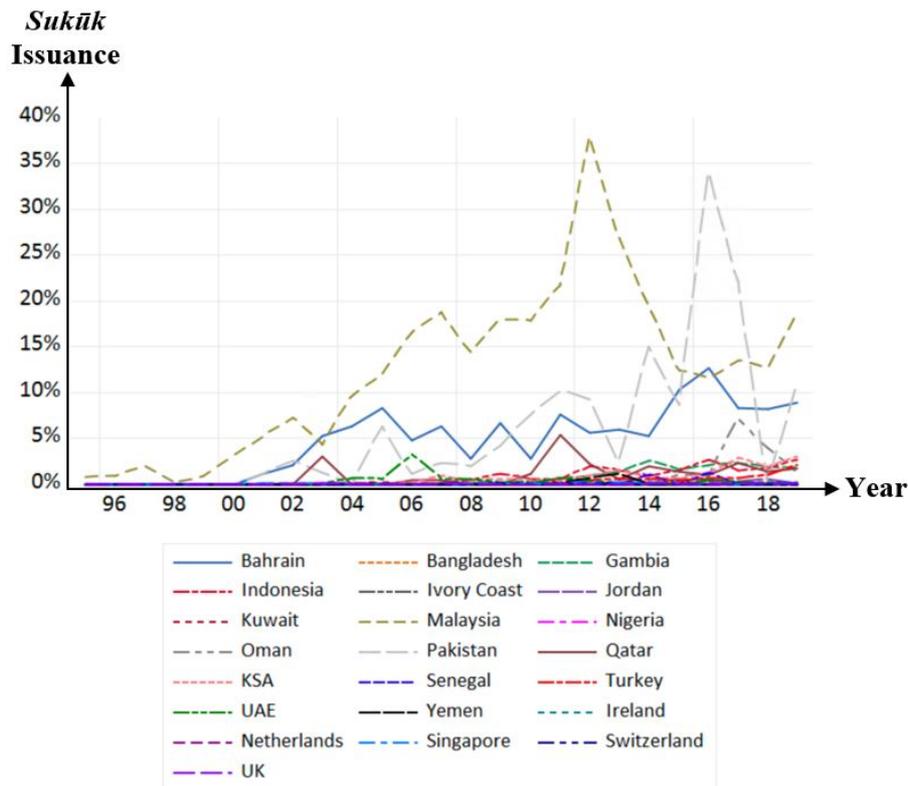


Figure 4.5: *Sukūk* issuance over GDP (1995-2019)

Both public and private sectors assumed a critical role in tapping the *sukūk* market. In many geographies, the private sector has adopted the *sukūk* ahead of the government. This is true for countries like Malaysia, Indonesia, Pakistan, Bangladesh, Saudi Arabia, Kuwait, Oman, UAE, Turkey, Nigeria, and also all the non-OIC countries, except for the UK and Singapore. The governments of the last two countries have been very enthusiastic about tapping the *sukūk* market. In the Muslim majority countries, such as Bahrain, Brunei Darussalam, and Qatar, the government interventions to initiate the *sukūk* financing are also common. Some nations even have only state-sponsored *sukūk*, such as Gambia, Yemen, Jordan, Ivory Coast, and Senegal.

The Pearson correlation test in Table 4.5 indicates a positive association between the *Sukūk* and Top 1%. However, the coefficient is very low and has yet to imply any causation between the two. The pair-correlation coefficients of our independent variables are also small

to moderate. *Sukūk* and Private Credit have a very weak positive correlation of 0.11. This is because Private Credit covers only financing offered by financial institutions, while a significant proportion of *sukūk* holders come from non-financial corporations. Thus, the two variables are complements rather than substitutes. Three pairs have higher than 0.8 correlations, namely Globalization-Private Credit, Globalization-Telephone, and OIC-Telephone. However, our further investigation using the Variance Inflation Factor (VIF) technique suggests mere moderate multicollinearity among them. Therefore, we refrain from modifying the respective variables in our models.

Table 4.5: Correlation matrix

Variable	Top 1%	<i>Sukūk</i>	Private Credit	GDP/capita Growth	Infl.	Pop. Growth	Telp.	Gender Eq.	Glob. Index	Ethno fract.	OIC
<i>Sukūk</i>	0.12										
Private Credit	-0.42	0.11									
GDP/capita Growth	0.01	-0.01	-0.14								
Inflation	0.17	-0.06	-0.28	0.11							
Population Growth	0.37	0.00	-0.25	0.00	0.02						
Telephone	-0.49	-0.09	0.77	-0.02	-0.16	-0.21					
Gender Equality	-0.59	-0.11	0.46	-0.03	-0.09	-0.46	0.54				
Globalization Index	-0.48	0.10	0.87	-0.08	-0.24	-0.17	0.83	0.52			
Ethno-fract.	0.23	0.15	-0.31	-0.01	0.03	0.25	-0.31	-0.05	-0.26		
OIC	-0.69	-0.17	0.72	-0.03	-0.20	-0.36	0.86	0.74	0.75	-0.38	
Income Category	-0.17	-0.03	0.61	-0.02	-0.25	0.07	0.70	0.10	0.73	-0.14	0.47

Note: The Top 1% is our dependent variable representing countries' income inequality. This is measured by the proportion of the population's total income that belongs to the highest 1% income group. The other variables depict our independent variables. Their definitions follow Table 4.2. While three correlations are higher than 0.8, their calculated Variance Inflation Factors (VIFs) show mere moderate multicollinearity. Globalization Index-Private credit: 4.01; Globalization Index-Telephone: 3.21; and Telephone-OIC: 3.90.

4.5. Empirical Results

4.5.1. Panel Data Model Selection

We initiate our analysis by specifying the best possible regression model for our panel data estimations. This has a crucial implication on the unbiasedness of the parameter estimates.

Three basic models are commonly considered, namely POLS, FE, and RE.

The appealing feature of FE is that this estimation necessitates no stringent exogeneity assumption of zero covariance between the unobserved effects and all independent variables. This condition is difficult to satisfy in reality but strictly required by the RE (Wooldridge, 2020). However, the RE excels the FE in dealing with the heteroscedasticity and serial correlation issues as, by construction, the former employs the GLS. Indeed, combining FE with GLS can also address the two common OLS issues.

The POLS is considered less efficient than the FE and RE as the former controls no individual and period heterogeneity (Wooldridge, 2020). However, the setting of our model can lessen POLS disadvantage as many individual and time-varying variables are controlled in our model. We involve two cross-sectional dummies representing the country's income level (Income Category) and the OIC membership (OIC). We also take into account countries' time-varying variables such as Inflation, GDP Per Capita Growth, and Population Growth.

Table 4.6 provides some sets of statistical tests as additional considerations for selecting the model specifications. In general, they support the argument that the POLS estimation is sufficient to produce unbiased estimates in our study. The Redundant Fixed Effect test evaluates whether incorporating FE into the models leads to higher efficiency than the basic POLS structure. The results indicate that the additional effects do not significantly improve the models. The Honda Uniformity Most Powerful (UMP) test also favors the POLS over RE as it fails to reject the nonexistence of effects in the models. While the incomputable Hausman statistics fail to compare RE and FE, they support Honda UMP's outcome as the RE variance is zero. These findings are robust to the introduction of interaction variables.

While POLS seems to be the best estimation methodology for our models, we also incorporate the other panel specifications (i.e., GLS, FE, FE GLS, RE GLS, and GMM) to examine the unbiasedness and consistency of its coefficient of estimates. GLS offers a potential

remedy for serial correlation and heteroscedasticity problems. GMM reduces any potential endogeneity issues. This is worth noting that RE’s regression results may converge with POLS due to the zero-effect variance documented by the Hausman test (Wooldridge, 2020).

Table 4.6: Model specification tests

Test (H_0 vs. H_1)	(1) Without interaction Variables [†]	(2) With interaction variables [†]
Redundant Fixed Effect (POLS vs. FE)	0.244	0.352
Honda (POLS vs. RE)	-2.950	-2.685
Hausman (RE vs. FE)	5.087 [‡]	0.000 [‡]

Note: This table evaluates the effect specifications of the models (1) without interaction and (2) with interaction variables. The interaction variables are Private Credit*OIC, Gender Equality*OIC, and Ethno-fractionalization*OIC (see Table 4.8). It examines (i) the Pooled OLS (POLS) against Fixed Effect (FE) in the Redundant Fixed Effect test, (ii) the POLS versus RE using Honda Uniformity Most Powerful test, and (ii) the Random Effect (RE) *vis-à-vis* FE employing Hausman test. All effects are in the time as the models have controlled for two categorical cross-section variables. [†]The reported statistics for the Redundant Fixed Effect, Honda, and Hausman are F, LM, and Chi-Square statistics respectively. [‡]Suggest that the random effect variance equals to zero. The Hausman statistics may not be computable. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

4.5.2. Regression Results

4.5.2.1. Sukūk Issuance and Income Inequality

Table 4.7 shows that various regression methodologies mentioned above provide consistent and robust results. The *sukūk* development has a positive relationship with the top 1% earners at least at a 5% significance level. This suggests that countries with a higher level of *sukūk* issuance experience a more profound income disparity, supporting our hypothesis. The marginal effect of *sukūk* issuance is also economically significant, ranging from 0.027 to 0.032. This means that a 1% increase of the proportion of *sukūk* issuance over the GDP enhances the highest earners’ claim on the population’s income by 2.7 to 3.2 basis points (bps).¹³

¹³ The convergence of RE GLS and POLS findings is well-predicted due to the zero random effect variance documented by the Hausman test in Table 4.6.

Table 4.7: Regression results

	Dependent variable: Top 1%				
	(1) PLS	(2) EGLS	(3) FE	(4) FE EGLS	(5) RE EGLS
<i>Sukūk</i>	0.030** (2.101)	0.027** (1.957)	0.032*** (2.335)	0.029** (2.215)	0.030** (2.101)
Private Credit	0.019*** (6.666)	0.019*** (8.284)	0.021*** (6.758)	0.021*** (8.246)	0.019*** (6.666)
Gender Equality	0.014** (2.183)	0.013** (2.070)	0.013* (1.895)	0.011* (1.717)	0.014** (2.183)
Globalization Index	-0.101*** (-7.072)	-0.100*** (-7.929)	-0.125*** (-7.468)	-0.126*** (-8.565)	-0.101*** (-7.072)
Ethno-fractionalization	-0.011*** (-3.196)	-0.010*** (-3.203)	-0.010*** (-2.998)	-0.010*** (-2.934)	-0.011*** (-3.196)
GDP per capita growth	-0.005 (-0.446)	-0.004 (-0.320)	-0.009 (-0.531)	-0.008 (-0.477)	-0.005 (-0.446)
Inflation	0.020* (1.954)	0.020** (2.000)	0.026** (2.400)	0.027** (2.534)	0.020** (1.954)
Population growth	0.191*** (4.935)	0.191*** (4.728)	0.181*** (4.005)	0.180*** (3.793)	0.191*** (4.935)
Telephone	0.068*** (7.011)	0.070*** (8.233)	0.075*** (7.169)	0.077*** (8.326)	0.068*** (7.011)
Income category	0.587*** (3.328)	0.556*** (3.423)	0.685*** (3.640)	0.659*** (3.851)	0.587*** (3.328)
OIC	-8.403*** (-13.089)	-8.360*** (-14.437)	-8.198*** (-13.459)	-8.142*** (-14.866)	-8.403*** (-13.089)
Constant	19.425*** (32.517)	19.469*** (33.734)	20.580*** (30.980)	20.717*** (33.210)	19.425*** (32.517)
Estimation method	OLS	OLS	OLS	OLS	OLS
GLS	NO	YES	NO	YES	YES
FE	NO	NO	YES	YES	NO
RE	NO	NO	NO	NO	YES
Adj. R-squared	0.550	0.555	0.534	0.540	0.550
Observations	550	550	550	550	550

Note: The dependent variable is Top 1%, measuring the highest 1% income group's claim on the population's earnings. The primary independent variable is *Sukūk*, which is calculated by dividing the annual *sukūk* issuance over the nation's GDP in the respective year. The definitions of the remaining variables are consistent with those in Table 4.2. All specifications (1-5) are estimated employing Ordinary Least Squares (OLS) after controlling for the heteroscedasticity. POLS stands for Pooled Least Square. EGLS represents Estimated Generalized Least Squares. FE and RE refer to Fixed Effect and Random Effect, respectively. The results of RE GLS converges with the POLS due to the zero random effect variance documented in Table 4.6. The *t*-statistics are reported in parentheses based on robust standard errors. The adjusted R-squared is reported in all estimations. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

Neighboring Malaysia and Indonesia can exemplify this substantial economic effect.

Within the period of our study (1995-2019), Malaysian *sukūk* issuance has been on average

growing 2.82% annually. This is more than twice Indonesia's 1.20% per annum expansion rate. Based on this data, our regression results suggest that the 25-year cumulative increase in Malaysia's top 1% associated with the level of *sukūk* development is 1.91-2.26%. This deepening of income inequality is 2.4 times more acute than in Indonesia, where the progression of *sukūk* is slower. Here, the top earners seize an additional 0.81-0.96% share of the country's income, *ceteris paribus*. We discuss further the rationale behind this positive impact of *sukūk* development on income inequality in Section 4.6.

4.5.2.2. *Some Other Variables*

Table 4.7 also documents some interesting findings from the remaining variables. Our results demonstrate a positive nexus between the proxy of financial development (Private Credit) and income inequality (Top 1%), supporting the findings of Jaumotte et al. (2013), Jauch and Watzka (2016), De Haan and Sturm (2017), and Piketty (2017).¹⁴ This relationship is statistically significant at 1% in entire regression methods. The economic impact of Private Credit is quite high, even though it is lower than that of *Sukūk*. A 1% increase in the former leads to 0.19-0.21 bps higher income disparity. To put this magnitude into context, let us examine the case of Malaysia and Indonesia in the period of the Asian financial crisis. The Private Credit of Indonesia plummeted 66.65%, down from 60.85% in 1997 to only 20.29% in 2001. Malaysia has also experienced lower-scale deleveraging. The proportion of domestic financing over the GDP in the most financially develop OIC countries scaled down by 18.49% from 158.39% to 129.10% during the same era. Subsequently, their income inequality has also reduced from 18.52% to 18.27% for Malaysia and from 11.71% to 10.55% in the Indonesian context. Our regression suggests that had Malaysia had deleveraged its economy with the

14 This relationship turns into non-monotonic after incorporating differences between the OIC and non-OIC countries' economic institutions, as explained in Subsection 4.5.2.3.

Indonesian scale (i.e., 66.65% instead of 18.49%), its inequality would have narrowed further to between 18.08% and 18.10%, i.e., from 0.92% to 1.02% lower than the actual one.

Table 4.7 also provides an intriguing relationship between countries' openness and inequality. The strand of the literature on the nexus between the two is mixed. Globalization can reduce inequality by advancing the demand for unskilled workers (Wood, 1997). However, the empirical literature also illustrates the opposite effect, where openness increases the demand for skilled labor and thus escalates the domestic inequality (Anderson, 2005). Our findings support the notion that globalization improves income redistribution. The Globalization Index adversely affects the income disparity at a 1% significance level, regardless of the econometric methods used. We argue that this negative outcome is not achieved through the conventional channel of intervening unskilled labor's demand. It is instead realized by incorporating non-economic elements into the openness dimensions. This is because our Globalization Index aggregates the *de facto* and *de jure* country's trade, financial, political, informational, and cultural openness. In other words, our study suggests that the non-economic elements of globalization play a crucial role in equalizing countries' income distribution.

The effects of Gender Equality and Ethno-fractionalization on income inequality in Table 4.7 are quite puzzling. It is commonly assumed that legal institutions' support of gender equality positively affects income redistribution (World Bank, 2020), while ethnic fractionalization leads to higher inequality (Desmet et al., 2012). Our results, however, suggest the opposite directions. These contradictions can be explained by the unique characteristic of the majority of OIC countries in our study explained below. As far as gender equality is concerned, those countries have a yearly average score of 44.52, half of their non-OIC counterparts of 86.09. The score is even worse in the Middle East that accounts for the majority of our OIC samples. Its average is only 29.89 (or 34.27 if we include Turkey). It is thus possible

that the rudimentary progression of OIC members in the institutionalization of gender equality contributes to even further income disparity. This is because their extractive institutions allow only a particular group of women to expropriate the opportunities (Acemoglu et al., 2002). In the case of Ethno-fractionalization, OIC members' institutional characteristics can also explain its positive effect on the income gap. Strum and De Haan (2015) document that the negative impact of ethnolinguistic fractionalization on income redistribution only holds when the country has a high level of economic freedom. This moderating factor is missing in many OIC countries in our sample.

In Table 4.7, two categorical variables representing the income groups and OIC membership also offer insightful information. The positive coefficients of the Income Category suggest that the more developed economies generally suffer higher income gaps. However, this result requires further analysis. This is because the OIC variable implies that the Muslim-majority countries generally have higher income inequality than their non-OIC counterparts. The gap between the two is relatively high, ranging from 8.1% to 8.4%. Therefore, while the more advanced non-OIC countries suffer higher income disparity, their level of inequality is still lower than the OIC members.

4.5.2.3. Robustness Checks: Interaction Variables Regression

In this robustness check, we incorporate the interaction variables of Private Credit*OIC, Gender Equality*OIC, and Ethno-fractionalization*OIC into our models in Table 4.8 and see whether this alters our results in Table 4.7. The findings are very consistent. The *sukūk* development positively impacts income inequality with slightly higher coefficients, ranging from 0.031 to 0.036. All the econometric methods used also indicate that the positive nexus between *sukūk* development and income inequality is significant at 5%. The reliability of our

results is also true for the rest of the variables. There are no contradictions between Table 4.7 and 8 at all. We also observe that the latter model (with interaction variables) is marginally better than the original one, as far as the explanatory power is concerned. Introducing three extra variables into the regression models raises our goodness-of-fit (adjusted R-squares) by a good percentage without significantly diverging our coefficient estimates from Table 4.7. This also indicates that our models are robust from the omitted variable bias.

We next analyze the economic implications of each interaction variable. The first interaction variable is employed to account for the distinct effect of financial development in OIC and non-OIC members. Table 4.8 shows that the marginal effects of Private Credit are consistent with Table 4.7. However, the interaction variable of Private Credit*OIC shows negative figures with the coefficient estimates range from -0.024 to -0.034. This makes the relationship between financial development and inequality non-monotonic. The effect of Private Credit in the OIC countries is positive, ranging from 0.020 to 0.027, while that in the Non-OIC ones is negative, ranging from -0.004 to -0.007 (i.e., $(0.020 - 0.024)$ to $(0.027 - 0.034)$). The previous literature documents that the benefit of financial development towards income redistribution occurs after countries surpass a certain economic threshold (Clarke et al., 2006; Kim and Lin, 2011). However, we attribute this inverted U-curve nexus to the distinct economic institutions in the OIC and non-OIC countries instead of the differences in their economic development stage. This result is consistent with Acemoglu et al.' (2002) institutions theory. This is because countries like Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia compare economically to our developed non-OIC countries. However, the inclusive economic institutions make the financial development in non-OIC countries more conducive to equitable income redistributions.

Table 4.8: Robustness check: Regression with intersections results

	Dependent variable: Top 1%				
	(1) PLS	(2) EGLS	(3) FE	(4) FE EGLS	(5) RE EGLS
<i>Sukūk</i>	0.036** (2.486)	0.034** (2.497)	0.032** (2.122)	0.031** (2.160)	0.036** (2.486)
Private Credit	0.022*** (3.959)	0.020*** (4.429)	0.027*** (4.233)	0.026*** -4.743	0.022*** (3.959)
Private Credit*OIC	-0.026*** (-3.206)	-0.024*** (-2.783)	-0.034*** (-3.717)	-0.033*** (-3.338)	-0.026*** (-3.206)
Gender Equality	0.035*** (4.078)	0.036*** (4.773)	0.034*** (4.174)	0.035*** (4.610)	0.035*** (4.078)
Gender Equality *OIC	-0.031 (-1.390)	-0.034 (-1.459)	-0.035 (-1.534)	-0.036 (-1.517)	-0.031 (-1.390)
Globalization Index	-0.118*** (-6.271)	-0.114*** (-6.826)	-0.152*** (-5.978)	-0.150*** (-6.585)	-0.118*** (-6.271)
Ethno-fractionalization	-0.021*** (-5.088)	-0.021*** (-6.297)	-0.020*** (-4.659)	-0.020*** (-5.357)	-0.021*** (-5.088)
Ethno-fractionalization*OIC	0.152*** (6.844)	0.154*** (6.959)	0.150*** (6.824)	0.151*** (6.743)	0.152*** (6.844)
GDP per capita growth	-0.006 (-0.505)	-0.005 (-0.431)	-0.012 (-0.695)	-0.013 (-0.733)	-0.006 (-0.505)
Inflation	0.017* (1.669)	0.017* (1.809)	0.024** (2.143)	0.024** (2.455)	0.017* (1.669)
Population growth	0.219*** (5.730)	0.222*** (5.709)	0.199*** (4.462)	0.202*** (4.434)	0.219*** (5.730)
Telephone	0.090*** (7.378)	0.092*** (8.438)	0.100*** (7.748)	0.103*** (8.333)	0.090*** (7.378)
Income category	0.646*** (4.604)	0.621*** (4.829)	0.739*** (4.761)	0.712*** (5.081)	0.646*** (4.604)
OIC	-9.096*** (-3.212)	-9.214*** (-3.396)	-7.715*** (-2.742)	-7.864*** (-2.966)	-9.096*** (-3.212)
Constant	19.533*** (25.456)	19.394*** (28.322)	21.091*** (20.068)	21.014*** (22.212)	19.533*** (25.456)
Estimation method	OLS	OLS	OLS	OLS	OLS
GLS	NO	YES	NO	YES	YES
FE	NO	NO	YES	YES	NO
RE	NO	NO	NO	NO	YES
Adj. R-squared	0.583	0.591	0.570	0.578	0.583
Observations	550	550	550	550	550

Note: This table re-estimates the models in Table 4.7 by incorporating three interaction variables: (i) Private Credit*OIC; (ii) Gender Equality*OIC and (iii) Ethno-Fractionalization*OIC. OIC is a categorical variable, where 0 represents the OIC countries and 1 for otherwise. Table 4.2 provides definitions of the remaining variables. Here again, the RE GLS method produces identical parameters with that of POLS one due to the zero random effect variance. The reported *t*-statistics in parentheses are robust standard errors. The adjusted R-squared is reported for all estimations. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

The second interaction variable suggests that the positive relationship between gender equality and income disparity holds only in the OIC countries. The final effect of this variable in non-OIC countries is negative. Take the FE regression output as an example. Here, gender equality's economic impact is 0.033, while that of the interaction variable is -0.060. This makes the net marginal effect of the non-OIC members -0.027. Our result again supports Acemoglu et al.' (2002) institutions theory.

Finally, the third interaction variable retains our notion for the relationship between Ethno-fractionalization and income disparity. The net economic impact of Ethno-fractionalization in non-OIC countries is positive, with a value of 0.092 (0.114-0.022) in the FE regression. This shows that the increase in ethnic diversity only jeopardizes income distribution in the presence of economic liberty. This result is consistent with Strum and De Haan (2015).

4.5.2.4. Robustness Checks: GMM

Table 4.9 provides an additional robustness check on our results by employing the GMM. This is done to address the potential endogeneity issue commonly caused by simultaneity, omitted variable, and measurement error biases. Stiglitz (2012) suggests the theoretical existence of this endogeneity issue in the relationship between financial development and inequality. Here, we utilize the first lags of the explanatory variables as instruments, in harmony with Beck et al. (2007). This strategy generates decent goodness of fit for the model indicated by insignificant Sargan's J-statistics. High consistency is also well-documented between our GMM and the other estimations results. The magnitudes and signs of the coefficient estimates in Table 4.9 concur with the other estimations in Table 4.7 and 8. This is also true for the *Sukūk* variable. The *sukūk* market development positively influences income disparity with slightly

higher marginal effects, ranging from 0.041 to 0.052. However, the variable is only statistically significant in Specification (2), where the interaction variables are incorporated.

Table 4.9: Robustness check: GMM results

	Dependent variable: Top 1%	
	(1) No interactions	(2) Interactions
<i>Sukūk</i>	0.041 (1.306)	0.052* (1.657)
Private Credit	0.018** (2.298)	0.019** (2.255)
Private Credit*OIC		-0.023* (-1.660)
Gender Equality	0.016* (1.863)	0.043*** (5.141)
Gender Equality*OIC		-0.064** (-1.988)
Globalization Index	-0.109*** (-4.798)	-0.125*** (-4.294)
Ethno-fractionalization	-0.013*** (-2.657)	-0.025*** (-5.014)
Ethno-fractionalization*OIC		0.147*** (6.285)
GDP per capita growth	-0.070 (-0.622)	-0.082 (-0.689)
Inflation	0.037* (1.695)	0.034 (1.556)
Population growth	0.196*** (2.849)	0.234*** (3.394)
Telephone	0.074*** (5.795)	0.096*** (5.999)
Income category	0.658*** (2.786)	0.777*** (3.796)
OIC	-8.451*** (-15.855)	-6.895** (-2.164)
Constant	20.012*** (16.653)	19.908*** (13.773)
Estimation method	GMM	GMM
GLS	YES	YES
RE	YES	YES
J-statistics	0.000	0.000
Observations	528	528

Note: This table examines our model by employing the Generalized Method of Moments (GMM). Panel 1 illustrates Specification (1) with no interacting variables while Panel 2 depicts Specification (2) with interaction variables involving: (i) Private Credit*OIC; (ii) Gender Equality*OIC; and (iii) Ethno-fractionalization*OIC. The instrumental variables (IVs) are the immediate lags of the independent variables. The *t*-statistics reported in parentheses are based on robust standard errors. In both cases, Sargan's *J*-statistics fail to reject the IVs used in our model as valid. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

4.5.2.5. Robustness Checks: OIC Only Regressions

We also examine whether excluding the non-OIC countries (i.e., Netherlands, Ireland, Switzerland, UK, and Singapore) from the sample alters our findings. This is because the proportion of *sukūk* issuance over the GDP in those countries is relatively small compared to the OIC ones (see again Table 4.4). Table 4.10 illustrates consistent findings between the OIC only and the full-sample models. *Sukūk* has a marginally significant positive relationship with income inequality except in the GMM model. The marginal effects of *sukūk* across different econometric methodologies are also in harmony with the previous results shown in Tables 4.7, 4.8, and 4.9. The same goes true for the financial development and the other right-hand side variables. This suggests the robustness of our findings against the outliers of relatively small *sukūk* issuing countries.

Table 4.10: Robustness check: OIC only regression results

	Dependent variable: Top 1%					
	PLS	EGLS	FE	FE EGLS	RE EGLS	GMM
<i>Sukūk</i>	0.027* (1.678)	0.025* (1.665)	0.031* (1.756)	0.029* (1.758)	0.027* (1.700)	0.057 (1.187)
Private Credit	0.018*** (5.168)	0.017*** (5.154)	0.017*** (3.347)	0.016*** (3.333)	0.018*** (5.236)	0.016 (1.300)
Women Law	0.044*** (5.389)	0.044*** (5.138)	0.045*** (5.454)	0.046*** (5.181)	0.044*** (5.460)	0.047*** (3.961)
Globalization Index	-0.116*** (-8.157)	-0.117*** (-8.683)	-0.107*** (-4.727)	-0.108*** (-4.954)	-0.116*** (-8.265)	-0.138*** (-3.174)
Ethno-fractionalization	-0.025*** (-6.998)	-0.025*** (-6.859)	-0.026*** (-6.493)	-0.011*** (-6.334)	-0.025*** (-7.090)	-0.028*** (-3.470)
GDP per capita growth	-0.013 (-1.061)	-0.015 (-1.190)	-0.022 (-1.093)	-0.028 (-1.436)	-0.013 (-1.075)	-0.163 (-0.761)
Inflation	0.004 (0.566)	0.004 (0.642)	0.003 (0.332)	0.004 (0.479)	0.004 (0.573)	0.033 (0.947)

Population growth	0.179*** (4.184)	0.176*** (4.219)	0.175*** (3.903)	0.173*** (3.813)	0.179*** (4.239)	0.186* (1.704)
Telephone	0.162*** (10.297)	0.167*** (10.875)	0.157*** (9.428)	0.163*** (10.093)	0.162*** (10.433)	0.161*** (5.253)
Income category	0.301* (1.876)	0.261* (1.781)	0.304* (1.762)	0.270* (1.738)	0.301* (1.901)	0.529* (1.803)
Constant	19.555*** (36.265)	19.622*** (36.921)	19.147*** (19.978)	19.249*** (20.226)	19.554*** (36.743)	21.050*** (8.084)
Estimation method	OLS	OLS	OLS	OLS	OLS	GMM
GLS	NO	YES	NO	YES	YES	YES
FE	NO	NO	YES	YES	NO	NO
RE	NO	NO	NO	NO	YES	YES
Adj. R-squared	0.253	0.264	0.214	0.231	0.253	
J-statistics						0.000
Observations	425	425	425	425	425	408

Note: This table excludes the non-OIC members from the sample. The definitions of all variables are consistent with those in Table 4.2. All specifications (1-5) are estimated employing Ordinary Least Squares (OLS) after controlling for the heteroscedasticity. POLS stands for Pooled Least Square. EGLS represents Estimated Generalized Least Squares. FE and RE refer to Fixed Effect and Random Effect, respectively. The results of RE GLS converges with the POLS due to the zero random effect variance documented in Table 4.6. The *t*-statistics are reported in parentheses based on robust standard errors. The adjusted R-squared is reported in all estimations except for the GMM, where Sargan's *J*-statistics is provided. The notations ***, ** and * represent significance at 1%, 5% and 10%, respectively.

4.6. Discussions of Our Results

The positive relationship between *sukūk* and income disparity indicates the prevalent issues of agency costs of debt (*ribā*) and excessive risk-taking (*gharar*) in its structure. This ensues from our ethical framework highlighted in Figure 4.1. Even though this conclusion is unfavorable to the IF proponents, it comes with no surprise. The half-century IF experimentation has been mainly centered around the jurisprudential (*fiqh*)-based product development with little attention to its socio-economic ramifications. It is in no way that we underestimate the role of *fiqh* in the innovation process. However, the following fundamental flaws of *sukūk* illustrate that reliance on only legal theory is not enough to realize the noble ethical objectives of Islamic law.

First, the design of *sukuk* is captivated by traditional transaction methods at the expense of socio-economic efficiency. IF strives to restructure conventional debt contracts by reviving medieval (8th to the late 14th century) arrangements of the prosperous era of the Muslim world (Pamuk and Shatzmiller, 2014). The industry employs those contracts merely as a legal stratagem to evade the issue of *ribā* and *gharar*. In practice, *sukūk* design is quite similar to debt facility but less efficient and more risky¹⁵ as discussed below. This result corroborates Kuran (2018).

The cost-plus *Murabaha* contract is utilized in around 41.76% of the existing *sukūk* (as discussed in Section 4.3). This sale-based transaction has the potential to address the issue of asymmetric information (*gharar*) due to its embedded collateral feature (see Chapter 2). However, the fixed *Murabaha* rate exposes the transaction to the market risk and hence to the risk-shifting problem. It induces the issuer's equity to become negative as the tenure of the contract increases (see Chapter 2). Even more, the contemporary practice of *Murabaha* has evolved to the reverse *Murabaha* (organized *Tawarruq*) or sale and buy-back arrangement (*Inah*), where asset centrality is no longer a principal tenet (El-Gamal, 2006). The contracts become a mirror of debt suffering from the twin issues of *ribā* and *gharar*.

The financial leasing (*Ijara*) contract is also roughly employed in 21.65% of the *sukūk*. Here, the *sukūk* holders acquire the ownership of the issuer asset. They then lease the asset to the issuer, who will buy it back at the end of the tenure. It may reduce the risk-shifting and underinvestment issues as floating (i.e., adjustable) rate of the facility pricing is allowed. The leased asset can also act as collateral and income stream for the issuer. However, the contract requires the issuer to have an income-generating asset for the underlying transaction. It

15 The empirical literature documents that *sukūk* is generally issued by less profitable and high leveraged firms with severe information opacity (Mohamed et al., 2015; Minhat and Dzolokarnaini, 2017; Nagano, 2017; Klein et al., 2018).

disregards securitization of intangible or even non-income producing (i.e., growth) assets and discourages greenfield (non-existing) infrastructure financing (see Chapter 2).

The use of a portfolio of income producing assets termed as investment agency (*Wakala bil Istithmar*) contract in *sukūk* has also been growing to around 18.66%. The SPV acts as an investment manager for the holders. The originator receives the proceeds from the SPV and invests them in *Shari'ah*-compliant assets. At the termination date, the originator buys-back the asset by paying the pre-agreed (i.e., non-market based) dissolution amount to the *sukūk* holders. This arrangement is quite similar to the medieval trust financing (*Mudharaba*) contract constituting nearly 11.66% of the *sukūk*. The differences lie in the pricing and the buy-back arrangement; the investment agency allows a fixed rate while the *Mudharaba* theoretically implies non-constant payments. In practice, however, both are not equity contracts. The Islamically endorsed risk-sharing is not conducted appropriately due to the asset-based nature of the contracts, the interest-linked pricing, and the pre-agreed buy-back arrangement discussed below.

Second, the asset centrality holds only in theory as most *sukūk* are asset-based rather than asset-backed (see also Chapter 5). In the latter, the function of the underlying asset is real. Not only does it become the source of cash flow for the *sukūk* holders, but it also serves as collateral. In the event of default, the holders have recourse to the underlying asset. These features, however, are barely existing in the contemporary *sukūk*. Its asset-based structure does not truly transfer the title of the underlying asset to the SPV due to the purchase undertaking agreement. This makes the *sukūk* holders have no recourse to the asset in the event of a default. This aggravates the risk of the asset-based *sukūk*. The payoffs of securitization also diverge from that of the underlying assets. On the contrary, the industry prices *sukūk* employing interest-based benchmark, as discussed below.

Third, interest-based pricing is one of the most endemic problems of the IF industry. *Sukūk* is no exception (Kuran, 2018). This type of pricing disconnects with the underlying asset performance and exaggerates the issue of *ribā*. The industry mainly relies on local variants of LIBOR for pricing. This is regardless of the contractual types of *sukūk*. In 2011, IF attempted to delink from LIBOR by inventing the IIBR. However, this alternative pricing offers a trivial difference with the LIBOR. In Chapter 2, we document the short-run and long-run convergence between LIBOR (and its local variants) and IIBR. Even more, the IIBR is consistently priced higher than its conventional counterparts. Considering the similarity between Islamic financing and conventional loans, IIBR's premium can be deemed an unethical price-gouging practice stemming from a piety premium (see Chapter 2).

Finally, the disconnect between the innovation process and *Maqāsid al-Sharī'ah* is also attributed to the institutional failure of *Sharī'ah* certification. Gözübüyük et al. (2020) argue that the lack of innovation roots in the interlocking network and monopoly of the religious scholars who legitimate the issuance of *sukūk*. Another study raises the governance issue as the industry pays those scholars for legitimizing their issuance (Al Mannai and Ahmed, 2019). Hasan (2014) documents that while religious scholars are experts on Islamic jurisprudence, their inadequate technical knowledge of the financial instruments, institutions, and, markets leads to their lack of reinforcing the ethical dimensions of the *Sharī'ah* in the *sukūk* development process.

To summarize, the deviation of *sukūk* in practice from that asserted is not surprising. Developing products without implementing the objectives of the Islamic law converges the securitization to a facility that is even less efficient and more risky than plain vanilla debt. It thus fails to remedy the positive nexus between financialization and inequality.

4.7. Conclusions

Equitable income distribution is an integral part of the ethical objectives of Islam to attain socio-economic justice. However, there has been little attempt to explore the link between the development of IF products and inequality, particularly in the context of *sukūk*. This is despite its growing importance as a corporate and government financing facility in both the Muslim majority and minority countries. The theory offers divergent predictions to the *sukūk*-inequality nexus. Banerjee and Newman (1993) and Galor and Zeira (1993) advocate for a negative link between finance and inequality, while Greenwood and Jovanovic (1990) postulate the Kuznets' inverted U-curve style relationship between the two. The recent literature documents a positive effect of finance in exaggerating the income inequality as prescribed in Piketty's (2017) central thesis of $r > g$. In this paper, we examine the role of *sukūk* development on income inequality in light of the above-competing theories.

Employing a large cross-country sample consisting of both OIC and Non-OIC *sukūk* issuing countries for 1995-2019, our findings document a positive nexus between yearly *sukūk* issuance and the top 1% earners. This result contradicts Abedifar et al. (2016), who establish a negative link between IBs and inequality but is in harmony with Mian et al. (2020), who demonstrate the positive relationship between bond issuance and income inequality. Our results also suggest a positive link between inequality and financial development (proxied by the loan proportion accorded by financial institutions divided by the GDP). This is consistent with Jaumotte et al. (2013), Jauch and Watzka (2016), De Haan and Sturm (2017), and Piketty (2017). However, when we account for political and economic institutional differences of OIC and Non-OIC members, the finance-inequality nexus seems to follow Greenwood and Jovanovic's (1990) inverted U-curve hypothesis. However, unlike Clarke et al. (2006) and Kim and Lin (2011), we attribute this non-monotonic relationship to the extractive institutions that

characterized the Muslim majority economies rather than their lower economic progression. Different institutions appear to bring about distinct behavior in other key determinants of inequality, including gender equality, ethno-fractionalization, and country openness. In a way, these findings are consistent with Acemoglu et al.'s (2002) inclusive institutions theory. The above results are robust across different panel estimations, including the GMM.

The implication of our *sukūk*-inequality findings is prevalent in our study. *Sukūk* fails to incorporate the ethical objectives of Islamic law in its product development. *Sukūk* design is captivated by inefficient medieval contracting, preferential employment of asset-based (instead of asset-backed) structure, and reliance on interest-based pricing models. The overly concentrated network of religious scholars who grant *Sharī'ah* certifications exacerbates these problems. Like other IF products, *Sukūk* has been hitherto developed on a narrow adherence to legal theory without contextualizing its socio-economic implications. This makes the Islamic securitization merely mimic the conventional bonds, albeit inefficiently and with excessive risk. The ill-effects of agency costs of debt (*ribā*) and excessive risk (*gharar*) still persist. These two endemic issues embedded in debt are the sources of inequality from an ethical perspective. This is why our study documents a positive link between *sukūk* and inequality. The only way forward is by incorporating the ethical objectives of Islamic law in the *sukūk* development process.

We acknowledge some limitations of our study. We do not categorize *sukūk* based on either type of issuer (government or private) or form of contract (*Murabaha*, *Ijara*, *Wakala bil Istithmar*, *Mudharaba*, etc.) due to data availability and sufficiency constraints. We have argued in this paper that, in practice, *sukūk* are primarily unsecured and mimic conventional bonds. However, accounting for the above categories can help us evaluate their varied impacts on income redistributions. Moreover, our paper only emphasizes the flow concept of inequality

(i.e., income) and is silent on wealth disparity. These are the gaps that future research can aim to fill.

Chapter 5

Can Culture Mitigate the Ill-Effects of Infrastructure Financialization?

5.1. Introduction

Inadequate infrastructure...has been recognized as a major barrier to economic advancement...

(Shaun McRae, 2015, p. 36)

Infrastructure advancement is among the critical enabling factors in sustainable development (Moyer and Hedden, 2020). The absence of a suitable infrastructure funding scheme contributes to years of pent-up deficits faced by every country. Surprisingly, research proposing efficient infrastructure financing is rare (Mazzucato and Semieniuk, 2017). We seek to fulfill this gap by enabling the ‘cultural turn’ in our analysis (Jessop and Oosterlynck, 2008). Incorporating culture allows us to avoid the infrastructure ‘financialization’ without losing emphasis on economic aspects. In doing so, we employ the ‘localized’ approach of Pollard and Samers (2007) and Bassens et al. (2011) by focusing on emerging Muslim economies’ culture-led infrastructure development. These regions of the world have some intriguing idiosyncratic cultural characteristics stemming from prohibitions of *ribā* (agency cost of debt) and *gharar* (opacity/asymmetric information) (Pryor, 2007).

The total infrastructure investments needed by the four oil-rich Muslim economies, Saudi Arabia, Kuwait, UAE, and Qatar from 2016 and 2030, amount to \$1.4 trillion. Forty percent of this is expected to be fulfilled by private investors (Youssef et al., 2018). The government budget is no longer a viable financing option for most Muslim oil-exporters in the post-oil-boom era as they have incurred more than a 20 percent budget deficit. Kuwait and Qatar are

the only two nations enjoying a government budget surplus in 2016.¹ This is not to mention most Muslim economies that fall under emerging and even underdeveloped countries categories.

The government budget constraint, coupled with a short-term vision of populous programs, hinders policymakers' long-term infrastructure development priority (Rogoff and Sibert, 1988). In the last three decades, the means of dealing with the above issues has been mobilizing resources from the private sector into infrastructure development by using the Public-Private Partnership (PPP) (Trebilcock and Rosenstock, 2015). Here, the private sector is invited to build and operate the infrastructure project before handing it to the government at the end of the contract period. While many praise the success of this method in accelerating infrastructure development, it also confers several disadvantages. First, this mode of financing may aggravate the uneven geographies of development (Siemiatycki, 2011). PPP incentivizes the investor to focus solely on profitable (i.e., positive NPV) projects, impeding the equitable distribution of infrastructure development (Tan, 2012). This provokes the spatial inequality of developing countries attributed to the unequal distribution of natural resources and agglomeration forces (Venables, 2005). Second, the PPP's reliance on default-prone bonds also runs afoul of the Islamic value system that bans financialization encompassing the agency cost of debt and opacity/asymmetric information (Ebrahim et al., 2016; Knight and Sharma, 2016). In Muslim-majority countries' cultural context, these two issues are related to *ribā* and *gharar*, respectively.

This study seeks a way out of the above predicament by incorporating the cultural values in the development of the infrastructure under the patronage of charitable endowments (*awqāf*)

1 See the World Bank link:
https://govdata360.worldbank.org/indicators/ha9ccf183?country=BRA&indicator=28953&viz=line_chart&years=2007,2016# (accessed on April 16, 2018).

and funded by a novel quasi-equity facility (described below—Sarno and Taylor, 1999) linking the payoffs of the same with that of the infrastructure. *Sukūk* (plural of Arabic term *sakk*, meaning certificate) is extolled as an ingenious culture-led financing mechanism for the above scheme. Unlike conventional bonds, *sukūk* is structured in the form of Asset-Backed Securities (ABS), where the income for its holders stems from the underlying asset/project's performance. This supposedly does away with the adverse effects of financialization involving fragile debt (harboring endemic agency issues) that heightens uneven development (Pan et al., 2017).² However, the majority of contemporary *sukūk* deviate from the ideal structure mentioned above. The industry (i) employs asset-based instead of an asset-backed *sukūk* (Bassens et al., 2013); (ii) de-links the pricing to the performance of the underlying infrastructure project (Kuran, 2018); (iii) institutionalizes inefficient *Sharī'ah* (Islamic legal) certification (Bassens et al., 2012; Hayat et al., 2013; Gözübüyük et al., 2020); and (iv) adopts the medieval Islamic contracts at the expense of economic efficiency (Jobst, 2007).

Thus, we propose and mathematically model a robust infrastructure financing scheme by reconstruing *sukūk* structure within the PPP framework while integrating the same with the charitable endowment and advanced financial innovations. This leads us to contribute the following to the strands of literature in development economics.

One, we integrate the *sukūk* structure with the PPP literature to maintain its asset centrality and mitigate asymmetric information (*gharar*) in the contract (Syrett and Bertotti, 2012; Knight and Sharma, 2016). Two, we highlight the cultural turn analysis by instituting a charitable endowment to alleviate one of the acute drawbacks of PPPs, i.e., the problem of uneven geographies of development (Siemiatycki, 2011; Tan, 2012; Pollard et al., 2016). This

² The *Qur'ān*, Muslim holy book, endorses this in verse (Q2:275), "...God has permitted trade and forbidden interest-bearing debt..."

scheme also enables us to incorporate the social dimension and the environment and governance ones (ESG) into the valuation and *Sharī'ah* certification of *sukūk* (Nicholls et al., 2012; Asiyani, 2018). Three, we discuss our intricate *sukūk* structure emulating development finance literature. This allows us to combine the Continuous Workout Financing (Shiller et al., 2019) and Participating Financing (PF - Ebrahim et al., 2011) to serve as an efficient funding scheme alleviating agency costs of debt (*ribā*) (Ashton, 2011).

The rest of this paper is structured as follows. Section 5.2 thoroughly discusses the pros and cons of inviting the private sector to public financing through the PPP mechanism. We then evaluate the conventional infrastructure financing from the perspective of cultural (i.e., religious) issues and the underlying economic rationale in Section 5.3. Next, we critically review contemporary *sukūk* in Section 5.4. Section 5.5 proposes a way forward by introducing an innovative *sukūk* structure by integrating the literature on PPP, charitable endowment, and development finance. Next, we mathematically model our innovative financing structure by amalgamating the Continuous Workout Mortgage with the Participating one in Section 5.6. Finally, Section 5.7 concludes our study.

5.2. Infrastructure and PPPs

...PPPs bring efficiency, innovation and finance...and appear as a win-win resolution of the gap between a country's infrastructure needs and the public funds available to finance these.

(Kate Bayliss and Elisa Van Waeyenberge, 2018, p. 577)

Soliciting the private sector to tap into public goods and services provision first emerged in the form of 'privatization' or 'divestiture.' Here, the government allows the private sector to own some or even entire stakes of State-owned Enterprises (SOEs). Despite a better economic performance of post-privatization firms (Shirley and Walsh, 2000), the practice

seemed to experience a decline during the second-millennium (Bayliss and Van Waeyenberge, 2018) due to (i) challenge by regulators; (ii) risk of the government buy-back; (iii) private sector preference to owning only profitable projects instead of loss-making ones, even though the latter may impact profoundly on society;³ and (iv), marginal benefits gained by the purchasing firms and community (Birdsall and Nellis, 2003).

PPP thus emerges as an alternative model of project financing for public infrastructure provision. The private sector (project sponsor) is responsible for designing, financing, building, operating, and maintaining the infrastructure project during a specific period. It transfers the asset's ownership to the government at the end of the contract tenure (Trebilcock and Rosenstock, 2015). Figure 5.1 illustrates the simplified mechanism of PPP.

Proponents of PPP argue that this project financing model offers a win-win solution for both contracting parties (Table 5.1). In this scheme, the private sector engagement can relax short- and medium-term fiscal constraints and thus accelerate the country's infrastructure development without losing the PPP assets (Syrett and Bertotti, 2012). This model allows the government to transfer the risk of design, building, finance, and maintenance of the project to the private sector. By doing so, some efficiencies stemming from the reduction of the intergovernmental coordination cost, low bidding loss, contract verification cost, and cost overruns that would otherwise be faced by traditional procurement models are anticipated (Trebilcock and Rosenstock, 2015). From the private sector perspective, PPP extends more certainty to the project execution. The political risk ensuing from the government's objective shift and commitment can be mitigated by a complete contract enactment (Trebilcock and

3 This may result in the poorest sectors (or countries) to be excluded from investment, thus leading to unequal resource allocation to primary public infrastructure sectors, thereby, creating uneven geographies of development. The World Bank reveals that between 1995 and 2015, 83 percent of private funding went to information and communication technology, electricity, and roadway while only 3 percent was invested in water and sewage infrastructure (Bayliss and Van Waeyenberge, 2018).

Rosenstock, 2015). The contract may also cover the government’s guarantee on the prices of infrastructure’s goods or services due to the projects’ natural monopoly characteristics. This can be done by stipulating the minimum government purchase price or allowing the price to be contingent on the macroeconomic uncertainty (Ramamurti, 2003). The project sponsor can also benefit from the asset-backed nature of the contract as it is entitled to the underlying assets of the Special Purpose Vehicle (SPV) and its cash flow from the users. Finally, the literature also documents a higher relative efficiency of this model in the forms of service quality, consumers’ satisfaction, and employment productivity (Andres et al., 2008).

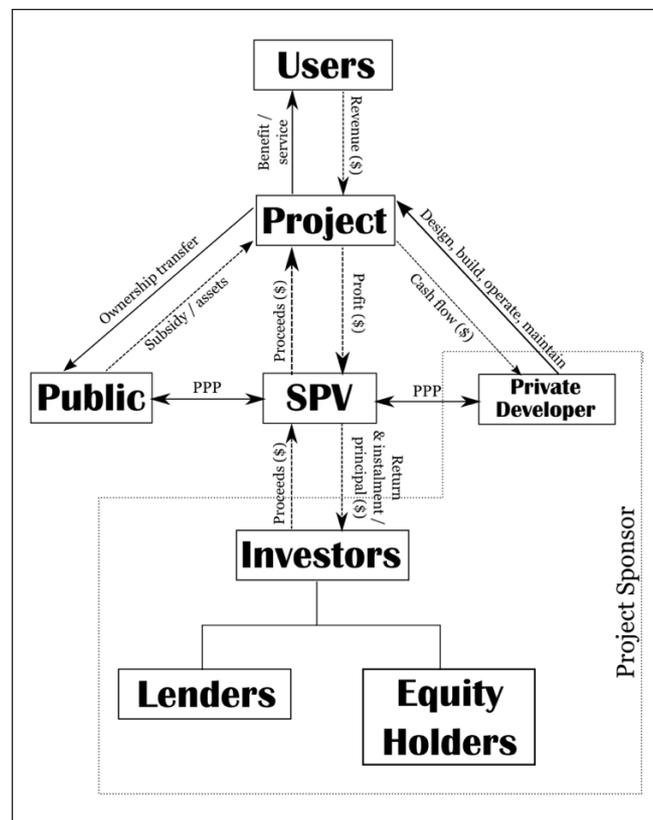


Figure 5.1: Simplified structure of a PPP

However, the advantages also come with some drawbacks. Among the most highlighted issues mentioned in the literature is the higher financing cost of PPP (Trebilcock and Rosenstock, 2015). It is argued that the project sponsor may not obtain a financing rate as

competitive as the government. However, this notion is opposed by de Bettignies and Ross (2004), who argue that the private and public debt are disparate as the former may confer tax benefits along with a put option to default. The government’s borrowing rate in the developing world may also be even more expensive than a highly reputable private sector, such as multinational enterprises (MNEs), due to political instability and the lack of public sector governance (Li et al., 2011).

Table 5.1: Pros and Cons of PPP

Advantages	Disadvantages
Enlarge the short and medium fiscal space.	Financing costs might be higher.
Bundling of finance, organizational, and operational contract can reduce agency conflict experienced in traditional infrastructure investment.	The incomplete contract may lead to the private party cutting corners in the project’s quality and delivery.
Reduce the probability of having low bids, high contract verification, and changes in the government objective during the construction period (political risk).	The recourse of lenders is limited as the project’s assets are generally public infrastructure that is difficult to liquidate.
Assets backed: recourse to SPV’s assets and its cash flow.	Promote uneven geographies of infrastructure development.
Reduce coordination costs that would otherwise be faced by intergovernmental departments.	Opportunity cost from the loss of project revenue during the contract period.
Speedy infrastructure development.	High government monitoring cost to the private sector.
Lower cost overruns, hence better project budgeting.	Huge long-term obligation to buy-back the assets.
Higher relative efficiency, including (i) quality of service; (ii) satisfaction of consumers; and (iii) employment productivity.	Infrastructure clients may face higher charges without government support.
Transfer of risks of design, construction, operation, and maintenance of the project to the private sector.	The bilateral contract may lead to the higher bargaining power of the project sponsor over the government.

Sources: Andres et al. (2008), Siemiatycki (2011), Syrett and Bertotti (2012), and Trebilcock and Rosenstock (2015).

Furthermore, the contracting issue of PPP is also important (Hart, 2003). While PPPs

may reduce agency problems, the contracting parties' inability to write iron-clad agreements (incorporating every possible future state of the economy) can wreck the accord. Conditioning the contract detail on all the possible states of the world is costly, and information on the contingency events is also limited and often non-verifiable. This subsequently incentivizes the private sector to 'cutting corners' in the quality of the project delivery through legal means.

Finally, PPPs have failed to alleviate the uneven geographies of development (Siemiatycki, 2011). Table 5.2 shows the distribution of commutative PPP investments across the developing Muslim world between 1990 and the first half of 2018.⁴ The World Bank figure suggests that the total PPP investment of developing Muslim economies is quite significant, accounting for 21.65 percent of the emerging world's private investment participation in the last three decades. Unfortunately, the private sector involvement in these regions has concentrated in only five countries (namely Turkey, Indonesia, Malaysia, Pakistan, and Morocco), contributing 77 percent of the PPP investments. The 20 Sub-Saharan Muslim countries account for 44.44 percent of developing countries contribute to only 8.96 percent of PPP investments, with the average project value of only \$153 million.

⁴ It should be noted that 99 percent of PPP investments were conducted from 1990 onwards.

Table 5.2: Total PPP investments across developing Muslim countries (\$ millions) (January 1990 – June 2018)

No.	ECA		%	EAPR		%	MENA		%	SSA		%	South Asia		%
1	Albania	1,959	0.4%	Indonesia	55,424	11.7%	Algeria	9,164	1.9%	Benin	1,079	0.2%	Afghanistan	69	0.0%
2	Azerbaijan	14	0.0%	Malaysia	42,883	29.7%	Djibouti	604	0.1%	Burkina Faso	876	0.2%	Bangladesh	5,484	1.2%
3	Kazakhstan	3,819	0.8%				Egypt	9,826	2.1%	Cameroon	1,352	0.3%	Maldives	40	0.0%
4	Kyrgyzstan	140	0.0%				Iran	1,881	0.4%	Chad	303	0.1%	Pakistan	27,439	5.8%
5	Tajikistan	961	0.2%				Iraq	2,950	0.6%	Comoros	1	0.0%			
6	Turkey	144,279	30.3%				Jordan	10,429	2.2%	Ivory Coast	3,808	0.8%			
7							Lebanon	183	0.0%	Gabon	1,986	0.4%			
8							Morocco	20,594	4.3%	Gambia	707	0.2%			
9							Syria	519	0.1%	Guinea	1,017	0.2%			
10							Tunisia	4,410	0.9%	Mali	671	0.1%			
11							Palestine	239	0.1%	Mauritania	748	0.2%			
12							Yemen	267	0.1%	Mozambique	2,737	0.6%			
13										Niger	19	0.0%			
14										Nigeria	11,222	2.4%			
15										Senegal	3,176	0.7%			
16										Sierra Leone	201	0.0%			
17										Somalia	38	0.0%			
18										Sudan	487	0.1%			
19										Togo	1,315	0.3%			
20										Uganda	1,949	0.4%			
	Investment	151,173	31.8%		98,307	20.7%		61,065	12.8%		33,689	7.08%		33,032	7.0%
	Project	303			245			207			220			169	
	Avg. / country	25,195			49,154			5,089			1,685			8,258	
	Avg. / project	499			401			295			153			195.46	

This table depicts total PPP investments in developing Muslim countries based on the World Bank Private Participation in Infrastructure (PPI) database (retrieved from: <https://ppi.worldbank.org/en/ppidata>). We exclude canceled projects as well as those who reported no total investments. ECA, EAPR, MENA, and SSA respectively stand for Europe and Central Asia, East Asia and Pacific Region, the Middle East and North Africa, and Sub-Saharan Africa.

5.3. Imperfections in Infrastructure Financialization

...PPPs have been used as an emergency exit from unsustainable public budget deficit leading to overinvestment or long-term commitments to pay off the private investments that put the state in an even tighter position after the state's payments for the service are due.

(Pekka Leviäkangas, Tuomo Kinnunen, and Aki Aapaoja, 2016, p. 231)

The long history of public debt defaults reveals that the principal-agent problem is embedded in PPPs, causing financial fragility (Poulton and Macartney, 2012). The plain-vanilla debt employed in this scheme is ill-suited for sustainable infrastructure financing as it aggravates systemic risks, and thus financial crises. Tomz and Wright (2007) document 250 occurrences of sovereign default stemming from 106 (developed and emerging) economies. Reinhart and Rogoff (2011) scrutinize a large number of sovereign defaults from 1800 to 2009 and categorize them into five periods of the sovereign crisis. This history repeated itself during the recent sovereign crisis of the advanced European Union economies in 2010 (Lane, 2012).

Cultural issues stemming from religious rulings can rationalize the above endemic flaws of sovereign debt. Here, the leading problems of plain-vanilla debt structure lie in the presence of agency costs of debt (Arabic: *ribā*) and opacity (Arabic: *gharar*) in contracting. The above two religious injunctions enforce property rights as elaborated below.

5.3.1. Agency (*ribāwi*) Issues of Infrastructure Financialization

Ebrahim et al. (2016) attribute the economic rationale of *ribā* in the financial contracting context to the expropriation of contra party's assets ensuing from the agency costs of debt, where two competing economic agents (lender as a principal and borrower as an agent) are incentivized to benefit themselves at the expense of the other (Jensen and Meckling, 1976).⁵

5 This notion goes beyond the literal Arabic translation of *ribā*, i.e., to 'growth.' It is derived from the *Qur'ān*, which bans expropriation of counterparts' assets in the spot or deferred trade (see Q 4:161). It is consistent with El-Gamal (2006), who argues that the prohibition of *ribā* is aimed at enhancing efficiency in financial contracting, thereby fulfilling the objectives of the Islamic law (*Maqāsid al-Sharī'ah*).

Shareholders (borrowing countries) [bondholders] can expropriate the bondholders' [shareholders'] claims by executing a strategic default when their embedded put option is in the money (risk-shifting or asset substitution) [by deterring them from investing in profitable projects (underinvestment)] (Malitz, 1986).

Asset substitution stems from the fixed coupon and principal repayment characterized in the plain-vanilla sovereign bond. Figure 5.2 depicts that this structure cannot absorb external and internal shocks that affect the project values and/or the borrowing country's cash flow in the poor states of the economy (i.e., before S_1). Subsequently, when the borrower's equity is negative (between t_1 and t_2 in Figure 5.3), it incentivizes the borrower to perpetuate a strategic default (Wojakowski et al., 2019). This results in the destruction of the collateral asset (or project) value, expropriating the lender's wealth (Ebrahim et al., 2016).

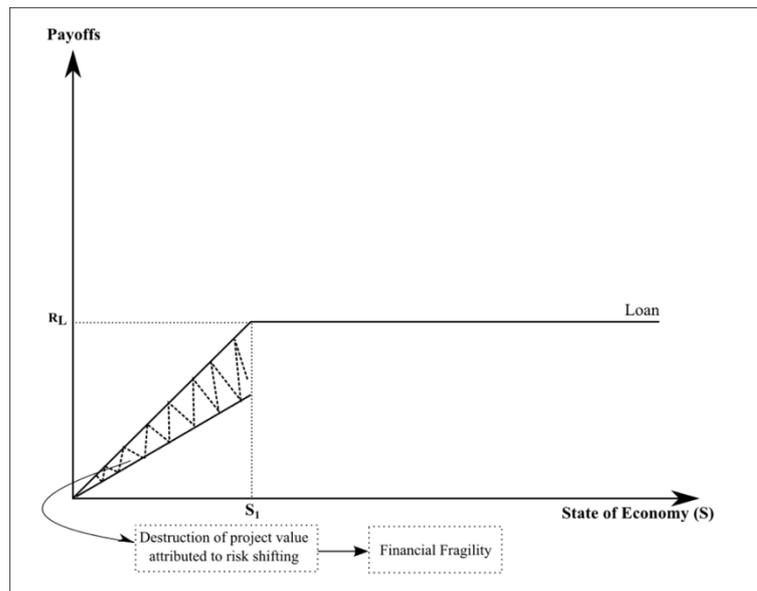


Figure 5.2: *Sukūk* payoffs for fragile (i.e., plain-vanilla risky) loan

Underinvestment arises when the plain-vanilla bond structure is not directly linked to the infrastructure project (Figure 5.4). The government issues bonds to fulfill its general budget

deficit.⁶ This approach of public financing entails two issues. First, infrastructure financing is often marginalized by more ‘urgent’ spending, such as civil servants’ salaries, principal and interest payments of the previous debts, and expenditure on subsidies. Second, the bondholders (coupon and principal) are not linked to infrastructure projects’ performance. While the former can be addressed by the growing adaptation of the project bond for infrastructure (Dailami and Hauswald, 2003), the fragility stemming from the latter remains as the coupon and principal payments of the project bond are delinked to the payoffs (i.e., cash flows) of the infrastructures. The coupon rate is pre-set to LIBOR plus risk premium with the stream of payment originating from the government budget instead of the project cash flow. This is problematic as it follows a pro-cyclical fiscal policy limiting government spending during the economic downturn (Borensztein and Mauro, 2004). Furthermore, the government has no perfect control over the future tax levy and cannot arbitrarily print money to repay its debts (Chander and Wilde, 1998).

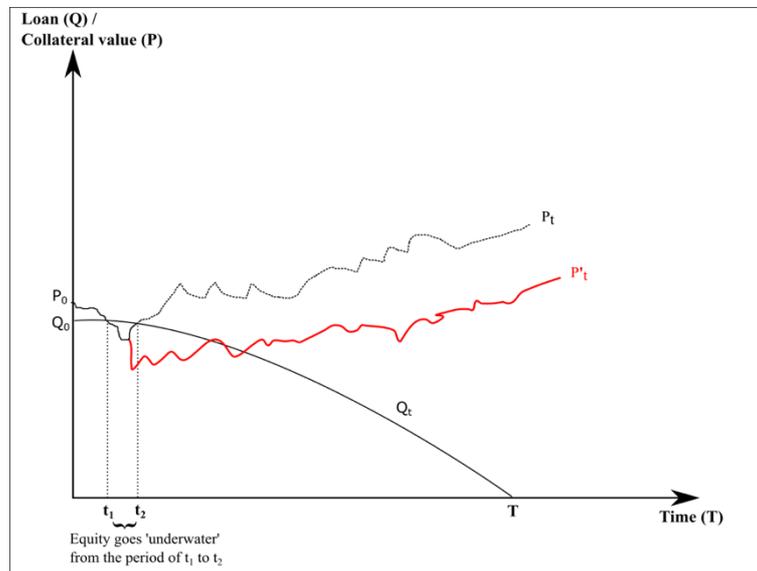


Figure 5.3: Risk-shifting in the risky collateralized loan facility.

Note: The figure shows the structural break in the upward movement of the asset after default (P'_t) in the interval (t_1, t_2).

6 While its proportion has been continuously decreasing over time, government-funded infrastructure remains one of the financing schemes for infrastructure development both in emerging and developed economies (see Pollitt, 2002; Ammermann, 2015; Negara, 2016). Here, the government issues bonds to allow more free fiscal spaces for infrastructure provision (Ahmad, 2014)

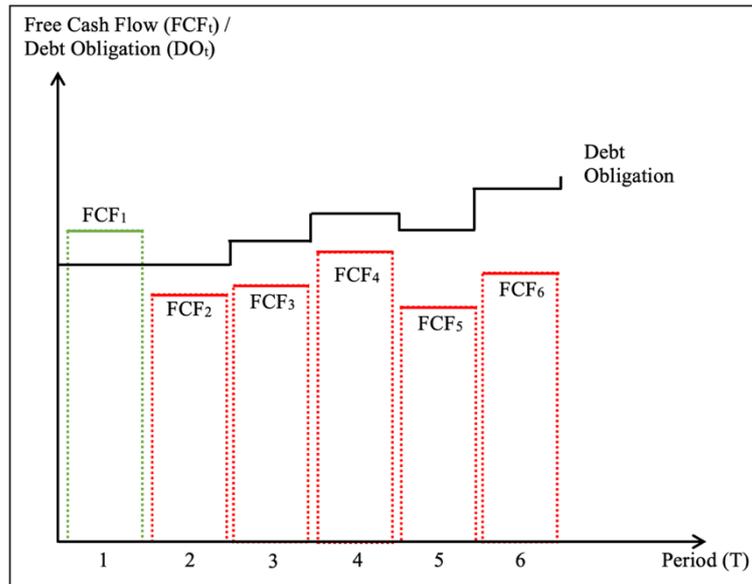


Figure 5.4: Underinvestment problems of the plain-vanilla debt

Note: The increase in the debt obligation due to the lack of free cash flows culminates in a ‘debt trap’ and stifles its ability to undertake future growth projects.

5.3.2. Asymmetric Information (*Gharar*) in Infrastructure Financialization

The second distortion in financial contracting, *gharar*, is attributed to asymmetric information (Ebrahim et al., 2016). This leads to the deterioration of complete market equilibrium into an incomplete one.⁷ The strategic default occurs due to the projects’ insolvency where their discounted future cash flows are lower than the value of outstanding bonds and asymmetric information that does not allow iron-clad contracting (Smith and Warner, 1979). This can give rise to *ex-ante* or/and *ex-post gharar* (adverse-selection/ moral-hazard) (Eaton et al., 1986). Defaults are also feasible even in the case of solvent governments, should the asymmetric information lead to ambiguity in contracting (Knight and Sharma, 2016).

The recent default of the Greek sovereign bonds has taught us a lesson on the cost of adverse selection. The cause of this problem was lax *ex-ante* screening, along with the withholding of vital information by the debtors (Keys et al., 2010). Moral hazard also emerges

⁷ This definition expands Averroes’ (or Ibn Rushd’s) definition of *gharar* (Thomas, 1995).

as a consequence of incomplete contracting (Hart, 2003). The nonzero transaction costs make the contracting parties unable to anticipate all possible outcomes of the future. Simultaneously, the lenders cannot precisely oversee the borrowers' activities in investing their funds into projects due to the high monitoring cost.

5.4. Can *Sukūk* be a Solution for Infrastructure Development?

...it becomes obvious that sukuk are essentially very similar to 'conventional' debt-based structures such as bonds, ...the technique of securitizing assets is used here as a mere stratagem to circumvent Shari'a rules, as they are 'Islamic' in form, but not in substance.

(David Bassens, Ewald Engelen, Ben Derudder, and Frank Witlox, 2013, p. 99)

The *sukūk* market has the potential to tap into a vast array of funds for both sovereign governments and corporations.⁸ Even though Malaysia, Indonesia, and the Gulf Cooperation Council (GCC) countries remain the dominant market players, the Muslim minority countries also tap the nascent market.⁹ This implies the acceptance of the mainstream financial markets to the product. *Sukūk* is supposed to be different from conventional debt. It entails transferring income-paying assets to an SPV which trades on a stock exchange. As the transfer of ownership matters in IF, *sukūk* must also allow investors access to income flow-through and recourse to underlying collateral in the event of default. *Sukūk* is thus expected to overhaul the flaws in the financialization of infrastructure, particularly in the form of the (i) *ribā*, (ii) *gharar*, and (iii) uneven geographies of development.

However, the contemporary *sukūk*'s structures are inspired by medieval financing

8 Bloomberg portrays that the volume of cumulative *sukūk* issuance reached approximately USD 508 billion in February 2018, contributing to almost 17% of the total global IF assets.

9 These include the United Kingdom, Hong Kong, South Africa, Singapore, Luxembourg, British Overseas Territories of Cayman Island, and British Crown Dependencies of Jersey and Guernsey. Until February 2018, these countries have issued 18% of the *sukūk*.

vehicles, such as agency (*wakala*),¹⁰ mark-up ‘sale’ (*murabaha*),¹¹ a purchase-order (*istisna*),¹² leasing (*ijara*),¹³ joint partnership (*musharaka*),¹⁴ and trust financing (*mudharaba*).¹⁵ These structures do not address the problems mentioned above due to the several factors described below.

5.4.1. Asset-Backed vs. Asset-Based *Sukūk*

The key difference between the mainstream ABS and *sukūk* is that financial/intangible assets generally back the former. In contrast, the latter’s underlying assets/projects are restricted to real/tangible ones. Religious nomenclature segregates the concept of ‘*ayn* (tangible assets such as building, projects, usufruct, etc.) and *dayn* (debt including loan, liabilities, etc.). It permits securitization of solely the former while restricting that of the latter due to the injunction of the sale of debt (*bay al-dayn*). This ruling offers resilience and a potential remedy to the conventional securitization’s fragility stemming from asymmetric information (Ebrahim et al., 2016; Knight and Sharma, 2016).¹⁶

10 *Wakala* structure entails a contract where a principal (investor) appoints an agent to manage his/her portfolio in exchange for predetermined fees.

11 *Murabaha* structure entails the ‘sale’ of a real asset to a ‘buyer’ in return for a payoff, including the purchase price plus mark-up. The mark-up is often linked to an interest-based index (see Chapter 2). That is, it is not linked to the performance of the asset/project. This can exacerbate financial fragility, and thus the systemic risk.

12 *Istisna* contract entails a sovereign entity asking a project developer to construct/manufacture a tailored asset. The delivery of the asset is typically done after the construction process while the price is paid (either in installment or a lump sum) during, or after the project construction is finished.

13 *Ijara* structure entails an exchange of the usufruct of an asset for rent.

14 *Musharaka* structure involves two or more parties contributing capital either in cash or in-kind to develop a project. They share in the proportionate ownership of the project as well as the claim for the project’s cash flows. The classic form of this entails unlimited liability, limited life and transferability (marketability), and lack of centralized management (Ebrahim and Sheikh, 2015).

15 *Mudharaba* structure involves a profit-sharing contract where one party contributes capital while the other serves as manager. The classic form of this is too restrictive, demanding 100 percent capital contributions from the investors, thus leading to severe agency issues. The other types of inefficiency stem from investors’ lack of control rights and information opacity (*gharar*) (Ebrahim and Sheikh, 2015).

16 It should be noted that this nomenclature may not be completely airtight and prone to errors (see Ebrahim and Rahman, 2005).

The contemporary practice, however, runs counter to the stability arguments of *sukūk* as the majority of them are constructed using asset-based instead of an asset-backed structure (Bassens et al., 2013). In the former system, investors are not the legal owners of the underlying assets of the SPV. They are only the beneficiary of the assets' payoffs without the legal right to dispose of the same. In the event of default, they have no recourse to the underlying assets, and their claims become *pari passu* (i.e., at equal priority) with the other unsecured debts. As the transfer of title of the asset to the SPV is not authenticated, the stream of payments to the *sukūk* holders stems from the obligor's performance rather than that of the assets/projects. This failure thus leads to a disconnect between underlying assets performance and *sukūk* payoffs.

The asset-based *sukūk* induces risk-shifting due to its endemic opacity and thus the element of '*gharar*' in the structure. This is illustrated in the observed default of several of these facilities irrespective of their composition, in the form of a joint venture (e.g., East Cameroon Partners, Investment Dar Company, and Villamar); or trust financing (e.g., Dana Gas); or leasing (e.g., Nakheel and Golden Belt 1). This substantiates our assertion that the scriptural injunctions' economic ramification is not comprehended by the religious scholars nor by the practitioners or policymakers.

5.4.2. Other Structural Flaws

Recycling medieval contracts for *sukūk* does not make it immune from the fragility stemming from the agency issues or deter the same from regressing to incomplete markets from the endemic opacity. The proponents of Islamic finance (IF) argue that infrastructure projects *sukūk* are ideally constructed using the project-based contract, such as *istisna* (purchase order). However, this structure has been barely used in infrastructure financing. The injunction of the sale/ securitization of toxic debt securities makes the purchase order *sukūk* non-tradable in the secondary markets and, thus, illiquid (Ebrahim et al., 2016). This securitization of debt issue

also occurs in the case of mark-up sale *sukūk*. The endemic agency costs of debt may lead to a freeze in trading these securities. However, unlike purchase order, the mark-up sale *sukūk* holders are not entitled to any gestation period for coupon payments.¹⁷

The infrastructure *sukūk* is also predominantly engineered using the joint venture and leasing contracts. Both structures have the potential of offering flexibility in the pricing mechanism and secondary market transactions. Unlike the mark-up structure, joint venture and leasing allow the *sukūk* payoffs to be variable and not constrained to the debt securitization injunction. However, the way these contracts are priced skews them to interest-based indices. The majority of joint venture *sukūk* in the market are also deemed not *Sharī'ah* compliant due to the detachment of their payoffs with the underlying projects (i.e., asset-based) (Jobst, 2009). The leasing contract may offer marginally better structure as it maintains the asset-backed argument. However, the contract is not applicable for greenfield (non-existing) infrastructure projects, as it requires the underlying assets to be operational, i.e., generating an income stream for the *sukūk* (Allen, 2018).

5.4.3. Rent Extraction by *Sharī'ah* Scholars

Investors prefer *sukūk* over bonds as reflected in their lower borrowing cost, the smaller yield spread, and positive stock market reactions towards its issuance in Ramadan (Godlewski et al., 2016; Halim et al., 2019). Investors rely on the services of *Sharī'ah* scholars to certify the religious compliance of these products. However, their services do not come for free. Firms spend around \$122,000 in the initial year of the *sukūk* issuance and \$34,000 per year afterward for a standard Islamic certification (Hayat et al., 2013). These fees may not be significant, considering the size of issuing firms. The positive reaction of the market towards the religious edict also justifies this practice (Godlewski et al., 2016). However, the interlocking network

¹⁷ Some views permit rental payments in the gestation period of the purchase order by using forward leasing contracts (Lahsasna et al., 2018).

and monopoly of religious scholars convey inefficiency (Gözübüyük et al., 2020).

5.4.4. Pricing Problem

A genuine *sukūk* should imply a different structure compared to conventional bonds. However, *sukūk* issuers offer a risk-return profile akin to conventional bonds (Kuran, 2018). They favor the so-called Islamic Interbank Benchmark Rate (IIBR) that imitates the LIBOR methodology in its construction. This is despite the manipulation scandal that encourages mainstream financial institutions to search for a more robust pricing mechanism (Eisl et al., 2017). The IIBR not only endows financial fragility (i.e., risk-shifting) but also offers a more expensive rate than LIBOR, exaggerating the underinvestment issue discussed in Figure 5.4 (see Chapter 2).

5.5. The Way Forward

...the recent financial crisis only intensifies the need to move beyond critique to find models and practices of growth that make claims to being more socially just and economically progressive.

(Jane Pollard, Kavita Datta, Al James, and Quman Akli, 2016)

To move ahead, we address three major problems of contemporary *sukūk* discussed above, namely (i) asymmetric information, (ii) uneven geographies of development, and (iii) agency costs of debt. First, *sukūk* should be structured within the framework of project financing. In this study, we focus on PPP for the reasons discussed in Subsection 5.2. While the PPP can alleviate the asymmetric information problem, the uneven geographies of development and agency cost of debt issues remain. Here, our second solution of blending the PPP financing with the Islamic charitable endowment has the potential to reduce the uneven geographies of development. Our final solution is to employ Participating Preferred Financing (PPF) to remedy the payoffs of *sukūk* from the agency costs of debt problems.

5.5.1. Reducing *Gharar* by Integrating *Sukūk* with PPP

Classifying *sukūk* as an alternative to bonds leads the investors and issuers (including government agencies) to behave in the same vein as they treat bond investment. Here, analyzing *sukūk* from a PPP finance outlook offers a better overview. Project finance is akin to asset securitization as both share the same feature of the asset's separation from limited liability entities. However, the latter builds upon existing financial assets, while the former is typically backed by underlying real assets that are yet to be constructed. *Sukūk* should be examined as a real asset securitization that is bundled for not only financing purposes but also for the design, development, operation, maintenance, and transfer mechanism of the infrastructure projects. Figure 5.5 shows the simplified mechanics of *sukūk* employing a PPP framework along the lines described above. The contract consists of three sequential phases, namely (i) construction; (ii) private operation; and (iii) charitable endowment (*waqf*) acquisition. Four main parties are involved in this arrangement, including the (i) government; (ii) charitable endowment; (iii) private investors; and (iv) developer-operator. By doing so, the existence of underlying real assets, asset-backed structures, and the apparent transfer of ownership is, by definition, guaranteed, and thus moderating the opacity problem of adverse selection and moral hazard.

The government plays a crucial role in incentivizing infrastructure development and mitigating the inherent problem of opacity, as discussed in Section 5.3. First, the government is responsible for providing land for the infrastructure project. This is because the majority of delays in infrastructure delivery stem from the intricate land acquisition process. The government may use its eminent domain (land acquisition power) to ascertain the availability of the land (Peterson, 2008). It then sells the land at a discount to the charitable endowment, the project's equity owner. (The details of the charitable endowment will be discussed in Subsection 5.5.2.) Second, the government encourages the involvement of private parties by

granting tax incentives. This includes not only income tax exemption for the charitable endowment but also private *sukūk* investors¹⁸ and developer-operator. The government can also mitigate uneven geographies of development by offering preferential tax treatment to infrastructure procurement in economically distressed regions (Rajan, 2019). Finally, the contract may also include government guarantees for the pricing of infrastructure services to mitigate the project's income risk (Ramamurti, 2003).

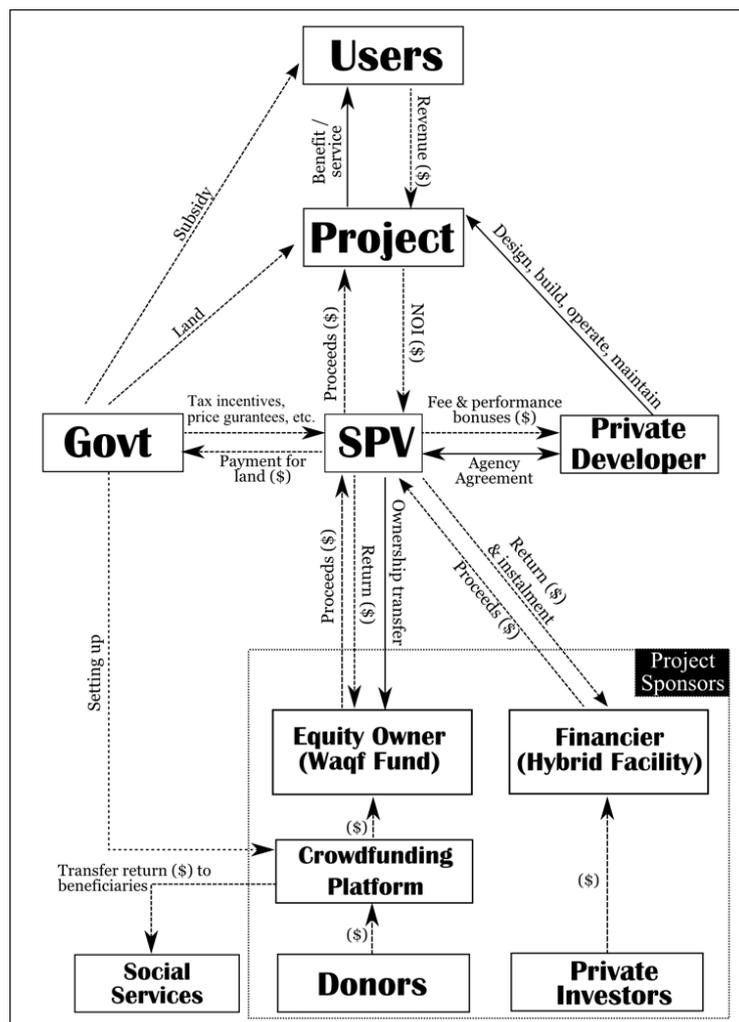


Figure 5.5: Simplified structure of a revamped *sukuk*

The financier co-sponsors the construction of the infrastructure project along with the charitable endowment. In return, the financier has a first claim to the infrastructure payoffs

18 This practice is widely observed in municipal bonds (Pan et al., 2017).

until the facility's tenure. The infrastructure's title is pledged against the financiers' lien to restrain the endowment from selling it, hence moderating the moral hazard problem. They provide funds on a quasi-equity basis. They are entitled to regular payments contingent on the performance of the underlying infrastructure project, which is malleable in the income-growth dimensions.¹⁹ The financiers have recourse (a lien) on the infrastructure assets in the event of default. They strengthen their claims by mandating the developer and the charitable organization to maintain the value of the underlying infrastructure collateral through meticulous maintenance and adequate insurance coverage (Smith and Warner, 1979). This mitigates moral hazard in the financial arrangement.

Finally, the developer-operator's central position as the Build, Operate, and Transfer (BOT) entity makes its selection of import. The government, along with the capital contributors (charitable endowment and private investors), should conduct a thorough due diligence process to eliminate adverse selection issues (Manove et al., 2001). In the construction period, the developer-operator is responsible for the planning and establishment of the infrastructure. Here, the disbursement of funds from the charitable endowment and private investors for the project development is split into stages, where payment of one construction stage is contingent on completing the prior one (Webb, 1991). An electronic procurement can be performed to alleviate the adverse selection, reduce the delays of project delivery, and improve the quality of infrastructure (Lewis-Faupel et al., 2016). The developer is incentivized to build quality by ordaining premium fees for on-time project delivery and high-grade infrastructure. After completing the project construction, the developer-operator is responsible for the daily operation and maintenance of the infrastructure assets. Here, the operator is entitled to a fixed fee with a performance bonus. At the end of the operation stage, the developer-operator must deliver all the technology and knowledge of the infrastructure to

19 That is, the facility provides a trade-off between payoffs in income with that in capital appreciation.

the charitable endowment, the project's ultimate owner. This can also be encouraged by a completion bonus.

5.5.2. Reducing Uneven Geographies of Development through Charitable Endowments

A distinct feature of our paper is introducing Islamic endowments as a provider of infrastructure services. Apart from the public and private sector entities, charitable endowments are a third source of entities whose goal is to accelerate the development of emerging economies. As its name indicates, the charitable endowment offers a sustainable disbursement of benefits from the return of the invested capital. While the scheme has flexibility in terms of the beneficiaries, purposes, and forms, it ensures that its capital remains to guarantee the perpetuity feature.

Despite its staple role as a reservoir of social capital in the emerging Muslim countries, this social fund is accused of acute institutional rigidity (Kuran, 2001). The religious rulings restrict the amendment of the objective of the endowment over time. For instance, an endowment of land is dogmatically not supposed to be disposed of, even though this is required to construct a national highway. Subsequently, the developer must find another way to exclude this land from its development plan. This impinges on social efficiency. However, AAOIFI allows the exchange of *waqf* assets (*Istibdal*). In its *Shari'ah* Standard No. 33, AAOIFI stipulates the permissibility of replacing less productive endowment assets with the ones offering higher benefits for society. The recent development of Islamic social finance also addresses this by proposing a cash endowment fund that receives capital from donors invested in a portfolio of real assets from which the payoffs are disbursed to the charity.²⁰

The cash endowment is set up to serve society through infrastructure investment. The government facilitates a crowdfunding platform to allow public donations for infrastructure

20 It should be noted that our proposed cash endowment is distinct from that employed in the Ottoman Empire era, where the structure was primarily a prototype hedge fund engaging in toxic debt arbitrage (Çizakça, 1995).

projects listed in the system funded by *sukūk*. The endowment fund buys the land at a discount from the government. This blended finance enables the cash endowment to help develop infrastructure by accepting lower returns to achieve its social goals and addresses the high cost of funds, as stated in Trebilcock and Rosenstock (2015). This allows it to pay a higher return to *sukūk* holders and could lead to an abnormal situation where the total returns to the residual (i.e., equity) claimants are lower than the senior *sukūk* ones. Even though the payoffs received by the charitable endowment may be lower than that of financiers, it is entitled to full ownership of the infrastructure assets at the end of the contract.

The charitable endowment is also expected to reduce the uneven geographies of development issue in the contemporary PPPs. The problem arises as the profitability-based investment decision-making encourages private investors to centralize their infrastructure investments in selected prosperous regions instead of peripheral/ poor ones (Siemiatycki, 2011; Tan, 2012). The charitable endowment can play a redistribution role by incorporating a social dimension in infrastructure development (Pollard et al., 2016). It allows the project valuation to account for positive externalities by integrating the Net Present Social Value (NPSV) with the traditional NPV (Nicholls et al., 2012). The NPSV can be calculated by employing ranges of non-market pricing methods. These include (i) the Revealed Preference, where the value is assessed based upon the market price of directly or indirectly related products (Samuelson, 1938, 1948); (ii) the Stated Preference, where the survey-based technique is conducted to discover the willingness to pay for the project's benefits (Ciricay-Wantrup, 1947); and (iii) the Life Satisfaction, where the value is elicited by evaluating people's subjective well-being towards the development (Frey et al., 2004).

A separate charitable entity can also be established to alleviate the *Sharī'ah* certification issues discussed in Subsection 5.4.3. Hayat et al. (2013) propose a non-profit certification scheme but fail to specify the new institutional structure. The charitable entity can serve as a

non-profit *Sharī'ah* certification institution at both the global and local levels. This charity's profit can be used to hire religious legal experts and practitioners who are well-versed with the *Sharī'ah* and can harmonize the same with the common law (Poon et al., 2017). This non-profit endowment is also expected to alleviate the problem of the small pool of overwhelmed *Sharī'ah* scholars and the associated leakage of information (Gözübüyük et al., 2020). Furthermore, this organization's independence will enhance the Islamic financial market's innovation process as industry players no longer drive it. For instance, the *Sharī'ah* certification process can also encompass a positive screening methodology by incorporating ESG issues.

The government of Indonesia became the first country to link the cash endowment and *sukūk*. Nonetheless, its model, launched in March 2020 (for the private placement) and in October 2020 and April 2021 (for the retail investors), differs significantly from our proposal on at least two grounds. First, Indonesia employs a temporary medium-term *waqf* (i.e., two years) that may hinder the long-term investment benefits (see Chambers et al., 2020). Most infrastructure projects require long-term investment. The failure to consider this fact can lead to the uneven sector or geography of the infrastructure development trap, as discussed by Siemiatycki (2011) and Tan (2012). Second, this arrangement is also prone to agency issues as the payoffs rely on the government budget and are detached from the project's performance. Our model, on the other hand, seeks to alleviate the problems of risk-shifting and underinvestment and thus fulfilling the spirit of the religious law. This is discussed in Subsection 5.5.3.

5.5.3. Mitigating *Ribā* through Participating Preferred Financing (PPF)

The proposed *sukūk* structure is incomplete without a robust financing model. The product innovation literature offers a range of choices for mitigating agency costs of debt in the *sukūk* for infrastructure development. The CWF (Shiller et al., 2019) and PFs (Ebrahim et al., 2011)

are potential candidates for this endeavor. These facilities emerged in response to the current financial architecture's failure from insulating the global macroeconomy during the recent financial crisis. Blending these two innovations allows infrastructure *sukūk* to preserve the long-term fixed-income feature along with a built-in stabilizer with embedded compound options on the sharing of income and/or capital appreciation as follows.

The CWF facility ensures that our quasi-equity infrastructure facility undertakes a preferred stock profile, as illustrated in Figure 5.6. The financier bears part of the downside risk of the infrastructure's net operating income and the terminal value. Figure 5.7 depicts that the financier is subject to receiving lower payoffs in the economy's poor states (between t_1 and t_2) when the value of the collateralized asset and/or the infrastructure project's revenue goes down. It thus prevents the equity holder from defaulting when the equity is negative. This facility is then amortized by including a portion of the initial funds advanced over the tenure of the facility (Wu, 1993).

The CWF allows both the charitable endowment and the *sukūk* holders to share the project risk, thus moderating the risk-shifting (or fragility) problem when negative equity occurs (Shiller et al., 2019).²¹ However, this risk-sharing requires a higher coupon rate ($R_{CWF} > R_L$)²² to compensate for the *sukūk* holders. This exacerbates the underinvestment issue highlighted in Myers (1977).²³ The charitable endowment needs to trade-off the higher cost of the CWF by attaching call options to share in the income (above a threshold) and/or appreciation (above a threshold) of the project to alleviate the underinvestment issue. In other words, the CWF needs to be amalgamated with a PF facility, as described below.

21 This feature makes the CWF in conformity with the *Qur'ānic* (2: 280) injunction by 'giving respite' to the users of funds in the poor states of the economy.

22 Here, we contrast the cost of financing in Figure 5.6 with that in Figure 5.2.

23 The aggravation of the underinvestment problem also makes the CWF facility to run afoul of the expropriation aspect of the *ribā* injunction (see Q 4:161).

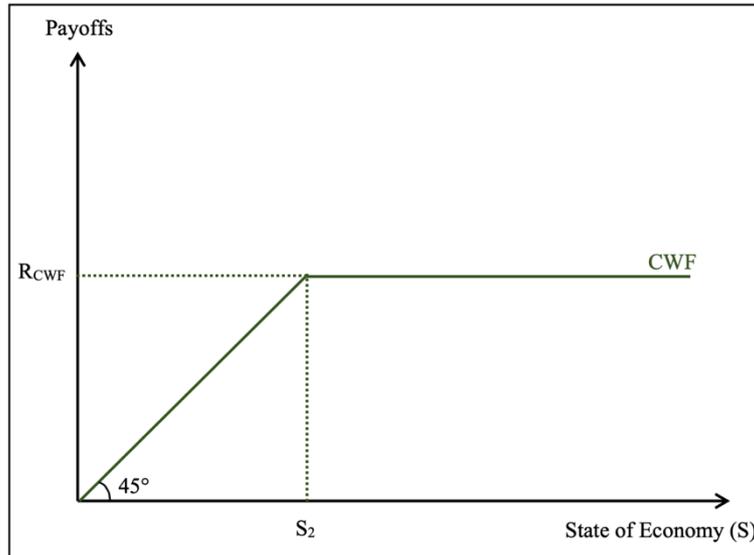


Figure 5.6: *Sukūk* payoffs for Continuous Workout Financing (CWF) facility with no risk-shifting

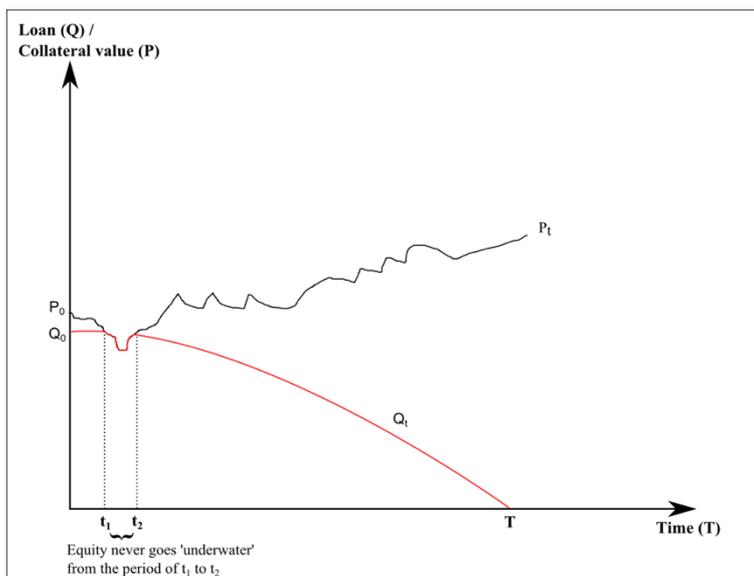


Figure 5.7: Risk-sharing feature of CWF

The PFs, as illustrated in Figure 5.8, encompasses a fixed payoff in conjunction with sharing in the income and/or appreciation of the underlying project. The various components of the PFs comprise the Shared Income Facility (SIF), Shared Appreciation Facility (SAF), and Shared Equity Facility (SEF). These facilities offset CWF’s disadvantages of the underinvestment problem but do not relieve the financial system’s fragility. Unlike CWF, PFs offer upside potential for investors in the rich states of the economy. They allow lower fixed

payments than the CWF contract ($R_{PPF} < R_{CWF}$) (Figure 5.9) in return for extraneous remuneration emanating from excess operating income and/or appreciation in the value of the underlying project in the rich states of the economy.

Coalescing the CWF with PFs cures our hybrid PPF facility of risk-shifting at the micro-level (and thus systemic risk at the macro-level) as well as underinvestment.²⁴ That is, our PPF structure, therefore, offers downside risk-sharing (below S_1) along with a reasonable cost of funds ensuing from the upside payoff-sharing (above S_3), as depicted in Figure 5.9. This mitigates the counter-effects of the incomplete PPP contract mentioned in Hart (2003) as the structure hedges its payoffs towards the infinite possibility of the future economic conditions. In other words, our revenue-sharing PPF contract encompasses all states of the economy and is ‘iron-clad.’

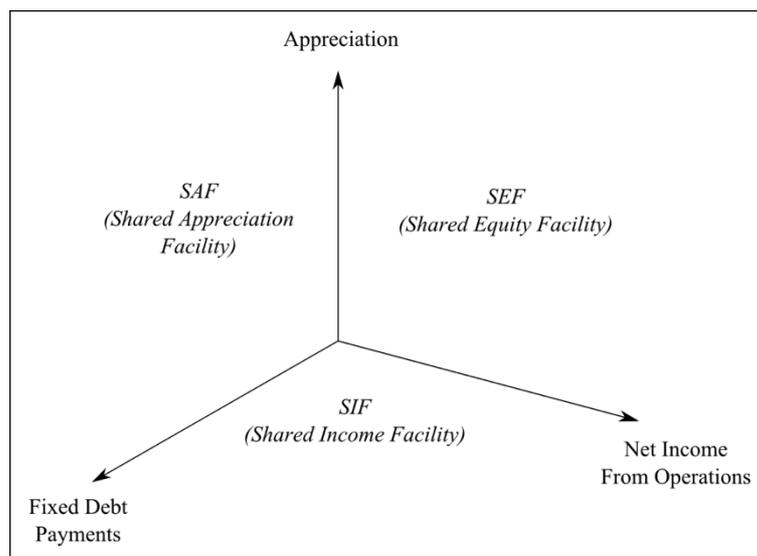


Figure 5.8: Participatory Financing (PF) facility

24 These two attributes of PPF comply with the *Qur'ānic* injunctions of *ribā* (Q2:280 and Q4:161).

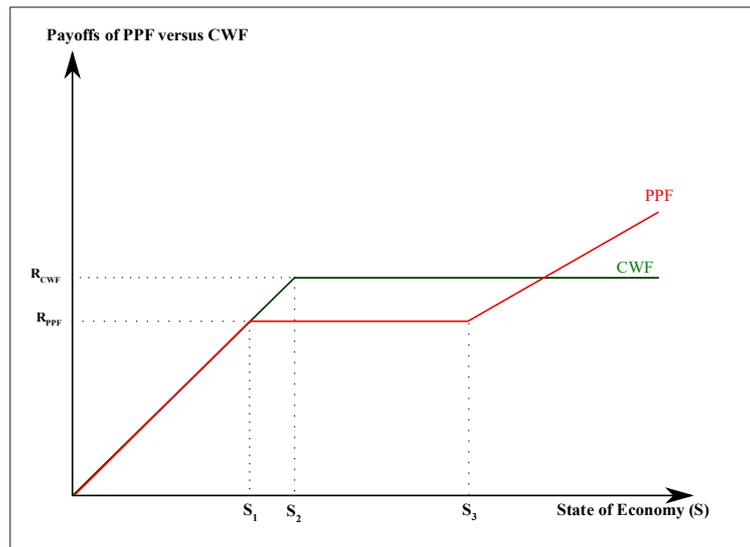


Figure 5.9: Comparing a PPF facility with a CWF

Finally, it is possible to price closed-form formulae (within the combination of CWF and PF variants) using cap and floor on continuous flows as illustrated in the following section to tackle the twin agency issues. This allows the trade-offs between current income with future capital appreciation of the project and links the *sukūk* payoffs to the performance of the underlying assets/projects in the real sector of the economy. The closed-form solutions corroborate the model to be not only theoretically appealing but also practically feasible.

5.6. Modeling the Financing of Infrastructure by a Charitable Endowment (*Waqf*)²⁵

Mathematical finance does show a way towards reducing risks and... help prevent... crisis.

(Robert Shiller, London School of Economics, 20 May 2009)

This section proposes a new approach to develop an economically viable infrastructure project by a charity (*waqf*). We assume the *waqf* to finance the project partially using its own resources and by employing a *Sharī'ah*-compliant financing vehicle called a *sukūk*. This infrastructure can, for example, constitute an airport, a hospital, a toll road, etc. There are four

25 This section was written in collaboration with Dr. Novriana Sumantri of Bandung Institute of Technology, Indonesia.

parties involved in this development: (i) the government, which provides the land; (ii) the developer, who builds the infrastructure and operates it until relinquishing it at time (N) in Figure 5.10; (iii) the *sukūk* holders, who partially fund the same; and (iv) the *waqf* that ultimately owns the infrastructure and operates it from time N until the end of timeline.

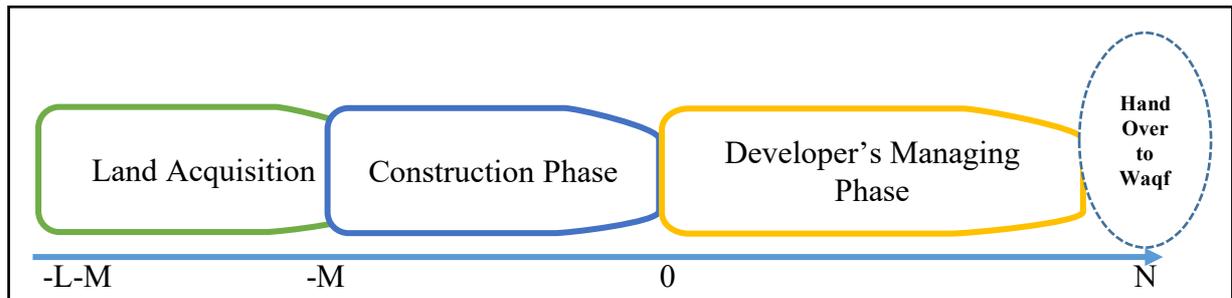


Figure 5.10: Infrastructure timeline

5.6.1. Institutional Details

We assume that it takes at most L months prior to the construction phase to acquire land from the government at the cost of P_{Land} . It also costs at most P_{Const} , to build the infrastructure in at most M months (after the land acquisition) and before the developer's managing phase (see Figure 5.10). This cost includes a premium payment for a high-quality product built on time as discussed below. Assuming a risk-free rate of inflation of π , the future value of total cost to build infrastructure project at time '0' is:

$$P_0 = e^{(L+M)\pi} P_{\text{Land}} + e^{M\pi} P_{\text{Const}}. \quad (5.1)^{26}$$

The *sukūk* for funding the infrastructure is issued at time $-(L + M)$. This raises funds worth P_0 at time '0'. It comprises of the present (time '0') value $P_{S,0}$ of funds provided by the private *sukūk* holders, and the present value $P_{w,0}$ of funds provided from the charitable endowment (*waqf*).

26 The Islamic law restricts payments over the rate of inflation for a risk-free debt contract. It, however, allows risk-sharing (state-contingent hybrid) contracts as discussed in our paper.

$$P_0 = \lambda P_{S,0} + (1 - \lambda)P_{w,0}, \quad 0 < \lambda < 1. \quad (5.2)$$

We assume the *sukūk* holders do not get any payoffs in the project's gestation period (i.e., from time $t = -(L + M)$ to $t = 0$). They, however, get paid from time 0 to N . To make the model tractable, this *sukūk* tenure period also coincides with the end of the developer's managing stage (see also Figure 5.10, Subections 5.6.2.2 and 5.6.2.3).

The developer-operator expends $P_{Dev-Op, I} \forall I = \text{low, medium and high quality}$ construction to build the infrastructure. Subsection 5.6.2.1 discusses the mechanism to incentivize it to instil quality in the same by way of its compensation package. Likewise, cost overruns can be penalized as discussed below. It receives a fixed payment D_1 per month during the construction phase (time $-M$ to 0)²⁷ and a stochastic payoff $G(x)$ during the managing phase (time 0 to N), where the value per month depends on the grade/quality of construction,

$$G(x) = \begin{cases} G_{Hgh}(x) & \text{High grade,} \\ G_{Med}(x) & \text{Medium grade,} \\ G_{Low}(x) & \text{Low grade,} \end{cases} \quad (5.3)$$

where x is the revenue of the infrastructure during its managing phase (see Subsections 5.6.2.1.1-5.6.2.1.3). Note that the grade of the infrastructure is certified ex-ante by an independent organization. This organization also has the authority to discipline any cost overruns by degrading the quality of the construction and thus the payoffs to the developer-operator.

In the developer's managing stage of the infrastructure, the payoffs $W(y)$ of the *sukūk* holders is contingent on its quality and the Net Operating Income (NOI), that is,

$$y = x - G(x). \quad (5.4)$$

27 This payment in the construction period is done to alleviate capital constraints of developer-operator.

This NOI is contingent on the infrastructure quality as described below in Subsection 5.6.2.2.

The *waqf* retains the residual income, that is $(x - G(x) - W(x - G(x)))$.

The infrastructure's cash flow increment/appreciation (β) over the non-guaranteed coupon C is shared between the developer-operator (β_1) and the *sukūk* holders (β_2) (see Figures 5.11 and 5.12 below), where their relation is

$$\beta = \beta_1 + \beta_2. \quad (5.5a)$$

To simplify the model, we assume:

$$\beta_2 = \Phi \beta_1, \text{ where } 0 < \Phi < 1. \quad (5.5b)$$

Residual appreciation of the infrastructure's cash flows retained by the *waqf* = $(1 - \beta)$.(5.5c)

5.6.2. Revenue Dynamics and Ensuing Economic Benefits to Society at Large

Revenue Dynamics

We define X_t be a random variable of the infrastructure revenue from time 0 to N . This is assumed to follow a Geometric Brownian Motion (GBM).

$$dX_t = X_t(\eta_X - \delta_X)dt + X_t\sigma_X z_t, \quad (5.6)$$

where η_X is the upward drift of revenue, σ_X is the volatility of revenue, and z_t is the Brownian motion under the pricing measure Q . Here δ_X is the expected decay rate denoting a rental or dividend stream, where a part of this, δ_{X_1} , is paid as a bonus to the developer-operator, while δ_{X_2} is paid to the *sukūk* holders. So we have

$$X_t = X_0 e^{\left(\eta_X - \delta_X - \frac{\sigma_X^2}{2}\right)t + \sigma_X \sqrt{t} z_t}, t < 0. \quad (5.7a)$$

For ease of computation, we assume both conditions below.

$$(i) \delta_{X_2} = \theta \delta_{X_1} \text{ where } 0 < \theta < 1; \quad (5.7b)$$

$$(ii) \text{ residual income retained by the } waqf = [\delta_X - (\delta_{X_1} + \delta_{X_2})]. \quad (5.7c)$$

Economic Benefits from the Infrastructure Revenue to Society

We consider social benefits *from the infrastructure revenue* to accrue to the community at large as a positive externality of development. This is described as a function $H(x)$ of *the infrastructure revenue* x . These social benefits reinforce economic development thereby boosting the endowment's (*waqf's*) charitable contributions. This is given as follows.

$$\Delta(\text{Charitable Contributions}) = \xi H(x), \quad \xi > 0. \quad (5.8)$$

5.6.2.1. Pricing the Payments to Motivate the Developer-Operator

The developer-operator company constructs the infrastructure for M months, and then operates the same while training the *waqf* employees to run it for N months. The developer's payoffs in the operating stage are contingent on the grade of the infrastructure, i.e. low, medium, and high, which is certified by an independent professional auditor as stated above. Cost overruns can also be disciplined in a downgrade of quality of the project.²⁸ The payment formula in the managing phase is also contingent on the revenue of infrastructure, whether poor (less than A_1 in Figure 5.11a), normal (between A_1 and B_1 in Figures 5.11c and 5.11d), or enhanced (more than B_1 in Figures 5.11c and 5.11d).

5.6.2.1.1. The Developer-Operator's Payoffs for a Low-Quality Construction

The developer-operator company is paid an amount of D_1 per month during the construction phase (as described earlier), and an amount of D_2 or lower per month during the managing phase (see Figure 5.11.a). There is no completion bonus at the time of the handover of the project to the *waqf*. Here $\alpha = 1$ is the slope of the line. This implies $A_1 = D_2$.

28 Please note that we do not differentiate the level of service of developer-operator as poor or medium quality service impacts the overall revenue and ultimately that of its cash flow stream over the managing phase.

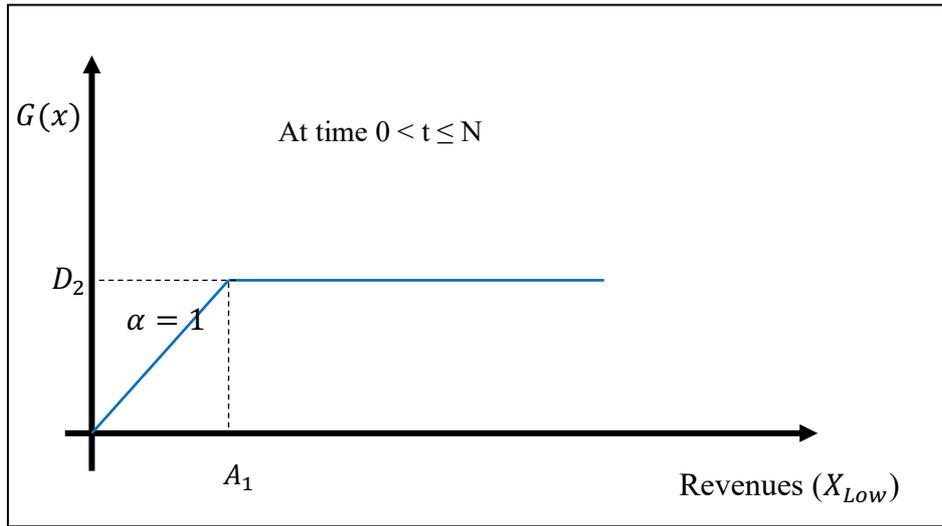


Figure 5.11.a: The payoff flows of the developer for a low-quality infrastructure in the managing and terminal phase, $t \in (0, N]$.

During the construction phase from time $-M$ to 0 , the developer payment per month is D_1 . In the managing stage, i.e., $t \in (0, N]$, the developer's payoffs per month is given below.

$$G(x) = D_2 - D_2 \left(1 - \frac{x}{D_2}\right)^+ \quad (5.9)$$

The discounted value at time $-M$ is calculated as follows

$$\begin{aligned} V_{Dev-Op,-M}(X_{Low,0}, N) &= E^Q \left[\int_{-M}^N G(s) \mu_s ds \right] \\ &= \int_{-M}^0 D_1 e^{-\pi(M+s)} ds + e^{-M\pi} \int_0^N D_2 e^{-\pi s} ds - e^{-M\pi} \int_0^N e^{-\pi s} E^Q[(D_2 - x_s)^+] ds \end{aligned}$$

We use the Floor formula from (Shackleton and Wojakowski, 2007) to simplify the third integral on the right-hand side of the above equation. The Floor formula is

$$\int_0^N e^{-\pi s} E^Q[(A_1 - x_s)^+] ds = F(X_0, A_1, N, \pi, \delta_{X_1}, \sigma_X). \quad (5.10)$$

We, thus, derive the discounted value of the developer payment at time $-M$ as follows.

$$V_{Dev-Op,-M}(X_{Low,0}, N) = \frac{D_1}{\pi} (1 - e^{-M\pi}) + e^{-M\pi} \frac{D_2}{\pi} (1 - e^{-N\pi}) \quad (5.11)$$

$$-e^{-M\pi}F(X_0, D_2, N, \pi, \delta_{X_1}, \sigma_X).$$

The future value at time ‘0’ is evaluated as follows.

$$V_{Dev-Op,0}(X_{Low,0}, N) = e^{M\pi}V_{Dev-Op,-M}(X_{Low,0}, N). \quad (5.12)$$

5.6.2.1.2. The Developer-Operator’s Payoffs for a Medium-Quality Construction

The developer-operator is paid D_1 per month during the construction phase and D_2 or lower per month in the early managing phase (see Figure 5.11.b). In addition, there are bonuses paid in the late managing and the terminal stages if the revenue flow is enhanced (see Figure 5.11.c). It should be noted that the independent auditor designates the level of mediocrity of the infrastructure (incorporating any cost overruns) and thus the starting time $K < N$ for the potential bonus payments. If the grade of the resulted infrastructure is a good-medium then K is close to 0, but it is still greater than 0. If it is a bad-medium then K is close to N , but it is still less than N .

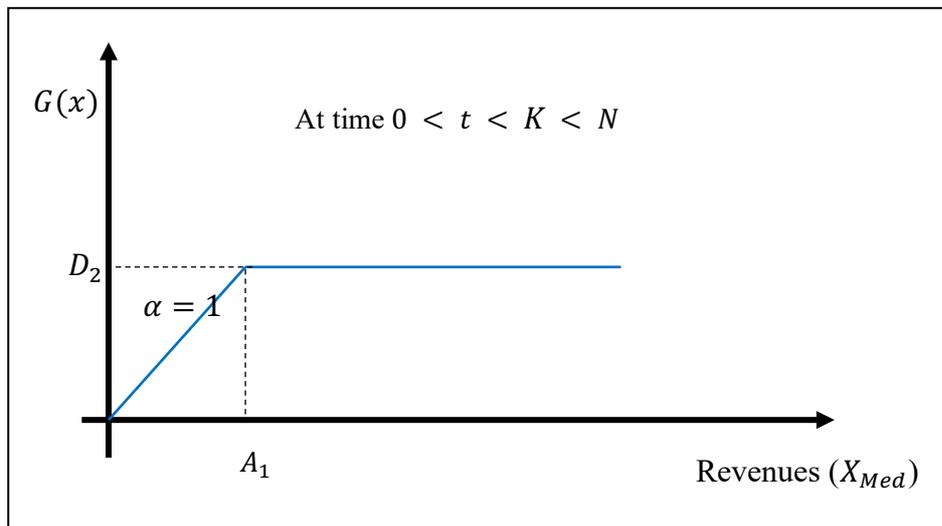


Figure 5.11.b: The payoff flows of the developer for a medium quality infrastructure in the managing phase, $t \in (0, K)$, where time K is decided by the independent auditor.

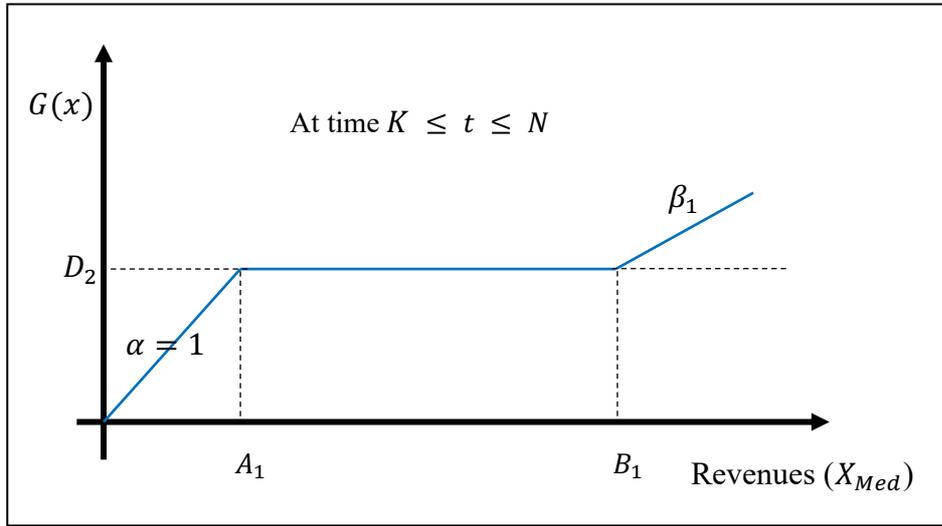


Figure 5.11.c: The lump-sum payoff of medium quality infrastructure developer in the late managing and terminal phases, $t \in [K, N]$, where time K is designated by the auditor.

Now we construct the payoff formulae. During the construction phase from $-M$ to 0 , the developer is paid an amount of D_1 per month. In the developer's early managing stage, i.e., $t \in (0, K)$, the developer payment per month is

$$G(x) = D_2 - D_2 \left(1 - \frac{x}{D_2}\right)^+ . \quad (5.13)$$

In the later managing and terminal stages, i.e., $t \in [K, N]$, the developer payment is included a bonus if the revenue value is appreciated, as follows

$$G(x) = D_2 - D_2 \left(1 - \frac{x}{D_2}\right)^+ + \beta_1 (x - B_1)^+ . \quad (5.14)$$

We calculate the discounted value at time $-M$ as follow.

$$\begin{aligned} V_{Dev-Op,-M}(X_{Med,0}, N) &= E^Q \left[\int_{-M}^N G(s) \mu_s ds \right] \\ &= \int_{-M}^0 D_1 e^{-\pi(M+s)} ds + e^{-M\pi} \int_0^N D_2 e^{-\pi s} ds - e^{-M\pi} \int_0^N e^{-\pi s} E^Q [(D_2 - x_s)^+] ds \\ &\quad + \beta_1 e^{-M\pi} \int_K^N e^{-\pi s} E^Q [(x_s - B_1)^+] ds \end{aligned}$$

To simplify the above equation, we use the Floor formula, similar to Equation (5.10), and Cap formula from (Shackleton and Wojakowski, 2007) as follows.

$$\int_K^N e^{-\pi s} E^Q[(x_s - B_1)^+] ds = U(X_0, B, N, \pi, \delta_{X_1}, \sigma_X) - U(X_0, B, K, \pi, \delta_{X_1}, \sigma_X). \quad (5.15)$$

Thus, the discounted value of the Developer-Operator Cash-flows at time $-M$ is

$$\begin{aligned} V_{Dev-op,-M}(X_{Med,0}, N) &= \frac{D_1}{\pi} (1 - e^{-M\pi}) + e^{-M\pi} \frac{D_2}{\pi} (1 - e^{-N\pi}) \\ &- e^{-M\pi} F(X_0, D_2, N, \pi, \delta_{X_1}, \sigma_X) + e^{-M\pi} \beta_1 \{ U(X_0, B, N, \pi, \delta_{X_1}, \sigma_X) \\ &- U(X_0, B, K, \pi, \delta_{X_1}, \sigma_X) \}. \end{aligned} \quad (5.16)$$

We calculate the future value at time '0' is

$$V_{Dev-op,0}(X_{Med,0}, N) = e^{M\pi} V_{Dev-op,-M}(X_{Med,0}, N). \quad (5.17)$$

5.6.2.1.3. The Developer-Operator's Payoffs for a High-Quality Construction

The developer-operator is paid an amount of D_1 per month during the construction phase. During the managing phase, the payment is around D_2 per month. This implies it can be the same as, or lower, or higher than D_2 . The latter occurs with the rate of β_1 of excess revenues over B_1 (see Figure 5.11.d) anytime in $[0, N]$. There is also a completion bonus at the terminal stage if the revenue flow is boosted prior to the handover of the infrastructure to the *waqf* (see Figure 5.11.d). The bonus has the same rate as β_1 of excess revenues over B_1 .

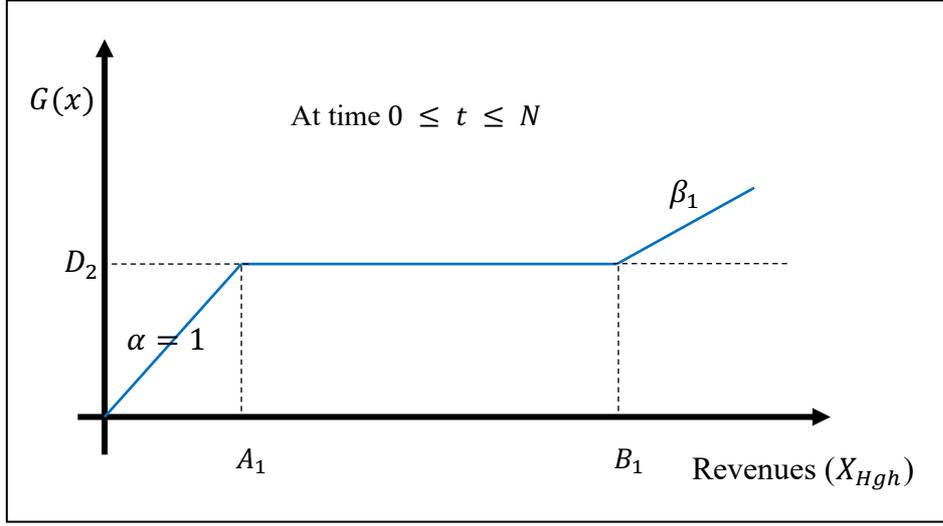


Figure 5.11.d: The payoff flows of developer for a high-quality infrastructure in the managing and terminal phase, i.e., $t \in [0, N]$.

Using a similar approach to the previous subsections, the developer is paid an amount of D_1 per month during the construction phase from time $-M$ to 0 . In the high-quality infrastructure managing stage, i.e., $t \in [0, N]$, the developer payment per month is described as follows. For $A_1 < B_1$,

$$G_{Hgh}(x) = \begin{cases} x, & \text{If } x \in (0, A_1), \text{ the revenue is low,} \\ D_2, & \text{If } x \in [A_1, B_1], \text{ the revenue is good} \\ D_2 + \beta_1(x - B_1)^+, & \text{If } x > B_1 \text{ the revenue is really appreciated.} \end{cases} \quad (5.18)$$

Note for the first condition, $\alpha = 1$ and $A_1 = D_2$.

Collectively, the Payoffs to the Developer for a high-quality Infrastructure is given as follows.

$$G_{Hgh}(x) = D_2 - D_2 \left(1 - \frac{x}{D_2}\right)^+ + \beta_1(x - B_1)^+ \quad (5.19)$$

The discounted value of the payment at time $-M$ is calculated as follows.

$$\begin{aligned} V_{\text{Dev-Op}, -M}(X_{Hgh,0}, N) &= E^Q \left[\int_{-M}^N G(s) \mu_s ds \right] \\ &= \int_{-M}^0 D_1 e^{-\pi(M+s)} ds + e^{-M\pi} \int_0^N D_2 e^{-\pi s} ds \\ &\quad - e^{-M\pi} \int_0^N e^{-\pi s} E^Q [(D_2 - x_s)^+] ds + \beta_1 e^{-M\pi} \int_0^N e^{-\pi s} E^Q [(x_s - B_1)^+] ds \end{aligned}$$

We use the Cap and Floor formulae similar to Equations (5.10) and (5.15), to derive the following

$$V_{Dev-Op,-M}(X_{Hgh,0}, N) = \frac{D_1}{\pi} (1 - e^{-M\pi}) + e^{-M\pi} \frac{D_2}{\pi} (1 - e^{-N\pi}) - e^{-M\pi} F(X_0, D_2, N, \pi, \delta_{X_1}, \sigma_{X_1}) + e^{-M\pi} \beta_1 U(X_0, B_1, N, \pi, \delta_{X_1}, \sigma_{X_1}). \quad (5.20)$$

Its future value at time '0' is

$$V_{Dev-Op,0}(X_{Hgh,0}, N) = e^{M\pi} V_{Dev-Op,-M}(X_{Hgh,0}, N). \quad (5.21)$$

5.6.2.1.4. Instigating the Developer-Operator to Build a High-Quality Product

The developer-operator will only accept to build the project if the present value of the stream of its cash-inflows ($V_{Dev-Op,0}(X_{i,0}, N)$) (contingent on i – the quality of its construction) is greater than its cost ($P_{Dev-Op,i}$). This yields the following:

$$V_{Dev-Op,0}(X_{i,0}, N) - P_{Dev-Op,i} \geq 0, \forall i = \text{low, medium, or high quality} \quad (5.22a)$$

$$\text{That is, } NPV_{Dev-Op,i} \geq 0 \quad (5.22b)$$

To incentivize the developer-operator to build a high-quality structure one needs to ensure that the following condition holds:

$$NPV_{Dev-Op, High-Quality} > NPV_{Dev-Op, Medium-Quality} > NPV_{Dev-Op, Low-Quality} \quad (5.23)$$

The above condition will motivate the developer-operator to imbue high quality in its project.

5.6.2.2. Integrating the Payoffs of the *Sukūk* with its Pricing

5.6.2.2.1. The Payoffs of the *Sukūk*

The payoff stream $W(x)$ of the *sukūk* holders in the managing phase, during the time $t \in [0, N]$ is illustrated in Figure 5.12. This payoff formula is contingent on the Net Operating Income (NOI) of infrastructure, whether poor (less than A_2), normal (between A_2 and B_2), or enhanced

(more than B_2). Note that $A_2 < B_2$. To simplify the model, we can put their values to be equal to A_1 and B_1 respectively, as in the previous analysis. We assume C as the non-guaranteed coupon payoff. Likewise, β_2 is also the slope of the payoff function when the revenues are greater or equal to B_2 . This reflects risk-sharing in Islamic financial contracting.

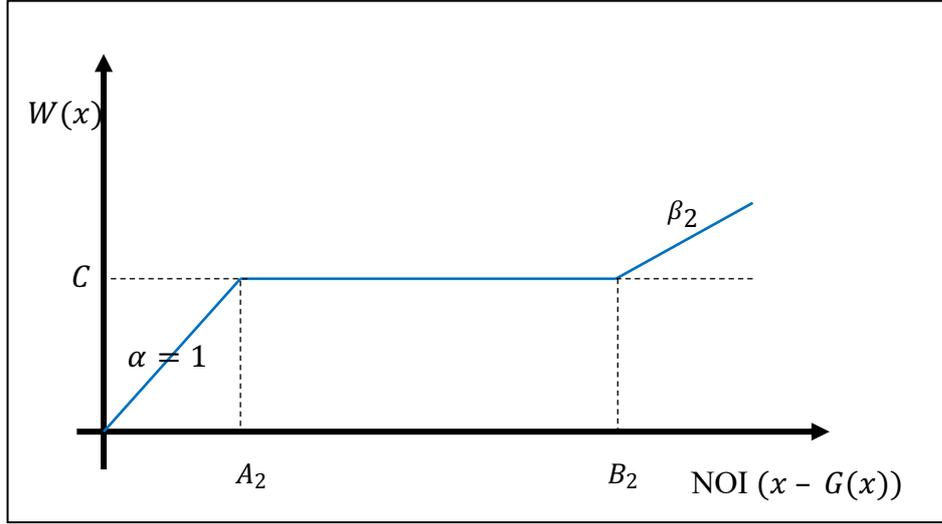


Figure 5.12: The payoffs of *sukūk* holders $t \in [0, N]$

Let $Y_t = X_t - G(X_t)$ be a random variable of NOI assumed to follow a Geometric Brownian Motion (GBM).

$$Y_t = Y_0 e^{\left(\eta_Y - \delta_Y - \frac{\sigma_Y^2}{2}\right)t + \sigma_Y \sqrt{t} z_t} \quad 0 < t \leq N, \quad (5.24)$$

where η_Y is the upward drift of NOI, σ_Y is the volatility, δ_Y is the expected decay rate denoting a dividend stream, and z_t is the Brownian motion under the pricing measure Q . The values of parameters here depend on the quality of the infrastructure building.

Now there are three formulae of the *sukūk* payoff based on three conditionals defined by the value of NOI position with respect to A_2 and B_2 , where $A_2 < B_2$. If it is below A_2 , i.e. $y \in (0, A_2)$ or $y < A_2$, the investors will receive payoffs below C ,

$$W_1(y) = C \left[(1 - \alpha) + \alpha \frac{y}{A_2} \right] = y, \quad (5.25)$$

where $\alpha = 1$ and $A_2 = C$.

If y is between A_2 and B_2 , i.e., $A_2 \leq y \leq B_2$, then the investors will receive payoffs C ,

$$W_2(y) = C. \quad (5.26)$$

If the NOI $y > B_2$, the issuer will distribute the excess payoff above C to the investors,

$$W_3(y) = C + \beta_2(y - B_2). \quad (5.27)$$

The payoff formula can be calculated as follows.

$$\begin{aligned} W(x) &= W_1(y)\mathbf{1}_{0 < y < A_2} + W_2(y)\mathbf{1}_{A_2 \leq y \leq B_2} + W_3(y)\mathbf{1}_{y > B_2} \\ &= y \mathbf{1}_{0 < x < A_2} + C \mathbf{1}_{A_2 \leq y \leq B_2} + (C + \beta_2(y - B_2))\mathbf{1}_{y > B_2} \\ &= C - C \left(1 - \frac{y}{A_2}\right)^+ + \beta_2(y - B_2)^+. \end{aligned} \quad (5.28)$$

Since $C = A_2$, Equation (5.29) becomes

$$W(y) = C - (C - y)^+ + \beta_2(y - B_2)^+. \quad (5.29)$$

The second term of Equation (5.29) represents the insurance for the *waqf* in the form of a Put Option (with strike price $K_p = C$) against the NOI slump when $y < C$. This Put option is worthless when $y \geq C$, in which case the payment attains its maximum $W(y) = A_2$. The third term of Equation (5.29) is the Call option (with strike price $K_C = B_2$) allowing the *sukūk* holders to participate in the NOI increase, i.e., when $y > B_2$.

5.6.2.2.2. Pricing of the Sukūk

For pricing the *sukūk* at time of issuance and during the time before the expiration, the expected present value of the *sukūk* contract along with the embedded options under risk-neutral measure with inflation rate π is derived both for time 0 and time $0 < t < N$. Let r be the *sukūk* coupon rate. Note again that there are no payments to *sukūk* holders in the project's gestation period (i.e., from time $t = -L - M$ to $t = 0$).

$$V_{Sukuk,0}(Y_0, N) = E^Q \left[\int_0^N W(s) \mu_s ds \right] = \int_0^N C e^{-rs} ds - \int_0^N e^{-\pi s} E^Q [(C - y_s)^+] ds \quad (5.30a)$$

$$+\beta_2 \int_0^N e^{-\pi s} E^Q[(y_s - B_2)^+] ds.$$

$$V_{Sukuk,t}(Y_t, N) = E^Q \left[\int_t^N W(s) \mu_s ds \right] = \int_t^N C e^{-rs} ds - \int_t^N e^{-\pi s} E^Q[(C - y_s)^+] ds \quad (5.30b)$$

$$+\beta_2 \int_t^N e^{-\pi s} E^Q[(y_s - B_2)^+] ds.$$

Here too, we use the Floor and Caps formulae similar to Equations (5.10) and (5.15). The expected present values of the *sukūk* at times 0 and t can be illustrated as follows.

$$V_{Sukuk,0}(Y_0, N) = \frac{C}{r} (1 - e^{-rN}) - F(Y_0, C, N, \pi, \delta_Y, \sigma_Y) + \beta_2 U(Y_0, B_2, N, \pi, \delta_Y, \sigma_Y). \quad (5.31a)$$

$$V_{Sukuk,t}(Y_t, N) = \frac{C}{r} (e^{-rt} - e^{-rN}) - [F(Y_0, C, N, \pi, \delta_Y, \sigma_Y) - F(Y_0, C, t, \pi, \delta_Y, \sigma_Y)] \quad (5.31b)$$

$$+\beta_2 [U(Y_0, B_2, N, \pi, \delta_Y, \sigma_Y) - U(Y_0, B_2, t, \pi, \delta_Y, \sigma_Y)].$$

Finally, our *sukūk* should be priced in an appealing manner for the potential buyers. In other words, the Net Present Value of the Investment in this facility should be positive. That is, Present Value of the Stream of Cash Flow ($V_{Sukuk,0}(Y_0, N)$) to the investors should exceed its Cost ($P_{S,0}$) illustrated in Equation (5.2). This is described below as follows.

$$V_{Sukuk,0}(Y_0, N) \geq P_{S,0} \quad (5.32)$$

5.6.2.3. The Economic Viability of the Infrastructure

Now we consider whether the infrastructure project is worth undertaking or not. The infrastructure is expected to yield returns from time 0 onwards, i.e., beyond the time N . Let $V_{InfProj,0}(X_0, \infty)$ be the present value of revenue X_t at time 0, and Economic Benefits to Society-at-large of this present value is $H(V_{InfProj,0}(X_0, \infty))$. Both terms add up to the following.

$$V_{InfProj,0}(X_0, \infty) + H(V_{InfProj,0}(X_0, \infty)) = E^Q \left[\int_0^{\infty} e^{-t\pi} x_t dt \right] + H(V_{InfProj,0}(X_0, \infty)). \quad (5.33)$$

The project should be undertaken if and only if the present value of revenue X_t along with those of Economic Benefits to Society-at-large minus the total cost to build infrastructure project should be greater than 0. This condition is modified from the Net Present Value concept in Corporate Finance and is an extension of the Net Present Social Value of Nicholls et al. (2012). We evaluate this condition at time $[-(L + M)]$ when the *sukūk* funding is issued for financing the land accusation as follows.

$$e^{-(L+M)\pi} [V_{InfProj,0}(X_0, \infty) + H(V_{InfProj,0}(X_0, \infty)) - P_0] \geq 0. \quad (5.34)$$

By using the definition of revenue X_t in Equation (5.7), we simplify the first term of Equation (5.34) as follows.

$$E^Q \left[\int_0^{\infty} e^{-t\pi} x_0 e^{(\eta_X - \delta_X - \frac{\sigma_X^2}{2})t + \sigma_X \sqrt{t} z_t} dt \right] = x_0 \int_0^{\infty} e^{-t\pi + (\eta_X - \delta_X)t} E^Q \left[e^{-\frac{\sigma_X^2}{2}t + \sigma_X \sqrt{t} z_t} \right] dt.$$

Note that $\varepsilon_t = e^{-\frac{\sigma_X^2}{2}t + \sigma_X \sqrt{t} z_t}$ is martingale under Q so that $E^Q \left[e^{-\frac{\sigma_X^2}{2}t + \sigma_X \sqrt{t} z_t} \right] = \varepsilon_0 =$

$e^0 = 1$. For $\pi - \eta_X + \delta_X > 0$, the present value of revenue X_t at time 0,

$$V_{InfProj,0}(X_0, \infty) = \frac{x_0}{\pi - \eta_X + \delta_X}. \quad (5.35)$$

Assuming $H(X_t)$ as a simple multiplication function of the revenue, $H(X_t) = \Omega X_t$, where $\Omega > 0$, we can simplify Equation (5.34) as follows.

$$V_{InfProj,0}(X_0, \infty) + H(V_{InfProj,0}(X_0, \infty)) - P_0 = (1 + \Omega)V_{InfProj,0}(X_0, \infty) - P_0.$$

So we have

$$(1 + \Omega) \frac{x_0}{\pi - \eta_X + \delta_X} - P_0 \geq 0,$$

We conclude that the infrastructure project should be undertaken if $\pi - \eta_X + \delta_X > 0$ and

$$x_0 \geq \frac{\pi - \eta_X + \delta_X}{(1 + \Omega)} P_0. \quad (5.37)$$

5.6.2.4. Controlling for Risk-shifting from the *Waqf* to the *Sukūk* Holders

It is important to control for risk-shifting (or strategic default) of the *waqf* impairing the assets of the *sukūk* holders. This is one of the worst scenario that could happen to the project. We consider an ex-ante percentile analysis or ex-ante Value at Risk (VaR) that contrasts $V_{InfProj,t}(X_t, N)$ with $V_{Sukuk,t}(Y_t, N)$ in terms of revenue X_t . Calculating the present value of revenue X_t at time t , $0 < t < N$, during the managing phase $[0, N]$,

$$V_{InfProj,t}(X_t, N) = \frac{x_0}{-\pi + \eta_X - \delta_X} \left(e^{(-\pi + \eta_X - \delta_X)(N-t)} \right). \quad (5.38)$$

We establish a confidence level $y_1\%$ such that the below condition is violated with low probability $(1 - y_1)\%$.

$$P \left(V_{InfProj,t}(X_t, N) \geq V_{Sukuk,t}(Y_t, N) \right) = P \left(\ln \frac{V_{InfProj,t}(X_t, N)}{V_{Sukuk,t}(Y_t, N)} \geq 0 \right) = y_1\% \quad (5.39)$$

We define the mean and variance of the random variable $S_t = \ln \frac{V_{InfProj,t}(X_t, N)}{V_{Sukuk,t}(Y_t, N)}$

$$m_S = E[S_t], \quad Var[S_t] = \sigma_S^2 t \text{ depending on } \sigma_X \text{ and } \sigma_Y. \quad (5.40)$$

To simplify the analysis, we transform Equation (5.40) into the form of a Standard Normal random variable Z such that

$$P \left(Z \geq \frac{-m_S}{\sigma_S \sqrt{t}} \right) = \Phi \left(\frac{-m_S}{\sigma_S \sqrt{t}} \right) = y_1\%.$$

where Φ is the cumulative distribution function of the standard normal distribution. For $\gamma_1 = -\Phi^{-1}(y_1\%)$, we have

$$\frac{m_S}{\sigma_S\sqrt{t}} = \gamma_1 \quad \text{or} \quad m_S = \gamma_1\sigma_S\sqrt{t}. \quad (5.41)$$

For example, $y_1\% = 95\%$ so $\gamma_1 = 1.645$,

$$E \left[\frac{V_{InfProj,t}(X_t, N)}{V_{Sukuk,t}(Y_t, N)} \right] = e^{1.645 \sigma_S\sqrt{t}}.$$

5.6.2.5. Controlling for the Underinvestment Issue Curtailing the *Waqf* from Investing in New Projects

We need to ensure that the *waqf* is not restricted by the *sukūk* in investing in new Net Present Social Value Projects. That is, we need to control the underinvestment issue. First we denote the payoffs of the private *sukūk* holder as I_t and the residual income of the Charitable Endowment as J_t . These serve as the source for paying the *sukūk* holders and the *waqf* as they ensue from net operating income. These two variables are defined as follows

$$I_t = I_0 e^{\left(\delta_I - \frac{\sigma_I^2}{2}\right)t + \sigma_I\sqrt{t} z_t} \quad \text{for } t \geq 0, \quad (5.42)$$

$$J_t = J_0 e^{\left(\delta_J - \frac{\sigma_J^2}{2}\right)t + \sigma_J\sqrt{t} z_t} \quad \text{for } t \geq 0, \quad (5.43)$$

where δ_I, σ_I and δ_J, σ_J are the upward drift and volatility of the lognormal distribution of income functions of *sukūk* holders and Charitable Endowment respectively.

Based on Equation (5.2), the initial capital of the infrastructure P_0 comprises of $P_{S,0}$ of funds provided by the private *sukūk* holders, and the $P_{W,0}$ of funds provided from the *waqf*. The Net Operating Income $W(y)$ in Equation (5.3) is respectively divided further into payment λ for the private *Sukūk* holders and payment $(1 - \lambda)W(y)$ for the *waqf*.

Now we define expectations and variances for the natural logarithm of the ratios of the respected NOI with respect to the sources for paying the *sukūk* holders and the *waqf*, respectively. For $t \geq 0$, we define

$$m_{12} = E \left[\ln \frac{\lambda W(x)}{I_t} \right] \text{ and } \sigma_{12}^2 t = Var \left[\ln \frac{\lambda W(x)}{I_t} \right] \text{ depending on } \sigma_X \text{ and } \sigma_I. \quad (5.44)$$

$$m_{22} = E \left[\ln \frac{(1-\lambda)W(x)}{J_t} \right] \text{ and } \sigma_{22}^2 t = Var \left[\ln \frac{(1-\lambda)W(x)}{J_t} \right] \text{ depending on } \sigma_X \text{ and } \sigma_J. \quad (5.45)$$

A confidence level $y_2\%$ is established such that the conditions (5.44)-(5.45) (given below) are violated with low probability $(1 - y_2)\%$. For $t < T$,

$$P(\lambda W(x) \geq I_t) = P \left(\ln \frac{\lambda W(x)}{I_t} \geq 0 \right) = y_2\% \quad (5.46)$$

$$P((1 - \lambda)W(x) \geq J_t) = P \left(\ln \frac{(1 - \lambda)W(x)}{J_t} \geq 0 \right) = y_2\% \quad (5.47)$$

To simplify the calculation, we transform them into the form of a Standard Normal random variable Z such that

$$P \left(Z \leq \frac{-m_{12}}{\sigma_{12}\sqrt{t}} \right) = \Phi \left(\frac{-m_{12}}{\sigma_{12}\sqrt{t}} \right) = y_2\%, \quad (5.48)$$

$$P \left(Z \leq \frac{-m_{22}}{\sigma_{22}\sqrt{t}} \right) = \Phi \left(\frac{-m_{22}}{\sigma_{22}\sqrt{t}} \right) = y_2\%. \quad (5.49)$$

For $\gamma_2 = -\Phi^{-1}(y_2\%)$, we have:

$$\frac{m_{12}}{\sigma_{12}\sqrt{t}} = \gamma_2 \text{ and } \frac{m_{22}}{\sigma_{22}\sqrt{t}} = \gamma_2.$$

Finally, the expectations of the natural logarithm of the ratios have values as follows, with the confidence level $y_2\%$.

$$m_{12} = \gamma_2 \sigma_{12} \sqrt{t} \text{ and } m_{22} = \gamma_2 \sigma_{22} \sqrt{t}. \quad (5.50)$$

For example, $y_2\% = 95\%$ so $\gamma_2 = 1.645$,

$$E \left[\frac{\lambda W(x)}{I_t} \right] = e^{1.645 \sigma_{12} \sqrt{t}} \text{ and } E \left[\frac{(1-\lambda)W(x)}{J_t} \right] = e^{1.645 \sigma_{22} \sqrt{t}}. \quad (5.51)$$

5.7. Conclusion

Given the potential of Islamic finance to support infrastructure development in emerging and developing countries, it is critical to address how to best deploy Islamic project finance in PPP delivery frameworks...

(World Bank, 2017, p.vi)

Infrastructure is crucial to unlocking the Sustainable Development Goals (SDGs) (Moyer and Hedden, 2020). However, this is difficult to implement due to the limitation of an efficient mechanism containing the adverse issues of financialization and spatial inequality. We seek to overcome these issues by incorporating the ‘cultural turn’ into our analysis without losing sight of economic aspects, consistent with Jessop and Oosterlynck (2008). Employing the ‘localized’ approach of Pollard and Samers (2007) and Bassens et al. (2011), this paper evaluates contemporary *sukūk* as a feasible solution for the infrastructure financing gap in emerging Muslim countries. Muslim countries are in dire need of an innovative instrument that not only satisfies their religious boundary but also improves the economic efficiency of conventional financing (Pryor, 2007). However, empirical evidence suggests the failure of these countries to implement a more just and sustainable infrastructure financing. Ill-suited financialization can drag Muslim regions into an infrastructure trap, where no investment goes to social welfare enhancing projects (Ghosh and Meagher, 2015).

In harmony with El-Gamal (2006), Bassens et al. (2012, 2013), and Kuran (2018), we illustrate that *sukūk* is currently structured akin to the conventional bonds but with ‘smoke and mirrors.’ *Sukūk* fails to maintain its asset-linked centrality argument, making it not only inconsistent with the religious value system but also inferior to its conventional counterparts. We attribute the inefficiency of contemporary *sukūk* to four factors: (i) the propensity of the market to engage asset-based rather than asset-backed *sukūk*; (ii) flaws of the *sukūk* structures employing medieval contracts; (iii) the rent-seeking behavior of *Sharī’ah* scholars stemming from the non-contestable market and highly interlocking network of them; and (iv) the lack of

fragile-free (i.e., toxic-free) financing model.

Unlike many studies, we offer constructive criticism of the practice of *sukūk* by providing an efficient alternative. We propose and mathematically model an improved structure of *sukūk* integrating the literature on project financing, charitable endowments, and development finance. We argue that the PPP framework offers the potential to rejuvenate the structure of *sukūk* as it does not separate the financing of the project with the development, operation, maintenance, and transfer mechanism. This allows our *sukūk* to mitigate the asset-linked centrality issue as well as the opacity problem of adverse selection and moral hazard (Knight and Sharma, 2016). However, PPPs are not a satisfactory solution for the *sukūk* structure due to their drawbacks of (i) sharpening the spatial inequality (Siemiatycki, 2011; Tan, 2012; Pan et al., 2017); (ii) escalating the cost of funds (Trebilcock and Rosenstock, 2015); and (iii) delinking their payoffs from the economic performance of the project in the future states of the economy (Hart, 2003).

To address these shortcomings, we further integrate the blended finance, ensuing from *awqāf* into the structure of our *sukūk*. Consistent with Pollard et al. (2016), we anticipate the charitable endowment's social dimension to address PPPs' uneven geographical development issue. This is done by incorporating the positive externalities into the project's valuation (Nicholls et al., 2012). Furthermore, the charitable endowment also reduces the cost of capital of *sukūk* and eliminates the inefficiency of *Sharī'ah* certification. The latter allows reconfiguration of our *sukūk* into sustainable infrastructure financing, consistent with the objectives of Islamic law (Asiyanbi, 2018).

We finally design our cost-effective fragile-free *sukūk* termed as 'Participating Preferred Financing' (PPF) by coalescing the Continuous Workout Facility with the Participating Facilities (Ebrahim et al., 2011; Shiller et al., 2019). This allows our PPF to be malleable in the income-growth dimensions and robust to external shocks in the future states of the

economy. It thus mitigates the negative impact of financialization by reducing the fragility (risk-shifting) and underinvestment. The adoption of PPF can vitalize the financial sector, boost its resilience, and further regional economic and spatial development.

Chapter 6

Conclusion

This thesis attempts to improve the roles of Islamic banking and *sukūk* on the socio-economic development of the Muslim world. We empirically examine the practical deviation of those two from the ethical objectives of Islamic law and theoretically propose ways to revitalize the industry. In so doing, we concentrate our analysis on the following four primary research questions. First, is Islamic banking truly ethical in light of the objectives of Islamic law? Second, if this is not the case, how can we disrupt the current practice of Islamic banking *Murabaha* financing? Third, has *sukūk* discharged its ethical objective of reducing income inequality? Fourth, if it is not the case, how can *sukūk* redress the socio-economic issues in infrastructure financing sponsored by a charitable endowment (*Waqf*)?

Chapter 2 addresses the first of these research questions. Here, our ethical framework for Islamic financial product development reconstrues *ribā* as wrongful expropriation of others' assets¹ emanating from the agency issues of (i) risk-shifting (or financial decoupling); and (ii) underinvestment (or price gouging). We also decipher *gharar* as asymmetric information and excessive risk-taking behavior. Our empirical examination shows that despite its legitimate theoretical constructions, *ribā* is still prevalent in the implementation of IBs most employed *Murabaha* contract, not to mention its variants in the forms of *Tawarruq* and *Inah*. Financial decoupling is evidenced by the short-term causality and the long-run cointegration between the IIBR ('Islamic' pricing) and LIBOR ('conventional' pricing) as well as the very low dynamic time-varying correlations between the IIBR and proxies of the real economy. Price gouging is observable in IBs as our paired difference tests document IIBR as being persistently overpriced

1 This alludes to the *Qur'ānic* verse (4: 161): "And for their taking *ribā* even though it was forbidden for them, and their wrongful appropriation of other people's property, We have prepared for those among them who reject faith a grievous punishment"

over LIBOR. Our theoretical investigation shows how *gharar* still exists in IBs' unique balance sheet structure. The random-walk feature of the collateral in the *Murabaha* contract and the lack of underlying assets in its variants destabilize the asset side of IBs. The equity feature of PSIA, on the liability side of the IBs, bestows instability as the payoffs are not linked to the asset side, putting the depositors (and thus society) at higher risk.

Chapter 3 focuses on the second research question by linking the classic *Murabaha* contract (in early Islamic history) with that of TC instead of bank credit. We argue that conducting *Murabaha* in the *real* sector of the economy is analogous to TC and conforms with the *Maqāsid al-Sharī'ah*. This is in contrast to the contemporary banking *Murabaha* in the *financial* sector of the economy, which cannot redeem the pricing and asset transferability issues and hence falls foul of the ethical objectives of Islamic law. We propose a parsimony pricing model of TC-*Murabaha*, extending Rashid and Mitra's (1999) analysis and contrast it with the interest-based pricing employed by the banking *Murabaha*. The results document that our TC-*Murabaha* offers a lower rate than interest-based pricing, especially in periods of monetary tightening or financial crisis. The implication of our findings indicates that IBs may be better conducted within a universal Islamic banking (or financial conglomerate) architecture by modifying the Japanese concept of keiretsu (and/ or universal banking concept commonly observed in some European countries) instead of the current specialized banking system.

Chapter 4 sheds light on the third research question by establishing the nexus between *sukūk* development and income inequality. Our empirical findings from 22 OIC and Non-OIC *sukūk* issuing countries within the 1995-2019 period suggest a positive nexus between yearly *sukūk* issuance and the top 1% earners. This result contradicts the negative link between IBs and inequality documented by Abedifar et al. (2016) but supports the positive relationship between bond issuance and income inequality shown by Mian et al. (2020). Our study implies that *Sukūk* development has yet to incorporate the ethical objectives of Islamic law. This is

because the ill-effects of agency costs of debt (*ribā*) and excessive risk (*gharar*) remain prevalent in Islamic securitization.

Finally, Chapter 5 responds to the last research question by proposing and mathematically modeling an enhanced *sukūk* design for infrastructure sponsored by a *Waqf*. We do this by integrating the literature on project financing, charitable endowments, and development finance. We illustrate that construing *sukūk* within a PPP framework incorporates asset-linked centrality to alleviate the information asymmetry (*gharar*) issues stemming from: (i) ex-ante adverse selection; and (ii) ex-post moral hazard. We further introduce *waqf* to address the main drawbacks of PPPs in sharpening the spatial inequality and escalating the cost of funds. We also mathematically model our Participating Preferred Financing (PPF) *sukūk* by amalgamating the Continuous Workout Facility (CWF) with the Participating Facilities (PFs) (Ebrahim et al., 2011; Shiller et al., 2019). The CWF embodies risk-sharing in the spirit of Islam. This mitigates the risk-shifting (or financial decoupling) issue of the agency cost of debt. The PFs, in contrast, reduces the cost of funding and thus the ‘expropriation’ (or price-gouging) highlighted in Q(4: 161). This mitigates the underinvestment issue of the agency cost of debt. Thus, the hybrid *sukūk* design (comprising of CWF+PFs) relieves the inequality caused by *ribā* and *gharar*.

To conclude, our study illustrates the disconnect between the practice of contemporary IBF and the ethical values stemming from the objectives of Islamic law. This is probably why the impact of IBF on socio-economic development in the Muslim world is hitherto limited. A genuine innovation has been missing in the five decades of IBF experimentation. IBF tends to mimic the existing conventional counterparts despite its vision of bringing a more equitable economic system. This Islamic vision of the economy can only be materialized by addressing unresolved issues of the conventional financial system. One of the primary reasons behind the ethical failure of IBF in practice is its overreliance on the Islamic legal aspect (*fiqh*) without

contemplating the deeper meaning of the law. It by no means suggests that the *fiqh* is dispensable in the IBF development process. However, legally approved IBF products should not be promoted in the market if they fail to fulfill the ethical objectives of Islamic law. The innovation process should improve the existing products towards fulfilling the objectives of Islamic law, not the other way around. We demonstrate how to apply this development paradigm into IBs and *sukūk* by reinterpreting *ribā* and *gharar* within the context of ethics. We apply this concept in IBs by reconstruing the *Murabaha* within the framework of TC instead of bank credit. Consequently, the universal Islamic banking architecture can be more conducive to the banking sector than the current specialized banking system. We also apply this notion in infrastructure *sukūk* employing the PPP, *waqf*, and development finance literature to restructure the Islamic securitization. This has the ability to redeem the ill effects of *ribā* and *gharar* in infrastructure financing.

Future studies may build on this thesis to explore the following research agenda. First, to what extent is the universal Islamic banking architecture better than the specialized one from both legal and socio-economic perspectives? Our results in Chapter 3 hint at areas where the universal Islamic banking architecture excels. However, we have yet to make a direct comparison between the two competing banking systems. Second, this thesis focuses only on income inequality as a proxy of socio-economic justice, while its dimensions are much broader. Future research may relax this limitation by employing various measures, including wealth inequality. Finally, the research design in this thesis can be extended to other IF structures, such as equity markets, insurance (*Takaful*), microfinance, etc. We should start with mapping the problems by empirically examining how far the IF institutions have incorporated the ethical objectives of Islamic law and followed by theoretically proposing solutions to disrupt the contemporary practices of IBF.

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Appendix A

Appendix for Chapter 3

A1. Linking the Classic *Murabaha* Mark-up (m) with the Trade Credit Discount (α)

Buyers can either pay the discounted price $p = (1 - \alpha)P$ immediately, or they can pay P in n days. Therefore

$$P = \frac{p}{1 - \alpha}.$$

On the other hand, if p is the current price in the classic *murabaha* mark-up terminology, then $P = p(1 + m)$, where m is the mark-up rate. It follows that

$$\begin{aligned} \frac{p}{1 - \alpha} &= p(1 + m) \Leftrightarrow 1 - \alpha = \frac{1}{1 + m} \\ \Leftrightarrow \alpha &= 1 - \frac{1}{1 + m} = \frac{m}{m + 1} \\ \Leftrightarrow m &= \frac{1}{1 - \alpha} - 1 = \frac{\alpha}{1 - \alpha}. \end{aligned} \tag{3.43}$$

The above equation thus integrates the classic *murabaha* mark-up (m) with the trade discount (α).