

A Guide to Islamic Asset Management

STUDIES IN ISLAMIC FINANCE, ACCOUNTING AND GOVERNANCE

Series Editor: Mervyn K. Lewis, *Professor of Banking and Finance, South Australia and Fellow, Academy of the Social Sciences, Australia*

There is a considerable and growing interest both in Muslim countries and in the West surrounding Islamic finance and the Islamic position on accounting and governance. This important new series is designed to enhance understanding of these disciplines and shape the development of thinking about the theory and practice of Islamic finance, accounting and governance.

Edited by one of the leading writers in the field, the series aims to bring together both Muslim and non-Muslim authors and to present a distinctive East–West perspective on these topics. Rigorous and authoritative, it will provide a focal point for new studies that seek to analyse, interpret and resolve issues in finance, accounting and governance with reference to the methodology of Islam.

Titles in the series include:

What is Wrong with Islamic Finance?
Analysing the Present State and Future Agenda
Muhammad Akram Khan

Islamic Finance in Europe
Towards a Plural Financial System
Edited by Valentino Cattelan

Morality and Justice in Islamic Economics and Finance
Muhammad Umer Chapra

Takaful and Islamic Cooperative Finance
Challenges and Opportunities
Edited by S. Nazim Ali and Shariq Nisar

Religion and Finance
Comparing the Approaches of Judaism, Christianity and Islam
Mervyn K. Lewis and Ahmad Kaleem

A Model for Islamic Development
An Approach in Islamic Moral Economy
Shafiullah Jan and Mehmet Asutay

A Guide to Islamic Asset Management
Portfolio Investing with Sharia
John A. Sandwick, M. Kabir Hassan and Pablo Collazzo

A Guide to Islamic Asset Management

Portfolio Investing with Sharia

John A. Sandwick

*General Manager, Safa Investment Services, Switzerland and
Doctor in Business Administration,
Grenoble Ecole de Management, France*

M. Kabir Hassan

*Endowed Full Professor of Finance,
Department of Economics and Finance,
University of New Orleans, USA*

Pablo Collazzo

*Senior Researcher and Professor of Competitiveness and
Sustainable Finance, Danube University Krems, Austria*

STUDIES IN ISLAMIC FINANCE, ACCOUNTING AND
GOVERNANCE

 **Edward Elgar**
PUBLISHING

Cheltenham, UK • Northampton, MA, USA

© John A. Sandwick, M. Kabir Hassan and Pablo Collazzo 2021

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical or photocopying, recording, or otherwise without the prior permission of the publisher.

Published by
Edward Elgar Publishing Limited
The Lypiatts
15 Lansdown Road
Cheltenham
Glos GL50 2JA
UK

Edward Elgar Publishing, Inc.
William Pratt House
9 Dewey Court
Northampton
Massachusetts 01060
USA

A catalogue record for this book
is available from the British Library

Library of Congress Control Number: 2021932701

This book is available electronically in the **Elgaronline**
Economics subject collection
<http://dx.doi.org/10.4337/9781800378407>

ISBN 978 1 80037 839 1 (cased)
ISBN 978 1 80037 840 7 (eBook)

Contents

<i>List of figures</i>	vi
<i>Foreword by Zeti Akhtar Aziz</i>	vii
<i>Preface</i>	x
<i>Acknowledgments</i>	xiii
<i>Introduction to A Guide to Islamic Asset Management</i>	xiv
1 Literature review, research gap, industry and theoretical summaries	1
2 Research design and finding data	39
3 Results, relevance and limitations	75
4 Empirical analysis, research design and methodology	77
5 Discussion of findings	166
6 Implications for theory and practice	170
7 Limitations, and future research	175
<i>Annex: survey questions for major asset management banks</i>	177
<i>References</i>	179
<i>Further reading</i>	186
<i>Index</i>	193

Figures

1.1	Initial and subsequent steps of asset allocation, with return to initial steps	35
2.1	The asset management process, from investible universe to optimized portfolio	41
2.2	Islamic mutual funds, distribution by country	52
2.3	Distribution of 855 Islamic mutual funds by fund type	53
2.4	Islamic mutual funds, years since inception	56
2.5	Islamic mutual funds, years since inception by country (top five) as % of AUM	57
2.6	Islamic mutual funds, geographic distribution	71
4.1	Five-year Islamic Growth portfolio performance, cumulative daily returns 2013–2017	124
4.2	Up and down days, five-year Islamic portfolio	128
4.3	Two-year Islamic portfolio, cumulative daily returns, 2016–2017	129
4.4	Up and down days, two-year Islamic portfolio	131
4.5	Cumulative performance of Islamic portfolio and conventional peers, 2013–2017	142
4.6	Comparative cumulative portfolio performance, 2013–2017	149
4.7	Comparative cumulative portfolio performance, 2013–2017	159

Foreword

Zeti Akhtar Aziz

International optimal portfolio diversification has long been considered the gold standard for long-term savings. It is practiced by the leading investors of the world, from international SWFs (sovereign wealth funds) to the major public employees' retirement funds.

This golden rule is also known to individual investors: diversify your savings portfolio not only by the type of investments but by regions too. As a result, we have seen the intensification of the globalization of financial flows; cross-border portfolio investments now account for hundreds of trillions of dollars, with the amount in the global asset management industry now reaching \$100 trillion.

Up to now, however, we have yet to see the emergence of a well-defined, industry-wide practice in Islamic asset management, which also includes wealth management. There seems to be an absence of incentive or focus from the world's major asset management institutions to deliver asset management offerings which adhere to the principles being followed by a quarter of the world's population.

Of importance, however, is the significant growth in ethical and socially responsible investment activities. Large numbers of endowments, pension funds and family offices worldwide have now signed up to the protocols for ESG and SRI investing, redirecting their investments toward those stocks, bonds, mutual funds and ETFs (exchange-traded funds) that are certified as either doing good or, at the least, doing no harm. Ethical investment activities are said to have now achieved a 20% penetration into the global asset management universe.

Because there is much in common between investing according to sharia and ethical investing, both can be considered to be in the same league. Studies have shown that these forms of finance focus on their positive impact on the economy and their long-term growth and sustainability. Recognizing that these similar elements are embedded in these respective forms of finance, the case is made in this book that the rigorous and robust professional practice in asset management can therefore be matched to the funds that adopt the principles of Islam to thereby support the development of the Islamic asset management industry.

Asset managers are fastidious in general. They apply modern portfolio theories and analytics that feature cutting-edge knowledge of statistics, data generation and comparative analysis in their approach to asset management. Supporting their efforts are the eminent works of several Nobel Laureates who have been some of the most celebrated contributors to financial market theory. Perhaps in no other industry has professional best-practice been so thoroughly enjoined with scholarship.

This has produced clarity on the path toward global diversification, risk management and optimized returns. Thus, one should not consider Islamic asset management without having the required knowledge and discipline needed to meet these tough professional standards and rigorous theoretical constructs, while at the same time looking over one's shoulder to comply with contemporary regulatory standards.

This book achieves the goal of simultaneously examining financial market theory—those concepts that have been proven over the decades to support responsible and optimal asset allocation—and then applying these rules of investing within the context of sharia. At the same time, it takes into consideration the prudential requirements imposed by regulatory authorities.

This book contributes something new, something that has yet to surface among the academic or professional literature. It applies the theoretical foundations, professional discipline and regulatory standards adopted in conventional asset management to the sharia-compliant investible universe. This is an exemplary contribution of this book. Prior to constructing optimal portfolios there has to be an understanding of where to find the securities needed for investment. The book provides readers with the manner in which to extract the data for over 1,000 Islamic mutual funds and ETFs, while also providing detailed guidance for sorting and filtering this universe of securities, thereby providing a list of funds that meet the required professional and regulatory standards.

The authors have made a major contribution in their efforts to align Islamic finance to the exigence of modern financial intermediation and portfolio asset management, while respecting the requirements of sharia to ensure that this form of financial activity stays true to its core values.

Finance, however, covers several sectors that include banking, insurance and asset management. We have long known that economic efficiency is improved when savers can effectively and efficiently channel their savings to the users of capital. In highly developed markets we see the intensive financialization of savings, starting with the growth of the banking sector, before progressing to higher penetration rates in the insurance sector and to increasingly massive volumes of funds that now come under professional asset and wealth management.

While being exemplary in banking and insurance (takaful), asset management in Islamic finance has yet to experience much growth. Contemporary numbers indicate the relatively very small size of the Islamic asset management industry, with only about 1,000 investment products and just over \$60 billion in total AUM (assets under management). These numbers themselves represent not only a small fraction of total assets in Islamic finance but an even smaller fraction of the total assets under the conventional asset management industry worldwide.

There needs to be new efforts toward spurring the further advancement of the Islamic asset management industry. Indeed, we know that Muslims do not differ from those from other faiths when it comes to savings. Anecdotally, many of them have higher household savings rates than their peers in other parts of the world.

Much needed, therefore, is the development of vehicles for their savings that match their spiritual requirements. The global asset management industry has not yet addressed this mismatch between the potential demand and supply. This is perhaps in part because until now there has been no practical guide for Islamic asset management, one that is deeply rooted in the theory embraced by conventional asset managers.

This book has aimed to do just that. It provides the global Islamic asset management business something that may be used as guidance; it has provided a formal, rigorous, professional framework for such guidance. For this, the authors should be commended for their work.

I hope academics, industry players and policymakers will benefit from reading this book.

Zeti Akhtar Aziz
Former Governor, Bank Negara Malaysia, Malaysia
20 August 2020

Preface

Since the early 1990s there has been an explosion of AUM in Swiss banking—and indeed in every major financial capital—from savers around the world. At the same time, asset management slowly went through a revolutionary change during subsequent decades. Before 1990 the practice of applying the theories supporting asset allocation was still somewhat new, and a somewhat hit-or-miss proposition. Today asset allocation everywhere is a disciplined science based on Nobel Prize-winning literature. All savers from every part of the globe benefit from this increased professionalization of asset management.

Industry practices today are firmly rooted in the revelations of scholarship from the 1950s to the 1990s. Markowitz started them in 1952 with his treatise on mean-variance optimization, which was enhanced in 1958 with Tobin's identification of the risk-free rate, then Sharpe's 1964 contribution on calculating the point of optimality between risky and riskless assets. Fama gave us the Efficient Markets Hypothesis in the 1970s, while Brinson, Hood and Beebower warned of hubris with their 1986 revelation on performance attribution. Finally, in 1992 Black and Litterman showed the wonders of global diversification, giving solid justification for investing beyond one's own borders.

We learned from correlation that diversification is essential, which led to multi-asset-category investing, that is, no longer just the stocks owned by our grandfathers but stocks, bonds, real estate and a host of different assets. Because no one is best at everything, manager selection became king, where qualitative and quantitative analysis figures into finding the best managers in each asset category. Data-driven tools to filter and sort manager performance increased in power and reach. At the same time, regulators began enforcing "prudent man" rules and open architecture, requiring managers to increase their diligence on security and manager selection.

In much of the past decade, the science of asset allocation has been increasingly harnessed by the moral trend we call ESG (environmental, social and governance) investing, sometimes also called SRI (socially responsible investing). Now estimated to make up nearly 20% of the total \$100 trillion in global assets under professional management, the sector seems to grow by leaps and bounds as investors come to grips with the social good that can come from their activism.

Today we have a global asset management industry deeply rooted in science, and increasingly influenced by moral choice. Some would say this is

as it should be, as every input will have its output, and moral choice decisions today should have positive results tomorrow.

Mostly left out of this process to date has been the question of spiritual choice as a component of moral choice as it pertains to Islam. The question is not trivial. The Muslim world accounts for approximately one quarter of the world's souls, and their faith is also growing by leaps and bounds. Further, while problems of all types abound in the Muslim world (like everywhere else), it is true to say that Muslims have found a greater degree of unity as the result of more harmonized sharia scholarship. This is most pronounced in Islamic finance, which evolved from infancy in the 1970s to become an increasingly important sector of global banking, with over \$2.5 trillion in industry assets today.

Islamic banking has become the meaningful, daily financial intermediation service for tens of millions of people in Malaysia, Indonesia, Saudi Arabia, the United Arab Emirates (UAE) and beyond. For them it has effectively replaced conventional consumer and company finance. The industry has built its own capital markets around sukuk, also called Islamic bonds, which alone now account for more than \$1 trillion in total issuances. Growth in industry assets has perennially achieved double digits in the past two decades.

Missing from the global Islamic finance industry, however, is a key component commonly found in conventional banking: asset management. To date there has never really been any systematic, disciplined effort to concentrate knowledge and transform it into a holistic service. None of the world's great centers of banking and finance have a meaningful Islamic asset management presence. As an example, total AUM in sharia-compliant mutual funds barely passes \$63 billion among well fewer than 1,000 distinct products, while conventional asset management accounts for well above \$40 trillion with over 100,000 investment funds.

This book helps to rectify this situation. It combines a practitioner's knowledge of the asset management industry within the context of both MPT (Modern Portfolio Theory) and sharia. The ultimate utility, after all, is to build a foundation of widely accepted theory, and then construct an edifice of industry best-practice and regulatory constraints on top, all within the context of the principles of Islam as defined by sharia.

Imagine cities like New York, London or Zurich, where literally tens of trillions of dollars in assets are managed daily for savers of the world, both individual and institutional. Here you find the ultimate professional nexus between scholarship and industry. The chief investment officers and chief economists of every major asset manager all hold advanced degrees in the field and work closely with portfolio managers and compliance officers to ultimately deliver advanced portfolio allocations in every sector of global investing.

Every one of these professionals is aware of the constraints of sharia, either through casual acquaintance or specific interest. In fact, many of these professionals are Muslim. They are all aware that some number of their clients—and, importantly, their potential clients—truly do care about their faith. Yet none of them has ventured into this area called Islamic asset management—not at BlackRock, UBS, Credit Suisse, JPMorgan, Fidelity, Franklin Templeton, or any one of the dozens of major asset managers with tens or hundreds of billions of AUM.

For these practitioners in particular, a guidebook on Islamic asset management is absolutely essential, particularly if the guide is firmly grounded in the same theory driving conventional asset allocation. Those practitioners will discover in this book the same theory, rules and regulations they deal with on a daily basis, from macro asset allocation to security selection. But they will also witness for the first time that the holistic service of Islamic asset management is more than feasible.

Scholars, on the other hand, have diligently pursued subsets of Islamic asset management for the past 20 years. Here, however, we see a primary focus of the literature on analyzing the performance of single-asset categories, mostly equities. This scholarship has led to important revelations, including the increasingly unanimous finding that sharia-compliant equities outperform their conventional peers. Yet the scholarship does not reflect real-world investing. Very few investors put all their eggs in one basket. Investing is all about diversification into multiple asset categories in optimized portfolios. In this regard, until now the cupboard has been bare in terms of scholarship focusing on Islamic asset management.

It is hoped this book will stimulate an increased appreciation for Islamic asset management by industry professionals on the one hand, and further work among scholars interested in Islamic finance on the other. The result could contribute to a thriving global Islamic asset management industry, one that serves the needs of one quarter of the world's population.

Acknowledgments

The authors thank Prof. Pablo Collazzo for the care and attention he paid to the course of this work and in the development of the study. Prof. Collazzo shone brightly as a source of inspiration and encouragement, but was also a rigorous guide for academic discipline.

Of substantial importance to this study was the support of the chairman of the Finance and Investment Department at Imam Mohammed Islamic University in Riyadh, Prof. Mohammad Alsuhaibani, who also provided important inputs on the nature of sharia in the context of Islamic investing. Moreover, as chairman of the SABIC Chair in Islamic Financial Markets, Prof. Alsuhaibani helped this study benefit from a significant grant to support the first ever research on sharia-compliant security selection and asset allocation.

Further appreciation is noted for the generous contributions of time and information from senior asset management staff at Credit Suisse, UBS, Pictet, HSBC and Mirabaud, each providing valuable knowledge on their professional best-practices in identifying, sorting and filtering securities for their respective Buy Lists. These inputs helped establish what could be considered a universal methodology for this practice, firmly grounded in theory but constrained by regulatory and professional “prudent man” concerns.

Finally, a special thanks to Salman bin Abdullah Bin Saedan in Riyadh, without whose continued support this work would not have been completed.

Introduction to *A Guide to Islamic Asset Management*

Many individuals and institutions save money for future spending. That is true regardless of spiritual identity. People of all faiths habitually save for their future.

In all developed and many developing economies the savings of individuals and institutions are largely channeled through one or another type of asset management entity. An individual can walk into a local bank or go online and purchase mutual funds. A university endowment or family foundation will have a Board of Trustees establishing an investment plan, and will hire professional asset managers to implement that plan. Pension funds and insurance companies employ investment professionals internally or on an outsourced basis to manage their assets. Almost all have investment goals that must be achieved through security selection and asset allocation, the core functions of asset management.

Asset management in more-developed areas of the world, and many developing ones, is a well-established business with hundreds of thousands, perhaps millions, of employees and tens of trillions of U.S. dollars equivalent in AUM. It is by and large a secular business. While socially responsible and ethical investing have become new, important trends in the last decade, they are generally not by themselves spiritual.

What is common among the largest piles of money in the world—whether these be pension funds, endowments, insurance companies, family offices or even the savings of families—is the existence of multi-asset investing. It is commonly known that none or almost none of these savings entities put all their eggs into one basket. Multi-asset investing is based on the well-known principles of diversification. Wealth is more often managed in portfolios consisting of multiple sub-portfolios, one for each generic asset class: Cash, Fixed Income, Equities and Alternative Investments. These commonly found asset categories don't differentiate by spiritual affiliation. Multi-asset investing is common among people of all faiths.

While nearly all investors deal with multi-asset portfolio investing, professional asset managers deal with decision constraints on a regular basis. A client can be an individual or institution and give instructions to invest in assets of type “A” but not in assets of type “B.” Some investors—such as the Methodist

Church, the California State Employee Retirement System, the Norwegian SWF or the Bill & Melinda Gates Foundation—provide specific constraints on their asset managers, usually involving the avoidance of investments involved in controversial businesses such as weapons, petroleum or gambling, or others considered anti-social, non-humanitarian or somehow defined as unethical or not socially responsible. So, adding constraints to security selection is not new; rather it's been extant for decades.

Modern Islamic finance can be said to have begun in 1975 with the foundation of Dubai Islamic Bank, and continued in 1976 with Bahrain Islamic Bank. Both institutions, and since then dozens more, are primarily retail banks. Retail banking in the Islamic sense means the same as with conventional banks: deposit-taking institutions that serve individual customer needs such as payment systems (debit cards or checking accounts), short-term credits, credit cards, auto loans and the like.

After a period of maturity nearly all the retail Islamic banks established parallel corporate banking services to serve business and government customers. For these customers they established Islamic payment systems, inventory finance, equipment finance, letters of credit and guarantee for exporters and importers, and the usual list of services provided to companies and agencies. Islamic corporate banking turned out to be identical to conventional corporate banking in terms of service, reliability and cost.

In 1998–1999 the world's first Islamic investment banking appeared, with Arcapita and Gulf Finance House in Bahrain raising an estimated \$30 billion from investors through 2007, and issuing close to \$3 billion in sukuk (Islamic bonds) for their own balance sheets. The world's first global sukuk was issued in early 2001 by the Malaysian government and was soon followed by more from the Dubai, Bahrain, Saudi and Indonesian governments. Sophisticated legal counsel created sharia-compliant share purchase agreements, mortgage loan agreements and long-term asset financing contracts that became widely accepted by sharia scholars. By 2014 even the U.K., Hong Kong, South Africa and Luxembourg governments had issued sukuk, indicating that a highly legitimized form of Islamic investment banking had been achieved.

Sharia-compliant trading and brokerage banking was established in the Islamic finance space with the likes of Mubasher, a highly popular independent Saudi brokerage and clearing house for regional and some international shares and mutual funds, while throughout the 2000s banks in the Saudi and Gulf region set up numerous sharia-compliant brokerage units, often in separately capitalized investment divisions, all generally recognized as providing the same level of service and cost as their conventional counterparts.

In short, these four pillars of Islamic banking—retail, corporate, investment, and brokerage and trading—have rapidly advanced over the last 40 years to become legitimate financial service providers for their respective clientele,

widely accepted as equal in nearly all senses to conventional financial service providers. The only difference in nearly all cases, of course, was the addition of sharia certification.

Absent in the evolution of Islamic finance, however, is the fifth pillar of banking: Islamic asset management. Compared to the other four areas of banking, Islamic asset management has barely moved. Total assets in the Islamic finance system worldwide at the end of 2017 was measured at \$2.4 trillion,¹ being expected to grow to \$3.2 trillion by 2020,² yet assets in sharia-compliant mutual funds total only slightly above \$60 billion, or just under 3% of assets in Islamic finance. Compare that to the approximately equal amounts of assets in U.S. mutual funds and U.S. commercial banks (about \$15 trillion each, meaning mutual fund assets are approximately equal to 100% of banking assets) and the disparity between Islamic AUM and Islamic finance assets becomes more acute.

There may be multiple causes for the retarded development of Islamic asset management. Certainly the advances in the other four categories of Islamic banking were swift and widespread. From near-zero levels in 2000, sukuk outstanding worldwide has now reached almost \$500 billion, Islamic mortgages in the United States are said to exceed \$3 billion, while sharia-compliant assets in the Malaysian banking system are quickly approaching 30% of all assets.

We consider here Islamic asset management as a unique and separate function of Islamic finance. Perhaps the retarded development of Islamic asset management is due to the lack of adoption of conventional asset management methodologies. Perhaps too there are cultural or social issues involved. The purpose of this study, however, is to seek whether one can follow professional and regulatory best-practice to isolate a minimally sufficient investible universe of sharia-compliant investments, and then determine the outcome from using this universe in optimized, multi-asset portfolio constructions, all within the context of MPT. If the results indicate feasibility within the confines of theoretical and practical constraints, then perhaps subsequent research can determine how to implement Islamic asset management on a wider scale.

There are two distinct areas of original research that follow. The first area of research is finding and then organizing a set of data of sharia-compliant investible securities in all major asset categories. The subsequent dataset must be free of labeling errors and sufficiently reliable to support research in the second area, as well as any conclusions. The second area of research is using that set of data to create optimized multi-asset portfolios that can test the hypothesis: "A sharia-compliant optimized portfolio, constructed identically to conventional (non-Islamic) portfolios, will demonstrate superior return and risk characteristics compared to its conventional peers." To begin the first area of research one must determine the size and nature of the sharia-compliant

investible universe and then examine it according to professional standards common in the global asset management industry.

Here we seek to determine whether like-for-like multi-asset portfolio constructions—Islamic and conventional—may exhibit different performance characteristics. A null hypothesis may be: “There is no difference in risk and return between Islamic and conventional multi-asset optimized portfolios.” Another null hypothesis may be: “Because of additional constrained security selection, an Islamic multi-asset portfolio will underperform an equivalent conventional multi-asset portfolio.” While this study does not address the potential null hypotheses, one can infer the validity of them from the results that follow.

Once a reliable dataset has been established, we can ask:

Research Question: *What are the performance (and risk) characteristics of multi-asset optimized portfolios comprising sharia-compliant securities as measured by contemporary risk and reward metrics, and how does this performance compare to conventional (non-Islamic) peer portfolios that are equally constructed?*

The size and nature of the sharia-compliant investible universe and its utility for professional asset managers with “common man” clients are first addressed. We know conventional portfolio management is dependent entirely on reliable datasets for optimization and subsequent asset allocations to work, so establishing an investible universe across all asset categories that meets industry and regulatory standards is presumably the first priority in any envisioned subsequent Islamic asset management process. In fact, we can say that the Research Question cannot be addressed without first responding to the question of reliable data. So, we start with finding the data and insuring its utility for subsequent applications in portfolio construction and measurements.

The empirical analysis that follows will apply the resulting data on qualifying securities discovered in the Islamic investible universe to optimized multi-asset portfolio constructions in strategy styles seen as typical in conventional asset management. The results will be tallied and compared to conventional peers in identical investment strategies.

The first part of this work will focus on finding, labeling, measuring and analyzing the sharia-compliant investible universe, while the second part examines the process of establishing optimized, multi-asset portfolios and measuring their performance against conventional peers.

It is hoped that the results of this effort will stimulate others to expand on research relating to Islamic asset management. The dearth of studies on multi-asset, sharia-compliant portfolio investing reflects the essentially new

nature of Islamic finance generally, and even more so the absence of Islamic asset management by any meaningful measure.

NOTES

1. Thomson Reuters *Islamic Finance Development Report 2018*, see <https://repository.salaamgateway.com/images/iep/galleries/documents/20181125124744259232831.pdf>.
2. S&P forecast, 19 October 2015, see <http://english.mubasher.info/news/2829566/Islamic-finance-to-reach-3trln-next-decade-S-P-s>.

1. Literature review, research gap, industry and theoretical summaries

LITERATURE REVIEW

Before we examine our main hypothesis, we would like to present a historical fact about the history and evolution of modern Islamic banking. In the 1950s Ungku Aziz, the famed Malaysian economist, realized there was an underlying issue with savings in Malaysia. The main reason for savings was to perform Haji, which is the pilgrimage to Mecca. Typically, money was stashed throughout one's property, such as in the attic and under pillows. However, those savings were rarely enough, leading families to sell all their assets in order to complete Haji. This created a problem because once they returned to their homelands they were left with no land or other assets. Ungku Aziz observed that this could not be beneficial for either the economy or the Muslims in Malaysia, so he started to research *riba* (interest). His goal was to establish a fund which would allow individuals to complete Haji without the worry of *riba*, since it is forbidden. Following his research, in 1959 Ungku Aziz submitted "The Proposal to Improve the Economics of Haji Pilgrimage" to the Malaysian government. His proposal included the establishment of an organization which would provide savings and management of funds for pilgrimages to Mecca. [Conversation with Dr. Zeti about Tabung Haji]

The Malaysian government was unable to immediately decide on this issue. Instead, it called on knowledgeable individuals to attend a meeting for public discussion. The meeting had a monumental impact in that the proposal was widely accepted, giving the government incentive to move forward. In 1960 it formed the Working Group for the Welfare of Pilgrims, and in 1962 the government approved the group's White Paper. Later the same year the Malaysian parliament approved the Incorporation of Pilgrimage Savings Fund act, which resulted in the creation of the Pilgrimage Savings Corporation (Tabung Haji) in 1963. Tabung Haji may well be the first deposit-taking Islamic finance institution in the world, even before Dr. Ahmad Al-Najjar's Mit Ghamr Savings Bank of the same year. The Malaysian pilgrimage savings fund now accounts for nearly \$20 billion in managed savings for over nine million Malaysians. [Conversation with Dr. Zeti about Tabung Haji]

Unlike conventional asset management—which has its own dedicated academic journals (e.g., the *Journal of Portfolio Management*, founded in 1966), thousands of scholarly articles stretching back nearly six decades, and more than a few Nobel Prizes¹—scholarly research on multi-asset Islamic portfolio investing is thin to date. Research cited here, therefore, is derived from a vastly smaller set of articles. This literature review is confined to the following general topics:

- Islamic asset allocation
- Islamic equity indexes versus conventional equity indexes
- Islamic mutual funds versus conventional funds and/or Islamic equity indexes
- Sukuk as an asset category; sukuk performance against conventional indexes
- Islamic indexes and SRI
- General interest articles on investible sharia-compliant securities, for example mutual funds.

All the above fit within the very generic context of Islamic asset management. However, what is deliberately absent here are, as examples, an investigation of scholarly work on the sharia compliance of sukuk structures or the contractual relationship that may exist between retail Islamic banking customers and their financial institutions. Instead, the first goal of the literature review was to identify literature on multi-asset, sharia-compliant, optimized portfolio investing. Where that was absent, the second goal was finding literature that analyzed the market performance of an Islamic asset category. Avoided entirely are articles unrelated to asset management. This investigation did not delve into parallel Islamic banking issues related to other sectors, such as retail, corporate and investment banking, and did not investigate sharia issues in Islamic finance, which are treated elsewhere.

While several articles appeared in peer-reviewed journals, and a few in ranked journals, many were working or conference papers, or were found in much lower-ranked journals. Much of the scholarship begins in the mid-1990s, expands substantially in the early to mid-2000s, before dropping off by the time of the great global financial crisis, but seems to have had somewhat of a renaissance in the last decade.

That said, a literature review does yield some important results despite the infancy of the Islamic asset management industry. There have been serious studies on pieces of the sharia-compliant investible universe, where most scholarship examined the performance of sharia-compliant indexes and their assets traded in capital markets today.

Interestingly, nowhere does the existing literature on various sub-components of Islamic asset management challenge or attempt to redefine the principles of asset management, which are more thoroughly discussed in the section “Modern Portfolio Theory and Theoretical Foundations of Asset Management” below. In other words, scholars who have to date approached Islamic asset management accept the general theories and methodologies of asset management, whether it be efficient allocation of portfolio securities, refined measurements of risk, or the comparative performance of conventional versus sharia-compliant assets. MPT and its derivatives remain the bedrock of investing, whether sharia-compliant or conventional.

With some exceptions, the large majority of existing scholarly literature on Islamic asset management seems to follow two primary threads, one focusing on the performance of sharia-compliant international, regional and national (almost always equity) indexes in comparison to conventional (non-Islamic) peer indexes, the other examining the performance of underlying securities (mutual funds, sukuk) and comparing them to the relevant conventional and Islamic indexes. A third thread is weak and more recent, comparing sharia-compliant equity investing to its cousin, SRI.

A disassociation of finance and economics was observed in the years preceding the Great Recession of 2008. International finance, especially, became more prevalent in the sense that it started contributing more to national wealth. Since the financial crisis, a stronger dependence on regulations and laws has been observed.

Taking into account ethical responsibility should be required after observing the hardship many faced following 2008. A study by Aziz, Idris and Sultan (2019) looks at both ethical and Islamic finance to evaluate the differences and similarities in these models. The goal is to combine two models which corporations can then build off of, thereby turning attention to how finance can play a part in supporting sustainable development around the world.

Ethical and Islamic finance are connected through their desire for sustainable finance which focuses on ensuring that future generations have access to the resources of today, resulting in economic growth and development. Though both have a similar focus, each can contribute insights to the other. For example, ethical finance includes observing the effect on the economy, society and environment, whereas Islamic finance has a foundation in sharia practices, which include four fundamental terms for transactions to be allowed. These include the requirement that an asset or real economic activity must back any transaction, the transaction must be deemed ethical by principle, all risk must be compensated with return and there is transparency between those involved.

Both types of finance include fairness, transparency, working toward a greater good, ensuring impermissible activities are not allowed and requiring social effects when considering business deals. By including these values,

financial stability is encouraged at an institutional level. When these values are not observed, issues typically surface, including a deterioration in ethical beliefs and a decrease in accountability. Both of these issues, plus many more, then lead to financial systems which are instable. These values lead to some concerns. For example, despite the desire for sustainability in economics, society and the environment, there is still a need to be profitable. In current times, both ethical and Islamic finance can play a role in achieving these goals.

As a whole, the finance sector still has obstacles to overcome. These include creating accepted standards, which includes a governance structure when dealing with projects and how they are managed throughout their existence. Islamic finance already has a procedure in place which reviews for sharia compliance; however, a financial measure is lacking. The use of value-adding or value-based measures is being considered, following a sharia check.

Knowledge of both ethical and Islamic finance is required in integrating both concepts to achieve sustainability. Economic sustainability is not the only topic of interest, as the environment and society as a whole could benefit from collaboration between these two fields.

For collaboration to work, both forms of finance will need to clearly state the intended goals of such a combination. Following this, a mechanism can be produced to evaluate the influence of each type of finance. The goal for finance is not only to work toward a stable and resilient economy, but also to provide a foundation on which to create benefits that place a focus on societal and environmental sustainability as well.

Common among all scholarship to date related to Islamic asset management was an effort to use advanced contemporary measurements of risk and reward that are identical to the statistical and mathematical tools commonly used in conventional asset management. This is as it should be, since nearly all of Islamic asset management, and the research done on it, is both fundamentally secular and quantitative in nature. As a result, most academic works feature historically common and even some newer measurements such as the Sharpe ratio (and adjusted Sharpe ratio), Conditional Value at Risk, Continuous Wavelet Transform, Paired Sample t-Tests and, of course, positive and negative correlation (and autocorrelation), with many other measurements of variance and return used in comparing Islamic and non-Islamic pairs.

Islamic equities have been the subject of the bulk of scholarship in this subset of work on Islamic finance. Works concentrating on the performance of Islamic indexes versus their conventional peers include Hakim and Rashidian (2004), Girard and Hassan (2008), Guyot (2011), Jain (2012), Walkshäusl and Lobe (2012), Affaneh, Boldin and Albohali (2013), El Khamlichi, Arouri and Teulon (2014), Ashraf (2014), Dewandaru et al. (2015), Yilmaz et al. (2015), Charles, Darné and Pop (2015), Nasr et al. (2016), Alam, Arshad and Rizvi (2016), Trabelsi and Naifar (2017), Saâdaoui, Naifar and Aldohaiman (2017),

Abu-Alkheil et al. (2017), Umar (2017) and Tukenmez, Saka and Kizgin (2019). The authors mostly discovered the outperformance, or at worst neutral performance, of Islamic equity indexes compared to their conventional peers, with some (e.g., Charles, Darné and Pop, 2015) indicating risk variance to conventional peers in certain time periods, in part because of a higher concentration in certain industries, and an explicit reduction of industry diversity among index components; these findings are also largely supported by Balcilar, Demirer and Hammoudeh (2015). Over time these studies have become more sophisticated. While Tukenmez, Saka and Kizgin (2019) use a less sophisticated return model with standard deviation and correlation included (indicating outperformance of sharia indexes versus conventional peers), Ashraf (2014) uses a multi-equation framework in an effort to “smooth out” the results due to index providers using different methodologies to construct their indexes (S&P and Dow Jones using market capitalization on the one hand, and MSCI and FTSE using book-to-market on the other). Yilmaz et al. (2015), meanwhile, uses dynamic conditional correlation and dynamic equicorrelation to examine correlation among Islamic equity indexes in an effort to improve portfolio asset diversification for index investors (although, unfortunately, the authors incorrectly cite \$70 billion in Islamic mutual funds as part of increased demand from a broader Islamic asset management industry, yet don’t point out that even using their incorrect number they still show that under 4% of Islamic finance assets are in mutual funds).

Conclusions from these articles on Islamic equity indexes generally relate to the source of the outperformance or neutral performance being derived from the nature of sharia-compliant investing, where financial and highly leveraged businesses are prohibited but at the same time are more volatile than the balance of the index composition. The great financial crisis of 2008 exposed investors worldwide to the perils of owning shares in financial services companies reliant on phantom derivative revenue and loans made during times of capital glut, or in heavily leveraged companies that succumbed or nearly died during the subsequent credit crunch. In such times sharia-compliant investing can intuitively be more rewarding as both debt and derivatives are shunned. There were, of course, contradictory findings as well, indicating that some Islamic indexes underperformed, but these results are admittedly indecisive as they were mostly drawn from single-country comparisons during restricted time periods. A good summary of indications both in favor and against the outperformance hypothesis of Islamic indexes is found in Alexakis, Pappas and Tsikouras (2016), which separately also describes the outperformance of Islamic indexes during times of crisis, and the beneficial results of optimizing a global conventional equity portfolio with the addition of sharia-compliant shares. A more recent and thorough study of the benefits of sharia diversification can be found in Bahloul, Mroua and Naifar (2017), where regional markets

were segregated into their respective conventional and sharia-compliant equity indexes and then tested for diversification benefit for U.S.-based equity investors. One of the most important findings of Bahloul, Mroua and Naifar (2017) was the clear benefit of adding Islamic equity securities to a domestic U.S. portfolio during times of financial market troubles, further underscoring the safe-haven nature of sharia investing during economic crises.

On investigating literature related to Islamic indexes and their conventional peers, one discovers that an entire sub-family of literature exists on the behavior and components of Islamic equity indexes alone. Most of this literature, and others, points out the high concentration of certain industries in Islamic indexes and the absence of conventional financial services, which tends to skew their risk compared to conventional indexes. These works include Naifar (2016), Mazouz, Mohamed and Saadouni (2016), el Alaoui et al. (2016), Ashraf et al. (2017) and Chen and Ngo (2016), as well as others. While outside the scope of this study, each of these works indicate some form or other of unique behavior of Islamic equities. For example, Naifar (2016) links Islamic market behavior to major global macroeconomic and financial market conditions, linking sharia index performance particularly to sovereign credit, while el Alaoui et al. (2016) and Ashraf et al. (2017) question whether sharia screening for levels of corporate debt forces investors to choose stocks in companies with suboptimal capital allocation. Asset managers who opt for Islamic investing should pay heed to these findings and anticipate the potential for predicted outcomes.

Relevant to this book, Camgoz, Kose and Seval (2019) provide a complete overview of Islamic equity index studies to date, pointing out that classic investment return literature will normally conclude that investment constraints will by nature reduce diversification and shift the Efficient Frontier lower and to the right, that is, higher risk with less return. They indicate that to date 11 such index studies mostly show Islamic indexes outperforming conventional peers. But the picture is more nuanced. There are factors at work in developing and developed economies that will alter the performance of equity markets, for example the U.S. and the U.K. markets are populated with a much larger number of large-capitalization stocks, while Malaysia and Turkey have much fewer. The authors conclude that there are “no statistically significant differences between the risk and return characteristics of Islamic indices and their conventional counterparts,” and “Islamic index investors have not incurred additional costs in the period examined” (2002–2017). This is welcome news for would-be Islamic portfolio investors who may have worried about underperformance or portfolio costs.

The other thread of equity-related scholarship followed the performance of Islamic mutual funds, mostly comparing them to conventional and/or Islamic market indexes or to peer conventional mutual funds. Among these were Elfakhani, Hassan and Sidani (2005), Abdullah, Hassan and Mohamad (2007),

Merdad, Hassan and Alhenawi (2010), Hayat and Kraeussl (2011), Hoepner, Rammal and Rezac (2011), Binmahfouz and Hassan (2012), Rajjaque, Tang and Alam (2013), Abdelsalam et al. (2014), Kassim and Kamil (2012), Bahlous and Mohd. Yusof (2014), Dah, Hoque and Wang (2015), Makni, Benouda and Delhoumi (2015), Makni, Benouda and Delhoumi (2016), Abdul-Rahim, Abdul-Rahman and Ling (2019) and Shaikh et al. (2019). Here there were mostly negative reports, where the performance of a single sector or multiple sectors of Islamic mutual funds was found to be below that of their respective mutual fund peers or indexes. The results are to be expected where such underperformance is compared to indexes, and parallel the numerous examples of scholarship that derive the same results from conventional mutual funds. Collective investment vehicles have costs, and those costs will almost always create a gap between a fund's reported performance and that of its index. Very few managers of any stripe beat their indexes, including operating costs, and even less do so on a sustained basis. It should be no different for Islamic mutual funds.

Of note, however, are the findings of Shaikh et al. (2019), whose examination of the internal Pakistani mutual fund market indicates that sharia-compliant equity funds outperform conventional peers in terms of both risk and return, which their fixed-income cousins (a sukuk versus bond comparison) did not. Another study indicating at least slightly positive Islamic versus conventional mutual fund performance was delivered by Alwi et al. (2019), who compared 100 Islamic mutual funds to an equal number of conventional funds in the Malaysian market, focusing in particular on the years of the global financial crisis. And finally, Peillex et al. (2018) decompose the monthly return variability of Islamic mutual funds (equity only) in a fashion similar to which conventional equivalents have long been exposed. They consider factors unique to Islamic funds, that is, a smaller investible universe, bias toward low-leverage companies and a young industry (with presumably less-experienced managers), in an effort to understand why Islamic funds may underperform their conventional peers (which, they conclude, is mostly from inefficient active management).

Makni, Benouda and Delhoumi (2016) make an effort to differentiate between potential gauges of Islamic mutual fund success or failure by evaluating the funds by size, track record, institutional size and relationships, fees and other metrics, all such definitions having been previously applied in research on conventional mutual funds. Their conclusions are well in line with the results from the same studies of conventional peers. Size, age and institutional relations are all important factors in choosing funds. At the same time, Naqvi et al. (2018) indicate that there is no sign of a superior performance of Islamic mutual funds, in particular when accounting for asset classes and style (although their study may have been fatally hampered by examining only

Malaysian and Pakistani equity funds, while at the same time the authors seem to have been deficient in defining their dataset by asset class, and suffered in their ability to produce common industry labels—and accompanying data—for various investment styles). At the same time, de la O González, Jareño and El Haddouti (2019) examined the performance of Islamic versus conventional stocks in ten traditional equity market sectors, including healthcare, technology, basic materials, consumer goods and so on. Importantly, their data time series is a respectable 20 years—January 1995 through December 2015—a time period of multiple global market events, that is, pre-crisis, crisis and post-crisis. Measuring common performance factors such as Sharpe, Treynor, Sortino and Omega, the authors indicate that overall Islamic stocks outperformed on a sector-by-sector basis in nearly all cases, with stocks of conventional sectors outperforming in only a relatively few instances.

Among the two major threads of literature a frequent initial conclusion is found: commonly accepted asset pricing theories, but in particular the Capital Asset Pricing Model (CAPM), tell us that an unconstrained investible universe provides the highest degree of efficiency. Portfolios subject to constrained security selection will demonstrate less return and more risk than unconstrained portfolios (i.e., the Efficient Frontier will shift toward the right and down). However, empirical results can differ. It has been shown that constrained portfolios can have equal risk and return performance. While Dah, Hoque and Wang (2015) used an almost absurdly constructed dataset of Islamic mutual funds,² they did show that a sharia constraint was not a barrier to some Islamic indexes and mutual funds achieving a neutral performance to their conventional peers. The abstract in Rajjaque, Tang and Alam (2013) is another example of authors pointing to a reduced investment set most probably producing different returns than equivalent conventional investing. Unfortunately Rajjaque, Tang and Alam (2013) is blemished by impossibly puzzling—and very wrong—statements about the Islamic mutual fund business. The authors state, “Moreover, because of the absence of an Islamic money market, the Islamic unit trust fund depends exclusively on the equity market for investment ...” The presence of many murabaha and sukuk funds in Malaysia (and available elsewhere internationally) seems to have escaped the authors’ attention. Adding to the confusion, the authors write, “Islamic mutual funds are different from conventional mutual funds as they invest only in Shariah-compliant assets such as stocks and sukuku” [citing Abdullah et al., 2007; and Elfakhani et al., 2005]. “Conventional unit trust funds managers do not solely invest in equity markets compared with Islamic unit trusts; rather the fund may also comprise all types of risk-free investment” [citing Low and Ghazali, 2007]. These seemingly contradictory statements belittle the broad availability of risk-free equivalents in the Islamic finance market.

Binmahfouz and Hassan (2012) made what might have been an important revelation, albeit perhaps inadvertent, relating to the performance of non-Saudi-managed Islamic mutual funds invested internationally (i.e., outside Saudi Arabia and the Gulf region) appearing to outperform conventional peers. While not specifically stated by the authors, it is obvious that they base their results on the assumption that such funds are actually managed inside the Kingdom, when in fact these are almost always sub-funds of much larger mutual funds managed in major capital centers such as London, Singapore or New York. Given the additional costs such sub-funds will always bear, it is indeed an achievement to show outperformance of Islamic mutual funds on a global scale.

Literature specifically on sukuk and sukuk markets was examined, but only where the articles had at least some relevance to Islamic asset management. Again, the literature was paltry. Explanatory, non-quantitative articles included Vishwanath and Sabahuddin (2009), Hanefah, Noguchi and Muda (2013), Alswaidan (2013), Wood, Mottahedeh and Wood (2014) (which may be wrongly inserted here as it dealt with taxation issues) and Kasuma and Silva (2014). These were essentially layman descriptions of a market that in all cases was very small and somewhat new at the time the articles were published (and, as will be indicated in the section “Results and Relevance of Analysis of the Islamic Investible Universe” in Chapter 3, still may be considered small and new). With sukuk outstanding increasing 141% from year-end 2011 to 2017 (\$180 billion to \$434 billion), these mostly verbal explanations of the sukuk market have become quickly dated.

Zulkhibri (2015) does justice in explaining the paltry nature of the literature on sukuk and sukuk markets. He identifies the minuscule number of articles relating to sukuk in peer-reviewed journals (only 12 articles on sukuk among 5,177 journals of economics, finance, accounting, business and management for the years 1990 through 2014), explaining structural and market reasons for the deficiencies.

Only six articles approached sukuk markets with a quantitative methodology, starting with Najeeb, Bacha and Masih (2014), who discovered low correlation among domestic sukuk issue prices, as well as identifying the poor secondary market trading in these securities and high correlation among international sukuk; while El Mosaid and Rachid Boutti (2014) compared the performance of sukuk versus bond portfolios in the Malaysian market, showing a significant and positive correlation. Godlewski, Turk-ariss and Weill (2011) also examined the Malaysian sukuk market, and identified the unusual phenomenon of corporate sukuk issuers facing negative equity price results after their new-issue announcements, versus those companies issuing conventional bonds. Naifar, Mroua and Bahloul (2017) use 2010–2014 quantile regression to analyze the Dow Jones and Malaysian sukuk and conventional Asian and

Malaysian bond indexes to determine that indeed sukuk and bonds behave in a sufficiently dissimilar manner to be considered as complementary rather than identical assets. Azmat, Skully and Brown (2017), on the other hand, delve into sukuk and conventional bond structures in an effort to determine whether certain religious variables have an effect on ratings (they do), while at the same time concluding that Islamic bonds displayed resilience during the global financial crisis. The most recent addition to quantitative examination of sukuk market behavior is Hassan et al. (2018), which concludes that indeed sukuk offer diversification benefits to bond investors, showing similar characteristics during periods of market shocks, but with reduced volatility.

Very few articles were discovered that actually covered sharia-compliant, multi-asset-class portfolio investing. Dewandaru et al. (2014) were perhaps the only authors to approach the construction of diversified portfolios under optimized conditions. Unfortunately their fatal flaw was considering Muslims could actually have the choice to invest in conventional bonds (under sharia they cannot), and their significant constraint was using only data from Malaysian and U.S. markets, thus invalidating their research results for any examination of global multi-asset portfolios. Dewi and Ferdian (2012) also considered multi-asset investing, but it is difficult to put their work into context given the very narrow focus on just two markets, Malaysia and Indonesia, and the dual scope of examining and comparing the performance of sharia-compliant equity and sukuk funds in them. The Dewi and Ferdian (2012) research discovered to no surprise that sukuk funds had more stable returns than equity funds in these two markets. They also point to outperformance of Malaysian versus Indonesian equity funds, again without surprise given the decades-longer history of a rich and deep Malaysian asset management industry (and an inarguably less-volatile Malaysian economy), and reach the unsurprising conclusion that fund managers don't often beat their markets. In short, given that Dewandaru et al. (2014) and Dewi and Ferdian (2012) comprise the entire body of literature on multi-asset-class Islamic portfolio investing, one can conclude the available literature on this portion of Islamic asset management is indeed paltry.

Perhaps the single and only effort to date that examines the possibility of multi-asset-class Islamic portfolio investing has been Tumewang (2018). Here the author makes an almost tangential link to this study by considering Islamic pension funds, and his perception is that they should invest similarly to Yale University endowment. Tumewang (2018) links portfolio construction to the type of asset-liability management (ALM) typically used by pension funds, then proposes investing in real estate (via real estate investment trusts, or REITs), foreign equity (meaning non-Indonesian), infrastructure (without explaining how to invest in this category, nor in which type of securities), U.S. large-cap stocks (as opposed to foreign equity) and natural resources, creating

an optimized allocation where the rate of expected inflation substitutes for the risk-free rate in the CAPM. While a unique case in observing the outcome of multi-asset-class Islamic investing, the relevance is limited due to the lack of any linkages to real-world capital markets' investible securities.

Generalist, non-quantitative compendiums of global Islamic mutual funds offerings, with their verbal descriptions, were made by Wilson (2007), Bose and Mcgee (2008) and Ghoul (2008), but they are today all very much out of date and the authors chose to pursue a very generalist, descriptive form of discussion. In this sense such articles cannot be considered scholarship.

Some effort has been made to compare sharia-compliant investing with SRI. Binmahfouz and Hassan (2012) search for statistical significance in the performance of Islamic and SRI indexes compared to their conventional peers and show there is none. They conclude, "... Muslim as well as [SRI] investors can choose investments that are consistent with their value systems and beliefs without being forced to sacrifice performance or expose [themselves] to higher systematic risk." Importantly, they enter the argument over whether constrained investment universes lead to lower portfolio performance and higher risk by stating that Islamic equity investors are by nature entering into a less-volatile market, where there are "financially stronger, more stable and profitable companies," which seems intuitively correct. Indeed, their citing the absence of Worldcom, Enron and Tyco from Islamic equity indexes gives comfort that there may be some truth here, but taking a much bigger picture one must also include the absence of hedge funds, derivative-based structured products and "full faith and credit" sovereign and corporate bonds from the sharia landscape, all of which contributed heavily to the global financial crisis. Future scholarship may penetrate the real world of conventional portfolio investing on the eve of the global financial crisis and create "what if?" scenarios speculating on what might have happened if, instead of the actual asset allocations of pension funds, endowments and insurance companies, asset managers had invested fully in sharia-compliant securities. The results could be surprising to many.

In the same context of SRI investing, Lashgari (2014) pursues the idea of a future fixed income security that is not tied to a fixed income, that is, the outcome of a security will be shared among participants in a fashion more akin to the GDP bonds previously proposed by Robert Schiller. The author envisions the returns of such securities being linked to future corporate profits, project returns or even economic output, making them more aligned with the concept of shared risk.

Again within the context of SRI investing, Nainggolan, How and Verhoeven (2016) argue that there is an implicit understanding that (1) financial shares are highly volatile and (2) the shares of highly leveraged companies are also highly volatile, so therefore sharia-compliant investing in shares will be less

volatile, that is, over time will exhibit less risk and produce higher returns. Their findings indicate there are no advantages to investing in sharia-compliant equities if such investing is through Islamic equity funds which underperform their respective conventional peer funds over time (with the exception of the period covering the global financial crisis). However, while they have undertaken a comprehensive effort to measure the higher costs of sharia compliance, their use of heterogeneous data sources and a highly limited set of Islamic equity mutual funds indicates the possibility of erroneous conclusions. Further, their findings are contradicted by Reddy et al. (2017), where there is either neutral performance or outperformance of Islamic mutual funds versus conventional peers in the U.K. mutual fund market (and no significant difference between sharia-compliant and SRI mutual funds). Fu, Wright and Blazenko (2020) deliver advanced analytics in comparing constrained versus unconstrained portfolio investing, again simply looking at equities. They examine sin (alcohol, tobacco, gambling and adult entertainment), carbon (mostly petroleum-related firms) and sharia (which excludes mostly sin and financial stocks, plus over-leveraged companies) investing as different ethical constraints. The authors argue that past, mostly favorable, measures of ethical investing performance were misapplying optimal portfolio weights, which when corrected show there are no costs to avoiding sin or carbon and embracing sharia in portfolio investing (as measured by Sharpe ratio).

RESEARCH GAP

What the existing literature on Islamic asset management makes abundantly clear is that to date there is no comprehensive study available on global, multi-asset, sharia-compliant portfolio investing. There is equally no literature on the investible universe of Islamic mutual funds and ETF markets, the preferred securities of the “common man.” Further, there is no literature on the combination of the two, answering the foundation question of this study: “What happens when one combines the Islamic investible universe with MPT? Will there be underperformance, outperformance or like performance of equally constructed portfolios?”

We know from the above literature that Islamic investment product managers exist, but little of the literature would have practical value to a practitioner who is seeking to create diversified, globally allocated, multi-asset-class, optimized portfolios from the securities in the investible universe that are acceptable and qualified from both professional asset management and regulatory perspectives.

While conducting a literature review on Islamic asset management, one quickly discovers an absence of “stepping stones” so common in other areas of scholarship. What this means is the absence of seminal early-stage work

that establishes widely accepted knowledge, and from which springs forth new knowledge on a step-by-step basis. In the literature on conventional MPT (MPT) described below, one can clearly map the path of the construction of MPT, starting with the iconic Efficient Frontier envisioned by Markowitz in 1952, followed by the introduction of the risk-free rate by Tobin in 1958, and then completed by Sharpe in 1964 with his Capital Market Line and points of optimality (and, of course, all three won Nobel Prizes in economics for these contributions). For practitioners of asset management, these scholarly stepping stones provide the logic, the concrete foundation, from which managers can approach security selection and asset allocation. And, unsurprisingly, they do. Global asset management is founded on a bedrock of scholarship. Unfortunately, there is no parallel path in the existing literature on Islamic asset management, but rather a more random, non-linear approach to discussion and analytics of pieces to the puzzle.

What this means is that a would-be practitioner of Islamic asset management does not have much knowledge available from scholarly literature on how to proceed from scratch. Any efforts would have to be intuitive, since no descriptive literature exists on a holistic approach to Islamic asset management. No scholar has yet asked, “How does one begin selecting an investible universe of sharia-compliant assets? What does one do with these securities once they have been filtered and sorted? Can we use these securities to construct efficient portfolios? And does following this process in any way violate the principles of sharia?” Combined, these four questions form the essence of this study’s Research Question, which is not answered in the existing literature.

This study makes an effort to approach Islamic asset management as a whole rather than performing an examination of its pieces, which essentially describes the nature of the existing literature on Islamic asset management.

SUMMARY REVIEW OF THE GLOBAL ASSET MANAGEMENT INDUSTRY

Size and Nature of Global Assets Under Management

The asset management industry comprises over \$160 trillion in professionally managed assets worldwide. Funds under management can be seen in various categories, as illustrated in a table provided by TheCityUK Fund Management. In the table, the division of assets and the dollar amount for each division is shown for various pension funds, mutual funds and insurance funds when dealing with conventional managed assets. As alternatives, SWFs, private equity, ETFs and hedge funds are options. In a figure also provided by TheCityUK, which gives numbers in trillions of dollars, the amount of profes-

sionally managed assets for the years 2006 to 2016 are shown, the lowest being 58.7 in 2008 and the highest 101.0 in 2016.³

We know intuitively that much of this managed wealth is owned by individuals and institutions (institutions often acting on behalf of individuals, such as pension funds, family trusts or insurance companies) in developed economies. Global wealth is measured at \$317 trillion (including non-financial assets).⁴ It is perhaps not possible to calculate the value of such assets owned by Muslims as credible wealth reporting is done by region (e.g., Europe, North America, Asia), where Muslims are widely distributed. However, one may make a generalist guess. Assume Muslims are 25% of the world's population, then if equally wealthy they would own \$79 trillion of global wealth. But we know most Muslims are middle to low income, so we can arbitrarily deflate that number by 80%, resulting in almost \$16 trillion in total Muslim wealth. Assuming that estimate is still too large, we can again arbitrarily discount that number by 50% and end up with just under \$8 trillion. Assuming 25% of that amount is financial assets, one can guess that Muslim-owned, professionally managed financial assets would be at least \$2 trillion, a not insignificant number.

Role of Mutual Funds

To focus more tightly on the purpose of this study, we examine the role of mutual funds in global asset management. Why mutual funds? Pension funds and insurance companies play an equally powerful role as intermediaries in the real economy by investing tens of trillions of dollars and their equivalents in other currencies in stocks, bonds, other credit vehicles, hedge funds and private equity. They also universally have the same general objective as mutual fund investors: maximizing return while minimizing risk through the application of MPT. But pension funds and insurance companies have special ALM issues. They are constrained in their portfolio allocations by regulators insisting on prudent investments to insure future liabilities (pension and insurance claims) are paid. And they are captive in the sense that no single individual can enter into and benefit from the investment strategy of a pension fund or insurance company. They represent specific investor groups and only those groups. Even with the most transparent investment policies, the large size and specific nature of these institutional investors makes their asset management profiles less appealing for what we are trying to achieve here in our discussion of Islamic asset management (although, of course, sharia-compliant pensions and insurers, or *takaful*, may benefit from applying Islamic asset management to their investment strategies and processes). To focus more tightly on the purpose of this study, we must include an examination of mutual funds as they are generally accessible to "common man" investors, which have very different

investment profiles and investible universes when compared to institutional investors.

Mutual funds play several roles in asset management. First, they are the investment vehicle of choice for many individual investors, and not only in developed economies. Most individuals cannot hope to gain the benefits of investment diversification by themselves due to the complexity of global capital markets and the barriers to individuals accessing them. Mutual funds offer a portal into sophisticated professional asset management with low entry amounts. As stated by the International Monetary Fund (referring to mutual funds), “Financial intermediation through asset management firms has many benefits. It helps investors diversify their assets more easily and can provide financing to the real economy as a ‘spare tire’ even when banks are distressed. The industry also has various advantages over banks from a financial stability point of view.”⁵

Second, few investors choose a single-asset-class portfolio. Professional investors diversify investments across multiple asset categories: Cash, Fixed Income, Equity and Alternative Investments. Occasionally one will see debate on a fifth category, Real Estate, although industry practitioners more widely refer to real estate as part of the Alternative Investments category (this debate is not discussed here). Most professional asset managers achieve diversified portfolios through MPT, or optimizing risk and return to achieve predefined investment objectives. By analyzing, filtering and selecting mutual funds, an individual investor can hope to achieve an optimized portfolio.

Mutual funds—numbering over 114,000 worldwide and managing more than \$49 trillion in assets⁶—play an important role in achieving diversification and portfolio optimization for many individual and a good number of institutional investors.⁷ Mutual funds, by nature, are the most democratic vehicle for individuals and many institutions to place their savings. They offer advantages to investing that few individual investors could hope to achieve on their own without mutual funds.

Further, absorption of mutual funds into an economy is considered an indication of that economy’s strength and sophistication. Developed economies have much higher ratios of mutual fund AUM to GDP than less-developed economies. As an indicator, the Investment Company Institute provides a chart that shows the penetration of mutual funds in more- and less-developed nations. It shows that the more developed a country’s stock market is, the more developed the fund industry is as a whole. This is based on regulated open-end long-term fund total net assets compared to stock market capitalization, both represented as a percentage of GDP. In this regard, Chile achieved 20% mutual fund AUM to GDP, India is at 7%, while Malaysia reached nearly 25%. At the same time, Saudi mutual fund AUM to GDP is just under 6%.⁸

We look now at the fashion in which mutual funds are invested globally. They do play a significant role in the markets in which they are invested, whether money markets, fixed income, equities or alternative investments. Mutual funds are invested across all asset categories, and given the current \$49 trillion value of AUM in mutual funds worldwide, one may conclude that their role in capital markets is not insubstantial. In a graph, the total amount of worldwide regulated open-end funds are broken down into four divisions, including money market, bond, mixed/other and equity. This is shown for the years 2008 to 2017, which supports this claim.

We conclude by stating that any examination of an investible universe of mutual funds—Islamic or conventional—should allow us to obtain data on a set of investments for subsequent optimized portfolio asset allocations using these collective investment schemes as our source of securities. This will be discussed further in the next section.

MODERN PORTFOLIO THEORY AND THEORETICAL FOUNDATIONS OF ASSET MANAGEMENT

Perhaps since the time of Moses the axiom “don’t put all your eggs in one basket” has been a golden rule in societies everywhere. The benefit of diversification is ancient wisdom. But how do we know we’ve achieved the optimal mix of assets?

The first to articulate this in a mathematical format was Markowitz (1952) in the landmark article “Portfolio Selection.” It begins with the premise that “the investor does (or should) maximize ... expected ... returns.” The author also posits “the investor does (or should) consider expected ... variance of return an undesirable thing.” In other words, Markowitz (1952) explains that investors do (or should) seek higher profits with lower risk.

But Markowitz (1952) showed that one does not simply stuff one’s portfolio with the single asset that individually has the best return and risk profile. Instead, expected price variations of each possible asset in one’s investible universe must be measured against the expected price variations of all other assets in that universe. Markowitz (1952) mathematically showed that constructing a portfolio with uncorrelated (or less or negatively correlated) assets achieves the goal of higher profits with lower risk. Such portfolios are efficient in that they represent that set of portfolios where no additional return can be added without increasing risk. The set of such portfolios creates what is known as the Efficient Frontier.

We inherently know this is true, but the article “Portfolio Selection” showed us why. Optimal diversification is achieved by not only investing in uncorrelated (or less or negatively correlated) assets in a single asset class, but in investing across multiple asset classes, geographies and industries.

Enormous work on asset allocation was done subsequent to Markowitz. Here we briefly examine only a very small sample of the literature after “Portfolio Selection,” choosing within it only a few major works in subsequent decades, and a small selection of recent works of interest.

Tobin (1958) gave us a useful supplement to Markowitz, identifying the two choices all investors must make—one, the holding of riskless assets; the other, the holding of a portfolio of risky assets—and the tradeoff between the two. This concept was further evolved by Sharpe (1964), who introduced the addition of risky assets to a portfolio of risk-free assets, from which one could construct the Capital Market Line, and from there the optimal portfolio found at the point of tangency (equal slopes) with the Efficient Frontier. This “point of optimality” is the Holy Grail for portfolio investors. For the first time, intersecting Efficient Frontiers with the Capital Market Line removed the uncertainty of where one should invest one’s assets. The only problem was that the entire construct was built on estimates of expected return and risk and past price correlation, which we shall see were improbably imprecise at the time. A great deal of work after these groundbreaking studies concentrated on removing the imprecision of variation in future returns, that is, risk.

Through a quirk of history, Treynor, by virtue of his unpublished early work in 1961 and 1962, is considered by some as the true originator of the CAPM, originally thought to have been Sharpe.⁹ Treynor puzzled over the enormous changes in present value when applying small changes to the discount rate for long-period cash-flow models. He understood that discount rates reflect risk, but how? This led to work on assumptions on asset valuations and risk, showing they worked in parallel to determine asset pricing. This important early contribution dovetailed perfectly with the Markowitz mean-variance optimization, which puts substantial emphasis on expected future asset returns and the “riskiness” of assets, that is, their probability of returns in the future.¹⁰

Jensen (1968) was the first to show that asset managers may not be efficient investors, that is, their “predictive ability” in finding securities or constructing portfolios that have superior performance to a benchmark is empirically absent (overall they delivered inferior, or at best neutral, investment returns). Jensen developed a method to explain outperformance or underperformance compared to a calculated expected return, resulting in the widely used “Jensen’s Alpha” portfolio performance measurement: $\text{Jensen's Alpha} = \text{Expected Portfolio Return} - (\text{Risk-Free Rate} + \text{Beta of the Portfolio} \times (\text{Expected Market Return} - \text{Risk-Free Rate}))$. This nifty formula, built on the foundations of CAPM, has been subsequently critiqued, but survives as a common measure of portfolio performance in the global asset management industry.

For markets to achieve homogeneous expectations, one must assume that investors have rational expectations. Rational and homogeneous expectations themselves require an instantaneous distribution of information to investors.

Under conditions of universal information distribution, market prices will adjust immediately to new information and achieve “fair value” as described by the risk adjustment factors of CAPM. The Efficient Markets Hypothesis (EMH), developed by Fama (1970), provided insight on the determination of market prices, that is, there are mechanisms that efficiently distribute information (in normal circumstances) to market participants such that a market may be deemed efficient (which is required for investors to make rational choices). Later behavioral finance research indicates there are inherent weaknesses in EMH caused by the often irrational choices made by investors, yet EMH continues to support Jensen’s premise that “you can’t beat the market” without adding risk equal to or greater than the additional expected return.

While not complete, the citations above encompass some of the major foundation work on MPT. There are, of course, many more contributors, not to mention Lintner, Black, Fabozzi, Elton and Gruber, and more from the likes of Markowitz, Treynor, Jensen and Fama (three of the five cited were awarded Nobel Prizes in economics). One can almost picture the fundamental theoretical research defining the boundaries of MPT lasting through to 1970, and its evolution as a practical tool for asset managers thereafter.

By the 1980s the concept of asset diversification and the application of basic MPT strategies were well established in the asset management industry, but there were still many more insights to come. Brinson, Hood and Beebower (1986) gave the industry its first look at what became known as attribution analysis. Portfolio performance was defined as a result of three subsets of activity: the investment policy defining the composition and weight of investing in each available asset category (the “Policy Portfolio”), the timing of overweighting or underweighting allocations in each asset category (such variation compared to the Policy Portfolio) and the selection of securities within each asset category, all as measured by the R squared of the regression of each examined fund’s returns. Not surprisingly, given the Efficient Markets Hypothesis, investment policy was shown to contribute 90% or more of a portfolio’s return variation, marginalizing the impact of timing and security selection. The article’s topic became known as BHB (after the names of the authors), and sparked a lively debate in the industry as many managers naturally wish to extol the virtues of their trading prowess, an activity that requires precision security selection and market timing, but found BHB shadowing their hubris. Because BHB argued that variations in return were almost entirely due to top-down policy and not trading strategies, the industry shifted toward emphasis on macro asset allocation, while traders still fought hard for their turf.

Black and Litterman (1992) considered CAPM equilibrium portfolio modeling on a global scale, in multiple asset categories (further consolidating multi-asset-class investing’s legitimacy). Considering the availability today

of fine-grain data and analytics from nearly every market, their assumptions on the poor quality of data (leading to unconvincing or no investor views of expected returns in other markets) in the early 1990s seem quaint. They combine key ingredients of MPT, the Markowitz mean-variance optimization and the Sharpe (or Treynor) CAPM. Black and Litterman (1992) explained the extreme sensitivity portfolio asset class weights have to expected return assumptions, and the investor's conundrum in weighting portfolios where no or weak views of expected return exist. They allowed for a model that creates a global equilibrium risk benchmark, from which investors can express their views, both weak and strong (or neutral), in all, few or no markets. The key is adding probability weights to those views.

Jorion (1992, p. 68) may have been somewhat obscure, but expressed a view that resonates powerfully in the context of the application of MPT to sharia-compliant assets today: "Given the wide applicability of the mean variance paradigm, it seems astonishing that investment practitioners do not put it to use more often." Jorion (1992) highlights estimation risk, the possibility that inputs such as expected returns, risks and correlations may be faulty (going back to Treynor's observed large variations in present value when discount rates are lightly altered). To overcome this handicap, Jorion (1992) introduces "fuzzy" data, meaning dispersion ranges around a benchmark instead of absolute numbers for mean-variance optimization inputs. By using dispersion methods as an input in global portfolio allocations, Jorion indicates the superiority of international diversification.¹¹

Lummer and Reipe (1994)¹² remind us that all security selection decisions are preceded by asset allocation decisions, meaning decisions are made on the weights in each category of a portfolio before the decisions on the composition of securities inside those categories. They also remind us that as early as the beginning of the 1970s—a time when many professional asset managers still did not understand the utility of Markowitz (1952)—many investors knew that diversification was essential to risk management, but simply allocated according to common sense, not through statistical interpretations of expected returns and risks. The utility of Lummer and Reipe (1994) lies in their summary of then-common methods of portfolio allocation, methods that have essentially survived intact since. Amusingly, they remark that in 1994, more than a quarter century ago, investors were just beginning to appreciate global investing and multiple asset categories. They also observed the increased utility of MPT when applied to asset categories, and not simply securities within a category, something perhaps taken for granted today. Importantly for this discussion, Lummer and Reipe (1994) highlighted the ability to utilize MPT in a continuous dynamic fashion, replacing call options with risk-free cash positions and adjusting portfolios to immunize them from downside risk. Given the availability of risk-free cash substitutes in the Islamic economy

(i.e., high-credit-quality Islamic bank deposits, for example), this gives rise to a potential dynamic asset allocation model that would be sharia compliant.

By the 1990s, MPT, and the general acceptance of diversifying multi-asset-class portfolios based on correlation, was a mature, well-established practice among asset management professionals. MPT had extended itself from the rare application among a few U.S. equities, to a broad application among global asset categories, and even in non-financial industries, for example electricity distribution and mobile phone tower load management. While legitimate concerns were raised, in particular on rational behavior and measures of expectations, the 1990s witnessed the global adoption of MPT as the core technique to invest one's own or a client's assets.

Elton and Gruber (1997) celebrated this maturing investment process with a seminal piece highlighting the achievements of MPT, as well as some of its idiosyncrasies. Most notably they confirm the persistence of MPT despite well-founded doubts and suspicions of its utility. It is intuitive, after all. Elton and Gruber's snapshot of MPT at that time included confirmation of the utility of mean-variance portfolio theory, showing how it evolved to answer to multiple periods, that is, that MPT could be adjusted at intervals to adapt to new information. Their second point indicated that accuracy problems once associated with data collection were largely a thing of the past due to higher computational speeds, but also because the use of index models substantially reduced the number of calculations. Their third focus indicated that future applications of MPT will finally add liabilities, a complexity considering the combined uncertainty of both investment returns and liability cash obligations (e.g., insurance companies and pension funds). They conclude with a look at portfolio evaluation to justify the value added by portfolio managers (i.e., in the vein of BHB). Without going into their detailed discussions, they show Jensen's Alpha and the generalized Sharpe ratio are still relevant methods of determining portfolio performance against an index, in the process debunking continuing myths regarding added returns from investment timing.

Soon after Elton and Gruber (1997) the work of Fabozzi, Gupta and Markowitz (2002) arrived to celebrate the 50th anniversary of the article "Portfolio Selection" (Markowitz, 1952). In the course of five decades, MPT had transformed investment management, primarily because professional managers now had the tools that didn't exist in previous generations. Like Elton and Gruber (1997), the authors surveyed the breadth and depth of MPT applications, importantly including the increasingly frequent use of MPT for macro asset allocation decisions, that is, choosing asset category weightings. Importantly, they take head-on the subject of historic data leading to misleading optimized portfolios. Despite an industry praying for tools to remove uncertainty, there is still a large component of human judgment and reasoning required in creating a set of expected returns. There is no magic bullet, or

not yet. They conclude by noting innovative applications of MPT, including risk-of-loss analysis, multifactor risk modeling, Value at Risk management and risk budgeting. All these innovations are commonplace in the industry now, supported by abundant literature in each category.

Again on the decomposition of portfolio performance, Berk (2005)¹³ starts with a repetition of criticism of highly paid portfolio managers never persistently beating market indexes, leading one to ask, what value do they add? By this point in asset management history the industry is global and well established, and with tens of trillions of dollars under management it does not in a practical (not theoretical) sense need justification. Berk (2005) says criticism of investment managers is based on myth, explaining that scale is important. Rational and informed investors will seek the best manager until his Alpha (returns above the risk premium, without the premium risk!) is exhausted by too much money to manage. Investors will seek the second, then the third, and then the Nth manager until all have exhausted their above-average expected returns simply due to problems of scale. Returns from managers sink until they reach index returns. Conversely, underperforming managers will lose clients and AUM, increasing their ability to increase performance. In both cases both under- and overperformers will be pushed toward the market index return. But are asset managers skilled (versus simple index investing)? Using indirect measurements, plotting management skill on an axis and showing the distribution of after-fee returns from managers, Berk (2005) shows that 80% of all managers contribute positive after-fee Alpha!

In support of managers contributing Alpha (portfolio outperformance above an assigned benchmark), Alankar, Blaustein and Scholes (2013) posit that investor constraints on managers result in less-than-optimal portfolios, which will result in masking the manager's true Alpha performance. Here the well-known practice of imposing tracking error (where managers are rated according to their ability to perform at or above benchmark returns) and liquidity reserves (to manage costs and redemptions) essentially creates two portfolios, one for Alpha-generating investments and the other to manage the costs of the constraints. Alankar, Blaustein and Scholes (2013) explain that when the performance drag of these costs are removed, or if the performance of the manager is examined in isolation of these costs, there is actually the possibility that Alpha is being generated.

Perhaps at this point it is useful to digress from scholarly literature, and look to the trade. While not peer reviewed, many trade publications reflect the implementation of decades of scholarship. It's not an accident that professional asset managers, few of whom are scholars, follow the guidelines laid down by Markowitz, Tobin, Treynor/Sharp, Jensen, Fama and Black. Chief investment officers mostly have at least Master's degrees in related fields, and presumably most of those have read Elton and Gruber's *Modern Portfolio Theory and*

Investment Analysis in graduate school, considered the foundation educational text for asset allocation.

Gibson (2007) and Idzorek (2010)¹⁴ are typical of this genre. Both were published by industry leaders, the former (MFS Investment Management) an asset manager with nearly \$500 billion in AUM, the latter (Morningstar) a market analytics and data provider, tracking tens of trillions of dollars in mutual fund AUM. Both extol the virtues of MPT as the core of asset allocation, written in a style for the educated layman. In simplified language, the first describes the diversification benefits of Markowitz's mean-variance optimization and emphasizes the importance of multiple asset categories in asset allocation. Gibson (2007) charts real-world portfolios comprising multiple asset classes, indicating their superior risk–return characteristics. Idzorek (2010) is in fact a scholarly article embedded in a trade publication. It returns to Brinson, Hood and Beebower (1986) and the BHB controversy, where laymen quickly assumed that portfolio *total return* and not portfolio *return variance* was 90% or greater controlled by macro-policy investment decisions. In fact, he shows 100% or more of total return is due to investment policy (i.e., portfolio weightings by asset category), and that timing and security selection were in fact a drag on performance. By identifying errors in methodology, Idzorek (2010) reconfirms the basic principle of “asset allocation is king.”

By the late 2000s a new asset management strategy emerged, particularly where investment managers began using quantitative signals to more actively time over- and under-weighting asset categories. Herold et al. (2007) looked at multi-asset-category portfolios and dynamic asset allocation, all in the context of institutional investors seeking to minimize downside risk in a low-yield environment (an environment that persists today). Interestingly, while concepts such as risk budgeting and Value at Risk were unheard of during the early days of Markowitz, and even Sharpe and Treynor, by 2007 they had become hugely influential in managing large, complex portfolios for institutional clients. Passive management was becoming a thing of the past. However, the relevance of options as used in this strategy is null for sharia-compliant investors, meaning the portfolio insurance required for this strategy is not applicable in the Islamic asset management space. Despite this, the study indicates several important achievements in asset management and portfolio diversification: by now dynamic asset management has attained respected credentials.

This section closes with summaries of two intriguing works, Ibbotson (2010) and Doeswijk, Lam and Swinkels (2014), that help us understand the theoretical underpinnings of MPT. Again, these were selected from among hundreds of contemporary relevant works on global asset allocation. They represent a class of literature that validates and continues the basic premise of MPT and the fundamental utility investors seek in globally allocated, multi-asset-class portfolios.

Ibbotson (2010), a commanding presence in scholarly work on asset allocation, is also a well-known asset management industry professional. With over 15,000 citations, his frequent treatment of Efficient Frontier investing stretches back more than 40 years. Ibbotson (2010) addresses the by-then well-studied subject of attribution analysis, answering the common investor question: “Where did my performance come from?” Since Brinson, Hood and Beebower (1986), a large body of work—principally called attribution analysis—has tried to answer this question. There was a great deal of emphasis, and not a shortage of misinterpretation, of the BHB proposal that over 90% of portfolio return variation derives from top-down policy decisions. Ibbotson (2010) subsequently questions that result, showing in fact that 100% of *return* is derived from policy, while only about 40% of *return variation* is so ascribed. He further clarifies that we have to be more specific in decomposing a portfolio manager’s returns. In the global financial crisis of 2008, for example, the prices of nearly all assets declined, and by 2010 everything went up, essentially independent of manager decisions. Market factors impacting asset category valuations explain a great deal of portfolio return variations, while policy, timing and selection comprise the balance.

Perhaps this focus on decomposing returns may seem overemphasized. But to some degree it’s what also drives the markets, or more accurately the competition between managers for investor funds. Every manager likes to boast about his returns, showing outperformance compared to benchmarks. But how did he or she achieve those returns? Finding out is critical to the industry’s ability to convey its value to investors. At the heart of this argument is the role, and now clearly obvious value, of asset diversification and a manager’s active role in selecting a portfolio of diversified securities.

Doeswijk, Lam and Swinkels (2014) contains an important summary of the world’s capital markets, supported by financial market data going back to the 1950s. Here the authors sum up exactly what’s out there—the securities that investors can actually buy, whether they are stocks, bonds, hedge funds, commodities or even private equity. They start with Tobin’s (1958) fundamental assessment that all assets are tradable and observable in the markets, and the subsequent realization via the CAPM that every investor must diversify investments between risky and riskless assets. They then proceed to refine the argument toward true global market investing, and a definition of the global market portfolio. How can one honestly achieve a global market portfolio if the nature and extent of global markets are unknown? (They state that their global capital market survey is the first ever study of its kind.) Doeswijk, Lam and Swinkels (2014) conclude there is an \$85 trillion worldwide securities market, indicating for the first time the detailed composition of that market. For globally diversified investors, here is an indication of just how they can construct a universal benchmark. Importantly, they delineate the precise components

of that global market, from government and corporate bonds, to equities and commodities, and real estate and hedge funds. What is not surprising is that the emerging Alternative Investment asset class, while growing steadily in size, remains trivial, despite its overwhelming presence in popular media (e.g., private equity, hedge funds and real estate). In a way, Doeswijk, Lam and Swinkels (2014) performed for the conventional asset universe what this author hopes to perform for the sharia-compliant investible universe, albeit only among Islamic mutual funds and ETFs.

A BRIEF DISCOURSE ON CAPM AND SHARIA

Many readers are aware of a fundamental principle of Islamic finance, the well-known prohibition against *riba*, or interest. It is useful to mention that there are various forms of prohibitions in sharia, for example pork, alcohol and gambling. Another is *riba* (or, earning money on money). Among the various activities considered *haram*—or forbidden—in Islam, one of the strongest prohibitions is against *riba*, so it is natural that some persons might wonder about *riba* in the context of the CAPM.

The core of this study is not intended to examine the sharia aspects of CAPM. Rather, it is intended to examine how the existing universe of sharia-compliant investment securities can be used in the context of the industry-standard methodologies of optimized asset allocation that is based on MPT, or MPT. In other words, it accepts CAPM as a significant and important component of portfolio optimization that, on the surface at least, is acceptable to Muslims and, in the context of industry application of CAPM, required for apples-to-apples comparisons between sharia-compliant and conventional (non-Islamic) portfolios.

Thankfully, the sharia aspects of CAPM have been dealt with elsewhere by sharia and academic scholars and—as is further discussed below—are of minor or no concern in this study except perhaps as a side note to discuss contemporary and historic scholarly discussion on how Muslims see the risk-free rate and adapt to it or change it for sharia compatibility. In fact, this study should be able to stand alone with no mention of an Islamic CAPM (ICAPM). In other words, an ICAPM is a peripheral and not central issue to this study and, as indicated below, to academic scholarship to date on Islamic investing.

Again, the intent here is to see whether contemporary asset management professionals can construct Islamic portfolios using the existing universe of sharia-compliant products and the contemporary tools of asset management, all within the context of the theoretical constructs that support MPT. Perhaps other scholars may wish to discover and apply an ICAPM in this context, but for the moment it is outside the scope of this book.

The expected utility of this book is that it is real time, real world, that is, it attempts to solve an important problem faced in the global \$100 trillion asset

management industry, where at least some Muslim clients who care about sharia may desire sharia-compliant, multi-asset, optimized portfolio investing services from their asset manager but cannot find these services anywhere. This by itself does not automatically invalidate the theoretical underpinnings of MPT because it may or may not be sharia compliant. In other words, it's the output that is important, not the input. A treatise on an ICAPM is not relevant to the core effort attempted here.

The Concept of *Ijtihad*

Islam and finance have a long and detailed history. The earliest sayings and writings from and about the Prophet Mohammed¹⁵ included discussion of various types of then-common business agreements between economic actors. However, in modern times new forms of finance arose. These included financial transactions that were unheard of during the life of the Prophet. Those who more recently sought a modern system of Islamic finance discovered no direct parallels for modern interpretation of historic texts, for example there were no treasury bonds, derivatives or equity warrants issued in the seventh century.

In order to create some sort of order, the Islamic jurisprudence community began over 30 years ago to organize their thinking on financial contracts, which ultimately are at the heart of any financial security. Here they were forced to make analogies from seventh-century events and apply those analogies to contemporary times in order to create modern solutions. The process is called *ijtihad*, which essentially translates to physical or mental effort, but in this case means the effort to find contemporary solutions based on centuries-old proclamations of right and wrong. *Ijtihad* is defined in Islamic finance as, "the process of deriving [sharia] rules for ... new incidents from ... [sharia] sources" (Abdulazeem, 2016).

What this means is that Islamic finance is an ongoing effort to find contemporary financial intermediation solutions based on the foundation knowledge of sharia. *Ijtihad* also means a "struggle" to achieve perfection, but knowing in the process that there are times when perfection cannot be immediately achieved. Muslim scholars accept that we are in a process of creating the "perfect" environment for Islamic finance, but that the concept of "perfect" is still a long way off. In the meantime, imperfect solutions are accepted (as long as the intermediate solutions themselves improve the status quo), until such a time that they can be perfected.

This is the case with much of contemporary Islamic finance. Because it is widely acknowledged to be a process, it is also widely accepted that it is imperfect today. If one accepts *ijtihad*, which says that one must at least "struggle" (or make an effort) to improve, then the current conditions are acceptable until better ones are available.

How is this relevant to an ICAPM? As discussed below, Islamic scholars acknowledge that many or most Muslims live within an interest rate environment. They accept that there is no perfect Islamic economy anywhere on the planet. As such, they accept that any advance in the direction of an Islamic economy is better than no advance at all, no matter how imperfect that advance may be. In other words, until there is widespread acceptance for a replacement of CAPM, there will likely be no curtailing of Islamic asset management solely because of the lack of an ICAPM.¹⁶

An Islamic CAPM

From all the available evidence, CAPM is neither philosophically nor theologically rejected on any widespread basis in the practical application of Islamic finance. While the evidence is sparse, the embedded risk-free rate of CAPM has periodically been dealt with in Islamic finance, and both Islamic finance and religious scholarship have occasionally examined CAPM and its utility.

Selim (2008) was perhaps the first scholar to decompose the components of CAPM and explain which elements may not be sharia compliant. While he did not address short sales, he did posit that Islamic financial contracts must be based on profit-and-loss sharing. Whereas Sadaf and Andleeb (2014) suggest the risk-free rate can be substituted with the relevant rate of inflation (stating, somewhat incoherently, that the Islamic state must guarantee the purchasing power of wealth), Selim (2008) inserts a risk-free rate of zero, indicating zero is the optimal point for the risk-free rate in risk-sharing partnerships. Unfortunately, Selim (2008) suffers from a focus entirely on musharakah contracts, akin to private equity or venture capital investing in conventional markets. Its applicability to portfolio investing of the kind mostly practiced in global asset management is highly limited.

Farooq (2014) acknowledges the quandary of using interest-based analytical tools when trying to understand concepts in Islamic finance. He states that the

Conventional financial system is based on an interest rate structure, as for example in [the] CAPM, where the base of this model is an imaginary, but fixed risk-free, real rate of return. Combined with inflation premium it is regarded [as] equivalent to the return on 3-month US Treasury Bills. Then, various risk-premiums are added to price various financial products. Based on [the] orthodox Islamic position, such structures are un-Islamic because there is [a] fixed and stipulated rate of return involved.

But Farooq (2014) goes on to explain that the Islamic finance system “would be unable to function without the global conventional market providing an interest-based structure.” This segues well to the concept of *ijtihad*. Islamic finance practitioners accept that they operate in an environment of

interest-based structures, and must adapt to it. Further, Farooq (2014) argues that criticism of this arrangement is hollow unless and until critics are able to deliver acceptable, practical solutions, that is, the eventual perfection that is sought in *ijtihad*. In short, we live in an imperfect world, and must accept certain conditions that are less than ideal.

There are a few absolutists in Islamic jurisprudence who believe that no compromise is possible. Hardliners exist in every community, it seems. Fortunately, they are vastly outnumbered by Islamic scholars who accept flexibility and accommodation.¹⁷ In the words of Sheikh Yusuf DeLorenzo, a noted and respected sharia scholar in Islamic finance:

A benchmark is no more than a number, and therefore non-objectionable from a sharia perspective. If it is used to determine the rate of repayment on a loan, then it is the interest-bearing loan that will be haram. LIBOR [or, U.S. Treasuries] as a mere benchmark has nothing to do with actual transaction or, more specifically with the creation of revenue or return.¹⁸

So, too, with using U.S. Treasuries as a proxy for the risk-free rate. If it's just a number, and if the overall structure of the mathematical formulation is not in violation of sharia, then as implied by such a noted sharia finance scholar such as Sheikh Yusuf, using U.S. Treasuries as the risk-free rate would not by itself violate sharia. Since the risk-free rate is simply a concept of the cost of capital where there is no risk, and is not an absolute (while very low in risk, U.S. Treasuries have more than zero), then the concept can be substituted with a proxy such as U.S. Treasuries, just as LIBOR is used to price sharia-compliant loans because when a loan is deemed sharia compliant there is no prohibition in using LIBOR as a proxy for the price of capital.

One might state that CAPM (and therefore MPT) is not compatible with sharia because, "*riba* (interest) is against sharia, and CAPM requires a risk-free rate, which means interest, which means CAPM is against the fundamental beliefs of Muslims." This chain of logic is clear, and rationalized by persons not familiar with the concepts and practice of contemporary Islamic finance. However, there are two problems with this conclusion. First, it ignores the fact that CAPM has already been examined by sharia scholars, and second that the use of CAPM does not by itself invalidate optimized portfolio constructions because the risk-free rate is a concept, not an absolute. Like the use of LIBOR in Islamic loans, proxies (such as U.S. Treasuries) for the risk-free rate do not invalidate CAPM. Muslims certainly do not argue that capital does not have a cost, so therefore they will not in general argue against using common measures for the cost of capital.

Regarding the first problem, one can thankfully find a risk-free rate in the Muslim world acceptable to sharia scholars. The easiest is to look at

government-issued sukuk (e.g., sukuk—also called Islamic bonds—issued by the governments of the U.K., Luxembourg, South Africa, Saudi Arabia, etc.) or lending rates between Islamic bank treasuries, which has been well treated by Nechi and Smaoui (2018) in their discussion of the construction and operation by Thomson Reuters of the Islamic Interbank Benchmark Rate (IIBR). In other words, few if any scholars on Islamic investing will discard CAPM because of an absence of a risk-free rate, when ready substitutes acceptable to Islamic scholars are available.

Hazny, Hasim and Yusof (2020) are the most recent of several academic scholars who have drilled down into CAPM in an effort to establish an ICAPM. Only two significant issues arise. The first, of course, is the risk-free rate, but that problem is easily dismissed by using a commonly available Islamic risk-free rate as mentioned above. The second is more problematic as it involves the concept of unlimited short sales (under sharia one cannot sell an asset that one does not already own). Here Hazny, Hasim and Yusof (2020) simply advocate the removal of short sales from the mathematical modeling of ICAPM, which has no significant impact on the resulting optimization tool. Importantly, Hazny, Hasim and Yusof (2020) point out, "... the traditional CAPM is a relevant model in Islamic finance. Most of the assumptions underlying the Markowitz's Mean-Variance Portfolio Theory are not contradictory to shariah principles."

As indicated above, one can extend this discussion to the parallel and nearly universal use of LIBOR (and other interbank offer rates, such as Saudi Arabia's SIBOR) as the pricing basis for Islamic fixed income securities and lending. Rather than expending considerable time on the scholarly treatment of LIBOR in Islamic finance, I simply refer to a quotation from one of the most respected names in contemporary Islamic finance, Sheikh Mohammad Taqi Usmani:

No doubt, the use of the rate of interest for determining a halal profit cannot be considered desirable. It certainly makes the transaction resemble an interest-based financing, at least in appearance, and keeping in view the severity of prohibition of interest, even this apparent resemblance should be avoided as far as possible. But one should not ignore the fact that the most important requirement for validity of Murabahah is that it is a genuine sale with all its ingredients and necessary consequences. If a Murabahah transaction fulfills all the conditions enumerated in this chapter, merely using the interest rate as a benchmark for determining the profit of Murabahah does not render the transaction as invalid, haram or prohibited, because the deal itself does not contain interest. The rate of interest has been used only as an indicator or as a benchmark.¹⁹

To repeat the concept expressed by Sheikh Yusuf DeLorenzo: one does not need to eliminate interest rate measures in Islamic finance simply because the

measures are derived from interest rates. The utility of interest rate measures has long been accepted in Islamic finance where the overlying and underlying structures are sharia acceptable. Measures based on interest rates are convenient tools for measuring the cost of capital, which is fully acceptable in Islamic finance.

Because the securities selected for the optimized Islamic portfolios ultimately used in this study are fully sharia compliant (all carry fatwa that are widely recognized by sharia scholars), the use of CAPM is not by itself an egregious violation of sharia. Yes, one could reconstruct the entire book by using an ICAPM that embeds an adjusted common sharia-compliant risk-free rate such as Saudi government sukuk or Saudi interbank offer rates, but since those numbers would be nearly identical to U.S. Treasuries then what would be the point? The outcome would be the same.

Let's take a quick look at the literature that relates, even tangentially, to Islamic asset management. If CAPM is commonly and historically used by an overwhelming number of academic scholars as a measure in analyzing security, index or portfolio performance in the context of sharia-compliant investing, then perhaps one may consider that academic scholars do not have grave concerns over the utility of CAPM in analyzing Islamic assets; nor do they find any specific need to separately develop an ICAPM. We summarize a few important papers herewith, but we benefited from a number of papers written by the co-authors that we include in the book's Further Reading section.

- Naqvi et al. (2018): "... we employ several statistical measures starting from the Jensen's Alpha and an extended CAPM-inspired-market-model ..."
- Rahim and Ahmad (2016): "Thus, there were no surprising results, although this study was tested with the extended CAPM, including data of KLIBOR and government Sukuk yield."
- Kamil et al. (2014): "Three common models of alpha computation will be adopted, namely: i. As per CAPM described in Sharpe (1964) and Lintner (1965) ..."
- Al-Khazali, Lean and Samet (2014): "In our paper, we present the CAPM statistics of Islamic and conventional Dow Jones indexes for different countries and regions over a long time period (1996–2012)."
- Ashraf (2014): "The basic model to measure the relative performance of IEIs [Islamic Equity Indexes] is within the context of the standard CAPM ..."
- Ho et al. (2014): "The generalized Capital Asset Pricing Model (CAPM) regression model is applied to determine the beta of the individual index with the market index."

- Kassim and Kamil (2012): “The returns on the unit trust funds are obtained from income and ... capital gain. The rate of returns for each fund is calculated as follows: ... The Jensen Index or alpha was developed by Jensen (1968) based on the capital asset pricing model (CAPM).”
- Tahir and Brimble (2011): “Systematic risk is defined in terms of the traditional CAPM beta calculated with the market model ...”
- Hoepner, Rammal and Rezec (2011): “We present and discuss our results in order of increasing sophistication of our econometric model. We start with the capital asset pricing model (CAPM) and Carhart model and proceed to the unconditional and conditional three-level Carhart model.”
- Hayat and Kraeussl (2011): “We estimate the risk-adjusted performance (alpha) and systematic risk (beta) for each IEF [Islamic Equity Fund] using Jensen’s (1968) version of the capital asset pricing model (CAPM).”
- Merdad, Hassan and Alhenawi (2010): “Jensen’s alpha was first used by Michael Jensen in the 1970s as a measure to evaluate the mutual fund manager’s performance. It is conventionally used to determine the excess return of a security (or portfolio) over the security’s theoretical expected return or risk adjusted return predicted by a capital asset pricing model (CAPM). In this paper, Jensen’s alpha is the coefficient of the constant term in equation (4) mentioned above. A positive and significant alpha indicates that the manger has superior selectivity skills.”

More examples can be provided, but perhaps the point is clear. Contemporary academic literature on Islamic investing nearly universally does not concern itself with an ICAPM. In fact, little of the literature cited here and in the literature review rejects CAPM in any form. CAPM is the basis from which most contemporary scholarship extracts analysis on sharia-compliant investing.

In other words, CAPM as it stands appears to work fine for nearly all analysis of Islamic finance, whether in academic or religious scholarship. Questions of a *riba* component of the risk-free rate appears to have no influence on academic scholarship on Islamic investing.

Here we detour for a short discussion of Hakim, Hamid and Meera (2016) and Pristiwati and Widianingsih (2019). These academic scholars fall into the (observably small minority) school of thought that generally opposes CAPM as a common measurement tool for sharia investing. Hakim, Hamid and Meera (2016) argue that Islamic investments are a subset of all investments, so therefore the market portfolio of CAPM is by nature unsuited for comparing the market portfolio of an ICAPM (i.e., the broader CAPM market portfolio contains securities that are not sharia compliant). The authors created two substitute ICAPMs and tested them against market portfolios (sharia-compliant equities) in the Malaysian stock exchange. They use an AAA-rated Malaysian sukuk yield as their risk-free rate. They concluded that both their ICAPM

and CAPM were identical over longer terms in explaining portfolio returns. In other words, while there are scholars who can argue against using CAPM in measuring sharia-compliant portfolios, in practice Hakim, Hamid and Meera (2016) indicate there is no difference between ICAPM and CAPM in real-world investing.

Similar conclusions were obtained using a different methodology to construct an ICAPM (or, as the authors note, an SCAPM, or sharia-compliant CAPM) in Pristiwati and Widianingsih (2019). Here the authors declare the sharia incompatibility of CAPM due to short sales, but importantly a reliance on those sales via a risk-free rate, which they claim is fundamentally in violation of sharia. They construct three new ICAPMs, where the traditional risk-free rate is substituted with three different rates: (1) none at all, (2) the zakat (Islamic asset tax) rate, and (3) the relevant government sukuk rate. In all three cases they indicate no relevant difference in the ultimate measure of return.

The research in this study was conducted to provide a solution to asset managers who may have Muslim customers desiring sharia-compliant investing, where the solution is fully grounded in contemporary academic theory. As will be seen in Chapter 4, this study did so by first identifying the sharia-compliant investible universe, then filtering that universe so that it meets contemporary institutional standards, resulting in a Buy List that could be then subjected to MPT allocation methodologies. At no point did this study question the validity of CAPM in the context of sharia because at no point was that considered relevant or necessary. Note the highlighted phrase in the Research Question: “What are the performance (and risk) characteristics of multi-asset optimized portfolios comprising sharia-compliant securities *as measured by contemporary risk and reward metrics*, and how does this performance compare to conventional (non-Islamic) peer portfolios that are equally constructed?” Here “contemporary risk and reward metrics” is emphasized because this study concentrates on those contemporary tools used by professional asset managers today, all derived from CAPM. This study did not state that this would be done using *new* metrics based on an ICAPM, which is entirely outside the scope of the work in this book.

Again, this study is not about creating an ICAPM. The bodies of Islamic and academic scholarship apparently do not believe this is needed. Yes, scholars have from time to time deconstructed CAPM to see where it may violate sharia, but until now there has been no body of sharia scholarship that categorically rejects CAPM as an optimization tool for Muslims. And, as mentioned above, one can reconstruct CAPM theoretically to eliminate the short sale component (but not remove the fundamental concept of risk-free rate, which is not necessary) but there is apparently no practical difference in doing so, and

there is no utility for the global asset management industry. It seems that the construction of an ICAPM is simply unnecessary.

This discussion of the ICAPM closes with an important point on methodology. One might ask that an ICAPM be constructed so that subsequent Islamic portfolio construction and performance (risk and return) can meet a more fundamental concept of sharia acceptance.

However, even if such an ICAPM was constructed, what then? Would we then compare the results of Islamic portfolios to conventional, non-Islamic portfolios constructed using conventional CAPM? Are we not entering an “apples and oranges” argument? The core concept of this study was to subject sharia-compliant assets to one set of rules in portfolio allocation for a particular investment strategy, then compare that portfolio to an equally constructed conventional peer.

In other words, how would one compare an automobile built under Earth-based safety regulations to an automobile built under Martian safety regulations? They would be fundamentally incompatible for comparison. If a study of the performance and risk of two separate portfolios is going to be conducted, where only the ingredients of the portfolios differ, then the construction methodologies and processes of building those portfolios must be identical; they must follow the same rules, that is, they must adhere to the same theoretical constructs. There is no other way to make valid comparisons without fundamental contradictions.

Further, this book attempts to discover whether industry-practical solutions are available. No one can anticipate the entire global asset management industry abandoning their Bloomberg terminals, or ditching the myriad optimization software programs available to portfolio managers. Since the measurement difference between CAPM and an ICAPM has been shown to be essentially negligible, it makes the utmost sense to use CAPM in this study, as is evidently nearly universally common in academic scholarship to date.

This book makes an effort to achieve this. It constructs optimized portfolios using sharia-compliant securities, then it compares the results of the Islamic portfolios to identically constructed conventional, non-Islamic portfolios. In both cases, MPT, with its embedded reliance on CAPM, is used in the optimization processes. Professional asset managers should find utility in that because they may seek to replicate this process in-house and provide something that does not yet exist: multi-asset, optimized portfolio investing that uses sharia-compliant securities. If one disregards the argument that CAPM violates sharia, then one could say the result is Islamic asset management.

ASSET ALLOCATION AND ASSET CATEGORIES

Having grounded itself in theory, MPT needed to extend to the practical art of asset allocation. We declare now that until this point there have been no spiritual components yet identified in asset management, at least not visibly applicable to one or another religious identification. As mentioned, so far we can conclude that the *theory* of asset management is quite secular in nature.²⁰ Here we'll show that the *process* of asset management is also by nature almost exclusively a secular activity.

“Asset allocation is a process and a result” (Maginn et al., 2007, p. 231). The process presumes that all necessary data on an investible universe is available, with price and other information available for all assets in every asset category. It requires first and foremost the identification of the strategic investment objectives of the investor. What is the investor's desired long-term return outcome, and what degree of risk is tolerated to hopefully achieve that outcome? The process begins by estimating future expected returns by asset category, both foreign and domestic, and then determining portfolio weights for each category. The result is a strategic asset allocation, or Policy Portfolio. Commonly, institutional investors of all kinds establish a Policy Portfolio—comprising weights by asset class—before concerning themselves with the securities that will be selected within each asset class of that portfolio.

Policy Portfolios—whether established by individuals or institutions—guide the subsequent asset allocation process. Over time the Policy Portfolio requires periodic updates and adjustments based on market expectations among and within asset categories, but the established bands between and within asset categories (e.g., between Fixed Income and Equities, and within Equities the choice of domestic versus international equities) generally are fixed for at least the short and medium term. This method of asset allocation is strategic in that the investor has made specific decisions that require long time periods for results to appear.

Changes made within this long time period are tactical in that they take advantage of what appears to the investor as short-term opportunities based on expectations of short-term market conditions. Tactical asset allocation, therefore, is a component of strategic asset allocation, but as a rule is not allowed to fundamentally alter the long-range Policy Portfolio.

At the heart of strategic asset allocation is the goal of achieving sufficient diversification to eliminate unsystematic risk, leaving the portfolio exposed only to that level of systematic risk desired by the investor. In other words, a sufficiently diversified portfolio containing assets across categories, and diversified within each category, subjects the portfolio only to those risks that cannot be diversified away.

Investors seek investment goals that are quantifiable, for example to exceed the rate of inflation (preserve purchasing power), to provide adequate funds for retirement or inheritance, or to cover living costs or other cash obligations. At the same time, we can quantify the risk an investor accepts in achieving those investment goals by measuring the investor's aversion to investment return shortfalls or minimum acceptable downside. Each asset category will have its own expected return and risk profile. The investor will seek that portfolio of diversified assets that is optimized in terms of return and risk, that is, the magic point of optimality where one's Efficient Frontier is tangent to the Capital Market Line.

In both theory and practice, the riskiness of owning a single asset can be improved by adding a second asset that has a different historic price correlation. The same mean-variance optimization works across asset categories, so adding an additional asset category to an investor's portfolio can improve the portfolio subject to the new asset category's correlation to the original portfolio. Portfolios are constructed to achieve the optimal level of expected portfolio return considering the desired level of expected portfolio risk, or vice versa. As an example, consider the following hypothetical three portfolio options comprising four asset categories (Table 1.1).

Table 1.1 Hypothetical allocations among asset categories

Portfolio	Expected Return	Standard Deviation	Sharpe Ratio	Cash	Bonds	Stocks	Alternatives
1	6%	5%	0.70	5%	55%	25%	15%
2	8%	10%	0.60	5%	45%	35%	15%
3	10%	15%	0.50	5%	35%	45%	15%

Source: Author's work.

Depending on his or her choices, the investor may select any of the above asset allocations. More risk-averse investors will seek those portfolios displaying lower standard deviation and higher Sharpe ratios (Portfolio 1), while more risk-tolerant investors will seek the opposite (Portfolio 3). In practice, most of us are somewhere in between (Portfolio 2).

Each asset class consists of securities that are homogeneous in that a security can fit into one basket of assets but not another, but also each class displays the ability to diversify the risk and returns when measured against other asset classes. As mentioned, common practice specifies these asset classes as Cash, Fixed Income, Equities and Alternative Investments, comprising respectively money market instruments, bonds, stocks and securities that do not fit into the previous three categories, that is, hedge funds, real estate funds, commodity

funds and so on. By nature this includes all securities, both domestic and foreign to the investor.

To illustrate the discussion of asset allocation, it can be viewed as a linear progression of evaluation, data collection and methodology choices, followed by observation and feedback as shown in Figure 1.1.²¹

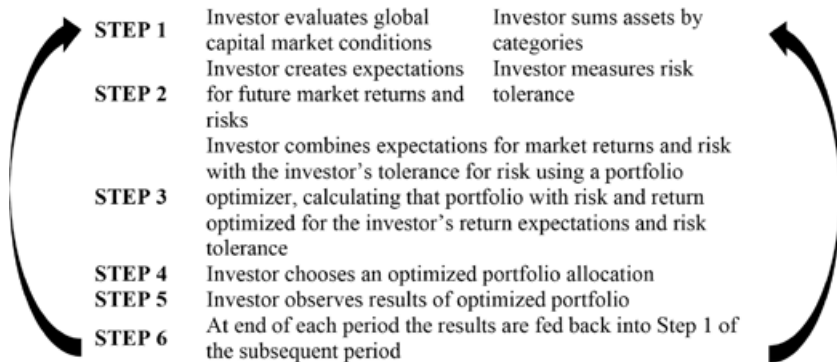


Figure 1.1 Initial and subsequent steps of asset allocation, with return to initial steps

Source: Author's work. Concept taken from Maginn et al. (2007).

DISCUSSION OF MARKET DATA SOURCES AND USES

The above section sought to simplify the process of asset allocation and the determination of asset categories. However, none of the inputs for asset allocation and portfolio optimization can be realized without underlying market data. Over the past decades numerous data sources have sprung up, of which the most popular today in the investment management industry are Thomson Reuters,²² Bloomberg and, for those concentrating on mutual funds, Morningstar and Lipper (a unit of Thomson Reuters). Global spending on these data sources reached over \$28 billion in 2017, with Reuters and Bloomberg together accounting for nearly 60% of the global financial data market supply business.²³

These services are ubiquitous in asset management. No asset management is conducted anywhere without the vast flow of data that allows for the measurement of one portfolio of assets against another. Bond funds, stock funds, hedge funds and just about every other type of investment management possible are entirely supported by the provision of data from one or more of the major data companies.

Price history is required for mean-variance optimization, but far more information is required for filtering and sorting an investible universe. As is further described in the next chapter, “prudent man” regulations are ubiquitous, limiting the investible universe to only those securities considered acceptable to regulators and to professional common sense. In this context a data source must provide not only price histories, but also qualitative information such as the legal domicile of a security and the name of the exchange on which it may be bought (or whether the security is bought and sold over the counter), as well as further information for collective investment schemes (i.e., mutual funds) such as the name, address and domicile of the fund management company, the amount of AUM, the date the fund was launched, the name of the fund manager and liquidity provisions embedded in the fund prospectus.

Because of the immature nature of the Islamic asset management industry, there is yet no perfect data source. A cursory examination of the three major services shows Reuters and Bloomberg to have more extensive coverage of the sharia-compliant asset universe than Morningstar or Lipper. Due to familiarity and a perception of more in-depth information, we have chosen Bloomberg for analysis of the Islamic mutual funds industry. Morningstar only covers approximately 250 securities of the sharia-compliant investible universe, whereas both Bloomberg and Reuters have over 1,000, but with multiple duplicates that reduce the utility for data observation and analysis. While Morningstar has an unquestionable reputation for analysis of mutual funds generally, its coverage of the Islamic investible universe is limited in number and therefore presumably not useful for either professional use or this study.

Importantly, Bloomberg provides a relatively data-rich environment for Islamic asset management. It provides information on a fund, the fund manager and its legal domiciliation, as well as reliable price histories. Further, Bloomberg has advanced asset allocation tools that includes portfolio optimization modules, along with dozens of metrics with which to measure portfolio risk and return. For all these reasons Bloomberg is selected as the unique data source for this study. However, further research could repeat the steps below using Reuters to insure there are no large variances in the output and analytics found here.

NOTES

1. The Markowitz article, “Portfolio Selection,” from *The Journal of Finance* (Volume 7, 1952), laying out his formulation of the Efficient Frontier, has been cited over 40,000 times in scholarly journals, indicating the extent of acceptance of “Portfolio Selection” as a bedrock of MPT.
2. The Dah, Hoque and Wang (2015) data includes price and value information on mutual funds from Kuwait, Malaysia, Saudi Arabia and the United States in every asset category, from sukuk to murabaha to equity funds (representing, respectively,

their conventional equivalents in bonds, money market and equity investing). The practicality of investing simultaneously in these jurisdictions is questionable, since no one could easily cross these borders and make these investments. Further, it's not clear that the authors understand the difference between a money market fund and an equity fund, and whether money market and sukuk (bond equivalent) funds are properly inserted in analysis against equity market indexes. In other words, this is a keen example of scholars with little knowledge of real-world capital markets, putting into question the validity of their findings. Happily, the significant results of this work mostly relate to two very large U.S. Islamic equity funds and their relation to equivalent U.S. equity indexes, where the scholarship is legible and appears valid.

3. TheCityUK *UK Fund Management* tallies year-end conventional (pension, mutual funds and insurance), alternatives (hedge funds, private equity, ETFs and SWFs) and net private wealth (year-end 2016). See <https://www.thecityuk.com/assets/2018/Reports-PDF/fe6b3af4b4/UK-fund-management.pdf>. According to a different definition from Boston Consulting Group's *Global Asset Management 2018* (summing AUM, based on fees paid), global AUM is \$79 trillion (year-end 2017). See http://image-src.bcg.com/Images/BCG-The-Digital-Metamorphosis-July-2018-R_tcm30-197509.pdf. The large disparity makes it difficult to ascertain the true volume of professionally managed AUM, but clearly it is in the tens of trillions of dollars, or more.
4. According to Credit Suisse *Global Wealth Report 2018*, see <https://www.credit-suisse.com/corporate/en/articles/news-and-expertise/global-wealth-report-2018-us-and-china-in-the-lead-201810.html>.
5. International Monetary Fund, April 2015, see <https://www.imf.org/external/pubs/ft/gfsr/2015/01/pdf/c3.pdf>.
6. Investment Company Institute, *Investment Company Fact Book 2018*, p. 274, https://sfama-cms.cdn.prismic.io/sfama-cms%2F37597afa-0cb7-4434-b04d-dabe83976e90_ici+investment+company+factbook+2018.pdf.
7. Almost 13% of the \$18 trillion mutual fund assets in the United States are owned by institutional investors. *Ibid.*, p. 267.
8. This data is extracted from various easy-to-obtain Internet sources, either professional media or official government statistics. *Source*: Investment Company Institute, *Investment Company Fact Book 2018*, page 274.
9. See a lively recitation of the final recognition of Treynor's contribution to determinants of asset pricing in French (2003).
10. Although in Fabozzi et al. (2002) the authors took great pains to explain that MPT does not rely on an asset pricing model, and is perfectly valid without an asset pricing model.
11. Jorion (1992) also makes a thoughtful expression of the limitations inherent in mean-variance testing, the main one being time. As with so many applications in statistics, a meaningful dataset is often only obtained over long time periods. But even then there is a tradeoff between precision and validity, showing again how difficult it is to obtain correct weights of each asset category in a globally diversified portfolio.
12. Lummer and Reipe (1994) is arguably not academic nor scholarly. It is from a trade publication. But the piece neatly summarizes the professional practice of asset allocation at the time it was written, and the evolution to that date of mean-variance optimization.

13. Only 52 citations noted in Google Scholar, but still a fascinating rebuttal to MPT critics.
14. This article is a layman's summary of Xiong et al. (2010).
15. PBUH.
16. Which is why CAPM is universally used by portfolio managers in Saudi Arabia, Indonesia and Nigeria, where portfolio managers use off-the-shelf optimization software that embeds the formulations of CAPM, such as the Bloomberg module PORT, or the optimization tools from Zephyr or AlternativeSoft, among many others.
17. *Ibid.*, see in particular the discussions on the flexibility of sharia interpretations as they apply in finance.
18. "Sharia scholar's place on the board: Interview with top sharia scholars," *Gulf News*, 13 August 2010. <https://gulfnews.com/business/a-sharia-scholars-place-on-the-board-1.625445>.
19. See one of the foundation texts on Islamic finance, *An Introduction to Islamic Finance* (Usmani, 2002). For reference, Sheikh Usmani was later Secretary General of the Accounting and Audit Organization of Islamic Financial Institutions (AAOIFI), a quasi-regulator of Islamic finance, when he repeated the above in his famous fatwa on sukuk in November 2007 (in Arabic) and February 2008 (in English), a seminal date in Islamic finance as it changed the permissible structure of sukuk forever.
20. On various online forums related to Islamic finance, some Muslims make the argument that the introduction of a risk-free rate implies interest (*riba*) is embedded in MPT. However, one can argue that the social cost of capital is an equivalent to, or at least a proximate substitute for, the risk-free rate, thereby satisfying the avoidance of *riba* in theory. Another argument may be that governments who borrow using asset-backed sukuk—which are widely approved by prominent sharia scholars and now includes Luxembourg, Hong Kong, South Africa and the United Kingdom—themselves create a risk-free rate.
21. The general concept and indeed specific ideas of this table were taken from Maginn et al. (2007). However, these concepts are generic in nature and widely used in asset management.
22. Hereinafter simply Reuters.
23. "Global spend on market data, news tops \$28B," from <https://www.marketsmedia.com/global-spend-on-market-data-news-tops-28b/> and "Demand for financial market data and news up 4.07% in 2014, highest since 2011," from <http://www.pnewswire.com/news-releases/demand-for-financial-market-data--news-up-407-in-2014-highest-since-2011---burton-taylor-report-300054093.html>.

2. Research design and finding data

RESEARCH DESIGN: THE INVESTIBLE UNIVERSE

Comments on Regulatory Background

In the Introduction the question was asked, “What is the size and nature of the sharia-compliant investible universe and what is the nature of this universe when analyzed according to professional standards common in the global asset management industry?” To answer this question we first have to answer another question, “What are professional (and, consequently, regulatory) standards that are common in the asset management industry?” Only by isolating the definition of professional and regulatory standards can we hope to find those assets suitable for a “common man” investment portfolio, since it would be unlikely that any asset manager would construct such a portfolio using securities that were not commonly considered qualified by regulatory and professional standards.

Asset management is a large, diverse industry with many tens of trillions of dollars of assets under professional management. It can be safely assumed there is some degree of homogeneity among asset managers in their approach to asset management, in particular given that the practitioners mostly read the same textbooks in graduate school, have obtained similar regulatory licensing across jurisdictions, read the same professional media and attend the same professional conferences, but also considering the high mobility of bankers working within the industry, where an asset manager may work for several employers during his professional career.

The Code of Conduct of the Swiss Association of Asset Managers (SAAM) can be considered a template for similar regulatory regimes applied elsewhere.¹ SAAM operates as a self-regulatory membership organization that is authorized by and follows the regulations established by the Swiss Financial Market Authority (FINMA), the ultimate Swiss financial market regulator.² FINMA itself abides by pan-European and certain global regulatory regimes in applying a regulatory environment for asset managers in Switzerland.

SAAM applies those anti-money laundering rules promulgated by the OECD’s Financial Action Task Force, where nearly all nations worldwide signed treaties to enforce anti-money laundering and terrorist-financing laws.

But, importantly, SAAM and other regulatory bodies also enforce professional asset management discipline, including the exercise of what are called “prudent man” laws. The American Bankers Association adopted its “prudent man” rule in 1940, based on an 1830 decision involving Harvard University. The text of their rule states:

In acquiring, investing, reinvesting, exchanging, retaining, selling, and managing the property for the benefit of another, a fiduciary shall exercise the judgement and care, under the circumstances then prevailing, which men of prudence, discretion, and intelligence exercise in the management of their own affairs, not in regard to speculation but in regard to the permanent disposition of their own funds, considering the probable outcome, as well as the probable safety of their capital.³

This same “prudent man” concept is realized by the SAAM Code of Conduct in such phrases as “transactions [must] be carried out in the interests of clients,” and “transactions that may give rise to a conflict of interest between the asset manager and the client be carried out in such a manner that the client is not disadvantaged in any way.” The concept of “prudent man” should not be confused with “rational” or “risk-averse” investor. “Prudent man” is a legal and not a financial markets concept.

Very specifically the SAAM Code of Conduct states:

when selecting an investment policy, the overall financial situation of the client is taken into account to ensure suitable advice. Consequently, the asset manager must obtain information from the client with regards to his investment requirements, appetite and tolerance for risk to establish a risk profile. The asset manager shall produce a risk profile on the basis of the gathered information and carry out periodic reviews as to its accuracy or whenever changes occur. If substantial changes to the risk profile of the client are noted, the asset manager must make a written record of this, inform the client and produce a new or amended risk profile.⁴

In other words, asset managers almost everywhere are compelled by law to follow MPT in the production of Efficient Frontier, optimized portfolios for their clients, with asset allocations firmly set within the bounds of a client’s appetite for risk and desire for return. Without going further it is evident that regulators are involved in the prudent decisions of asset managers in the management of client funds, extending even to the securities selected for client portfolios.

Research Design

Given an environment of regulatory constraint, an asset manager cannot invest in anything he or she wishes unless those investments (1) are based on a “prudent man” judgment on the client’s appetite for reward and tolerance for

risk, and (2) are combined in such a fashion to produce a diversified portfolio that matches the client's investment objectives, whether or not the client has established his or her own Policy Portfolio. We approach the discussion of research methodology, therefore, with regulatory constraints in mind.

To go further, we need to establish a research and analysis path. This is provided in Figure 2.1.⁵

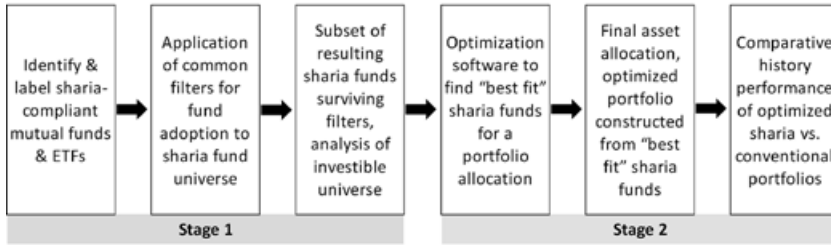


Figure 2.1 The asset management process, from investible universe to optimized portfolio

Source: Author's work.

Here we focus on identifying the investible universe, which is first achieved by selecting a date in time for the downloading and recording of sharia-compliant investible universe data from Bloomberg, the preferred data source. But this also requires determination of the filters used by asset managers to produce a shortlist of assets that are deemed acceptable by regulatory and professional standards for asset allocation into client portfolios. To determine these standards, a survey needs to be conducted among what might be considered benchmark asset managers in the industry, the results of which might shed light on the filters currently used by the industry. The survey results must then be compared and tallied to determine what, if any, are the common rules used by conventional asset managers in selecting securities for subsequent portfolio allocations. We will apply these common rules as filters in the downloaded data on the sharia-compliant investible universe.

Once the data is downloaded and the filters have been defined, then we must sequentially apply the filters to the broad universe and see what happens: What is the reduction of the set of investible assets when regulatory and professional filters are applied? Does the resulting subset of assets provide sufficient numbers of securities from which one can apply MPT and produce a diversified, optimized portfolio? What is the size, nature, scope and extent of

the sharia-compliant investible universe? Where are there concentrations and gaps? By which asset category, and by which countries? What is the dispersion of the investible universe across and within asset categories, and within geographic bounds?

A description of the results should give us an idea of the utility of the sharia-compliant investible universe not only in their application to optimized portfolios in the empirical analysis that follows but also in what would be an emerging Islamic asset management industry should the results indicate such a business would be feasible.

Survey and Conclusions

A survey was prepared in May 2014 and distributed to a set of four institutional asset management banks in Switzerland which range in size when measured in terms of AUM (the most significant measure of a manager's importance within the global asset management industry). A fifth bank responded to the same survey in November 2015. The asset management banks were Credit Suisse (Zurich), HSBC Private Bank (Geneva), Pictet (Geneva), Mirabaud (Geneva) and UBS (Zurich). At the time they had over \$4.4 trillion in professionally managed client portfolio assets. The survey responses reflect official institutional policy on asset allocation and security selection, and are not the personal opinions of individuals.

This survey—and admittedly this research—is European-centric and in particular Swiss-centric. For example, there are no American or French asset managers among survey respondents, nor any from other asset management centers such as New York, London, Tokyo or Singapore. However, one must recognize two features that define these managers. First, the major asset managers Credit Suisse, UBS and HSBC have offices worldwide, from Sao Paulo to Melbourne to Chicago. Yet they only have one established center for global research and asset allocation—Zurich in the case of Credit Suisse and UBS, and London in the case of HSBC—that serves the entire global asset management presence of these banks. Second, the smaller banks Pictet and Mirabaud are present in multiple global locations, including Amsterdam, Brussels, Frankfurt, London, Luxembourg, Madrid, Milan, Paris, Zurich, Hong Kong, Osaka, Singapore, Taipei, Tokyo, Dubai and Montreal for Pictet; and London, Paris, Madrid, Dubai and Luxembourg for Mirabaud. The research and asset allocation work done at all these banks, including generating the rules for asset allocation, emanates across the globe from their cores in Switzerland or London. In other words, in an integrated community of global asset management, the rules applied in Geneva, Zurich or London are very likely the rules applied everywhere these banks do business.

The survey does not aim to achieve quantitative results and thus attempts to avoid banks disclosing numerical figures. Instead, the objective is to obtain a “yes/no” answer to generic questions. In other words, it is not important that the results are qualitative rather than quantitative since the aim is to establish whether the results support or go against a general hypothetical statement. The survey is reproduced in the Annex.

In the survey a simple response measurement system based on Yes or No responses was used to construct observable results. As mentioned, it is not the focus here to determine the size of the AUM at these institutions (although all report managing tens of billions to trillions of dollars for individual and institutional clients, so they are not small asset managers), only to sequentially determine the following:

INTENDED QUESTION	POSSIBLE ANSWERS
Does your institution manage money for clients?	Yes or No
Does your institution use mutual funds in asset allocations for clients?	Yes or No
Does your institution filter for minimum AUM of mutual funds?	Yes or No
Does your institution filter for minimum track record of mutual funds?	Yes or No
Does your institution filter for minimum liquidity provisions?	Yes or No
Does your institution filter for gate provisions in mutual funds? ^a	Yes or No
Does your institution filter for domiciliation of mutual funds?	Yes or No
Does your institution use other filters to adopt mutual funds?	Yes or No

Note: ^a Gate refers to the mutual fund manager’s ability to shut down redemptions in a fund if withdrawals hit a limit within a stated time period, for example the fund will gate if 10% or more of its AUM is redeemed in a given week. If a gate is triggered the fund will close to redemptions until the gate is lifted. This directly affects the liquidity of the fund. As a result many asset managers will refuse or reduce their use of mutual funds that have gate restrictions in their prospectuses in order to protect their client portfolio liquidity.

The results should help us understand (1) the role of mutual funds in asset allocation in major asset management institutions, (2) the extent to which filtering criteria are used by these banks to reduce the investible universe to only those mutual funds that meet minimum filtering criteria and (3) to what degree each filter is applied.

The survey results are shown in Table 2.1.

Table 2.1 Results of survey of major asset management companies

SURVEY RESULTS	Yes = 1; No = 0	Bank 1	Bank 2	Bank 3	Bank 4	Bank 5	Results	Range Low	Range High
Use of mutual funds									
Private banking/wealth management clients		1	1	1	1	1	Yes	Yes	Yes
Use of mutual funds in private client portfolios		1	1	1	1	1	Yes	10%	100%
Screening of mutual funds									
Minimum assets under management		1	1	1	1	1	1.00	\$50,000,000	\$300,000,000
Minimum track record		1	1	1	1	1	1.00	3 years	3 years
Minimum liquidity (redemption rights)		0	1	1	1	1	0.80	daily	monthly
Gate		0	1	1	1	1	0.80	Allowed	Not allowed
Domiciliation		0	1	1	1	1	0.80	No restriction	Only EU UCITS
Other		0	1	1	1	1	0.80	N/A	N/A

Source: Author's survey.

Table 2.2 Results of asset management survey

INTENDED QUESTION	INDICATED ANSWERS
Does your institution manage money for clients?	All Yes
Does your institution use mutual funds in asset allocations for clients?	All Yes
Does your institution filter for minimum AUM of mutual funds?	All Yes
Does your institution filter for minimum track record of mutual funds?	All Yes
Does your institution filter for minimum liquidity provisions?	4 of 5 Yes
Does your institution filter for gate provisions in mutual funds?	4 of 5 Yes
Does your institution filter for domiciliation of mutual funds?	4 of 5 Yes
Does your institution use other filters to adopt mutual funds?	4 of 5 Yes

Source: Author's survey.

The results of this survey are fairly unambiguous (Table 2.2).

One may conclude, therefore, that in general professional asset managers:

- Use mutual funds in their asset allocations, with a low of 10% of private client allocations to a high of 100%.
- Filter those funds for minimum AUM, with a range of \$50 million to \$300 million minimum AUM.
- Apply a minimum three-year track record for adoption of a mutual fund, with some exceptions.

- Require all mutual funds to have redemption rights, normally within a week or less but with exceptions up to one month (but no longer).
- Apply varying degrees of stringency on a mutual fund's application of gate provisions;
- Strongly prefer or require domiciliation of mutual funds where they are comfortable with local law and judicial practice.
- Apply varying degrees of other filters before adopting mutual funds for allocation into their client portfolios.

These are important results for application in the Islamic mutual fund universe as they reflect common professional standards in the industry—standards that are extensions of their regulator's "prudent man" regulations.

Definitions of Filtering Criteria

It is important to look a little closer at the filtering criteria enumerated earlier. They are not haphazard but in fact reflect the "prudent man" standards expected to be observed by all asset managers. A short discussion of each follows.

Assets under management

The major risk of a small fund (i.e., with low levels of AUM) is liquidity. Where a manager has small market positions in stocks or bonds (which would be the case for managers with, for example, \$5 million in mutual fund AUM versus \$100 million) there is the question of whether the manager could unload (sell) his positions quickly if market conditions required such fast action. Markets favor large-sized trades. It is more difficult to find a market-clearing price for small trades unless one uses a retail brokerage, plus small trades are hit with a higher proportion of fees and expenses compared to large trades (where for small trades a fund manager will often use its own inventory for purchases and sales rather than enter the open markets). Further, one must consider the economic viability of a small versus a large fund. The great majority of fund managers charge annual management fees of between 1% and 1.5%. If a manager has only \$10 million in a mutual fund then his or her probable fee revenue on that fund is only \$100,000 to \$150,000. In other words, one must question the economic viability of that fund if there is insufficient revenue to pay staff, rent and other operating costs. With a fund of \$50 million in AUM the minimum revenue is \$500,000, which is considered to be the minimum sufficient level to maintain an economically viable business. Families of funds, that is, one asset manager with anywhere from a few to dozens (or even hundreds) of funds, are somewhat different, as large funds can cross-subsidize smaller ones and there are greater economies of scale available to lower the operating costs of smaller funds. But even here an investment professional

must be diligent to insure a small fund is viable, and that its parent organization is committed to its continuance. In short, all asset managers who buy mutual funds will favor larger funds to smaller ones, with \$50 million in AUM appearing to be the absolute minimum allowed by major asset managers who adopt third-party mutual funds.

Track record

Track record is important when considering the price series provided by the data provider for the underlying mutual fund. If the manager has not established a sufficient price history then it is difficult if not impossible to derive reliable performance and risk characteristics, a critical input in means-variance optimization. Simply put, the longer the track record the more statistical confidence that can be achieved in measuring the fund's performance and risk metrics. All of the respondents identified a minimum three-year track record in selecting mutual funds for adoption into client portfolios.

Liquidity

All mutual fund prospectuses are required to state the rights of unitholders regarding the redemption of their units in the fund. A mutual fund administrator is required to accept redemptions from investors at the Net Asset Value (NAV) at the applicable transaction date. If that transaction date is more than a week in the future then there could be important variance between the price on the sell order date and the transaction date. A lot can happen in a week, and even more can happen in a month. As a result most managers require early redemption rights to reduce future settlement price risk. From the survey it is evident that asset managers commonly accept mutual funds with daily and weekly redemption rights, while making an exception for funds with such rights up to one month.

Gate

During the months from September 2008 through March 2009 a very large number of mutual funds worldwide, in particular hedge funds, were closed to redemptions, that is, the "gate was closed." Large volumes of sell orders were sent by investors to the fund administrators of mutual funds in every asset category, which would have led to panicked market conditions if all the sell orders had been accepted and executed. Managers apply gates to reduce the sales price impact during dramatic market price collapses (perversely, there is no "gate" on additional purchases of a fund when prices are rising). One of the most important provisions of "prudent man" legislation or regulation is for the manager to maintain liquidity in the client's portfolio. By refusing to accept gates, or accepting only more limited gate terms, an asset manager can reduce the liquidity risk of its client portfolios during difficult market conditions.

Domiciliation

A number of risk issues relate to domiciliation, and the survey responses indicate the breadth of those issues. Take for example a mutual fund domiciled in Kuala Lumpur and operating under Malaysian securities law. For a European- or American-based asset manager these legal conditions are perhaps inscrutable or alien. Even if Malaysian (or other market) securities law does in fact meet the standards expected by Western asset managers, there may be fear of other related institutional risks. For example, while Malaysian securities law may be utterly clear and uncomplicated, the application of that law in the Malaysian judicial system may be unknown, in particular in disputes that involve non-local participants (e.g., the foreign asset manager), and the cost of legal representation may be unduly high. Also, even where securities law is considered as meeting global standards, and where dispute resolution is considered easy and affordable, a domiciliation may have exchange control risks that a foreign manager may not accept. Consider those countries that have erected stringent capital controls. These might include a large withholding tax for investments made in the country that are liquidated in one year or less. For all the reasons cited earlier, and more, domiciliation is a key filter in the adoption of mutual funds by global asset managers.

Other filters

In many cases the filters mentioned earlier are the minimum required. Additional filters will include qualitative functions such as the size of the fund management team, the relationship of that team within its parent institution, the parent institution's observed relationship within its group (if it is inside a financial services group), the employee turnover of the fund management team and many other factors.

In summary, the survey confirms that asset managers use filtering and sorting of their investible universe in order to establish a final list of securities that meet professional and regulatory criteria. While there is a range of filters, the main filters are \$50 million or more minimum AUM, three years or more track record, weekly or less redemption rights, limited or no gate and limited acceptable domiciliation. Other filters exist but we can reasonably state that these are the major ones.

FINDING DATA: WHAT IS THE SHARIA-COMPLIANT INVESTIBLE UNIVERSE?**Notes on the Historic Development of the Islamic Mutual Funds Industry**

Ernst & Young (E&Y) annual reports on the sharia-compliant mutual funds universe estimated there were 150 such funds in 2000 and 400 in 2006. Today

the number is well over 1,000 (on a gross basis), indicating substantial growth during the previous 20 years. Islamic mutual fund AUM were estimated by E&Y to total \$39.5 billion at the end of 2006, while measurements today indicate the figure is over \$60 billion.

What is interesting is that the Islamic mutual funds industry was born sometime in the mid-1990s and today many of the same funds founded in the industry's infancy are still operational. What is not so clear is the historic evolution of these funds and their AUM. This is examined in greater detail below.

Asset Allocation for the “Typical” Muslim Investor

The data and analysis in this study is organized to allow a “common man” approach to global investing, or in our case the common Muslim investor (or, for that matter, non-Muslims who appreciate the socially responsible elements of sharia-compliant investing). For this reason we have chosen Islamic mutual funds rather than the universe of sukuk, equities or private equity. For scale reasons only the wealthiest of investors could approach the sukuk market, where small order sizes are possible but generally prohibited. With exceptions, market makers in sukuk secondary markets do not generally accept individual trade orders under \$1 million, making direct access to sukuk prohibitive for all but the wealthiest investors. Further, we don't envision this study encompassing all individual global equities that can be considered sharia compliant. By the estimates of Dow Jones, their Dow Jones Global Index, an all-stock index, comprises something like 4,500 securities with a global market capitalization of around \$80 trillion. Their Dow Jones Islamic Market Index starts with the same 4,500 securities, but excludes those not acceptable to sharia, reducing the number to around 2,800 stocks with about \$40 trillion in global market capitalization. Any individual investor who wishes to exploit investment opportunities in multiple markets worldwide would require substantial resources to succeed—resources that most individual investors do not have. In other words, there are very significant barriers to entry to global sukuk and equity markets, where localized research and market analysis, plus access to local exchanges, consumes much time and money. The alternative for the “common man” is mutual funds, which are vastly easier to access in smaller sizes than going “direct to market.”

One key assumption here is that the “common man” investor in question seeks global diversification and not an increasing concentration of domestic assets. Another key assumption is this “common man's” requirement that these assets be invested according to modern standards of asset management, but with a strict requirement for adherence to sharia.

Total Funds Universe

Bloomberg data from its ISLM page (a compendium created by Bloomberg of Islamic financial products and markets) was first downloaded in December 2014, but more seriously for this project beginning in March 2015, with dozens of subsequent downloads through 31 December 2017, the version that is the subject of the analysis below. It is believed the funds universe did not change much in number from the first to the most recent downloads, although it is difficult to be precise because failures to capture the entire universe prevented a full dataset from being created in earlier downloads. It is known that the Islamic mutual fund and ETF markets are fluid and organic, meaning that during any single month there will always be a population of securities that may have been withdrawn or gone out of business, opened for business or been subject to labeling changes at Bloomberg. By taking data from a single date, 31 December 2017, we are essentially taking a photograph of the market at a static point, not a time series.

The full Bloomberg ISLM data download for 31 December 2017 contained a total of 1,176 entries labeled “mutual fund” or “ETF” and “Islamic.” These were subsequently processed for common data issues such as duplication and label errors, and then further processed according to the filters mentioned.

Data labeling issues

It was discovered that data labeling in the Bloomberg ISLM pages is a challenge. Unlike the data pages for other markets that are more mature with far greater numbers of participants, the Bloomberg ISLM page and subsequent sub-pages are frequently subject to gross title and other labeling errors. The most common error is in asset class, which requires an enormous amount of time for relabeling. For example, a fund listed as Equity may in fact be invested in sukuk or other fixed income products. A fund labeled Fixed Income often does not provide additional information: Is it a sukuk fund, a standard deposit-substitute money market product or a trade financing fund? Only through digging into the prospectus can one find out. Assets labeled Mixed Allocation may not in fact be mixed in anything other than cash and equities, and with a large equity position (70% or more) they need to be more responsibly placed into the Equities category. The second most common error discovered in the Bloomberg data relates to the label “Geographic Focus.” In a typical case a Saudi-domiciled fund was shown as investing in global securities, but after examining the relevant fact sheet it was discovered that the fund was in fact buying only domestic and regional securities.

While the number of label errors discovered in the Bloomberg data was not tabulated, it is thought that at least 100 of the 1,184 total entries required relabeling in one or more data categories, a very time-consuming and some-

times exhaustive job. The poor quality of Bloomberg's data labels, and the large amount of time dedicated to correcting them, may be more a reflection of the immature, undeveloped nature of Islamic asset management than of Bloomberg's labeling process. As a side note, one can reflect on the fact that many of the articles relating to Islamic asset management, and featured in the literature review in Chapter 1, were written by academics who appear to have little or no professional experience in asset management. They therefore could not know the condition of their similar Bloomberg (or Reuters) data downloads. Knowing now the fairly wide extent of data mislabeling, there is concern that at least some of the previous work by other scholars concentrating on Islamic asset markets may not have used accurate data. It is suspected that there is substantially less data mislabeling among conventional, non-Islamic mutual funds because of their intense use by a much larger body of professional participants. Such poor-quality data on sharia-compliant securities may be because of the young, untested and immature nature of Islamic asset management.

Removal of duplicates

It is common in the mutual fund industry to provide different share classes of the same mutual fund to different types of investor, in order to satisfy their different needs. For example, a mutual fund may be issued an A share, B share and C share, each in a different currency, to give investors the opportunity to buy the fund in their domestic reference currency. This is typical for a fund that may have a USD core reference A share class, where the fund units are priced and reported in USD, while a B class may be priced and reported in EUR for investors domiciled in Europe and a C class may be priced and reported in GBP for investors resident in the United Kingdom.

Further, there may be multiple share classes to differentiate between institutional and individual investors, and to accommodate brokerage fees in between the mutual fund and the ultimate beneficiary. For example, an A share of a mutual fund may be for the typical retail individual investor. This share class will have a low purchase minimum of say \$5,000, but comes with an entry fee of up to 5%, such fee being payable to the intermediary who chose the fund for the investor, normally a financial advisor or asset manager. The B share class, on the other hand, may be dedicated to institutional investors with a minimum purchase of say \$100,000, but with no or a small up-front purchase fee because such investors will generally buy direct from the fund manager.

One of the most important share class differentiators is dividend policy. A mutual fund, for example, may have an A share that does not distribute earnings in the fund, but rather accumulates those earnings to purchase more assets. The B share, on the other hand, would distribute all earnings to unitholders.

This wide variation in mutual fund share classes means it can be difficult to understand the true number of mutual funds outstanding and their true AUM. A shares, B shares and C shares (etc.) are often listed on Bloomberg separately, as if they are unique and separate funds. Summing the number of funds or AUM therefore involves substantial double counting if there are such repeated entries.

An initial glance at the Bloomberg ISLM reference list, for example, gives a total of 1,176 funds with almost \$192 billion in AUM. A careful review of the list, with removal of 321 duplicates as represented by different share classes, reduces the investible universe to only 855 mutual funds with a total of \$63.18 billion in AUM. In other words, removing duplicates reduces the investible universe by 27% in number of funds, but 67% in AUM.

Geographic dispersion (domicile)

Islamic mutual funds are domiciled in at least 30 different national jurisdictions, ranging from Malaysia and Indonesia in Southeast Asia to Luxembourg and Dublin in Europe and the United States in North America. This wide range of countries hides some significant factors regarding concentration. Of the 855 total number of mutual funds, we find that the top two (Malaysia and Saudi Arabia) account for almost 59% of all mutual funds, and 68% of AUM. When we expand the view to the four countries with the highest number of Islamic mutual funds (Malaysia, Saudi Arabia, Indonesia and Pakistan), we cover 82% of all Islamic mutual funds with 75% of Islamic mutual fund AUM, again an indication of high concentration.

The next 20 countries with more than one Islamic mutual fund (from Luxembourg with 39 to Morocco with 2) indicates a total of 17% of all mutual funds and 25% of mutual fund AUM. The bottom of the list—seven countries with only one mutual fund domiciled in their jurisdictions—represents less than 1% of all mutual funds and less than 0.1% of Islamic mutual fund AUM.

An illustration of these geographic dispersion results is given in Figure 2.2.

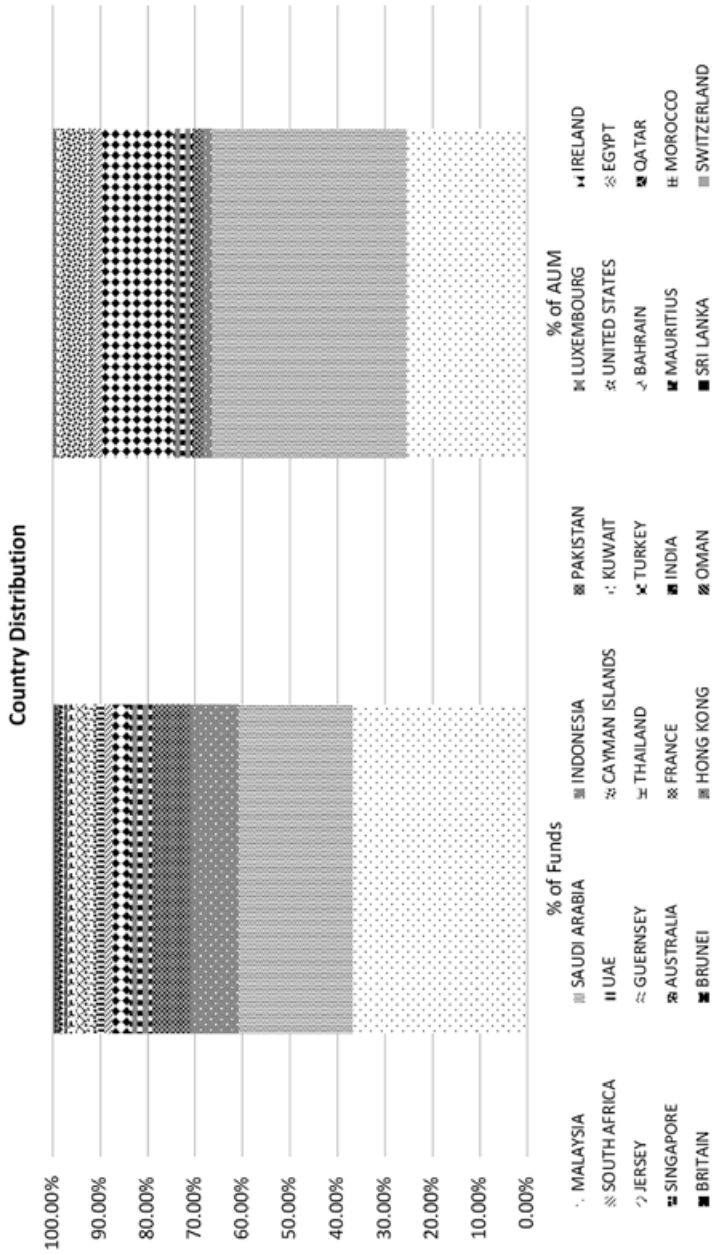


Figure 2.2 Islamic mutual funds, distribution by country

Source: Author's work, data from Bloomberg.

Asset categories

We look now at the distribution of Islamic mutual funds within classic asset categories in an effort to see if there is skewness in the types of funds that have been produced to date by Islamic fund providers, where here we'll define skewness in comparison to the U.S. mutual funds market. While not a good measure, since mutual fund markets can be quite different, it at least provides us with one comparison to a developed mutual fund market.

There is evidently a predominance of Islamic equity mutual funds, with 51% of the 855 funds dedicated to this asset category, and 42% of AUM. Is this “normal?” In terms of AUM, the U.S. mutual fund market has 59% dedicated to domestic and international equities,⁶ so while the ratio of funds is similar, the variance of AUM ratio is significant (see Figure 2.3).

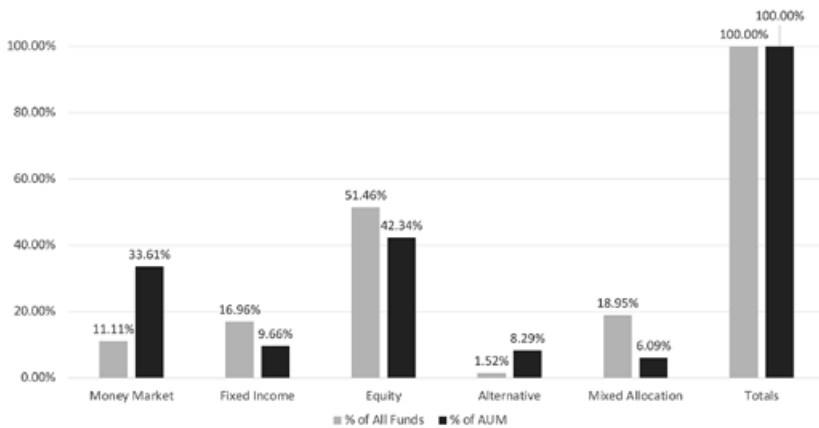


Figure 2.3 Distribution of 855 Islamic mutual funds by fund type

Source: Author’s work, data from Bloomberg.

More variance is visible when comparing other asset categories. There are 145 Islamic mutual funds in the Fixed Income category (where “Trade Finance” is sometimes added in this text due to the occasional appearance of funds that invest in sukuk as well as trade finance, something that is rare in conventional bond mutual funds), comprising 17% of all funds and nearly 10% of AUM. In the U.S. market AUM in bond funds comprise 21% of all mutual fund AUM, a variance of about 250% more than we see in the Islamic mutual funds market. Even more graphically, Islamic money market funds (aka, murabaha or commodity finance funds) comprise 11% of all sharia-compliant mutual funds, yet a whopping 34% of Islamic fund AUM. In comparison, U.S. money market funds account for only 13% of American mutual fund assets.

The loosely defined category Alternative Investment funds accounts for 1.5% of all Islamic funds and 8% of AUM, while in the U.S. market this category has a 7% share of assets. As shown below, however, this can be highly misleading. Alternative funds in developed markets are highly heterogeneous, while the Alternative Investment category in Islamic mutual funds is quite concentrated.

The Mixed Allocation category is more difficult to define (19% of Islamic funds with 6% of AUM), as this is sort of a “grab bag” of mutual fund investments and investment styles. Drilling down into the fact sheets of many of these funds is illustrative. One might invest in up to 99% sharia-compliant equities when the manager sees an opportunity, or up to 99% cash and fixed-income instruments if the manager feels valuations are under threat (being, in essence, an equity mutual fund and a cause of mislabeling). Several funds exist with defined allocation limits on fixed income (murabaha, sukuk and deposit assets) and equities. Others commit to make “best efforts” to keep within certain bands, for example not to invest more than 40% or 80% in equities, with the balance in fixed-income securities. These mirror the portfolio strategy funds common among major asset managers (and which could presumably provide one type of the benchmark needed to compare performance and risk of Islamic optimized portfolios in the section “Creating the ‘Guessed’ Asset Allocation and Optimizing within Asset Classes” in Chapter 4).

After reviewing these Mixed Allocation funds, it’s difficult, or even impossible, to give them any general definition. They are not money market, fixed income or equity funds, and they cannot be categorized as alternative funds because they may come under any one of these first three definitions during different periods of time. For the moment we’ll leave aside discussion of Mixed Allocation funds among the larger sharia-compliant investible universe, and discuss their possible utility only among those funds that are qualified after filtering and sorting, as discussed earlier.

Table 2.3 Distribution of Islamic funds by category

Asset Category	Number of Funds	% of All Funds	AUM (\$ Millions)	% of AUM
Money Market	95	11.11%	21,238.31	33.61%
Fixed Income	145	16.96%	6,103.74	9.66%
Equity	440	51.46%	26,753.59	42.34%
Alternative	13	1.52%	5,240.51	8.29%
Mixed Allocation	162	18.95%	3,846.88	6.09%
Totals	855	100.00%	63,183.03	100.00%

Source: Author’s work, data from Bloomberg.

To conclude, it can be said somewhat definitively, and contrary to the published surveys from the likes of E&Y, that on 31 December 2017 the total Islamic investible universe comprises 855 mutual funds and ETFs, with a total of \$63.18 billion AUM.

Track record

As discussed previously, an important distinction between mutual funds for asset managers is their different histories, or track record. A fund with a longer track record will provide more data that will display the consistency, or lack thereof, of the fund manager's skills in managing assets through measurements of price and price volatility, plus AUM.

Slightly surprisingly, it was discovered that among the 855 mutual funds in the universe of Islamic mutual funds, 65% had a track record of five years or more, and comprised 89% of all Islamic mutual fund AUM. This gives evidence that the majority of investment in Islamic mutual funds is made in those with established histories, a key ingredient for professional and regulatory acceptance.

It was discovered, too, that while only 13% of all Islamic mutual funds had been around for 15 years or longer, they comprised 38% of all Islamic mutual fund AUM. These 108 veterans of the industry enjoyed an average AUM of \$223 million, a figure which combined with track record indicates a relatively big pool of large, historic funds. This dispersion of track record and AUM can be more clearly envisioned in Table 2.4.

Table 2.4 Track record of Islamic mutual funds

Years since Inception ^a	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
0–2	93	10.88%	3,120.20	4.94%
2–5	205	23.98%	3,762.23	5.95%
5–10	246	28.77%	15,790.17	24.99%
10–15	203	23.74%	16,417.47	25.98%
> 15	108	12.63%	24,092.96	38.13%
Totals	855	100.00%	63,183.03	100.00%

Note: ^a The data in this table does not provide the three-year track record identified by the majority of survey respondents as a criterion for selecting third-party mutual funds. Considerations of the three-year rule are noted in the section “Application of Common Professional and Regulatory Filters, Filters 1 and 2” that follows.

Source: Author's work, data from Bloomberg.

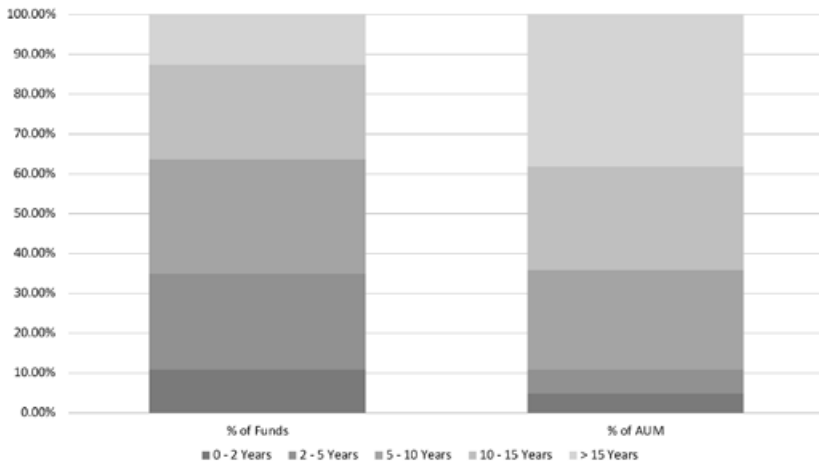


Figure 2.4 Islamic mutual funds, years since inception

Source: Author's work, data from Bloomberg.

Among the top five countries for Islamic mutual funds (Malaysia, Saudi Arabia, Indonesia, Pakistan and Luxembourg), there is evidence that these countries have different histories in creating mutual funds; some had their peak of new-fund creation in years past, while others are just now getting up to speed in new-fund creation. In terms of number of funds, both Malaysia and Saudi Arabia display maturing mutual fund industries, while relative newcomers Indonesia and Pakistan are closing the gap with substantially greater fund production in the “less than 10 years” category than their more mature rivals. In fact, the evidence indicates the graying, or aging, of the Islamic mutual funds industries in both Malaysia and Saudi Arabia, perhaps because most available product gaps were first filled ten years or more ago.

The evidence also points to the maturing of mutual fund AUM in Saudi Arabia, and to a lesser extent also in Malaysia, and the younger nature of assets in the Indonesian and Pakistani markets. And measuring the top five by AUM adds Luxembourg to the list, where 61% of Islamic funds have five or fewer years of track record, making it a relative newcomer compared to the other four.

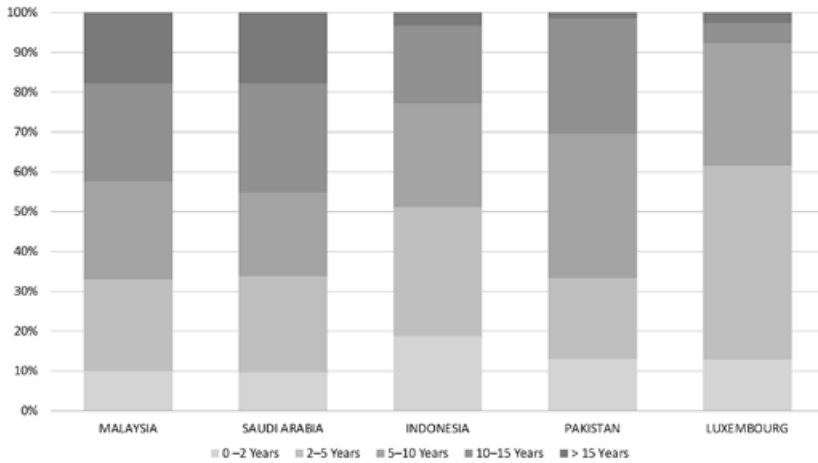


Figure 2.5 Islamic mutual funds, years since inception by country (top five) as % of AUM

Source: Author’s work, data from Bloomberg.

APPLICATION OF COMMON PROFESSIONAL AND REGULATORY FILTERS, FILTERS 1 AND 2

While examination of the greater Islamic funds universe—the 855 mutual funds and ETFs that are netted out after removing duplicates—is interesting to the practitioner, it does not substitute for an evaluation of the universe of Islamic mutual funds that meet regulatory and professional standards *after* being filtered for investment qualification. To achieve this subset of data we must first begin eliminating funds according to those filtering criteria common in the global asset managing industry. Only then can we realize the subset of investible securities, an important objective of this study.

The following examines the application of two filtering rules. Filter 1 is where all filters are strictly applied, those filters being the ones determined in the survey above plus an additional filter, Exemption, to be discussed further below. Filter 2 applies all Filter 1 rules, but specifically changes Track Record (from 36 months to 24 months) and Domicile (adding domiciliation from such countries as Saudi Arabia, the UAE and Malaysia, where there is relaxed or no foreign exchange control and reasonably advanced domestic mutual fund markets, but still excluding those countries with observably strict exchange controls, such as Indonesia and Pakistan).

Table 2.5 Conventional and Islamic fund filter rules

FILTER	CONVENTIONAL, FILTER 1		ISLAMIC, FILTER 2
AUM	Generally excludes any funds under \$50 million AUM, with rules-based exceptions	=	Generally excludes any funds under \$50 million AUM, with rules-based exceptions
Liquidity	Generally excludes any fund with more than weekly redemption rights, with occasional exceptions up to one month	=	Generally excludes any fund with more than weekly redemption rights, with occasional exceptions up to one month
Track Record	Excludes as a general rule any fund with less than a 3-year track record	≠	Excludes any fund with less than a 2-year track record
Domicile	Excludes all funds in jurisdictions generally not considered “friendly” to conventional asset managers	≠	Excludes only those jurisdictions with known, strict exchange control regimes; includes jurisdictions with low or no exchange controls, and with observably active capital markets, regulatory authorities and dispute resolution
Exchange-traded Funds	Does not generally apply the above rules to ETFs, since they are unmanaged and generally immediately liquid regardless of size or track record	=	Does not generally apply the above rules to ETFs, since they are unmanaged and generally immediately liquid regardless of size or track record
Exemptions	(1) if a fund is a sub-fund of a larger parent fund, and in combination the sub- and parent funds have at minimum \$50 million AUM, then the sub-fund is considered qualified as long as all fund activities are identical to the parent fund; and (2) funds are qualified if they are managed in parallel with other identical discretionary mandates and if the combined mandates are greater than \$50 million	=	(1) if a fund is a sub-fund of a larger parent fund, and in combination the sub- and parent funds have at minimum \$50 million AUM, then the sub-fund is considered qualified as long as all fund activities are identical to the parent fund; and (2) funds are qualified if they are managed in parallel with other identical discretionary mandates and if the combined mandates are greater than \$50 million

Source: Author’s work.

The application of Filter 1 and Filter 2 to the 855 Islamic mutual funds results in these outcomes shown in Table 2.6.

The rationale for Filter 1 is clear enough: it includes the primary criteria that the survey respondents deemed important when adopting mutual funds for their client allocations. But its utility is questionable in the context of creating the parameters for an Islamic mutual fund asset allocation. By applying Filter 1 there does not appear to be sufficient numbers of resulting securities to achieve an acceptably diversified, globally allocated Islamic portfolio.

Table 2.6 Results from application of Filters 1 and 2

Asset Category	Number of Funds	
	FILTER 1	FILTER 2
Money Market	1	29
Fixed Income	9	26
Equity & Equity ETFs	14	85
Alternative Investments	7	7
Mixed Allocation	-	11
Totals	31	158

Source: Author's work, data from Bloomberg.

The rationale for Filter 2 may be as follows: If an investor were to accept the increased level of risk associated with Filter 2, yet with a subjective assessment that such increased risk is minimal, then the set of securities resulting from Filter 2 may have utility for that investor. The variation between Filters 1 and 2 in terms of Track Record and Domicile are discussed below.

Track Record

Filter 2 reduces a fund's minimum track record from three years to two. There does not appear to be existing literature relating to the minimum set of data points required for statistical significance in such measurements. However, the survey indicates that several major asset managers have established a minimum 36 months of track record, which is a reflection of their perceived and/or measured risk versus a 24-month (or 12-month) track record. The amount of additional risk that is assumed by an asset manager and the underlying client portfolio by reducing by 12 months the minimum number of management data months from an otherwise qualified fund's history is not known. Here it will be assumed that there is an increase in risk, but the extent of that risk is unknown and perhaps even negligible.⁷

Domicile

Whereas it is indicated earlier that conventional asset managers generally will not purchase a mutual fund for a client account outside a known Western or Western-style jurisdiction, Filter 2 explicitly allows mutual funds from additional jurisdictions based on two factors: there is an observable, active capital market—a regulator recognized by investors as being reliable; and an assumed history of dispute resolution within a jurisdiction that has few or insubstantial exchange controls, for example Saudi Arabia, the UAE, Malaysia and (pre-

sumably) South Africa. Countries known for strict exchange controls are still excluded as in Filter 1, for example Indonesia and Pakistan. Identical to the change to Filter 2 for Track Record, it is not known what degree of additional risk is assumed by expanding jurisdiction in this fashion. It is also assumed here that there is an increase in risk, but that the extent of that risk is unknown and is perhaps negligible.⁸

This commentary indicates the need for further research on the measurement of additional risk in Filter 2 as opposed to Filter 1. If it were discovered that the additional risk of a 24-month Track Record limit and a wider Domicile range were insignificant, the conclusion could be an important stimulant to creating and expanding Islamic asset management, in particular among the rules-based conventional assets managers surveyed.

EXEMPTIONS

This section discusses the last filtering category, mutual funds exempted from the normal filters. These exemptions come in two types, ETFs and the generic “exempt” fund.

Exchange-Traded Funds

With a track record of over 20 years in the United States and over 15 in Europe, ETFs have become a common asset held by investors everywhere. They differ from mutual funds in that they are unmanaged. Rather, investors select an index of stocks or other traded securities and own that index in proportion to market weights. Because they consist of securities freely traded on an exchange, often the most frequently traded (and therefore most liquid) among them, they do not have the risks associated with mutual funds that do not meet a specified limit of AUM. Because they are unmanaged a track record is not required, and such funds are therefore usually exempt from AUM and track record limits. The same rule applies to both conventional and Islamic ETFs as there is no operational difference between them.

Exempted Mutual Funds

Exempted mutual funds include those funds managed in parallel with other identical asset management mandates; for example, a sukuk mutual fund in Malaysia may have less than \$50 million in AUM, but in parallel and *pari passu* with other mandates the same manager manages well in excess of \$50 million in sukuk for clients such as the central banks of Malaysia and its neighbors, Indonesia and Brunei. In this type of situation the manager’s collective parallel and identical AUM can exceed the minimum limit, often

Table 2.7 Summary of Islamic mutual funds and ETF investible universe

Fund Exclusion Criteria	Description	Number of Funds	% Δ from Total Funds	Remaining Funds	Remaining AUM (\$ Millions)	\$ Δ from Previous	% Δ from Total AUM	% Remaining AUM
Initial Total		1,176			191,586	191,587		
Duplicates	Includes duplicates Remove duplicates, new total	321	-27.30%	855	63,183	-128,404	-67.02%	100.00%
Domicile	Country of domicile has exchange controls	211	-24.68%	644	59,368	-3,814	-6.04%	93.96%
AUM	AUM < USD 50 million	477	-55.79%	167	52,146	-7,222	-11.43%	82.53%
Liquidity	Pricing frequency more than one month	12	-1.40%	155	46,722	-5,425	-8.59%	73.95%
Track Record	Years since inception < 2 years	18	-2.11%	137	44,885	-1,837	-2.91%	71.04%
ETF	Add ETFs < \$50 million	13	1.52%	150	45,177	291	0.46%	71.50%
Exempt Funds	Add funds exempt from Liquidity & Track record criteria	8	0.94%	158	46,391	1,214	1.92%	73.42%
Local Investments	Remove all local investments	94	10.99%	64	15,379	-31,012	-49.08%	24.34%
Investible Universe		64	7.49%		15,379			24.34%

Source: Author's work, data from Bloomberg.

\$500 million or more (as is often seen among many sukuk fund managers). Conventional asset managers make this exemption on a regular basis when buying a sub-fund of a parent fund (e.g., a U.S.-domiciled European equities trading fund may open a sub-fund domiciled offshore for European institutional investors, who would not generally apply their mutual fund adoption rules to the sub-fund if the parent fund meets both size and track record filter criteria, all other elements being equal).

QUALIFIED INVESTIBLE UNIVERSE

The earlier-mentioned 855 Islamic mutual funds were sequentially subjected to the criteria in Filter Rule 2, with the resulting number of funds and AUM shown in Table 2.7.

Perhaps surprisingly the total number of funds was reduced by 82%, but the amount of AUM in the resulting qualifying funds lost less than one third, with more than 73% of assets in the original investible universe managed by the 18% of funds that qualified.

If Filter 2 were accepted by a “common man” investor, then he or she would see the qualified investible universe comprise 158 funds, with over \$46 billion in AUM. Compared to the \$49 trillion in AUM among the more than 114,000 mutual funds worldwide this may seem trivial, but at first glance the dispersion and variation of these qualified funds gives them a semblance of professional and regulatory credibility. Table 2.8 shows a summary by asset class of the qualified Islamic mutual fund investible universe according to Filter 2.

Table 2.8 Initial Islamic fund investible universe

Asset Category	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
Money Market	29	18.35%	16,463.24	35.49%
Fixed Income	26	16.46%	4,142.89	8.93%
Equity	85	53.80%	19,709.15	42.48%
Alternative	7	4.43%	5,099.98	10.99%
Mixed Allocation	11	6.96%	975.83	2.10%
Totals	158	100.00%	\$46,391.09	100.00%

Source: Author’s work, data from Bloomberg.

A casual observation indicates the same “normal” distribution toward equity funds, and an increase in the percentage of alternative investment funds to also more “normal” levels. Money market funds still have a disproportionate

volume of AUM, at the expense of a small fixed income segment. And the Mixed Allocation funds play a small role in the total number and AUM of qualified funds. These will be discussed further below.

The process to arrive at this qualified list, and some commentary on the surviving qualified securities, follows.

Exchange Controls (211 Securities Removed)

More than a few emerging markets apply controls on the exchange of their currency for other currencies, in particular the most traded of the world's currencies, USD, EUR, GBP and JPY. Among the most well known of the exchange control countries is China (e.g., strict allocations are permitted for exchanging renminbi for U.S. dollars, but the market is far from free). However, countries such as Indonesia and Pakistan enforce very strict exchange control regimes as well, while others are well known for their less strict but still very strong foreign exchange controls, including the likes of Egypt, India, Sri Lanka and Morocco.

While not trying to present an exacting list of exchange control countries with specific details of their foreign currency exchange rules, the first filter eliminated 211 funds from the original list of 855 Islamic mutual funds (representing 25% of the net number of Islamic funds), but with only a 6% loss of AUM.

Removing such funds follows the earlier-described “prudent man” rules common in many jurisdictions, where liquidity is a priority of regulatory oversight of the asset management industry. Recalling the global financial crisis of 2008–2009, and earlier the Asian financial crisis of 1997, there is a backdrop to this resistance to liquidity risk. Investors worldwide fear placing investments into countries that could require very long minimum investment periods, or penalize them with heavy taxation should they attempt to sell assets and repatriate funds in less than the minimum investment period allowed by regulators (usually central banks).

Assets Under Management (477 Securities Removed)

The surviving 644 Islamic mutual funds were then screened for a minimum \$50 million volume of AUM. This resulted in the removal of 477 securities, representing 56% of the net investible universe of 855 funds, but only 11% of that universe's AUM. This means that well over half of the funds of the larger Islamic investible universe are too small for consideration (except Exemptions, noted below). With only 11% of assets in the greater Islamic investible universe, the impact on AUM of the resulting funds is less substantial than one might expect. However, it is also an indication of the

typically small size of Islamic mutual funds, where these 477 funds manage an average of only \$15 million.

Liquidity (12 Securities Removed)

Filters for exchange controls and AUM removed 80%, or 688 funds, of the original investible universe of 855 funds. But the resulting universe of 167 funds has an aggregate \$52 billion in AUM, or 83% of the original total. In other words, reducing the investible universe by adding domicile and size factors does not significantly reduce total AUM in the Islamic investible universe.

The converse is true for the liquidity filter. By constraining the list to only funds with monthly or less redemption rights, matching the filter commonly witnessed among asset managers in our survey, only 12 funds are removed, just 1.5% of the 855 total. Perhaps paradoxically this represents a disproportionately large 9% of original AUM.

When discussing liquidity among sharia-compliant mutual funds one point quickly becomes apparent. Nearly 100% of the securities that survived Filter 2 have weekly or less liquidity, and more than four fifths enjoy daily liquidity.

Table 2.9 Liquidity provisions of Islamic mutual funds

Pricing Frequency	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
Daily	135	85.44%	37,354.08	80.52%
Bi-weekly	5	3.16%	8,536.58	18.40%
Weekly	16	10.13%	364.54	0.79%
Monthly	2	1.27%	135.88	0.29%
Totals	158	100.00%	46,391.09	100.00%

Source: Author's work, data from Bloomberg.

Track Record (18 Securities Removed)

In the discussion of Filters 1 and 2, it was stated that Filter 2 would be applied where qualified funds are restricted to those with a minimum 24-month track record, rather than the 36 months discovered to be common among survey respondents.

After controlling for domicile, size and liquidity, the Islamic fund investible universe fell from 855 funds to 155, a loss of 82% of all funds but paradoxically only a loss of 26% of AUM. The track record filter removed an additional 18 funds, representing \$1.8 billion in AUM. This is equal to a loss of just 2%

of the number of funds, and 3% of AUM. However, 71% of the original AUM is retained in the remaining 137 funds.

Sub-tally of Islamic Funds After Filter Rule 2

The final tally of Islamic mutual funds subsequent to the application of the criteria in Filter 2 is 137 securities (16% of the original 855) with \$45 billion in AUM (71% of the original). This is not an insubstantial sum, but asset managers always prefer more than fewer securities in their investible universe. Diversification is more readily achievable when there is greater depth and breadth in an investible universe.

Fortunately, as well as the reductions detailed earlier there are two important additions to the Islamic investible universe. These are the return to the qualified investible universe of ETFs, plus those funds that can demonstrate they would otherwise be exempt from the strict application of filter rules. By their nature both of these additions would apply whether using Filter 1 or Filter 2.

Addition of ETFs (13 Securities Added)

There are a total of 13 ETFs under \$50 million AUM on the larger list of 855 Islamic funds, which under strict application of Filters 1 and 2 would be rejected. Among these are several country and regional funds. For example, HSBC and Falcom introduced Saudi-market ETFs, the former linked to the shares of the largest 20 companies on the Saudi bourse, the latter devoted to petrochemical stocks on the same exchange. In total these ETFs comprise \$291 million in AUM, although the term “management” is not exactly appropriate as an ETF is an unmanaged security, linked directly to a long position (as required under sharia) in shares listed on an exchange. As discussed earlier, these securities are readded to the qualified list because of their basis in highly liquid, immediately redeemable shares on market exchanges.

The addition of these ETFs increases the number of qualified funds by a paltry 1.5% (as measured against the original 855), bringing the number of qualified securities to 150 and increasing total qualified AUM by \$292 million.

Addition of Exempt Funds (8 Securities Added)

To find any possible exempt securities one must sift through 495 Islamic mutual funds previously rejected for not meeting AUM and track record criteria, an enormously complicated task given the opacity of many Islamic mutual funds. This is the result of taking the latest number of funds, 150, and adding back those lost from not having sufficient AUM nor sufficient track records, as the exemptions being sought are precisely on these two controls. We maintain

the exclusion of funds in countries with rigid exchange controls, as well as the exclusion of any security with more than one-month redemption rights, two iron-clad criteria that cannot be violated under “prudent man” laws.

An analysis of these 495 funds was conducted, first examining the funds to determine if they were part of a larger family of funds. Typically one would search for the names of major global fund managers. Here, the likes of HSBC or Franklin Templeton, two fund managers with hundreds of billions of dollars and the equivalent in AUM, are typical of those whose funds may qualify for exemption.

An additional search needs to be made where it is known or suspected that the fund in question is outsourced to a larger, more well-known international mutual fund manager. Here a fairly substantial industry knowledge is required, as the information is rarely evident from mutual fund documentation. Without this knowledge it would not be possible to identify potential candidates for exemption. For example, all the international, non-Saudi mutual funds investing in equities at both NCB Capital in Jeddah and Riyad Capital in Riyadh are managed on an outsourced basis—respectively Amundi Asset Management (which is 80% owned by the French banking giant Credit Agricole and 20% owned by its rival Société Générale) for NCB Capital, and Fidelity Asset Management and DWS Group (the former asset management arm of Deutsche Bank) for Riyad Capital. When a link is established it often requires detective work to obtain information, as the local asset manager may not want to disclose to its clients that the assets in a particular fund are actually being managed thousands of miles away. Amundi is a good example. With €1.4 trillion in AUM it is one of the world’s largest mutual fund companies. A typical situation where an exemption is suspected would involve an Amundi fund that focuses on equities in the global healthcare sector, and through its relationship with NCB Capital it was asked to create a sharia-compliant sub-fund for distribution through NCB Capital exclusively in Saudi Arabia. In such situations the parent fund often easily passes all filter criteria, but the sub-fund may be too small or lack the track record to pass. If it is established that the fund in question is in fact wholly managed by the parent and uses identical clearing and settlement processes, and has the same administrator, registrar and paying agent and all other typical functions are identical, then the sub-fund can be declared exempt from the AUM and track record rules.

There were eight funds that could be categorized as exempt due to “prudent man” rules not being violated, with a total of almost \$1.2 billion AUM, or 1.9% of the original total. Of the eight total funds that were given exemption from Filter 2, most were exempted for the reasons described. However, there is another category of funds that needs further examination for possible exemption. This category involves funds that do not meet the minimum AUM or

track record tests but there are circumstances where an exemption is acceptable according to industry professional and regulatory standards.

While this category has numerous variations, a typical example is the EFH Global sukuk Plus Fund, managed by the London office of QInvest, a major asset manager in Doha, Qatar. Again, here a deep industry knowledge is required to piece together a substantial justification for exemption, the same degree of detective work typical in the sub-fund/parent fund example given earlier.

The Al Hilal sukuk fund from BNP Paribas meets track record tests as it first started operations in 2012. For much of the period afterward the fund's AUM were comfortably around \$50 million. For most of the life of the fund it would have passed both Filters 1 and 2.

However, from sometime in 2015 onwards the Al Hilal fund saw its AUM decline to just under \$40 million. This is probably due to the redemption of a position in the fund by a significant client.

Two questions need to be examined: (1) "Does the fund sit alone in its category, where the fund manager is remote from the underlying markets except for his or her few positions in this sector of Islamic finance?" and (2) "Does the fund manager itself have sufficient financial resources where a fund under \$50 million may not contribute sufficient revenue to maintain an ongoing business?" Investigating both, the answers are satisfactory. First, it was discovered that while the fund had only \$39 million AUM, it is managed in parallel and by the same team that manages very substantial sukuk portfolios for the likes of central banks and major regional pension funds. This indicates that the fund manager is not managing only \$39 million in sukuk, but closer to \$1 billion in total sukuk volumes. Importantly, the legal nature of the sukuk and the firm's own treasury require equal attention and resources; in other words, they are invested *pari passu*. In answer to the second question, it can be concluded that sukuk management is an important function at the bank, the sukuk management team has substantial available resources and the publicly available sukuk fund is part of the bank's position in this high-visibility area of Islamic asset management.

While it is often the case that even sophisticated investors have made substantial investments with even less evidence of solvency and substance, the above illustrates the dilemma occasionally faced by asset managers in security selection. In those cases where an exemption from the filter rules is suspected, the only recourse is to conduct thorough due diligence and determine the exact nature of the fund in question compared to its peers, its institution and even departments within the institution. Fund managers can be and are challenged by regulators and courts to prove that they exercised "prudent man" laws. Only by establishing convincing evidence that an exemption is warranted can an asset manager be considered as operating within the constraints of those laws.

In the case of the Islamic investible universe investigated here, only a few of the eight exempted funds were subjected to the second kind of analysis: the search for parallel credibility rather than the vertical credibility determined for funds exempt in the first category. Fortunately there is some room for error, as these funds account for only a small fraction of the total qualified assets.

NOTES ON DIVERSIFICATION

Knowledge of the broader Islamic investible universe has utility for a “common man” investor, but more importantly it has utility for his or her asset manager if the manager is assigned a mandate for managing a globally diversified sharia-compliant portfolio that meets professional and regulatory standards. However, there is more to learn about the investible universe, first and foremost the degree of diversification within each asset category, by geographic dispersion and by track record. Here we address each of these considerations.

Diversification by Asset Class, the Case of Mixed Allocation Funds

As previously outlined, we note that the surviving qualified securities are distributed across traditional asset classes, being Cash, Fixed Income, Equities and Alternative Investments. There is a further category labeled Mixed Allocation, which needs some explanation.

To the credit of many Islamic mutual fund managers, the efforts to provide certain customers with global, multi-asset-class investing have in fact a long history. The first among these was the Al Rajhi Multi Asset Class global portfolio fund, established in 1998 by David Gibson-Moore, the then-new head of private banking at Saudi Arabia’s largest Islamic bank. The fund operates still, on an almost purely outsourced basis. The second veteran of this category is the ProLink Dana Urus fund, created in 2000 by the Malaysian unit of Prudential Assurance, one of the world’s largest combined insurance companies and asset managers (£657 billion in AUM). Typical of Mixed Allocation funds, the ProLink Dana Urus combines equity and fixed income investing which alters over time considering market conditions. These two funds were pioneers in an effort to provide this seminal style of global, multi-asset investing for the “common man.” What eliminates them from reasoned consideration here is their extremely limited distribution. Both are constrained to highly localized markets, targeting small investors. And, for domicile reasons, they would be naturally excluded for consideration by major asset managers.

There are 11 Mixed Allocation funds in the list of 158 qualified sharia-compliant mutual funds, together accounting for 7% of all funds, with approximately 2% of AUM. The oldest among them was created in 2001, and

the youngest in 2012, so they are among the veterans of the Islamic mutual funds industry.

When speaking of the “common man” frequently referred to in this study, the Mixed Allocation fund is one option for such “common man” investing. Naturally one would seek a Mixed Allocation fund in the investor’s domestic currency to avoid currency risks on the part of the allocation which is not in that currency.⁹ Among the qualified Mixed Allocation funds there are six funds in Malaysian ringgit (MYR), one in Saudi riyal, one in U.S. dollar and two in South African rand. For investors who live in countries with hard-currency pegs to the US dollar,¹⁰ there are a two such funds encompassing global, multi-asset-class investing, with a combined \$249 million in total assets.

Money Market Funds

Sharia-compliant money market funds, where the qualified number of funds is 29, includes 15 in MYR and a total of 14 in Saudi riyal and U.S. dollar. Few or no Saudi investors would wish to keep their liquidity in a ringgit security except for modest currency diversification needs, but with over \$11 billion in assets the USD-linked and USD Islamic money market funds offer substantial choice for USD-referenced investors.

Fixed Income Funds

Qualified funds in the fixed income and trade finance category number 26, of which 15 are in USD-reference currencies (SAR (Saudi Arabian riyal) and USD), while 9 MYR sukuk funds and one ZAR-denominated sukuk fund comprise the balance. Here four funds were ruled exempt from the Filter 2 minimum AUM, each with substantially confirmed exemption factors. For global investors favoring USD (and the fixed SAR) currency fixed income Islamic funds, total AUM is approaching \$2.7 billion among the 15 funds, meaning there is a reasonably good selection of fixed-income mutual fund investments available in the Islamic asset space for USD-referenced investors.

Equity Funds

Eighty-five Islamic equity funds and ETFs survived the filtering, from an original total of 647 funds, with only 13% able to pass professional and regulatory standards. Total AUM among these 85 is almost \$20 billion, indicating an average of \$230 million each. However, just two of these funds are from Saturna Asset Management in Washington State, the Amana Income and Growth funds, accounting for \$3.1 billion of total sharia-compliant equity mutual fund AUM, or 15% of the total. Removing these two from the qualified

list reduces the available funds to 83, with \$17 billion in AUM. The average AUM among the post-Saturna exclusion is \$200 million.

Alternative Funds

There were only seven securities that survived the Filter Rule 2, and among these all are metal commodity ETFs with a single exception, a global real estate fund. Since the 1970s institutional investors have increasingly added non-traditional securities to increase the uncorrelated returns of their portfolios. Among the biggest proponents of this trend toward increasing alternative investments was David Swensen, CIO of the Yale University endowment, with over \$30 billion in AUM. Swensen's fervent belief was that uncorrelated assets could only be found by seeking alternatives to traditional stock, bond and money market investments. He promoted as high as 80% alternatives, saying the investment horizon of endowments was so long that it indeed made sense to buy Indonesian rainforest logging rights, exotic private equity investments and a host of other non-traditional investments. Unfortunately the financial crisis of 2008–2009 unwound the portfolios of those who followed the Yale Model. Harvard's endowment lost 30% and others more, pulling many investors back toward traditional asset allocations. Yet, while it became clear that over-investing in alternatives was unwise, there is still a large body of investors who believe all investors should have *some* alternatives. No one yet has determined how much, in large part because of the extremely heterogeneous nature of alternatives. It's not easy to determine the correlation coefficient of U.S. large-cap stocks with, for example, Indonesian logging rights.

Nonetheless, despite the confusion surrounding the amount of alternative investment that should be in any portfolio, the fact that there are uncorrelated or differently correlated assets out there justifies some alternatives. This is true for both Islamic and conventional investors. Since there is such a justification then there should be as broad and diverse a set of investments as possible in the alternative category. In the Islamic asset space there are just seven that meet Filter 2 criteria, a small sum.

SURVIVAL RATES

One unique element of the filtering process is establishing the total number of funds that failed to meet those standards to become qualified. The investible universe was reduced from a net of 855 funds to 158 through the processes described earlier. We can examine the survival rates by asset category and make some conjecture on those rates (Table 2.10).

Table 2.10 Survival rates of Islamic mutual funds

Asset Category	Original	Survivors	Survival Rate
Money Market	95	29	31%
Fixed Income Finance	145	26	18%
Equity	440	85	19%
Alternative Investments	13	7	54%
Mixed Allocation	162	11	7%
All Asset Categories	855	158	18%

Source: Author’s work, data from Bloomberg.

There is little consistency among the survival rates for the various asset classes. Attrition is attributable to the controlled factors, of course, mostly for such funds being too small to meet “prudent man” tests. However, further research may be needed to determine just why 82% of all Islamic mutual funds do not meet regulatory and professional standards. That study could also decompose the attrition by country to determine if some areas of the global Islamic finance market are more susceptible to attrition (or, fail to achieve minimum standards). The data indicates that Malaysia and Saudi Arabia account for nearly 59% of all Islamic mutual funds, and around 69% of their AUM, but perhaps they do not have the highest rate of underachievers in the Islamic mutual funds space due to their more mature markets and asset volumes. The large number

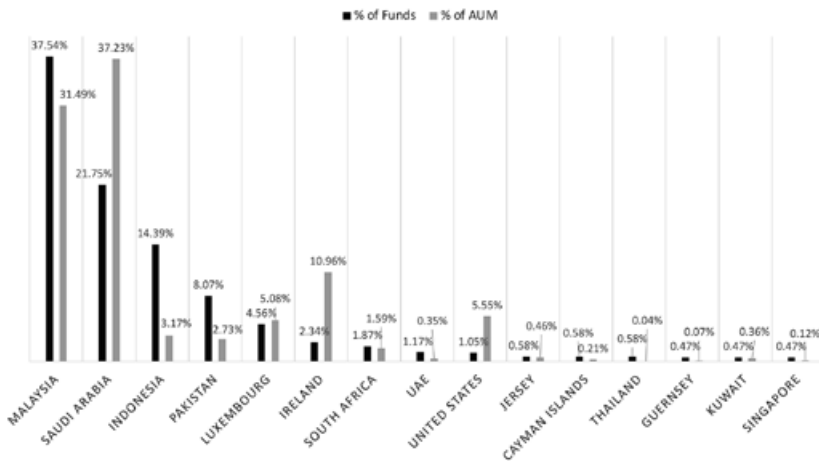


Figure 2.6 Islamic mutual funds, geographic distribution

Source: Author’s work, data from Bloomberg.

of AUM that are five years and older from these two markets indicates that maturity may be key to survival.

Of the 855 total Islamic mutual funds there are 24 countries with ten funds or less, most with one to three, accounting for 81 funds in total and 8% of total AUM. A considerable amount of attrition may be due to these countries being unable to gain traction in marketing and sales of Islamic mutual funds. Only 9 of the 24 nations have majority-Muslim populations, and of the other 15 few have any Islamic finance presence at all (Figure 2.6).

TRACK RECORD

Looking at the qualifying 158 mutual funds one can see the distribution of mutual funds by age, where there remains a preponderance of funds that are five years and older. Consider Tables 2.11 and 2.12.

Table 2.11 Track record, entire investible universe

Years Since Inception	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
0–2	93	10.88%	3,120.20	4.94%
2–5	205	23.98%	3,762.23	5.95%
5–10	246	28.77%	15,790.17	24.99%
10–15	203	23.74%	16,417.47	25.98%
> 15	108	12.63%	24,092.96	38.13%
Totals	855	100.00%	63,183.03	100.00%

Source: Author's work, data from Bloomberg.

Table 2.12 Track record, investible universe after initial filters

Years Since Inception	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
0–2	3	1.90%	236.15	0.51%
2–5	16	10.13%	1,632.64	3.52%
5–10	59	37.34%	13,951.31	30.07%
10–15	46	29.11%	12,057.30	25.99%
> 15	34	21.52%	18,513.68	39.91%
Totals	158	100.00%	46,391.09	100.00%

Source: Author's work, data from Bloomberg.

While there are some important similarities, there are also observable differences. For example, funds that are five years or older in the larger 855 set of funds make up 65% and 89% of total funds and AUM, respectively. Among

qualified funds the numbers are 88% and 96%, which indicates that funds five years and older dominate the investible universe in all cases.

Looking at the shorter end (less than five years), however, reveals a different story. The number of funds and AUM were 35% and 11% for all 855 funds, versus 12% and 4% for the qualified 158 funds. Further research may indicate a more vibrant market for new funds in some regions and not in others. In other words, the variance may be due to some mature markets, such as Saudi Arabia and Malaysia, showing a slowing of new-fund development, while other markets have only recently entered the Islamic mutual fund business and are launching many new products.

What is clear, however, is that regardless of which dataset is being examined—the broader large market or the reduced qualified market—funds with substantial track records of five years and more dominate both the number of funds and AUM.

UTILITY FOR PROFESSIONAL ASSET MANAGERS

We conclude this section with remarks on the utility of the earlier research to persons pursuing professional Islamic asset management. Is this useful? Can the earlier information extend professional practice into a newly formed Islamic asset management industry? Are the results from applying Filter 1 so severe that no one should enter these waters? Or are the main filters restricting the application of Islamic mutual funds to “prudent man” portfolios too restrictive, giving credence to the application of Filter 2?

Much of the utility of the results from applying Filter 2 will be demonstrated in subsequent sections of this book, where the qualified assets are subjected to additional filtering for qualitative and quantitative measures, in particular peer performance tests. The objective will be to find a “Buy List” of securities that will fit into a portfolio allocation demonstrating “best fit” (optimal correlation) among the securities, indicating optimized allocations that can then be back tested and benchmarked against conventional peers.

That said, the 150 securities passing through Filter 2 criteria (before adding back exemptions) meet relatively stringent “prudent man” tests: they have over \$50 million in assets, are not from countries with severe exchange controls, the large majority enjoy daily liquidity and they have at least 24 months if not 36 months or more of measurable track record. Except for missing 12 months of track record (which affects a very few funds), and with domicile in places like Dubai and Kuala Lumpur, they would otherwise meet the tests indicated as being common in jurisdictions such as Switzerland. Even among the eight additional exempted securities there is a good case that they, too, would all or mostly meet the exacting standards of important asset management centers in developed economies.

Subsequent sections will determine in part if further studies of the change in filtering criteria are warranted. They may indicate that sharia-compliant portfolios outperform conventional peers, and perhaps by a substantial margin in terms of absolute and relative performance as measured by Sharpe ratio, Information ratio, R squared, Capture, Value at Risk (VaR) and other conventional performance and risk metrics. The question then will be, are apples being compared with apples, or have the changes made in Filter 2 permitted the introduction of riskier assets, with subsequent riskier returns, allowing for an uneven, mismatched comparison?

NOTES

1. See http://www.vsv-asg.ch/uploads/file/Selbstregulierung/englisch/vsv_standesregeln_2014_en_final.pdf.
2. Although since 1 January 2020 independent asset managers in Switzerland must be directly regulated by FINMA.
3. Harvard College v. Amory; Pickering, Octavius (1831), *Harvard College and Massachusetts General v. Francis Amory. Reports of Cases Argued and Determined in the Supreme Judicial Court of Massachusetts, Vol. IX*. Boston: Hilliard, Gray, Little and Wilkins. pp. 446–465, https://books.google.co.uk/books?id=GbBLAAAAAYAAJ&pg=PA446&redir_esc=y#v=onepage&q&f=false.
4. *Swiss Code of Conduct for Independent Asset Management 2017*, <http://www.herculis.ch/files/5J6O9ldadP.pdf>.
5. Note that in the fourth box appears “Optimization software,” indicating that the output from identifying and filtering the investible universe is the input for the empirical work that follows. This means that the shortlisted securities are inputted into standard portfolio optimization software for the construction of optimized portfolios. Optimization software programs are widely available from multiple sources in the asset management industry, and all use means-variance testing as their core optimization function.
6. Investment Company Institute, *Investment Company Fact Book 2018*, https://sfama-cms.cdn.prismic.io/sfama-cms%2F37597afa-0cb7-4434-b04d-dabe83976e90_ici+investment+company+factbook+2018.pdf.
7. It is quite possible that the risk of a fund with three years of data is virtually identical or only modestly different to one with only two years of data. The three-year rule may be purely arbitrary.
8. Regulators in several predominantly Muslim countries (e.g., Kazakhstan, Malaysia, Saudi Arabia, the United Arab Emirates) are noted for applying rules of securities law that are often lifted entirely from their Western counterparts. While it is true that litigation in the event of a collapsed fund could be expensive in such emerging economies, this seems immaterial considering the otherwise highly qualified mutual funds one can find in some of these markets. Further research could be done to determine if there is measured Western bias in the selection of domicile by major global fund managers.
9. This points to the longstanding axiom of personal investing: place the large majority of one’s savings in the currency you will spend in retirement. No effort is made here to reference scholarly or professional works that support this statement.
10. The Saudi riyal has maintained a hard 3.75 peg to the U.S. dollar since 1986.

3. Results, relevance and limitations

RESULTS AND RELEVANCE OF ANALYSIS OF THE ISLAMIC INVESTIBLE UNIVERSE

The preceding chapters have demonstrated the broad nature of the Islamic mutual funds market, giving for the first time an explanation of its extent, and providing practical metrics for any asset management practitioner who is curious about this subset of global securities.

After exploring the global asset management industry and attempting to define the “prudent man” regulations applied in many if not most jurisdictions, the Islamic mutual fund market was subjected to those set of rules determined to be common from a survey of several major asset managers. The subset of qualified securities was determined and identified. This subset is the feedstock of the empirical analysis mill that will grind out optimized portfolio allocations and attempt to compare them to conventional peers, knowing in advance that the filtering criteria take two important departures from those defined by conventional asset managers (track record and AUM).

What has been attempted here is the first step of a sequential process that will result in portfolio allocations that may meet accepted professional and regulatory standards, or that may satisfy demand among “common man” investors seeking global asset allocations but with sharia compliance. Without this effort to identify the Islamic investible universe it would not have been known whether the securities needed to realize these allocation objectives actually existed.

LIMITATIONS OF AN ANALYSIS OF THE ISLAMIC INVESTIBLE UNIVERSE

The most significant limitation in determining the Islamic investible universe was the unreliable listing and labeling of data from Bloomberg (which is still the only relatively comprehensive source of data for Islamic mutual funds and ETFs). While it is believed that Bloomberg has captured a very large percentage of the sharia-compliant investible universe, it is clear they are not putting the same resources into their ISLM pages as they are with other services provide by Bloomberg. The vast number of errors in labeling required

somewhere between 50 and 100 hours of meticulous labor to correct, and even after such efforts the database is not perfect. It is noted that a number of the reporting funds do not have pricing later than six months before, and occasionally even older. For example, in May 2017 it is known that none of the mutual fund fact sheets from Alistithmar Capital in Riyadh were newer than December 2016. There may not be a sense of urgency for a local Saudi investment company catering to local investors with mostly local securities to report to Bloomberg, which for them largely represents international investors. Moreover, outside of a few Mixed Allocation funds there are no Islamic asset managers, that is, the type who regularly seek mutual funds for investing in their client portfolios, but with sharia compliance. And there are no “classic” asset managers, the kind observed among the survey respondents, providing sharia-compliant services. As a result, the data infrastructure for investors seeking Islamic asset management does not often meet the standards professionals may expect.

There is an understudied yet large and historic global market for Islamic mutual funds. Little has been written about this market and there is paltry academic research, yet the potential utility to Muslims (and non-Muslims who wish to achieve the same ethical goals) of Islamic mutual fund investing into diversified, globally allocated, optimized portfolios is presumably very large. This research takes one step toward closing the gap between Muslim savers and users of capital.

As with all such studies, most research indicates the need for yet more research. There is still much to learn about each of the asset categories in Islamic mutual funds, in particular determining if there are geographic biases among issuers of Islamic mutual funds. Do Saudis create and manage more equity funds, while Malaysians create and manage more fixed income funds? Are mutual fund families in the UAE more likely to outsource non-local fund management than those in Saudi Arabia? Why are the large majority of existing Islamic mutual funds issued in just two reference currencies, the U.S. dollar (and the dollar-linked currencies of the Gulf Cooperation Council region) and the MYR? Is there space for distributing these funds in other currencies via additional share classes, or would home-grown mutual funds better meet domestic savings needs?

Certainly, the revelations discussed earlier in this book barely scratch the surface of the Islamic mutual funds market and the subsequent construction of sharia-compliant, optimized portfolios in the classic Income, Balanced and Growth strategies typical in the asset management industry. The academic research in this sector is paltry compared to that done on conventional asset management. The mass is thousands of times greater in the latter field. But, with each small step a better platform is constructed for the next level of research.

4. Empirical analysis, research design and methodology

EMPIRICAL ANALYSIS

In Chapter 1 the research gap in Islamic asset management was identified: there do not appear to be any substantive works on multi-asset-class investing with regard to optimized sharia-compliant portfolios. Other scholarly work includes efforts to extract performance indicators from sharia-compliant equity and sukuk indexes in multiple markets and compare them to conventional peers. These indicate mostly a neutral or superior performance (but also a negative one) of sharia-compliant securities in individual asset classes compared to conventional securities. However, because single-asset-category investing is less common and less practical in the real world of asset management—or is a subset of multi-asset-category investing—much of the existing research has no direct correlation to the real-world experience of professional asset managers with global mandates covering multiple asset categories.

Chapter 1 also outlined the history of theoretical achievements in constructing and implementing MPT, with a clearly defined step-by-step path of academic discoveries that led toward a commonly accepted international professional practice. This path began with the introduction of mean-variance testing, of the risk-free rate and of the Capital Market Line to determine the point of optimization for portfolio allocations. Ultimately it is asset diversification that is key to achieving the beneficial results of MPT. It was noted earlier that very little of the asset allocation process relates to religious prescriptions, that is, most of the professional practice called asset allocation is performed mostly through mathematical evaluations operating under constraints imposed by regulators applying “prudent man” principles. In other words, there are no obvious initial activities in asset management that would need to conform to religious dictate.

The focus so far has been on introducing for the first time a global evaluation of the sharia-compliant mutual funds and ETFs universe (the market portfolio), indicating that they are the common tool for asset allocation in important parts of the conventional, non-Islamic asset management industry. Data was extracted from an imperfect data source, then labeled, sorted and

filtered according to criteria commonly used in the asset management industry and enforced by regulators. A subset of Islamic mutual funds and ETFs was established from which one may reasonably create sharia-compliant, globally diversified, optimized portfolio allocations within any of the three major investment strategies.

The empirical analysis begins with the naming of a hypothetical customer of asset management services, then deducing that customer's risk and reward preferences. From this we can create an appropriate investment strategy that meets regulatory standards by matching it to a Client Profile, then create a "Buy List" of securities extracted from the sharia-compliant investible universe using the filtering and sorting techniques detailed earlier. These are the inputs for allocation experiments in a typical portfolio optimization program. The results are examined according to common performance and risk measurements, then compared to conventional peers. The empirical analysis concludes with a discussion of the possible reasons for variance between Islamic and non-Islamic portfolio allocations and their risk and return metrics.

RESEARCH DESIGN: CONSTRUCTING OPTIMIZED PORTFOLIOS

We begin with the hypothesis: "A sharia-compliant optimized portfolio, constructed identically to conventional (non-Islamic) portfolios, will demonstrate superior return and risk characteristics compared to its conventional peers." The hypothesis requires the sharia-compliant portfolio construction to utilize the same inputs as conventional asset management, which begins with identifying the investible universe (commonly comprising mutual funds and ETFs), then sorting and filtering securities based on common rules (size, track record, liquidity, domicile, etc.) adopted by professional asset managers and enforced by regulators.

Once such a shortlisted set of securities has been identified, the next step is to select securities within asset categories that are best suited for the final "Buy List" (see below). Each security in each asset class is measured by a set of common metrics, which includes both risk and return measurements. Securities displaying superior metrics are chosen for the Buy List. An optimization exercise is performed among those selected to provide the allocation by security within the respective asset class. Separately, an optimized macro strategic asset allocation is created using multiple market inputs (the Policy Portfolio), resulting in the allocation of a portfolio by asset category. The sub-portfolios within each asset category are then allocated accordingly.

The process is iterative. Again, portfolios are optimized from a Buy List of securities within each asset category and then among asset categories. Optimization—or the search for those assets whose correlations allow for the

highest return and lowest risk—is blind to whether one is using a collection of securities from one asset category or another. Given there are four traditional asset classes, optimization will therefore consist of five different operations, one for each of the asset classes and then one for all the asset classes combined. While tedious, there is no other path to discovering an optimized portfolio.

One cannot claim that a back-tested Islamic portfolio created today was actively managed in the past. It is by nature static. Therefore, comparing a passive Islamic portfolio over any time period with actively managed ones is problematic. To mimic an actively managed Islamic portfolio, conventional portfolio mutual funds (i.e., mutual funds that are constructed to achieve a similar investment objective) are first selected from among four major global asset managers (UBS, Credit Suisse, Franklin Templeton and Fidelity), all within the Growth investment strategy. These mutual funds are then examined internally to determine their percentage allocation by asset category over time, that is, to tabulate the percentage range of allocation in each asset category at month-end during the examined time period. To provide a close approximation of a duplicate investment strategy over time, the asset categories of the Islamic Growth portfolio will be established precisely at the midpoint of the range found in the comparative portfolio strategy mutual funds from the global asset managers. While this does not replicate an actively managed Islamic portfolio, it does provide changes in allocations among asset categories over time, and within a range that is found among peer globally allocated conventional portfolio mutual funds in the same investment strategy. This is considered a proxy—although not a substitute—for active management.

The text in the sections following describes this process for a sharia-compliant portfolio and is posited to be a near identical process to that used for conventional (non-Islamic) asset allocation. The resulting Islamic portfolio will therefore have very close to identical overall characteristics to its conventional brethren in terms of its construction using professional and regulatory standards that are currently common. And, importantly, the Islamic portfolio constructed is like its conventional peers in that it is entirely built according to the principles of MPT, with means-variance optimization at its core.

The portfolio data will be examined over two time periods, five years and two years (ending 31 December 2017). The Islamic portfolio for the five-year period will by nature have fewer securities available for the Buy List given the less-developed nature of the sharia-compliant investible universe (the total number of securities available was less in 2013 than in 2017), but the resulting optimized Islamic portfolio should be similar enough to a conventional portfolio to consider them peers. The two-year Islamic portfolio will have a richer dataset of securities given that there are more qualifying mutual funds and ETFs than in the five-year scenario.

Both the five-year and the two-year Islamic portfolios will be back tested to their inception dates and compared against the conventional strategy portfolio mutual funds from the four major global asset managers named earlier. Measurements for portfolio risk and return that are commonly found in the asset management industry will be used to make comparisons between the Islamic and conventional portfolios. To test five- and two-year portfolios there are ten optimization exercises in total.

In short, by following professional best-practice, which itself is founded on MPT, the Islamic portfolios should be sufficiently similar in construction that they will fall within an acceptable range of “likeness” when compared to their conventional peers.

CREATING THE SHARIA-COMPLIANT BUY LIST

The Role of the Asset Manager

An asset manager’s first goal in asset allocation is to create a list of securities that meet regulatory and industry best-practice standards from among his or her investible universe, and then to select among those securities those that will comprise his or her “Buy List” of securities, in other words, securities that are shortlisted for actual portfolio allocation in each asset category. As detailed earlier, for a number of reasons, this would involve mostly examining mutual funds and ETFs, particularly if the underlying client (or clients) is not a large institutional investor.¹

An asset manager in the United States given a global multi-asset-class allocation assignment would typically apply the same (or very similar) filtering and sorting criteria described in Chapter 2 to the universe of approximately 10,000 mutual funds and ETFs available in the U.S. market to obtain his or her list of “qualifying” securities, that is, those securities that meet regulatory and industry criteria.² It is not within our scope to assess conventional securities in the U.S. market, but one can assume the number of qualifying securities available for an asset manager in the United States is less than the full number of securities in the global market due to various regulatory and professional constraints. In other words, all or nearly all asset managers do not invest in all available securities. Filters applied to the investible universe are used to satisfy professional and regulatory demands. A constrained portfolio is normal.

The U.S. asset manager with a mandate for globally allocated, diversified, multi-asset-class investing would then need to examine the performance and risk metrics of the surviving qualifying securities, finding those that are the best performing among their peers in each asset category as well as those that meet objective and subjective criteria such as those described in Chapter 2 in the section “Application of Common Professional and Regulatory Filters,

Filters 1 and 2.”³ In the United States this is a relatively straightforward exercise given the data-rich environment for conventional investing, where firms such as Morningstar rate mutual funds by their historic performance, transparency, liquidity and other measures, and where Bloomberg data easily permits the peer-comparison tests vital to this stage of security adoption onto a Buy List. Even with over 2,000 Fixed Income mutual funds and nearly 5,000 in the Equity category this is not a daunting challenge. In conventional asset management, advanced computational tools and reliable data sources support an efficient asset allocation process that can determine a Buy List in relatively short order.

The Process of Shortlisting Sharia-Compliant Securities

Consider now an asset manager given the same assignment but with a sharia constraint. The manager would by nature follow the same steps to obtain a Buy List, beginning with a download to Excel of the sharia-compliant mutual funds and ETFs universe available on the Bloomberg ISLM page, providing 1,176 total securities. As detailed in “Application of Common Professional & Regulatory Filters, Filters 1 & 2” in Chapter 2, these securities would then be subjected to filters based on the same criteria established by “prudent man” regulations and professional best-practice in conventional investing. The result of this process is a set of securities from the Qualified Investible Universe from which one can create a Buy List for final portfolio allocation and optimization.

Identifying the Client and Investment Policy Statement

Before proceeding to security selection and optimization, it is useful to identify a hypothetical client for the subsequent portfolio optimization exercise. This allows one to create an Investment Policy Statement (IPS), whether for individual or institutional clients. The IPS defines the investment strategy the manager will follow in allocating the client’s assets. Managers commonly receive mandates from clients to manage portfolios, and under these mandates the manager may choose when and how to make buy orders and sell orders. Where there are such mandates, regulators require a close match between a formal Client Profile prepared by the manager and the investment strategy chosen for that client. Violation of this matching rule can lead to serious penalties in the asset management industry, where regulators may sanction individual managers or firms found guilty of mismatching client preferences and needs with an inappropriate investment strategy.⁴

We cannot reasonably create a Buy List of securities, therefore, without first thinking about the risk and reward profile of a hypothetical client. Since this discussion is on Islamic asset management for the “common man,” and we

will later compare the results of an Islamic optimized portfolio to conventional peers for “common man” clients in Saudi Arabia, our target hypothetical client will be a Saudi male living in Riyadh, aged 42 and with four teenaged children, where the man has \$5 million in savings he would like to place into global capital markets through a skilled asset manager—such savings entirely gained through inheritance after the death of his father. In our example this hypothetical man already has \$5 million in local and regional investments (for a total net worth of \$10 million), so the financial advisor in this case could be justified in investing entirely outside of the Saudi and Gulf region for diversification purposes (i.e., 50% domestic and 50% international assets, which happens to be the same allocation target as the Saudi SWF). Further, this man today has a \$250,000 annual income, which is expected to be generated continuously until his retirement at 65. It is to be noted (in order for this to be a “typical” client) that the asset manager’s mandate is limited to only global investing. The asset manager can only refer to the domestic and regional investments of the client when considering the client’s overall risk and diversification profiles.

A quantitative and qualitative analysis of the client’s willingness to accept risk, and his expectations for rewards or losses resulting from that risk, are key elements of an ISP. This study does not go into the development of an ISP, although such work is frequently done in the context of asset management (see Abdullah, 2018 for an example of “life-cycle” financial planning for a Muslim individual). Suffice it to say we will make general conclusions based on common sense and industry practice here, giving us guidance on the selection of an investment strategy for this “typical” client, and then on the subsequent selection of a Buy List of securities and finally the asset allocation for this client’s portfolio.

The three main investment strategies are commonly labeled Income, Balanced and Growth. Each represents a position on a scale of risk, with Income investment strategies markedly lower in expected risk than Growth. In between is Balanced, a midpoint between the other two.

The client responds to questions about risk and reward in a survey-like fashion, where he assigns quantitative results to various questions. Among these may be, what is the annual loss you are comfortable with in any one year? Another might be, what is the minimum annual income you expect to receive from the managed account (in percent)? This type of feedback allows the manager to discern the risk–reward matrix the client understands and accepts. It also provides the data that feeds into the construction of the IPS.⁵

In our hypothetical case, we assume the client has affirmed the following basic expectations:

- Investment horizon, not less than five years
- Will avoid drawing down the portfolio for other investments or general expenses

- Minimum targeted annual cash return, 1%
- Can live for two or three years with zero cash return
- Maximum single-year loss, 40%
- Maximum recovery period after maximum loss, 24 months
- Annualized return at maximum investment horizon, 8%.

The above describes a portfolio construction leaning toward a higher level of risk willingness, and an accompanying level of returns expectations. To simplify this we assign a Growth investment strategy (in this case, the client's IPS) to the client, a strategy which will quantitatively display characteristics that match the targets embedded in the Client Profile. The design of the Growth asset allocation is detailed further in the section "Creating the 'Guessed' Asset Allocation and Optimizing within Asset Classes" below.

Removing Securities to Match a Client Profile

Because all of this "typical" client's existing investments are local or regional, we will as much as possible exclude investment securities that are invested in the economies of Saudi Arabia and the Gulf (Bahrain, Kuwait, Oman, Qatar and the UAE), where the client's investments are already heavily allocated (which after final allocation of global securities will comprise 50% of his assets). One obvious reason for excluding local-economy investments is the assumed extremely high correlation between securities markets of petroleum-exporting Arabian states. We therefore satisfy the client's diversification needs by excluding local and regional assets. However, we will not exclude locally domiciled securities that invest outside the region.⁶

Consider the domicile of the qualifying 158 mutual funds and ETFs derived in Chapter 2 (Table 4.1).

The list includes 49 onshore⁷ mutual funds from Saudi Arabia, Kuwait, the UAE and Qatar. Before proceeding, each of these securities needs to be examined so that we may extract those investing in local or regional assets. This filter finds that 13 of the 49 mutual funds from the region are not invested locally but rather entirely in international (non-local) assets. These 13 mutual funds and ETFs are preserved while the remaining 36 are removed.

Onshore mutual funds and ETFs from such domiciles as Malaysia and South Africa must further be examined. We know in advance that, for diversification purposes, the subsequent allocation of this "typical" client's portfolio will include a sector dedicated to equities and other asset categories in emerging markets.⁸ Since those mutual funds and ETFs selected to represent emerging markets in the client's portfolio will already contain components for Malaysia and South Africa (and other emerging economies), and because it is not reasonable to take direct positions in these local markets,⁹ we will remove

Table 4.1 *Geographic distribution of Islamic mutual funds*

Country	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
Malaysia	69	43.67%	17,194.20	37.06%
Saudi Arabia	44	27.85%	16,164.79	34.84%
Luxembourg	16	10.13%	2,609.61	5.63%
Ireland	11	6.96%	5,507.97	11.87%
South Africa	7	4.43%	1,105.94	2.38%
United States	5	3.16%	3,374.39	7.27%
Kuwait	2	1.27%	185.61	0.40%
UAE	2	1.27%	116.49	0.25%
Qatar	1	0.63%	88.10	0.19%
Jersey	1	0.63%	43.99	0.09%
Totals	158	100.00%	46,391.09	100.00%

Source: Author's work, data from Bloomberg.

Table 4.2 *Islamic mutual funds by country after geographic filtering*

Country	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
Malaysia	17	26.56%	2,608.65	16.96%
Luxembourg	16	25.00%	2,126.18	13.83%
Saudi Arabia	11	17.19%	1,171.61	7.62%
Ireland	10	15.63%	5,292.84	34.42%
United States	5	7.81%	3,374.39	21.94%
South Africa	3	4.69%	688.95	4.48%
UAE	2	3.13%	116.49	0.76%
Totals	64	100.00%	15,379.10	100.00%

Source: Author's work, data from Bloomberg.

onshore, domestically invested Malaysian and South African (and other emerging market) mutual funds and ETFs from the list. Here we start with 76 securities and find 20 that qualify for admission onto our Buy List.

For this hypothetical client, at least, our investible universe has shrunk significantly (Table 4.2).

The number of qualifying securities that may comprise our Buy List has shrunk by 59%, while AUM of the remaining securities is almost 70% less than the original amount. We now have a much smaller universe for constructing our Buy List, but in the filtering and sorting process we adhered

to “prudent man” regulations and professional best-practice common in asset management.

The remaining 64 securities (mutual funds and ETFs) operate in markets with limited or no exchange controls, and may be purchased by international investors. They also may be considered prudent and appropriate for our hypothetical client.

The same line of reasoning would apply if the hypothetical client was a resident of Malaysia. In those cases onshore investing in other jurisdictions may be acceptable, while still the exclusion of Malaysian securities would be maintained due to the probable high existing concentration of Malaysian assets owned by the client. In other words, altering the qualifying list of securities will affect each hypothetical client differently, with removals of securities from the qualifying list different in each case.

The Final Set of Investible Securities

The availability of accurate historic data is key to any analytical exercise. The earlier mentioned 64 qualifying securities need to be examined for their available historic data, in particular price movements. In examining the 64 candidates, it is discovered that 7 are less than five years old, that is, their inception dates were after 1 January 2013. These 7 securities, therefore, will not be available for the five-year portfolio construction and subsequent analysis.

This leaves 57 securities with almost \$15 billion in AUM that qualify for possible addition to the five-year portfolio (Table 4.3).

All the above securities have at least five years of track record according to our minimum filtering criteria. However, in this chapter we will be processing both five- and two-year analyses of the individual securities and the optimized portfolios, and then comparing these portfolios in both five- and two-year time frames with conventional ones. Digging further into the Bloomberg data

Table 4.3 Islamic mutual funds after all filters, five-year track record

Asset Category	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
Money Market	7	12%	1,171.19	7.86%
Fixed Income	13	23%	1,332.43	8.94%
Equity	26	46%	6,850.74	45.97%
Alternative	7	12%	5,099.98	34.22%
Mixed Allocation	4	7%	448.43	3.01%
Totals	57	100.00%	14,902.77	100.00%

Source: Author’s work, data from Bloomberg.

Table 4.4 Islamic mutual funds after all filters, two-year track record

Asset Category	Number of Funds	% of Funds	AUM (\$ Millions)	% of AUM
Money Market	8	13%	1,235.49	8.03%
Fixed Income	16	25%	1,697.49	11.04%
Equity	29	45%	6,897.71	44.85%
Alternative	7	11%	5,099.98	33.16%
Mixed Allocation	4	6%	448.43	2.92%
Totals	64	100.00%	15,379.10	100.00%

Source: Author's work, data from Bloomberg.

we discover several investment securities created after 1 January 2013. We segregate the securities accordingly, one for the full five-year analysis and the other for the two-year analysis. The securities with two years of track record are shown in Table 4.4.

At this point there are a still a relatively abundant number of funds in each asset category competing for our investment, in particular those with at least two years of operating history. We will use this information to compare and contrast securities in each asset class to determine those that are most appropriate for investing, where "appropriate" means those securities with the highest historic performance and lowest historic risk, assuming those characteristics will be maintained in the future.

Common Measurements of Security and Portfolio Return and Risk

For measuring return and risk characteristics, this study uses metrics common in the industry, as follows:

MEASURE	BRIEF DEFINITION
RETURN MEASURES	
Total Return	The total return of an investment is calculated by taking its ending value, adding all dividends and other income from an investment to the ending value, and then dividing the total ending value by the initial value of the investment.
Maximum Return	Maximum Return is defined as the highest return of any period when measuring investment returns over multiple periods. If returns are measured monthly then Maximum Return is that return on an investment during one month that was the highest of any of the monthly returns being measured.
Minimum Return	Minimum Return is defined as the lowest return of any period when measuring investment returns over multiple periods. If returns are measured monthly then Minimum Return is that return on an investment during one month that was the lowest of any of the monthly returns being measured.

MEASURE	BRIEF DEFINITION
Annualized Return	<p>Annualized return is the geometric average of returns over an investment period and includes the concept of compounding returns over time. It is the discount rate that allows for the present value of an investment to equal the future ending value, or</p> $\text{Annualized return} = ((1 + R_1) \times (1 + R_2) \times (1 + R_3) \dots \times (1 + R_N))^{1/N} - 1$ <p>where R is the return for each given year, and N is the number of periods measured.</p>
Mean Excess Return	<p>The difference between the annualized mean return of a security (or portfolio) A versus security (or portfolio) B, where B is the reference from which measures are being made, often referred to as a benchmark.</p>
RISK MEASURES	
Standard Deviation	<p>Standard deviation measures the dispersion of data points around the mean value of a set of data. Distance is measured from each data point to the mean of the data. The distance is squared, summed and then averaged. A high standard deviation for a security indicates a wide dispersion of its price over time, meaning higher expected risk.</p>
Skewness	<p>Skewness measures asymmetric data distribution, or the weight of data to the left or right of a mode (the point of greatest observations). For example, if the mean and median of a dataset are to the right of the mode, then the data is negatively skewed. Securities with frequently increasing prices will be skewed left, implying a long tail to the left, and vice versa. Skewness is considered in establishing probability of outcomes.</p>
VaR at 95%	<p>Traditional volatility measures consider both upside and downside price movements. Most investors consider only downside risk. Value at Risk measures time, confidence and value of losses. Confidence is generally at 95%. "X% VaR at 95%" means with a confidence level of 95% an investment will not lose more than X% of its value in a given time period. Confidence can be measured either using non-normal historic data placed directly into a histogram or by normalizing the data by taking the standard deviation of historic returns to create a normal distribution curve.</p>
Tracking Error	<p>Tracking error is equal to the standard deviation of the difference between a security's (or portfolio's) price and its benchmark. Tracking error helps an investor understand the potential difference in future price comparisons between a security (or portfolio) and its benchmark. A mutual fund that has a low historic tracking error means its returns are very close to the benchmark returns, giving an indication of the probability of the low tracking error results continuing in the future. A high tracking error indicates (assuming normal distribution of returns) that the fund's returns vary widely from the benchmark.</p>

MEASURE	BRIEF DEFINITION
RISK vs. RETURN MEASURES	
Sharpe Ratio	<p>The Sharpe ratio measures risk-adjusted returns by calculating the average return earned in excess of the risk-free rate per unit of volatility. It is one of the most widely used measures of risk-adjusted return. The Sharpe ratio is calculated by measuring mean asset or portfolio return less a risk-free rate, and dividing the sum by the standard deviation of the portfolio return. Subtracting out the risk-free rate from mean returns and dividing by volatility (standard deviation) allows for measuring additional profits for given units of risk. A higher Sharpe ratio indicates a security (or portfolio) has achieved a higher return above the risk-free rate, implying superior risk-adjusted performance when compared to a security (or portfolio) with a lower Sharpe ratio.^a</p>
Jensen's Alpha	<p>Jensen's Alpha attempts to measure the risk associated with a security (or portfolio) against the security's (or portfolio's) return during a given time period. To achieve this it considers predicted return conditioned by a security's (or portfolio's) Beta and benchmark return. The formulation of Jensen's Alpha is</p> $= R(i) - (R(f) + B \times (R(m) - R(f)))$ <p>where R(i) is realized return, R(m) is the market (or benchmark) return, R(f) is the risk-free rate and B is the Beta (see below) to the benchmark.</p>
Information Ratio	<p>Similar to the Sharpe ratio, the Information ratio attempts to measure the amount of risk taken to achieve a certain level of return. In other words, it measures a security's (or portfolio's) return above a benchmark against the volatility of those returns. The Information ratio allows one to measure the consistency of return, that is, it answers the question of whether the return exceeded (or was lower than) the benchmark by a lot in a short time, or in small increments over time. The formulation of the Information ratio is (Portfolio Return – Benchmark Return) / (Standard Deviation of (Portfolio Return – Benchmark Return)) (the denominator also called the tracking error). While the Sharpe ratio sums the difference between an investment's return and the risk-free rate, then divides by the volatility of an asset's return, the Information ratio takes the sum of an investment's return less the investment's index, and divides by the tracking error (the standard deviation of the difference between the investment's return and its index). In other words, the Information ratio is another and perhaps more accurate measure of an investment's performance and risk against its index.</p>
Treynor Ratio	<p>Like the Sharpe ratio, the Treynor ratio or measure helps one to understand the tradeoff between profit and risk in an investment. It measures the difference in return between a security (or portfolio) and riskless assets. The measure is calculated by taking the measured return of an asset (or expected return) less the risk-free rate, and dividing the sum by the asset's Beta (see below).^b</p>

MEASURE	BRIEF DEFINITION
Beta (ex post)	<p>Beta is a measure of a security's (or portfolio's) price movement compared to a benchmark. It involves measuring the magnitude of movement against a comparison movement, indicating the volatility, or risk, of a target against the benchmark. Beta is measured as the covariance of two measurements (e.g., a security and its index) divided by the variance of the second measurement. A high Beta (greater than 1) indicates that a security has more volatility (risk) than its index, meaning it has greater systematic (undiversifiable) risk.</p>
Correlation	<p>Correlation is the degree to which the prices of two different securities (or portfolios, or benchmarks) move respective to each other. Positive correlation indicates the price movements are similar, while negative correlation indicates the price movements are opposite. No correlation indicates the movements are unrelated. Investors seeking diversified portfolios require low-correlated or non-correlated assets to achieve optimization. Correlation is calculated by taking the sum of the data series for two securities, X and Y. Each data point in X and Y is then squared and summed. The correlation coefficient between X and Y is then calculated as</p> $\frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$ <p>A correlation of 1 means the prices of the two securities move in perfect harmony with each other. Less than one means they are somewhat uncorrelated, zero means they are completely unrelated price movements and negative indicates they move in opposite directions. Asset managers seek to diversify portfolios by combining securities that are non-correlated or uncorrelated (a key element of portfolio optimization).</p>
Capture Ratio	<p>There are both up- and down-market Capture ratios, indicating the relative performance of a security (or portfolio) to respective up or down benchmarks, such as a market index. The Capture ratio is measured by taking the nominal value of a target measure and deducting the nominal value of a reference measure, then multiplying by 100. For example, if security A had a 5% return, and market or benchmark returns were 2%, then the Capture ratio would be $(5 - 2) \times 100$, or 300 (equal to $((5 - 2) \times 100)$). In measuring up markets, a fund manager who exceeds a 100 Capture ratio is beating his or her index. In down-market measures, a manager who achieves less than a 100 Capture ratio is beating his or her index; for example, a fund manager with a 70 Capture ratio in a down market means his or her fund only suffers 70% of the amount of decline of the down market.</p>

Notes:

^a It is not within the scope of this study to discuss the problem with asymmetric distributions and the Sharpe ratio, nor the use of standard deviation as a risk metric.

^b As opposed to dividing by standard deviation to measure market risk.

The earlier list is only a portion of the full array of metrics available to asset managers for measuring portfolio return and risk. Additional common measures include Pain ratio, Pain index, upside and downside Omega, Kurtosis and others. However, these are considered a sufficient variety of commonly used measures to obtain indications of historic portfolio performance and risk. Such historic data allows one to place a security or portfolio in the context of estimating future returns and risks, the key driver of MPT. However, as in all cases of asset management, these metrics are calculated on past performance. No measure has yet been devised to accurately predict the future. As such, all such portfolio measurements only approximate the future based on the past, which is a less-than-perfect method of prediction.

Security Selection Within Asset Classes

Armed with the data mentioned earlier we can now examine the 57 mutual funds and ETFs that survived our defined screens and filters, permitting the examination of each security individually and among peers within each asset category.

Using specialized software on Bloomberg,¹⁰ the surviving 57 mutual funds and ETFs are placed in columns where they may be examined against a relevant benchmark, measuring the earlier mentioned factors on an individual security basis and comparative basis. The results indicate those securities with historically superior or inferior return and risk characteristics.

The first goal is to identify whether any securities may be excluded from a final optimization calculation based on certain criteria. We can include here a range of historic performance and risk that is considered “tolerable,” meaning the range is within the parameters needed to achieve the expected future returns of a Growth portfolio. In other words, any security can be rejected if it displays annualized historic returns well below required expected returns, as the probability of achieving expected returns above historic annualized returns is low (there being no changes at the level of management and administration of the security in question).¹¹

Money Market, five-year observations

Money Market investment products in Islamic asset management comprise short-term contracts, typically in one or more commodity markets and often through a murabaha agreement, where the bank or mutual fund acts as an agent for the purchase and resale of an asset on a cost-plus basis. There are numerous ways to build a portfolio of such contracts, but typically they are created through large commodities exchanges such as the London Metals Exchange, or through direct inventory or similar short-term asset finance with large companies. Underlying assets can be steel, precious metals, oil or other

similar liquid, globally marketed basic materials. These short-term murabaha contracts are bundled into a mutual fund structure. Among their sharia features is that they are ultimately based on real underlying assets, not simply corporate commitments to pay.

In the five-year data we observe that two Money Market mutual funds had performed substantially lower (-9.76% and -12.43%) compared to their peers, and well below the benchmark (2.72%). Both are referenced in MYR, so evidently they suffered substantial foreign exchange losses to the USD reference currency used here. Furthermore, the same funds show similar negative underperformance in the two-year data. Given persistent and substantial negative historic performance and assuming no other changes to management or administration, there is a possibility that these funds will continually underperform in this category. They are therefore rejected as potential mutual fund candidates for our final Islamic Growth portfolio allocation.

Selecting among the remaining three candidates requires further analysis of performance and risk. For two of the three remaining funds we see superior performance to the benchmark. To obtain more a meaningful understanding of how the three candidate securities will react to optimization, four measures will be described: Sharpe ratio, Information ratio, correlation and Capture ratio. All four are conveniently available from the Bloomberg data.

One security, the Al Rajhi commodity fund, stands out with a Sharpe ratio more than three times that of its neighboring Al Ahli fund and over 2.5 times the Emirates NBD fund. The other two are substantially lower than the Sharpe ratio of the index. This indicates a superior risk-adjusted return of the Al Rajhi fund compared to its peers.

Similarly, the Al Rajhi commodity fund has extraordinary outperformance to its peers when measured by Information ratio. Whereas Sharpe ratios are essential to understanding the tradeoff between risk and returns between assets, the Information ratio gives one a similar risk-adjusted return measure when compared to a benchmark, in particular the asset's ability to beat a benchmark over time. In this case the Al Rajhi fund has substantially outperformed its peers.

Examining correlation, the Al Rajhi fund is negatively correlated, while the Al Ahli fund is very lightly correlated and the Emirates NBD more positively correlated to the reference index. These variances in correlation indicate the potential for added diversification benefits.

Measurements of Capture ratio on Bloomberg are done on an average daily basis, and measure both upside and downside capture. The Capture ratio for the Al Rajhi and Al Ahli funds during the five-year period were closely matched at an unimpressive one third, while the Emirates NBD fund Capture ratio was near the 0.60 level where manager skill is more evident in "capturing" upside movements. We note here that Money Market funds are by nature

very low-risk investments, meant to substitute for cash in most portfolios, and therefore downside capture is not as relevant. In this regard, one can note that for all three funds the Treynor ratio is near zero (identical systematic risk) and Minimum Return is at zero (or near zero).

Given the above, it is evident that the subsequent optimization exercise will likely select the Al Rajhi fund as the dominant asset within the Money Market sector of the Islamic portfolio, although the diversification benefits evident in the data may cause the inclusion of one or both of the remaining funds in the final portfolio allocation.

Fixed Income, five-year observations

In examining the eight Islamic Fixed Income funds that have survived our screening and filtering, one must first recognize that these all comprise mostly investments in sukuk, or Islamic bonds. Sukuk are fixed-income-like securities that behave much like bonds, but their legal structure does not allow for straight interest payments as bonds do. Sukuk (singular in Arabic is *sak*) have been the subject of heated debate among Islamic scholars, with the Accounting and Audit Organization of Islamic Institutions (AAOIFI, a quasi-regulator of sharia standards in finance) declaring in December 2007 that the majority of sukuk then outstanding was in violation of sharia principles.¹²

In the last decade much progress has been made in harmonizing rules governing sukuk, and today there are few securities in this category that do not comply or at least pay attention to the earlier and subsequent AAOIFI rulings. While sukuk have been made to harmonize more with sharia, they occupy a space in the Islamic asset universe that has performance and risk characteristics very similar to conventional bonds.

We keep this in mind when we consider the performance and risk measurements of the eight Fixed Income funds that have survived our screening and filtering. Standing out among the measures is the substantial underperformance of the three funds reporting in MYR and comprising mostly sukuk issued in that nation's currency (until recently about two thirds of all sukuk were issued in the Malaysian market). Given that each has indicated substantial losses in the five-year recorded period, mostly due to changes in MYR to USD, and given the difficulty of hedging against ringgit volatility for a "small" portfolio (in our case \$5 million, where Fixed Income would only represent at most \$2 million in a Growth strategy), these three funds are immediately excluded from the final selection due to the potential for ongoing foreign exchange rate risk.

Among the remaining five, two have at or above index performance (EFH Global sukuk and Azzad Wise). The other three experienced slight to substantial underperformance compared to the index. All five experienced relatively mild Minimum Return (the measure of the worst monthly performance during the 60-month period), ranging from -2.04% to -0.71%, a reflection of the

inherently lower-risk nature of fixed-income investing (as compared to Equity or Alternative investment categories). Of note, only the Azzad Wise fund displayed positive mean excess return on an annualized basis (meaning return above the index). On a total return basis the Azzad Wise and EFH Global sukuk funds showed superior performance.

The tight total return performance range for three of the five funds leads us to a deeper analysis of non-return measures. In seeking Sharpe ratio measurements one looks for the highest results, and here the picture becomes cloudier. The BNP Paribas Hilal fund achieves the highest Sharpe ratio of 2.36, while the Azzad Wise and Emirates Global sukuk funds come joint second at about 20% less. At the same time both are above the index's Sharpe ratio (displaying potential superior risk-adjusted returns). The EFH Global sukuk fund is at near par with the index, while the Jadwa sukuk fund trailed significantly behind.

Measures of Information ratio add confusion. Only the Azzad Wise fund registers positive at a healthy 0.46.¹³ The Information ratios coming in at less than zero for the other four funds indicate they produced no excess return above their benchmarks whatsoever, a compelling and important negative measure.

The Jadwa and EFH Global sukuk funds indicate relatively low correlation. The Emirates, BNP Paribas and Azzad funds are much more correlated to the index. The very different ranges of correlation indicate the potential for manager style variation, which could be an indicator of the potential diversification benefits of holding more than one of these five funds.

The relatively high annualized mean return of the index (4.68%) during the 60-month period indicates a generally bullish market for sukuk. Bullish markets attract investors around top-performing managers. Among the five managers, three were closely bunched when it comes to Capture ratio, indicating similar manager fortunes in capturing upside movements relative to the index. The Jadwa and EFH Global funds, however, indicated low capture, meaning they were unable to "beat their index" despite a generally bullish market during the observation period.

The five sukuk funds will be subsequently subjected to an optimization exercise. It is assumed given their relatively wide range of correlation and performance that the Azzad Wise fund will get a predominant placement, but unlike the position of Al Rajhi in the optimized Money Market portfolio, the Azzad Wise fund will not overly dominate the optimized Fixed Income portfolio.

Equity, five-year observations

Islamic equity mutual funds invested internationally comprise listed market stocks on recognized exchanges. Like their conventional brethren, Islamic equity mutual funds come in a number of varieties. But unlike conventional

equity funds, Islamic mutual funds are few in number and have a much narrower range of fund investment strategies and geographic targets.

The criteria for sharia compliance of stocks is relatively straightforward. Generally, the underlying company cannot be involved in activities considered to be against sharia, the well-known restrictions on alcohol, gambling, pork and weapons. While the number of companies excluded from popular indexes (e.g., the Dow Jones Global Islamic Market Index) because of their non-sharia activities (apart from financials) is not publicized, it is believed to be small, perhaps not more than 5% of all listed companies. Further sharia screening measures include a maximum amount of balance sheet leverage (usually 25% or 33%) and maximum amount of balance sheet cash (often 5%).

Sharia compliance also includes a prohibition against conventional financial activities, which excludes all banks, non-bank finance companies and insurance companies. Global market capitalization is now at about \$76 trillion.¹⁴ The Dow Jones Global Broad Market Index indicates that financial services comprise 18.1% of its total, indicating that as much as \$13 trillion of global markets are removed by sharia screens.

While there is no public source of information on the global market capitalization of sharia-compliant stocks, it is assumed to be at least 40% of global market capitalization, making sharia-compliant stocks worth at least \$30 trillion at the end of 2017.¹⁵ Few of these companies actually know they are sharia compliant, as typically the shareholders and managers are not informed of this fact. However, Islamic equity indexes are available directly (for a fee) from Dow Jones, MSCI, FTSE and others, such as IdealRatings which applies additional ESG and SRI ratings.¹⁶

While the Islamic equity mutual fund and ETF market is dominated by domestically or regionally invested securities (e.g., Saudi-domiciled equity mutual funds invested entirely in Saudi stocks, or in markets of the immediate region), there are 26 with at least five-year track records that invest outside their national and regional equity markets. These comprise ten that define themselves as investing in global markets, three invested only in the United States/North America, three that invest in Europe, one in emerging markets and nine in Asian markets. Combined, this selection covers nearly all the planet's equity capital markets.

None of these 26 securities are excluded due to poor performance or missing data. All meet the minimum required return and risk expected from professionally managed investment products. They represent five different types of equity investing based on geography: World, North America, Europe, plus Asia and Emerging Markets. Alternatively, they can be broken down into developed economies (North America, Europe and Japan) and developing economies (Asia and rest-of-world). There will be overlap between World and North America, as the U.S. market comprises 58% of global market cap-

italization¹⁷ despite having only 17% of company shares listed on exchanges worldwide.¹⁸ Managers with global mandates will respect ratios of global market capitalization, usually with representative shares of major markets in their portfolios (e.g., where allocations match the percentage of global market capitalization for each major market: North America, Europe and Emerging Markets). The same would be true between World and European mandates. Any mutual fund labeled “World” would be expected to have at least 50% or more of fund assets invested in only the United States and the European Union.

As noted, those securities covering global equities were mostly invested in North America, and within that region mostly in the United States. Still, because these funds technically have global opportunity sets, they are measured against global equity indexes. Among them there is a broad range of total returns, from 32.71% to 121.3%—a wide dispersion. The highest performer among them had almost four times the annualized mean return of the lowest, but with only 41% more standard deviation of the latter. Except for the Franklin Templeton Global Equity Fund, Sharpe ratios were relatively tightly bundled for the lower six performers at 0.80 to 0.95, while the top two performers enjoyed the highest Sharpe ratios at 1.35, indicating that their performance was achieved on a more efficient risk-adjusted basis. The Capture ratio for nine of the ten were relatively tightly bundled between 0.75 and 1.03, with one outlier at 0.30. This same outlier was also the lowest in correlation, with half or less than that of the other nine. This could indicate the manager’s failure to allocate more closely to his or her index, or making off-index investment choices.

It should be noted here that those five funds specifically labeled as “global equities” (i.e., Aberdeen, iShares, Aljazira, HSBC and Templeton) will likely contain developing market equities in some proportion near to the weight of emerging markets equities to global market capitalization. In other words, while these funds have a preponderance of developed market equities, there is some emerging market exposure in them. Since the performance of the developed and developing market components of these funds cannot be decomposed, we will ignore here the possible contribution to performance and risk that the two components—developing and developed market equities—produce for the subsequent optimized portfolio.

In this vein, there is only one investment product representing emerging market equities, an ETF. However, seven cover Asia, although they are divided into sub-categories: Asia ex-Japan, Asia Pacific, China and Japan. Among these are both dynamic, young Asian economies and more mature ones, giving a relatively broad access to the entirety of more-developed Asian equity markets. Here the Asian securities are bundled with the emerging market security, as most Asian economies (with the exception of Japan) are somewhere within the emerging markets category, and Asian shares comprise over 70% of all emerging market capitalization.

Total returns among these eight funds (Emerging Markets and Asia) ranges from 16.2% to as high as 97.33%, or six times the lowest return. Minimum Returns, however, are more clustered with a range of -3.81% to -8.47%. Annualized mean returns reflect the distribution of total return and average a healthy 9.13%. The Japan fund is the only one of the eight to cover a developed market. It also witnessed the highest return during the measurement period (97.33%), barely above its national index.

As for standard deviation, we see a tight range between 11.44% and 14.88%, indicating that all eight managers had similar risk profiles during the observation period. Sharpe ratios have a wider distribution, ranging from 0.28 to 1.05 (compared to Fixed Income and Money Market this indicates the much higher tradeoff between risk and return expected for equity investing). At the same time, there are two funds with a positive Information ratio (a measure of excess returns compared to a benchmark and the consistency of those returns).

Correlation of the one Emerging Market security is 1, which is unsurprising since it's the only ETF in the selection. Correlation among the Asian securities ranges from 0.31 to 0.80, indicating opportunities for diversification within this general asset category.

The three North American-focused funds matched their Asian/emerging market counterparts in standard deviation, but had dramatically higher Sharpe ratios, indicating a superior risk–reward tradeoff between these two investment regions. Total return among the three was mixed, with one being below, one at and one above the respective benchmark. This is surprising as each are exchange-traded products that are meant to capture the return of their underlying benchmarks. The SC U.S. Equities Passive ETF had a generous 16 percentage points above its benchmark. It was the only one among the three with a positive Information ratio, correlating with the return to indicate that excess return was achieved. The negative figures for Information ratio among the other two indicates that they were unable to produce excess return.

The two highest-performing North American securities had, unsurprisingly, the highest Capture ratio. Indeed, 9 of the 11 securities that were entirely or majority invested in North America enjoyed high Capture ratios, from 0.75 to 1.03. No other region came close to this consistently high level of Capture ratio, indicating a superior ability to gain much of the market upsides in these markets.

The two European equity funds (quoted in USD) had bifurcated returns (12.07% and 34.68%), indicating impressive outperformance by the latter as a managed fund versus the former's status as an ETF. Unfortunately, for these two securities Bloomberg suppressed index data (normally available, but for a fee), so other measurements were not possible. Given the key role of European equities in globally allocated portfolios they will both be retained for subsequent asset category allocation.

While not great in number, the selection of sharia-compliant equity investment products does comprehensively cover much of the global equity market. For subsequent portfolio optimization exercises, this set of equity products will be divided into two, one for developed markets (U.S./North America, Europe and Japan) and another for developing markets (Emerging Markets, Asia ex-Japan, Asia Pacific). Optimization will be done within each of the two categories and then, combining the results of the two, will optimize again to give the final optimized equity portfolio that will be used inside the Islamic Growth portfolio.

Alternatives, five-year observations

Alternative investments in conventional asset management (i.e., asset management constrained by regulators to avoid illiquid investments, or allowing zero or only a small portion of an allocation in illiquid investments) generally means hedge funds, but also commodity funds, structured products (which are produced from derivatives), liquid real estate funds (primarily real estate investment trusts, or REITs), foreign exchange funds and essentially any kind of fund that cannot fit within one of the other three baskets (Money Market, Fixed Income and Equity).

Fifty years ago there was almost no concept of Alternative Investments in the asset management industry. Today industry practitioners regularly review and evaluate Alternatives as a fundamental component of portfolio investing. The underlying rationale is correlation, or the ability to deliver returns less correlated, uncorrelated or negatively correlated to traditional asset markets like cash, bonds and stocks. A 2015 report from Strategy& predicts the then \$10 trillion market for Alternatives will grow to \$18 trillion by 2020.¹⁹

A part of the growth story for Alternative Investments may be fees, where the asset management function is generally priced much higher than in traditional mutual funds. One report predicted that by 2020 Alternatives will comprise 15% of the global asset management industry's assets, but will command 40% of the industry's revenue.²⁰

The Islamic mutual fund and ETF space is already small relative to that of conventional investment funds. In the Alternative space the difference is more pronounced. Among the funds that meet our filtering and sorting criteria mentioned earlier, including a five-year track record, are only five investment products (two meet all other criteria, but do not report more than three years of data on Bloomberg).

Of these five, four are precious metal ETFs from one product provider and one is a global real estate investment fund. There is, in other words, a distinct lack of diversification available in the global Islamic mutual fund industry for Alternative Investments.

Examining the first four, the precious metal ETFs, reveals that they all had total returns and standard deviations nearly identical to their indexes. Average correlation to their indexes was a relatively high 0.73 while the average Capture ratio was also a relatively high 0.69. Sharpe ratios were also tightly clustered around their respective indexes, and all had Information ratios near zero.

The one Alternative not among the commodity ETFs is the SEDCO Capital Global Real Estate Equities fund, which purchases stocks and real assets in major real estate markets worldwide, but primarily in highly developed markets. Avoiding almost all development, the fund seeks to buy yields from rentals, choosing a wide variety of real estate products.

The SEDCO real estate fund trailed its index by nearly ten percentage points for the five-year period, yet did so with nearly identical standard deviation. A Beta of 0.78 implies that the fund achieves its returns with less volatility than the global real estate markets.

The subsequent asset allocation exercise will determine the allocation of securities in each asset category. For Alternatives, the choices are scant, and for four of the five securities the assets are highly homogeneous, meaning among them there are few diversification opportunities. The resulting Alternatives allocation will likely result in a mix of one or two commodity ETFs, plus the diversification allowed by the SEDCO real estate fund.

Mixed Allocations, five-year observations

Mixed Allocation Islamic mutual funds are problematic as by nature they cannot be placed directly into any single-asset category basket. They are by definition multi-asset, sharia-compliant portfolio investing of the type being reviewed here. In fact, this study is an effort to duplicate the efforts of the Mixed Allocation funds but within the confines of academic research and professional best-practice.

The Old Mutual Albaraka and Kagiso Islamic Balanced mutual funds are administered and managed by onshore South African asset managers, and primarily sold to South African Muslims for their long-term retirement savings plans. While technically they could be acquired by an international custodian for an account outside of South Africa, presumably many custodian banks would refuse to accept this purchase unless there was a very large purchase order. Further, for investors resident outside South Africa the purchase of these funds would require some form of tax declaration and presumably withholding taxes.

That said, the two funds are clearly constructed using MPT and are allocated accordingly in Cash, Fixed Income, Equity and Alternative Investments. By all appearances they appear to be managed and allocated equivalently to their

conventional (non-Islamic) peers, for example the global investment strategy mutual funds from credible asset managers.

The Al Ahli Multi-Asset Growth mutual fund appears to be more or less identical, too, except it is primarily targeted toward onshore Saudi residents seeking the benefits from global diversification in multiple asset categories. However, the Al Ahli fund differs from the others in one key area: it lacks independence. This is evident in its asset allocation. The fund is completely allocated to other Al Ahli mutual funds. The global asset allocation is achieved by directing the Multi-Asset Growth fund's investments toward Al Ahli funds in European equities, U.S. equities, Asia-Pacific equities and emerging market equities, as well as both sukuk and trade finance murabaha funds, all managed by Al Ahli (or, for non-Saudi assets, by Al Ahli's dedicated foreign partners). While this kind of in-house investing may be the norm in some emerging market jurisdictions, the Saudi regulator may not be aware of the "prudent man" restrictions enforced in developed jurisdictions, where open architecture²¹ is mandated by regulators when a client's funds are under a discretionary portfolio mandate. Independence, the foundation of open-architecture investing (and the primary reason for "prudent man" rules enforced by regulators), is absent.

The four Mixed Allocation mutual funds were matched against a synthetic benchmark: 5% three-month LIBOR, 40% Dow Jones sukuk Index and 55% Dow Jones Global Market Index. The synthetic benchmark is considered to be in line with numerous asset allocations for Balanced investment investing (also called Moderate by some asset managers).

Immediately it becomes clear that reporting on and investing in South African rand-denominated investments in the Old Mutual and Kagiso funds has heavily impacted their five-year performance. While these securities are also exposed to international markets, the rand-centric portfolios make them unsuitable for our hypothetical investor. The two funds are therefore rejected.

The Al Ahli fund, while violating regulatory standards for independence, was initially considered as it has size and a track record, and it was subject to optimization even though the optimization was being done only on Al Ahli's own investment products. Despite its reporting currency in USD and heavy weighting toward USD-referenced assets, the fund's performance was so far below the reference benchmark that it was rejected as a potential input for further optimization.

The Dana Takaful security was founded in 2006 to give Malaysian investors the opportunity to benefit from multi-asset portfolio investing. However, being focused on the local market in local currency, it does not achieve a full global allocation matched to market capitalization, and is therefore rejected from further consideration.

Unfortunately, while each of these funds purports to seek the same objectives as this study's goals, that is, creating an optimized, global, multi-asset Islamic portfolio, none was able to allocate assets or achieve performance within credible limits. Three of the four suffered own-currency losses that makes them unsuitable for international investors, while the fourth suffers a lack of independence that automatically disqualifies it for inclusion (as well as extremely poor performance by any standard).

Creating the “Guessed” Asset Allocation and Optimizing Within Asset Classes

There are now shortlisted securities (Buy Lists) in each asset category that are considered suitable for investing, that is, they have survived the initial filters and screens applied for general security selection, and have been investigated more deeply for their individual characteristics within each asset class. They also, of course, meet professional and regulatory standards as previously identified.

The next step is to pursue the iterative process of creating discrete optimized portfolios within each asset category. Such portfolios will consist of those sets of securities that optimize the parameters of risk and return established for each category. These optimized sub-portfolios will later be used to create an optimized portfolio containing all asset categories.

The optimized portfolio theoretically is the set of securities, established after examining the correlation coefficients of each individual security and making all possible matches of the securities in question, that delivers the highest expected return with the lowest expected risk. This must be done within the framework of the IPS in order to constrain the portfolio, that is, to be able to reduce the set of investible securities to those that make positive contributions to optimization yet do not violate the rules of the asset manager.

Ideally investors would invest in the entire universe of investible securities to establish their global market as per Sharpe (1964) and Black and Litterman (1992), where investors should consider all available investments (the market portfolio) for the construction of their optimized portfolios. Such investors with access to the global market can establish their own expectations for risk and return, and use them for means-variance optimization.

But the global investible universe is large and crossing borders is often no easy task for most investors, in particular the “common man.” No public source estimates the total number of investible securities globally, but it may be assumed to be at least 1 million in stocks, bonds, mutual funds, ETFs, American depository receipts (ADRs), global depository receipts (GDRs) and the like available on formal exchanges and in over-the-counter (OTC) markets worldwide. Investor access to these markets is variable. Some markets make

it easy to cross borders, or bring securities to offshore markets using GDRs or ADRs, as well as onshore and offshore mutual funds that invest in various international markets from centralized locations amenable to global investors (e.g., Dublin and Luxembourg). Others require a large initial investment, or specialist access that only institutional investors can afford. What is true, however, is that the imperfect structure of the global capital market makes access to all securities improbable today for all but well-endowed investors. This is the first constraint to achieving portfolio optimality.

We also consider investors who by nature impose additional constraints. Many funds that are managed on behalf of religious organizations (Catholic Church, Methodists, etc.), SWFs, pension funds and many endowments have signed up to international and national treaties or agreements that forswear investing in what are considered immoral, uneconomic, unsustainable or otherwise prohibited investments.

Sharia-compliant investing is no different. From the global market one must remove objectionable securities that do not conform to sharia, but then additional filters are added for professional and regulatory reasons. Investors who do not qualify as major global institutions must also consider the economics of cross-border investing, where many otherwise potential investments are unavailable.

While global market investing is the ideal, constrained investing is the rule rather than the exception. Here we proceed to construct sub-portfolios using multiple constraints—spiritual, professional, regulatory and practical—to ultimately obtain an optimized portfolio.

But first it is useful to pause and consider how to construct an allocation among asset categories. An initial hypothetical allocation (the “guessed” allocation) is required to guide the allocation process. A brief view of existing conventional portfolios in the Growth investment strategy helps determine initial allocation by sector. An informal survey of existing Growth strategy mutual funds already in the market will display the range of allocations among asset categories, that is, in Money Market, Fixed Income, Equities and Alternatives.

What is a Growth portfolio? Among the three commonly available investment strategies that can be chosen for a typical client (i.e., Income, Balanced and Growth), Growth is the one most exposed to price volatility (e.g., higher standard deviation or lower Sharpe ratio) among its holdings. It is commonly known that Money Market securities (representing cash or very short-term cash-like holdings) will have the lowest price volatility, followed by bonds and then stocks. Alternative investments are generally considered highly volatile investments akin to stocks, but with varying degrees of correlation to conventional cash, bond or stock securities.

Rather than constructing the rationale for asset allocation among asset categories for Income, Balanced and Growth portfolios—which is not within the

scope of this study—we instead look horizontally at large, established asset managers and examine their ratio of allocations among asset categories. From this we can establish a range in each asset class for examining the performance and risk of similarly constructed Islamic portfolios.

The first step in knowing what a Growth portfolio is, is through selecting mutual funds that purport to achieve a “growth” investment objective. Here we choose mutual funds from Credit Suisse, Franklin Templeton, UBS and Fidelity,²² each of them representative of the official Growth investment strategy at their respective institutions. Most of the historic allocation among asset categories was taken for each of these investment securities for the period 2011 through 2017 (dates for all data from each vary, but a sufficient volume of data is available for most of the 2011 through 2017 dates). The allocation by month was averaged over time for each asset category, and came out among these funds as shown in Table 4.5.

Further, during the time period selected we are able to establish a range of allocations in each asset category (Table 4.6).

Given the ranges in Table 4.6, an initial “guessed” allocation here for an Islamic portfolio constructed in the Growth strategy can be seen in Table 4.7.

It can be argued that this portfolio has insufficient “risk” in that the equity allocation is underrepresented by at least five percentage points. However, as the conventional average has, and the Islamic will have (see below), a total of 75% allocated to both Equity and Alternative securities, which for our purposes here will be deemed equally risky (i.e., sharing similar volatility characteristics), it is deemed sufficiently similar to be a close approximation to what is generically labeled a Growth portfolio allocation in the global asset management industry.

We can make one additional refinement to the hypothetical Growth allocation by considering the weight of market capitalization of developed and developing equity markets. Publicly available estimates of the ratio of emerging markets capitalization ratios varies from 9% to close to 25%. Here we make an arbitrary division of 82% global market capitalization for developed markets and 18% for developing markets (including Asian and rest-of-world emerging markets). While an imperfect method, this division among developed and developing markets is sufficient for the optimization exercises that will be performed in Table 4.8.²³

Calculating the distributions in Table 4.6 and 4.7 within the portfolio by asset class, we can approximate the size of each asset category within the \$5 million portfolio for our hypothetical Growth investment strategy client. The hypothetical allocation in Table 4.8 will be used in the “guessed” initial portfolio prior to optimization in the section “The Results of Optimizing the Five-Year Islamic Growth Portfolio” below.

Table 4.5 *Hypothetical allocation, growth strategy*

Asset Category	Average Allocation
Money Market	2.16%
Fixed Income	19.23%
Equity	73.26%
Alternative	5.44%
Total	100.00%

Source: Author's work, data from named mutual funds.

Table 4.6 *Hypothetical allocation, ranges by asset category*

Asset Category	Low Allocation, Average	High Allocation, Average
Money Market	-0.13%	7.70%
Fixed Income	3.77%	32.39%
Equity	66.50%	91.10%
Alternative	0.00%	11.52%

Source: Author's work, data from noted mutual funds.

Table 4.7 *Hypothetical allocation, final allocation by asset category*

Asset Category	% Portfolio Allocation
Money Market	5.0%
Fixed Income	20.0%
Equity	65.0%
Alternative	10.0%
Total	100.00%

Source: Author's work.

Table 4.8 *Hypothetical allocation by category with \$ amounts*

Portfolio Size:		\$5,000,000
GROWTH PORTFOLIO	% of Portfolio	Allocation (\$)
Money Market	5%	250,000
Fixed Income	20%	1,000,000
Equity	65%	3,250,000
Developed Market Equities	82% 53%	2,670,200
Developing Market Equities	18% 12%	579,800
Alternative	10%	500,000
Totals	100%	5,000,000

Source: Author's work.

Money Market Sub-portfolio Optimization

As previously mentioned, there are numerous software programs available to asset managers for portfolio optimization exercises. They all perform the same primary function: measurement of correlation coefficients among all input securities, and then multiple iterations of every possible combination of the input securities to determine the optimal output of securities, that is, the optimized portfolio. The resulting portfolio is then subjected to standardized measures of risk and return.

In this exercise we use the portfolio optimization tool on Bloomberg, a system popular with asset managers worldwide. This module takes inputs from the Bloomberg securities database selected by the user, and performs the optimization calculations described earlier.

The earlier section shortlisted two Money Market mutual funds that met all investment criteria and were selected for subsequent optimization. The commentary described differences in various measurements of the funds, including total return, Sharpe ratio, Information ratio, correlation and Capture ratio being among the most common measures used to determine security or portfolio performance.

The Bloomberg tool starts with an equal weighting of all Money Market input securities. The Bloomberg security identifiers are ALCOMUS AB, ALDIUSD AB and EMISHMMA JY, which are the respective Money Market securities from Al Rajhi, Al Ahli and Emirates NBD.

Subsequently, the user chooses from multiple parameters to perform defined tasks. In this case the software is tasked with performing optimization among the three securities (given their 60-month historic performance and risk metrics) and conditioned by the proprietary Bloomberg Active Total Risk process, which is described by Bloomberg as, “Ex-ante (predicted) portfolio tracking error (standard deviation of portfolio active return based on Bloomberg multi-factor risk model), expressed in %.” Ex ante is used because of its potential for predictive capabilities. The risk model selected is for Fixed Income (other risk models are available for other asset categories). Date ranges are input (e.g., our 60-month data range).

Other parameter inputs include ranges of asset allocation per security (where concentration risk limits must be respected; for example, no security can be more than 15% or less than 5% of a portfolio).²⁴ However, because Money Market is expected to occupy a small position in the overall final optimized Islamic Growth portfolio (5%), the user should set a range input between 0% to 100%. Next, the user presses the “Run” button and the Bloomberg optimization tool begins to perform the correlation iterations. The resulting output is considered to be optimized.

For the earlier exercise on Money Market mutual funds the portfolio began with an equal 33.33% weighting of the three securities. The optimized portfolio recommends selling 10.37% of EMISMMA JY (Emirates NBD), adding an additional 10.37% of ALDIUSD (Al Ahli) and maintaining ALCOMUS AB (Al Rajhi) at 33.33%. The resulting optimized portfolio of Money Market securities will be 43.71% ALDIUSD (Al Ahli), 33.33% ALCOMUS (Al Rajhi) and 22.96% EMISMMA JY (Emirates NBD). This is considered the optimized sharia-compliant Money Market sub-portfolio, as displayed in Table 4.9.

Note that in Table 4.9 we have used the hypothetical allocation to display a hypothetical buy order and the percentage that each position will hold in the final overall portfolio. These are added for the practical benefit of observing the approximate value of each transaction to ensure no purchase is below those limits of economic efficiency. By this it is understood that transaction costs for very small positions can be high, and should be avoided. If any position was too small (in this case purchases of a security below \$50,000 are considered uneconomic) the security in question can be removed from the allocation. Further, the column “% of Portfolio” allows one to quickly determine if limits in a position are being reached or breached. Regulators and common sense dictate maximum concentration limits per position. Managers may set those limits within parameters considered reasonable. In our case we are establishing a security position limit of not more than 15% of the portfolio. All securities selected for the optimized Money Market sub-portfolio are within the limits of economic efficiency and concentration.

Table 4.9 Optimized allocation, money market

Security	Investment Focus	Initial Allocation	Optimized Allocation	Buy Order (\$)	% of Portfolio
ALDIUSD AB	Al Ahli – Diversified USD Trade Fund	33.33%	43.71%	109,275	2.19%
ALCOMUS AB	Al Rajhi – Commodity Fund USD	33.33%	33.33%	83,325	1.67%
EMISMMA JY	Emirates NBD Islamic Money Market Fund	33.33%	22.96%	57,400	1.15%
Totals			100.00%	250,000	5.00%

Source: Author’s work, data from Bloomberg.

Fixed Income Sub-portfolio Optimization

The same procedure detailed earlier is repeated with the five shortlisted Fixed Income funds.

These funds are EMDYLQR, which is the Emirates Global sukuk fund; JDSUKUK, which is the Jadwa Global sukuk fund; BPIHIPA, which is the BNP Paribas Hilal fund; EFHGSPF, which is the EGH Global sukuk fund; and WISEX, which is the Azzad Wise Capital fund.

In this case the risk model used is again Fixed Income, the same date range is adopted, and again we do not insert portfolio concentration ranges as there are only five input securities (meaning only at 100% Fixed Income allocation would any security violate the 15% total portfolio concentration rule, which we will watch for).

This optimization exercise derives the following instructions (we are using the asset management jargon “buy” and “sell” arbitrarily here to indicate “increase” or “reduce”):

- Buy an additional 10.83% of JDSUKUK, resulting in a final weight of 30.83%.
- Buy an additional 9.32% of EMDYLQR, resulting in a final weight of 29.32%.
- Buy an additional 4.24% of WISEX, resulting in a final weight of 24.24%.
- Sell 11.93% of BPIHIPA, leaving 8.07% of this fund in the final portfolio.
- Sell 12.47% of EFHGSPF, leaving 7.53% in the final portfolio.

The final optimized portfolio of Fixed Income mutual funds would, therefore, be as is seen in Table 4.10.

These results are within the parameters set for minimum and maximum buy orders, that is, no purchase is below \$50,000 (uneconomic) and no position is more than 15% of the final portfolio (concentration risk). The sub-portfolio for Fixed Income is now considered optimized.

Of note here is the insertion of a recommendation from the optimization tool for the purchase of \$100 cash, representing 0.01% of the portfolio. While not a random Bloomberg error (the software is attempting to create perfectly optimized portfolios), these additions are ignored in the allocation process (although removing them creates results totaling 99.99%, which will be ignored).

Equity Sub-portfolio Optimization

The Equity sub-portfolio will comprise two sub-portfolios, one for developed markets and the other for developing. This bifurcates the world of equity

Table 4.10 Optimized allocation, fixed income

Security	Regional Focus	Initial Allocation	Optimized Allocation	Buy Order (\$)	% of Portfolio
JDSUKUK AB	Jadwa Global sukuk	20.00%	30.83%	308,300	6.17%
EMDYLQR JY	Emirates Global sukuk Fund	20.00%	29.32%	293,200	5.86%
WISEX US	Azzad Wise Capital Fund	20.00%	24.24%	242,400	4.85%
BPIHIPA LX	BNP Paribas Islamic Hilal Income Fund	20.00%	8.07%	80,700	1.61%
EFHGSPF LX	EFH Global sukuk Plus Fund	20.00%	7.53%	75,300	1.51%
USD	-	-	0.01%	100	0.00%
Totals			100.00%	1,000,000	20.00%

Source: Author's work, data from Bloomberg.

investing into two common categories of investment, developed and emerging markets. There are, of course, many other sub-categories of global equity investing by many measures: geography, style, industry and others. But since the universe of qualified sharia-compliant equity mutual funds and ETFs is limited, there is no possibility of creating additional sub-categories beyond developed and developing markets.

The 18 Equity mutual funds and ETFs for developed markets are therefore combined. This includes the securities for the United States/North America, Europe, and Japan, but also World. The latter are added as they already have large majority allocations to developed markets. Further, there are too few securities in Europe and the United States/North America to provide meaningful results as standalone sub-categories of Equity. This is one example of the constraints in Islamic asset management, where the population of securities in all global markets is limited.

Again, the process starts with inputting the data from these 18 securities. Bloomberg assigns an equal initial weight to all 18 securities, or 5.56%. We must change the risk model to Global Equity Fund, a proprietary algorithm of Bloomberg that assesses securities against expected risks and returns in global equity markets, as opposed to the Fixed Income risk model previously used.

An additional parameter must be set: with 18 investment products of varying degrees of performance and risk, there is a possibility that the optimization may result in large single positions. While in securities with less inherent risk, such as Fixed Income, there are fewer professional and regulatory concerns with concentration in any single position, the more volatile Equity asset category must respect position limits. To conform to "prudent man" rules, the

limits are set with a maximum of 18% for any single position (which equals just under 12% in the final portfolio allocation, where Equities are initially assumed to comprise 65% of the total). No lower limit is set as small orders can be dealt with in the next step.

After optimizing, Table 4.11 is extracted from the Equity optimization exercise.

Unlike in the Fixed Income case, all developed market equity securities survived the first round of allocation. None of the securities reached even close to their 28% allocation limits. Nine positions are below the \$50,000 economic limit, which will be dealt with in later optimization exercises.

As will be seen also in the case of developing markets, the optimization of developed market securities is blind to normative judgments. It operates simply on mathematical formulas that are founded on academic theory, without regard to other elements that have not been input as numerical parameters. In this case we see direct, explicit exposure to European equities reduced to 2.2% of the entire portfolio. Direct, explicit exposure to U.S. and North American equities (the latter dominated by U.S. equities) is 17.02%. However, as the category international equities is usually weighted toward market capitalizations, and with almost 66.93% of the portfolio invested in international equities, it can be readily assumed that U.S., European and Japanese equities indirectly make up a very large part of this portion of the portfolio (i.e., international equities), although this is not visible at first glance. In other words, U.S. and European equities are represented in larger numbers than is immediately visible.

The same exercise is conducted using securities in the developing market category. Showing the asymmetric choice faced by sharia-compliant investors, seven of these represent Asian markets, with only one encompassing all emerging markets (of which Asian markets are a majority subset). This asymmetry cannot be corrected without more securities representing the market capitalization of each of the world's developing regional economies, which don't exist in the Islamic asset space. However, we proceed with the optimization exercise understanding this constraint in advance.

Bloomberg establishes an initial allocation of 12.5% for each of the eight securities. As before, no portfolio upper limit is set as an assumption has been made that the developing market total allocation will not exceed 16.25%, and the optimization exercise will likely produce more than one security. Also as before, no lower limit is set. The final optimized allocation is shown in Table 4.12.

In this optimization four securities were eliminated, concentrating the final orders among the other four securities. The resulting allocation is heavily dominated by Asian markets with nearly 62% in explicit emerging Asian positions, plus as high as 70% of the 38.49% of the emerging markets position (ISDE, the

iShares Islamic emerging markets ETF). The MENA equities and China funds are among those that have been dropped by this optimization exercise.

Table 4.11 Optimized allocation, developed market equities

Security	Type	Regional Focus	Initial Allocation	Optimized Allocation	Buy Order (\$)	% of Portfolio
AMAGX US	Fund	International equities	5.56%	13.83%	369,289	7.39%
AMANX US	Fund	International equities	5.56%	13.57%	362,346	7.25%
IMANX US	Fund	International equities	5.56%	13.43%	358,608	7.17%
BAJAMJE AB	Fund	Japanese equities	5.56%	13.39%	357,540	7.15%
ISDU LN	ETF	U.S. equities	5.56%	13.38%	357,273	7.15%
ADJEX US	Fund	International equities	5.56%	13.29%	354,870	7.10%
ISDW LN	ETF	International equities	5.56%	3.60%	96,127	1.92%
BAJALKH AB	Fund	International equities	5.56%	2.11%	56,341	1.13%
ALEURTR AB	Fund	European equities	5.56%	1.89%	50,467	1.01%
OACREQU SJ	Fund	International equities	5.56%	1.82%	48,598	0.97%
ALUSTRA AB	Fund	U.S./North American equities	5.56%	1.82%	48,598	0.97%
SCUSEPA LX	Fund	U.S./North American equities	5.56%	1.82%	48,598	0.97%
TSGEAAU LX	Fund	International equities	5.56%	1.81%	48,331	0.97%
HSBCGLE LX	Fund	International equities	5.56%	1.79%	47,797	0.96%
SWIPIUB LX	Fund	International equities	5.56%	1.37%	36,582	0.73%
ALHCTRE AB	Fund	Healthcare equities	5.56%	0.46%	12,283	0.25%
BNPIEOP LX	Fund	International equities	5.56%	0.31%	8,278	0.17%
BAJATEE AB	Fund	European equities	5.56%	0.31%	8,278	0.17%
Totals			100.00%	100.00%	2,670,200	53.40%

Source: Author's work, data from Bloomberg.

Table 4.12 *Optimized allocation, emerging market equities*

Security	Type	Regional Focus	Initial Allocation	Optimized Allocation	Buy Order (\$)	% of Portfolio
PUBISAL MK	Fund	Asia Pacific ex-Japan	12.50%	38.63%	223,977	4.48%
ISDE LN	ETF	Emerging markets	12.50%	38.49%	223,165	4.46%
PUBASIT MK	Fund	Asia Pacific	12.50%	13.33%	77,287	1.55%
PUBISAD MK	Fund	Asia Pacific ex-Japan	12.50%	9.55%	55,371	1.11%
AHASPCI AB	Fund	Asia Pacific	12.50%	0.00%	-	0.00%
EMIMOIU LX	Fund	MENA Fund	12.50%	0.00%	-	0.00%
PUBCITT MK	Fund	China	12.50%	0.00%	-	0.00%
CIMAPAD MK	Fund	Asia Pacific ex-Japan	12.50%	0.00%	-	0.00%
Totals			100.00%	100.00%	579,800	11.60%

Source: Author's work, data from Bloomberg.

The final exercise is to combine the developed and developing equity market portfolios into one optimized portfolio. The optimized portfolios were saved in Bloomberg, and then used as inputs for an all-new portfolio comprising optimized weights for the two. As before, the initial weight for each of the developed and developing equity market portfolios was set at equal amounts, or 50%. The resulting optimization instructions and final optimized allocations are shown in Table 4.13.

Table 4.13 *Optimized allocation, all equities*

Security	Type	Regional Focus	Initial Allocation	Optimized Allocation	Buy Order (\$)	% of Portfolio
AMAGX US	Fund	International equities	11.36%	12.18%	395,850	7.92%
AMANX US	Fund	International equities	11.15%	12.05%	391,625	7.83%
IMANX US	Fund	International equities	11.03%	12.02%	390,650	7.81%
ISDU LN	ETF	U.S. equities	10.99%	11.99%	389,675	7.79%

Security	Type	Regional Focus	Initial Allocation	Optimized Allocation	Buy Order (\$)	% of Portfolio
ADJEX US	Fund	International equities	10.92%	11.99%	389,675	7.79%
BAJAMJE AB	Fund	Japanese equities	11.00%	11.86%	385,450	7.71%
ISDW LN	ETF	International equities	2.96%	8.11%	263,575	5.27%
BAJALKH AB	Fund	International equities	1.73%	-	-	0.00%
ALEURTR AB	Fund	European equities	1.55%	-	-	0.00%
OACREQU SJ	Fund	International equities	1.50%	-	-	0.00%
ALUSTRA AB	Fund	U.S./North American equities	1.50%	-	-	0.00%
SCUSEPA LX	Fund	U.S./North American equities	1.50%	-	-	0.00%
TSGEAAU LX	Fund	International equities	1.49%	-	-	0.00%
HSBCGLE LX	Fund	International equities	1.47%	-	-	0.00%
SWIPIUB LX	Fund	International equities	1.13%	-	-	0.00%
ALHCTRE AB	Fund	Healthcare equities	0.38%	-	-	0.00%
BNPIEOP LX	Fund	International equities	0.25%	-	-	0.00%
BAJATEE AB	Fund	European equities	0.25%	-	-	0.00%
PUBISAL MK	Fund	Asia Pacific ex-Japan	6.89%	-	-	0.00%
ISDE LN	ETF	Emerging market	6.87%	9.94%	323,050	6.46%
PUBASIT MK	Fund	Asia Pacific	2.38%	9.86%	320,450	6.41%
PUBISAD MK	Fund	Asia Pacific ex-Japan	1.70%	-	-	0.00%
Totals			100.00%	100.00%	3,250,000	65.00%

Source: Author's work, data from Bloomberg.

Importantly, 13 positions were eliminated in this optimization, most notably the two European-specific funds, two of the three U.S./North American funds and six of the international equities funds. The mathematical process of optimization asks for a “best-fit” correlation among portfolio securities. In the case of these 13 positions, none were considered in the optimization process to add benefit in terms of risk or reward.

In the final sub-portfolio, developed market equities comprise 80.2% of the allocation, while developing market equities make up 19.8%, which is well in line with global equity market capitalizations. The Equity asset category has now been satisfactorily optimized.

Alternative Sub-portfolio Optimization

For Alternative assets, three of the four ETFs showed poor performance during the 60-month period, but at least closely tracked their benchmarks. They are retained as subsequent optimization may discover non-correlation or low correlation to the other asset in this category, the global real estate fund from SEDCO Capital.

The five securities—four commodity precious metal ETFs and one global real estate fund—begin with an initial allocation of 20% each. Here again we are not concerned with concentration limits as the category’s expected overall position will not be more than 10% of the final optimized portfolio. As before, we also do not set lower limits. In Table 4.14, we present the instructions and results of optimization for the Alternative sub-portfolio.

As a result of optimization, two securities were eliminated (ETFs for platinum and silver), and the remaining allocations are all above the \$50,000 economic limit.

The surviving three securities comprise one real estate and two precious metals positions. We know that palladium is the one precious metal with the most common industrial applications, plus palladium prices were on a bull run for much of the previous 60 months, so we take subjective (although not objective) comfort in seeing it in the portfolio. Gold, with a relatively strong bear market behind it, was included by the optimizer, but not platinum or silver, which also suffered substantial losses in the previous five years. As a totally different type of asset with very different behavior, and performance one third below its benchmark over the previous five years, the global real estate fund gets equal allocation treatment.

The one factor linking these precious metals and real estate is that they are both considered long-term hedges against inflation, so again we take subjective comfort knowing there will likely be inflation hedges in the final portfolio. With this the Alternatives sub-portfolio is now considered optimized.

Table 4.14 Optimized allocation, alternative investments

Security	Type	Regional Focus	Initial Allocation	Optimized Allocation	Buy Order (\$)	% of Portfolio
SPAL LN	ETF	Source Physical Palladium P-ETC	20.00%	33.34%	166,700	3.33%
SCREITS LX	Fund	SC Global Real Estate Fund	20.00%	33.33%	166,650	3.33%
SGLD LN	ETF	Source Physical Gold P-ETC	20.00%	33.33%	166,650	3.33%
SPPT LN	ETF	Source Physical Platinum P-ETC	20.00%	0.00%	-	0.00%
SSLV LN	ETF	Source Physical Silver P-ETC	20.00%	0.00%	-	0.00%
Totals				100.00%	500,000	10.00%

Source: Author's work, data from Bloomberg.

CONSTRUCTING THE OPTIMIZED FIVE-YEAR GROWTH PORTFOLIO

Here we construct the optimized Islamic Growth investment strategy portfolio using the asset category components that were optimized in Table 4.14. In this process each asset category sub-portfolio acts as its own element in the optimization of the macro portfolio. Missing here, of course, are the tightly defined rules of an ISP, where specific targets in each asset category are evident in the asset allocation before optimization is attempted. However, the process described earlier has to a large degree followed rules similar or identical to basic portfolio construction common in the industry and that meet the standards of MPT. And, as described below, elements of an ISP are preserved in the rules that restrict the optimization process both among and within asset categories. In the final optimized portfolio we may witness adherence to the original ISP of the hypothetical client, the Global growth strategy.

Setting Up the Optimization Exercise

The collection of assets in each category are assembled in Bloomberg as a new portfolio. However, during the input stage the assets are segregated into the defined asset categories, and allocation rules are added. The first step is the assembly of assets. This results in a multi-asset portfolio constructed from the results of optimizing sub-portfolios, as is seen in Table 4.15.

Table 4.15 Portfolio before final optimization

Security	Investment Focus	% of Portfolio	% of Category
ALDIUSD AB	Al Ahli – Diversified USD Trade Fund	2.19%	-
ALCOMUS AB	Al Rajhi – Commodity Fund USD	1.67%	-
EMISMMA JY	Emirates NBD Islamic Money Market Fund	1.15%	5.00%
JDSUKUK AB	Jadwa Global sukuk	6.17%	-
WISEX US Equity	Azzad Wise Capital Fund	5.86%	-
EFHGSPF LX	EFH Global sukuk Plus Fund	4.85%	-
BPIHIPA LX	BNP Paribas Islamic Hilal Income Fund	1.61%	-
EMDYLQR JY	Emirates Global sukuk Fund	1.51%	20.00%
AMAGX US	International equities	7.92%	-
AMANX US	International equities	7.83%	-
IMANX US	International equities	7.81%	-
ISDU LN	U.S. equities	7.79%	-
ADJEX US	International equities	7.79%	-
BAJAMJE AB	Japanese equities	7.71%	-
ISDW LN	International equities	5.27%	-
ISDE LN	Emerging market	6.46%	-
PUBASIT MK	Asia Pacific	6.41%	65.00%
SPAL LN	Source Physical Palladium P-ETC	3.33%	-
SCREITS LX	SC Global Real Estate Fund	3.33%	-
SGLD LN	Source Physical Gold P-ETC	3.33%	10.00%
Totals		100.00%	100.00%

Source: Author's work, data from Bloomberg.

A total of 20 securities are input from our optimization exercises in Table 4.15, which can be seen in Table 4.16.

Table 4.16 Number of securities before final optimization

Asset Category	Number of Securities
Money Market	3
Fixed Income	5
Developed Market Equities	7
Developing Markets Equities	2
Alternatives	3
Total	20

Source: Author's work, data from Bloomberg.

Following the input of securities, a set of rules needed to be established for the optimization to be guided in its processing.

Inputting Optimization Rules

Table 4.17 Optimization rules

Asset Category	Allocation Rules among Asset Classes
Money Market	The portfolio will have no more than 5% allocation to Money Market At least one security must be allocated in the range of > 0% to 5%
Fixed Income	The portfolio will have no less than 10% and nor more than 35% allocation to Fixed Income securities
Equity, developed & developing	The portfolio will have no less than 50% and no more than 75% allocation to developed and developing market Equity securities, combined
Equity, developing markets	The portfolio will have no more than 15% allocation to developing market Equity securities
Commodity (Alternative 1)	The portfolio will have no more than 5% allocation to Commodity securities At least one security must be allocated in the range of > 0% to 5%
Real Estate (Alternative 2)	The portfolio will have no more than 5% allocation to Real Estate At least one security must be allocated in the range of > 0% to 5%

Source: Author's work.

The rules for asset allocation among asset classes are available in Table 4.17.

These rules were established to insure a broadly diversified portfolio with representative securities in each asset category, and represent the “guessed” allocation identified in the section “Identifying the Client & IPS” earlier in the chapter. Without these rules the optimization exercise may have resulted in a portfolio with empty categories, which is not considered acceptable in a diversified multi-asset portfolio. While we are dealing here with a hypothetical mandate, real-world issues arise in asset allocation by category. A regulator’s “prudent man” rules require diversification across asset classes in a discretionary portfolio mandate. Without the earlier mentioned rules, diversification among asset categories, one of the key elements of risk management, may not be achieved as a result of the portfolio optimization exercise. To insure diversification—and achieving diversified returns as a result of uncorrelated or less-correlated assets—the rules insure that every asset class is included in the final portfolio.

Further, the category Alternatives was divided into two distinct segments, Commodity and Real Estate, in order to preserve the unique characteristics

(uncorrelated or less correlated with other asset categories) of these asset classes.

The rules did not impose defined values for each asset category, that is, there is no requirement that in the final allocation Fixed Income be fixed at 20% and Equities at 65%. Rather, the rules allow the optimization process to establish the best fit of these category allocations within a relatively broad range, a range similarly broad for the actual asset category allocation in Growth portfolios seen in the market from major global asset managers.

Additional rules were also input for allocations within asset classes, as can be seen in Table 4.18.

These rules govern allocation within asset classes, which insures diversification. However, they are liberal enough to also insure the allocation is not overly restricted. For example, in Money Market the rules permit the optimization to allocate up to 5% of the total portfolio to short-term Money Market securities. The rules within the asset class insure that no single position will be more than 2%. And, yes, there are only three candidates in this asset category so the maximum the optimization could generate is only 4% (not the limit of 5% in the rules among asset categories). However, an important objective in allocation is to limit the presence of low- or no-yield cash investments. Such investments are used primarily to pay occasional fees and expenses, so they must be present, but not in substantial amounts.

For Fixed Income, the same kind of rule applies, but for a different reason. Here there is an initial constraint that with a Growth investment strategy the Fixed Income allocation will be 35% or less, and very likely in the region of 20%, as befitting a more aggressive investment strategy. To insure there is sufficient diversification in this category the rule constrains the optimization to not more than 6.5% per position.

The same rationale also supports the rules in Equity and Alternative (Commodity and Real Estate) asset categories.

Finally, it is useful here to mention that this optimization used the Bloomberg Risk Model: Global.²⁵ Bloomberg offers two risk models for optimization calculations. The first is Fundamental, which is more appropriate for single-asset category investors in stocks or bonds. Fundamental will perform optimization using market weights for specific countries or regions, that is, one can choose U.S. Equity Fundamental, Latin America Equity Fundamental and so on. The second tool is the Bloomberg Risk Model, within which Regional or Global can be sub-selected. By nature the choice for the portfolio optimization here is Global. Using the Bloomberg Risk Model: Global, the software derives its own regional index performance and risk metrics from the global Bloomberg database and uses these in the context of allocations among regions and asset categories. In all cases these calculations are performed using Bloomberg's own 252-day forward-view forecasts of the underlying asset category and geographic markets.

Table 4.18 Additional optimization rules

Asset Category	Allocation Rules within Asset Classes
Money Market	No single fund in the Money Market allocation can be more than 2% of the portfolio
Fixed Income	No single fund in the Fixed Income allocation can be more than 6.5% of the portfolio
Equity, developed markets	No single fund in the developed markets Equity allocation can be more than 13.95% of the portfolio
Equity, developing markets	No single fund in the developing markets Equity allocation can be more than 13.95% of the portfolio
Real Estate	No single fund in the Real Estate allocation can be more than 3.5% of the portfolio
Commodity	No single fund in the Commodity allocation can be more than 2.5% of the portfolio

Source: Author's work.

The Results of Optimizing the Five-Year Islamic Growth Portfolio

After the inputs in Table 4.18, the optimization process starts. It results in a portfolio where the correlation measurements are performed, all securities are matched in all possible combinations (meaning many thousands of iterations are performed by the software) and eventually the program delivers an allocation that is optimized, that is, given the input rules and securities there is no other allocation with higher efficiency (return and risk) than the resulting allocation.

The post-optimization exercise displays the optimizer's instructions, for example increase PUBASIT from 6.41% to 12.97%, increase EMDYLQR from 1.51% to 4.65% and so forth through the entire security selection.

It should be recalled that the "guessed" allocation allocated 5% to Money Market, 20% to Fixed Income, 65% to Equities (of which 53% was to developed economies and 12% to developing economies) and 10% to Alternatives. Following optimization, the portfolio results can be seen in Table 4.19.

While the pre-optimized portfolio contained 20 securities, 5 of them were discarded in the optimization process, leaving a total of 15 securities for the optimized portfolio. Some interesting results are visible:

- Money Market is maximized with just one security at 1.17%.
- All five qualified Fixed Income securities were selected, and optimized with near-equal weights; none are dropped and none reached the position limit.

- Fixed income exceeded the “guessed” allocation of 20% by 2.88 percentage points.
- The total Equity position did not reach its maximum 75%, falling short by 2.69 percentage points.
- Within Equities the developing market equities achieved 12.97% allocation in the portfolio, within its allocation limit.
- Developed market equities are just shy of 60% of the total portfolio allocation, or 82% of all equities, with emerging markets at 18% of all equities, again both well within the range of global market capitalizations for these two regions.
- Alternatives were allocated between precious metals (palladium ETF) and real estate in a near-equal split, while Alternatives themselves were allocated well below the 10% limit, at 3.64%.

No human can possibly make the computations that provide these results. The 20 securities, each showing 60 months of price history, provide over 1,440 data points that must be matched in all possible combinations, the primary function of optimization. Thankfully computational assistance is available from

Table 4.19 Final allocation, five-year multi-asset Islamic growth portfolio

Security	Investment Focus	% of Portfolio	% of Category	Allocation (\$)
ALCOMUS AB	Al Rajhi – Commodity Fund USD	1.17%	1.17%	58,500
JDSUKUK AB	Jadwa Global sukuk	4.66%	-	233,000
WISEX US Equity	Azzad Wise Capital Fund	4.39%	-	219,500
EFHGSPF LX	EFH Global sukuk Plus Fund	4.60%	-	230,000
BPIHIPA LX	BNP Paribas Islamic Hilal Income Fund	4.58%	-	229,000
EMDYLQR JY	Emirates Global sukuk Fund	4.65%	22.88%	232,500
AMANX US	International equities	9.96%	-	498,000
IMANX US	International equities	9.70%	-	485,000
BAJAMJE AB	Japanese equities	8.97%	-	448,500
ISDU LN	U.S. equities	10.33%	-	516,500
ADJEX US	International equities	10.18%	-	509,000
AMAGX US	International equities	10.20%	-	510,000
PUBASIT MK	Emerging market equities	12.97%	72.31%	648,500
SPAL LN	Source Physical Palladium P-ETC	1.83%	-	91,500
SCREITS LX	SC Global Real Estate Fund	1.81%	3.64%	90,500
Totals		100.00%	100.00%	5,000,000

Source: Author’s work, data from Bloomberg.

specialized optimization programs, and most portfolio managers have sufficient cognizance of MPT and the underlying mathematical rationale supporting optimization to understand these results.

Comments on the Two-Year Islamic Portfolio Security Selection and Optimization

The above process was repeated but with the two-year historic data of the shortlisted mutual funds and ETFs that were screened in the two-year data table in the section “The Final Set of Investible Securities” earlier in the chapter. Comments on the asset categories, optimization process and the optimized portfolio follow.

Money Market, two-year observations

Examining the two-year data resulted in the same three funds being retained as in the five-year data. Oddly, no additional security was added versus the securities selected for the five-year portfolio. And, as before, the Money Market securities from Malaysia were removed as they created an unacceptable level of foreign exchange rate risk for our hypothetical client. However, the performance of the Malaysian funds was admirable, with the now-four funds widely outperforming the three-month USD LIBOR benchmark. For example, during the 24-month measured period, the Eastspring fund witnessed 13.64% total return, while the benchmark was only 1.92%. Its Malaysian brother CIMB Islamic Corporate Deposit fund was equally an outperformer at 11.86%. The two funds measured standard deviation and Sharpe ratio in equity-like numbers: an average of 6.7% and 0.87, respectively (both were very close to the averages). These results indicate a highly volatile period, with prices referenced in USD swinging wildly according to changes in MYR:USD exchange rates. Again, because such volatility is not expected for a cash-substitute product, all four of the Malaysian Money Market funds were rejected for “prudent man” reasons.

As with the five-year data, the Al Rajhi fund outperformed its two peers, with Al Ahli and Emirates NBD coming in second and third, again. Only the Al Rajhi fund had zero months with negative performance, while the other two had very modest down months, reflecting the safety inherent to these investment products. High Sharpe ratios and very low standard deviation were also recorded for these conservative products. The Al Rajhi and Al Ahli funds had very large Capture ratios at 1.40 and 1.36, respectively, while the Emirates NBD fund registered a still-respectable 0.59.

Fixed Income, two-year observations

The two-year results substantially expanded the availability of Fixed Income mutual funds, from 5 to 12. Importantly, all the sukuk funds new to this list originate in a broader geographic area among managers: AZ (Azimut) is an important Italian asset manager based in Milan, the SEDCO Capital sukuk mutual fund is managed in London and the Oasis Crescent product is managed from Cape Town. The sukuk funds from Mashreq, Rasmala and Franklin Templeton are all managed from Dubai, while the Al Hilal fund is from Abu Dhabi. All these funds were established less than five years before our cutoff date, 31 December 2012 (the five-year data started on 1 January 2013), or did not provide data to Bloomberg as of that date. As outliers, the data availability on Bloomberg for the Franklin Templeton sukuk fund starts only in 2015 (despite its inception in 2012), while the Al Hilal Income Fund (managed in Abu Dhabi by Al Hilal Bank, and not to be confused with the BNP Paribas Hilal sukuk fund) was also started in 2012, but only supplied data to Bloomberg within the two-year range.

While the three Malaysian sukuk funds from Public Mutual are also present, we retain the prohibition against securities in a foreign currency unhedged from the USD, which through the link with SAR is the reference currency for our hypothetical client. And one of the most respected names in Islamic mutual funds is removed—the CIMB Islamic Institutional sukuk Fund. No data is available on Bloomberg from CIMB Principal for this fund.

The performance of the 12 funds in terms of total returns ranged from 3.23% to 11.18%, with newcomer Rasmala the highest performer—the only sukuk fund to beat the benchmark. However, outside of the lowest and highest performers the results were tightly within the 6.78%–8.19% range. Standard deviation among the sukuk funds was low, ranging from cash-like 0.71% (Mashreq) to 3.22% (Franklin Templeton), but again outside the outliers standard deviation was in a tight range. While correlation was in a relatively narrow range of 0.43 to 0.76, the Jadwa fund proved to be an extreme exception at 0.07, with EFH Global close behind at 0.12. Six of the managers displayed Capture ratios above 0.40, indicating an ability to extract value from index movements, while another six displayed relatively low capture. Nearly all Sharpe ratios hovered in the range of plus or minus 10% from 2.00, while the outliers were 3.5 for the BNP Paribas Hilal fund and 1.07 for Franklin Templeton.

Equity, two-year observations

Equity funds remained at 26 in the two-year dataset. All funds continued to meet the minimum criteria needed to be included (eliminating survivor bias from the dataset). The same regional distribution was evident as in the five-year dataset, bifurcated between developing and developed markets.

All funds from all geographic areas registered positive gains, reflecting the ongoing global bull market in equities. Twenty of the 26 funds had greater than 20% total return. Only two funds registered returns in single digits (Al Ahli Europe Index fund, which surprisingly was almost 26 percentage points short of its index, and another index fund, MyETF Southeast Asia, which suffered over 47 percentage points underperformance). Returns on six funds were within 10% of their respective indexes, while returns on seven funds were at least 10% or more above their indexes.

As before, the funds were divided into geographic sectors—U.S./North America, Europe, Emerging Markets and Asia—but then further divided between developed and developing markets. Standard deviation across all funds was in a relatively narrow range of 9.49% to 14.97%, but most funds clustered in the 10% to 13% range, indicating that global equity market movements were nearly equally volatile. No region stood out as having an excessively higher or lower standard deviation or Sharpe ratio. The average Capture ratio among the Asian funds was a respectable 0.48, while nine of the ten international equities funds registered Capture ratios of between 0.68 and 1.05, indicating a superior ability to capture upside market performance. For nearly all the equity funds the two-year measured period displayed overall excellent portfolio return and risk results.

Alternatives, two-year observations

In the two-year dataset an additional two securities were added—a global real estate fund and another precious metals ETF. Both new entrants long outdate the data cutoff date, by ten years or more, so the puzzle of missing data beyond two years remains. It is suspected that the fund managers do not provide Bloomberg with more than two or three years of historic data, or there is a reluctance to display data for long periods. Either way, without data there can be no analysis, so only funds displaying full data series can be included in any such optimization exercise.

The two-year data now includes five ETFs and two real estate funds, giving more depth and breadth to the Alternatives asset category. As expected, there is a relatively high clustering of total return around the benchmarks among the ETFs, but surprisingly the two real estate funds also fit tightly to their benchmarks. Standard deviation for the newly added DWS Noor Precious Metals ETF basket was a high 32.42%, while the Source silver, platinum and palladium ETFs also registered high standard deviation in the mid-20% range. Source gold and the two real estate funds registered more modest standard deviations in the 10.52% to 13.71% range. Capture ratios for all Alternative securities were high, ranging from a low of 0.55 to a high of 0.9, all respectable numbers. But, in terms of the tradeoff between risk and reward, or Sharpe ratio, all the Alternative products registered low numbers, with the highest at 1.66.

Setting Up and Optimizing the Two-Year Islamic Growth Portfolio

The process to set up the two-year portfolio optimization was identical to the five-year one. Optimization was performed among the shortlisted assets in each category and then reviewed. Afterward, the same rules for concentration (no more than 15% of a final portfolio position) and economy (no purchase of a mutual fund under \$50,000, which is suspended for ETFs) were applied to create the final list of securities eligible for the optimization exercise. Again, a hypothetical portfolio with the same ratio of asset categories (5% Money Market, 20% Fixed Income, 65% Equities and 10% Alternatives) was used as an estimated initial measure of the final optimized two-year portfolio.

Optimization of the full two-year portfolio was also conducted in an identical way to the five-year case. The sub-portfolios (i.e., securities in each asset category were optimized) from each two-year asset category were used as inputs for creating one master list of securities that would then be subjected to optimization. The final optimized portfolio appears in Table 4.20.

In comparing the results of the five-year and two-year optimization exercises, some variation is evident:

- Money Market is again optimized with only one security, this time at 1.48% of the portfolio's allocation, well below the 5% range limit.
- Five sukuk funds again survived the optimization exercise, while the allocation to sukuk increased from 22.88% to 24.49% of the total allocation, well within the 30% constraint.
- Like the five-year allocations, the two-year allocations within Fixed Income were in a tight range, from 4.55% and 5.34%, that is, within less than one percentage point; indicating that the optimization found equal benefit among these five funds.
- Equities decreased from seven to six positions, losing one position in international equities, with only a small variance in allocation (from 72.31% to 70.19%).
- Explicit emerging markets as a percentage of total allocation shrunk from 12.97% to 11.57%, while explicitly U.S. equities had a small increase of about the same magnitude (1.54 percentage points).
- Again, explicit European equity funds are absent from the two-year allocations, as in the five-year ones.
- Japanese equities held their place, increasing nearly three percentage points.
- Alternatives increased from 3.64% to 3.84% of the portfolio, with palladium maintaining its position and the SC Global real estate fund being replaced by the newly introduced Oasis real estate fund.

Table 4.20 Final Allocation, two-year multi-asset Islamic growth portfolio

Security	Investment Focus	% of Portfolio	% of Category
ALCOMUS AB	Al Rajhi – Commodity Fund USD	1.48%	1.48%
FTGSIAX LX	FRANKLIN GBL SUKUK-IAUSD	4.58%	-
RASGLIU LX	RASMALA GLB SUKUK-GSFI	4.55%	-
SCINCSU LX	SC GLOBAL SUKUK FUND-S USD	5.34%	-
ALHGSUK UH	AL HILAL GLOBAL SUKUK FUND	4.91%	-
BADISIN UH	MASHREQ AL-ISLAMIC INCOME FUN	5.11%	24.49%
AMANX US	International equities	11.61%	-
BAJAMJE AB	Japanese equities	11.89%	-
SCUSEPA LX	U.S./North American equities	11.87%	-
IMANX US	International equities	11.68%	-
AMAGX US	International equities	11.57%	-
ISDE LN	Emerging markets	11.57%	70.19%
CRESGPA ID	Oasis Crescent Global Property Equity Fund	2.25%	-
SPAL LN	Source Physical Palladium P-ETC	1.59%	3.84%
Totals		100.00%	100.00%

Source: Author's work, data from Bloomberg.

If nothing else, the exercise indicates the dynamic nature of portfolio management and the ongoing shifts in allocation output over time when performing portfolio optimization. It also illustrates the substantial changes resulting from changing input data parameters, in this case from limiting data to not less than five years to not less than two years. Very evidently portfolio allocation changes can result from this choice of constraint.

ANALYSIS OF PERFORMANCE AND RISK: OPTIMIZED ISLAMIC GROWTH PORTFOLIOS

The Five-Year Portfolio

After first constructing an initial Buy List from finalist securities, then optimizing within and among portfolios to generate a final Buy List, a set of securities was put through optimization. This resulted in two-year and five-year portfolio allocations considered optimally balanced between risk and reward given the defined constraints, that is, Growth strategy portfolios that required diversification among asset categories and which forced a presence in each

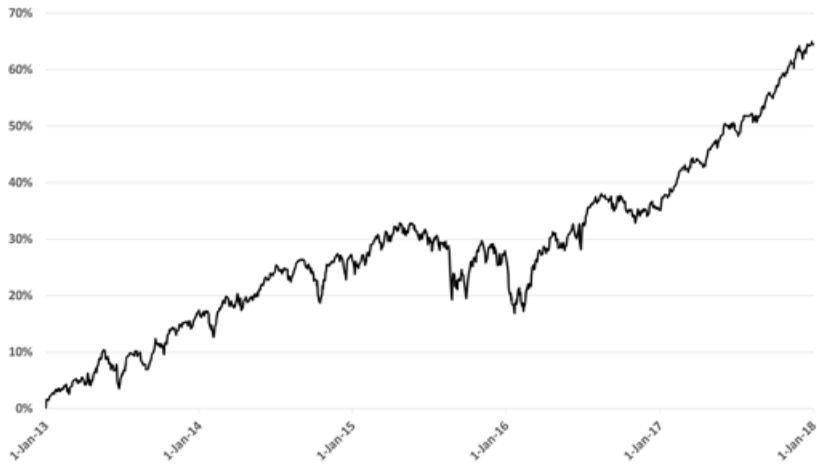


Figure 4.1 Five-year Islamic Growth portfolio performance, cumulative daily returns 2013–2017

Source: Author's work, data from Bloomberg.

Table 4.21 Monthly and annual performance, five-year Islamic Growth strategy

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2013	2.97	0.75	1.67	1.56	0.83	-2.55	3.90	-2.33	3.93	2.98	1.56	1.95	17.22
	%	%	%	%	%	%	%	%	%	%	%	%	%
2014	-3.04	4.85	0.12	0.01	2.54	2.29	-1.02	3.25	-2.90	2.00	1.49	-0.81	8.78
	%	%	%	%	%	%	%	%	%	%	%	%	%
2015	-0.79	4.81	-0.18	0.99	0.51	-2.13	-0.10	-5.64	-2.56	7.36	-0.20	-1.34	0.74
	%	%	%	%	%	%	%	%	%	%	%	%	%
2016	-6.04	0.77	6.88	1.14	1.15	1.53	4.28	-0.04	0.99	-3.39	0.79	0.15	8.21
	%	%	%	%	%	%	%	%	%	%	%	%	%
2017	3.40	3.66	1.70	1.87	2.80	0.75	2.42	1.48	2.59	4.14	3.68	0.85	29.34
	%	%	%	%	%	%	%	%	%	%	%	%	%
													64.29
													%

Source: Author's work, data from Bloomberg.

asset category (i.e., no category was allowed to be empty). The results allow for an examination of the return and risk characteristics of the portfolios.

Cumulative performance (return) of the five-year Islamic portfolio is visualized in Figure 4.1.

Performance on a monthly basis, with indicated returns at the end of each annual period, is shown in Table 4.21.

In other words, a portfolio constructed using this methodology, meaning it consists of the securities identified and then optimized in the described process, would have had the performance as indicated in these illustrations.

Return characteristics for the five-year Islamic portfolio can further be measured as shown in Table 4.22.

Total return is the cumulative total return of the portfolio. In other words, \$100 invested in the initial period would have increased to \$164 during the five-year period. However, a more meaningful measure is annualized return, which determines the discount rate that makes the beginning and ending amounts equal in value, in this case 10.45%. The annualized return is also known as the geometric average return and is formulated as follows:

$$\text{Annualized Return} = ((1 + R_1) \times (1 + R_2) \times (1 + R_3) \dots \times (1 + R_N))^{1/N} - 1$$

In the case above, the annualized return is calculated as:

$$10.45\% = ((1 + 16.23\%) \times (1 + 7.49\%) \times (1 + 0.99\%) \times (1 + 6.67\%) \times (1 + 19.87\%))^{1/5} - 1$$

Annualized return is more meaningful than average return (in this case an average return is $64.29\%/5 = 12.86\%$) in that the annualized measurement considers present and future values, equalizing them through a discount rate that indicates the annualized compounded growth rate.

Maximum monthly and **minimum monthly** returns are simply the end points of the highest and lowest returns during any one-month measurement period. They give an idea of the volatility of the portfolio, with a variance between the highest and lowest monthly returns approaching 5%, but calculating volatility requires measuring the difference in returns over all months, after first determining the standard deviation. Further measurements of volatility can then be calculated.

Risk measurements start with the simplest and most common, **standard deviation**. Daily price movements—both upward movements and downward movements—are registered and a mean established. The degree of dispersion

Table 4.22 Return measures, Islamic portfolio

Total Return	64.29%
Total Return (Annualized)	10.45%
Maximum Return (Monthly)	1.93%
Minimum Return (Monthly)	-2.99%
Mean Return (Annualized)	10.74%

Source: Author's work, data from Bloomberg.

around the mean will indicate the volatility of an asset's price: the higher the dispersion, the higher the volatility. Historic volatility is considered a basis from which to calculate future volatility. A security with higher historic volatility may have a higher probability of repeating that volatility in the future.

Skewness is a helpful risk measure when securities do not display normal distribution but instead show asymmetric distribution. Skewness measures the weight of data observations around a mode, or the most frequently occurring number in a set of numbers. Observations can be weighted to either the left (negative) or the right (positive) of the mode, or equally distributed. When observations are more heavily weighted to one side, the data is considered skewed. The degree of skew left or right may indicate the attractiveness of a security for investment. When data is positively (right) skewed it has a long tail, indicating frequent small losses and fewer large gains. Negatively skewed data indicates the converse, that is, infrequent large losses and frequent small gains.

Value at Risk with a confidence of 95% (**VaR at 95%**) is another common risk measure in the asset management industry. While standard deviation measures both upside and downside price variations from a mean, it is not helpful in understanding the difference between positive (upside) movements and negative (downside) movements over discrete time periods. VaR at 95% helps us understand the probability of downside (or upside) events occurring by looking at the range of performance in historic data. As a simple example, if we examine the daily pricing of the Islamic five-year portfolio here, and determine that during the 1,304 price reporting days from 1 January 2013 through 31 December 2017 there were 65 days (5% of the sample) that had a -0.62% or worse daily return, then one can say with 95% confidence that any single-day future return on that portfolio will not be worse than -0.62% (the VaR calculated here is the historical simulation method).

However, the same result can be mathematically described with the variance-covariance method. First, the same 1,304 reporting days are used to calculate a normal distribution and superimpose that on the distribution of the actual returns. From the normal distribution we can calculate the standard deviation and multiply it by 1.64 (which represents the largest possible movement 95% of the time) to obtain VaR at 95%. The resulting X% means that there is a chance of 5% that the security will return X% or more during the investment period.

Bloomberg portfolio software reports the standard deviation, skewness and VaR at 95% for the Islamic five-year portfolio as is seen in Table 4.23.

Moving on from separate return and risk measures, the Islamic portfolio is subjected to measurements of return and risk combined. Among the most widely used of these is the **Sharpe ratio**, a metric that compares the excess return of a security (or the deficiency in return) to a benchmark that represents

Table 4.23 Risk metrics, five-year Islamic portfolio

Standard Deviation (Annualized)	6.15%
Skewness	-0.70%
VaR at 95% (ex post)	-0.62%

Source: Author's work, data from Bloomberg.

the risk-free rate in the portfolio's reference currency. The five-year Islamic portfolio is referenced in U.S. dollars as the underlying client is a Saudi whose savings are in riyals, which has been hard-pegged to the USD since 1987. Therefore, the Sharpe ratio of the Islamic portfolio will be measured against the USD risk-free rate, which in Bloomberg is one of the convenient U.S. Treasury bill or note rates.

The utility of the Sharpe ratio is its ability to give some idea of the tradeoff between risk and return, that is, what is the variance in return for a given amount of risk above the risk-free rate? This allows the comparison of two securities (or portfolios) to indicate that while they may have identical returns, they may involve very different amounts of risk.

The calculation of the Sharpe ratio is simply:

$$\text{Sharpe Ratio} = \frac{\text{Mean Portfolio Return} - \text{Risk-Free Rate}}{\text{Standard Deviation of the Security (or Portfolio)}}$$

Using historic returns (ex post) for the five-year Islamic portfolio, the resulting Sharpe ratio is 1.20.

Daily price analysis of the five-year Islamic portfolio indicates a relatively significant outperformance of days with increased prices versus days with decreased prices (Table 4.24).

Table 4.24 Period analysis, five-year Islamic portfolio

Period Analysis	Up	Down	Total
Number	1,238	585	1,823
Percentage	68%	32%	100%
Average	0.19	-0.31	0.03
Standard Deviation	0.27	0.36	0.38
Max. Sequence	14	5	14
Ave. Sequence	3.38	1.60	2.49

Source: Author's work, data from Bloomberg.

On both maximum sequence and average sequence, the positive days outnumber the negative ones. The best- and worst-performing days are concentrated in the 2015–2016 calendar years, with no concentration of the worst three days during any of the five years (Table 4.25).

Table 4.25 Best and worse performance, five-year Islamic portfolio

Best–Worst	Performance	Date
Best 1	1.93%	26/08/2015
Best 2	1.70%	29/01/2016
Best 3	1.56%	01/03/2016
Worst 1	-2.99%	24/08/2015
Worst 2	-2.36%	24/06/2016
Worst 3	-2.12%	20/06/2013

Source: Author's work, data from Bloomberg.

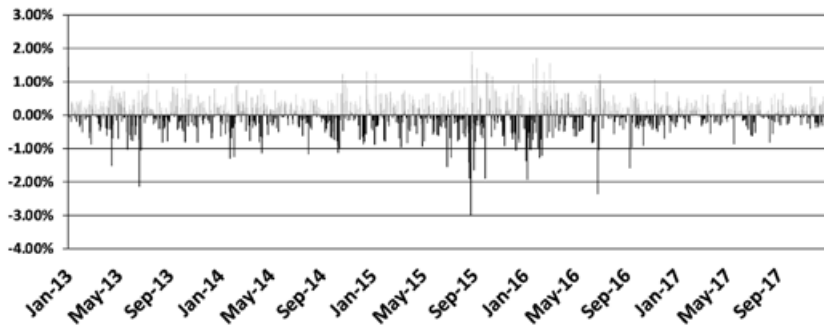


Figure 4.2 Up and down days, five-year Islamic portfolio

Source: Author's work, data from Bloomberg.

Table 4.26 Two-year Islamic portfolio, monthly and annual performance

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	-4.25	0.89	5.57	1.66	0.40	1.35	3.69	-0.27	1.20	-2.67	-0.09	0.50	7.98
	%	%	%	%	%	%	%	%	%	%	%	%	%
2017	2.90	2.79	1.70	1.75	2.67	0.49	2.04	1.52	1.86	3.42	2.18	1.26	24.60
	%	%	%	%	%	%	%	%	%	%	%	%	%
													32.58
													%

Source: Author's work, data from Bloomberg.



Figure 4.3 Two-year Islamic portfolio, cumulative daily returns, 2016–2017

Source: Author's work, data from Bloomberg.

An illustration of the up versus down price days is provided in Figure 4.2, which allows one to visually observe the higher price volatility during the 2015–2016 calendar years.

The Two-Year Portfolio

The two-year Islamic portfolio cumulative performance is visualized in Figure 4.3.

In table form, the two-year performance indicates a healthy positive 2016 annual return and a substantially greater 2017 return. Notably the 2017 return does not have a single negative month during the entire calendar year, something that is unique over the five-year measurement period of the Islamic portfolio (Table 4.26).

Like its five-year counterpart, the two-year portfolio enjoyed a relatively robust bull market resulting in a 32.58% total return despite having a bumpy start. The single-portfolio return and risk statistics are shown in Table 4.27.

Annualized total return, indicating the compounded rate of return during the time period measured, is almost 50% higher than the five-year portfolio, while the range between maximum and minimum monthly returns were fairly similar.

Table 4.27 Return and risk measures, two-year Islamic portfolio

RETURN MEASURES, 2-YEAR ISLAMIC PORTFOLIO	
Total Return	32.58%
Total Return (Annualized)	15.14%
Maximum Return (Monthly)	1.56%
Minimum Return (Monthly)	-2.24%
Mean Return (Annualized)	15.42%
RISK MEASURES, 2-YEAR ISLAMIC PORTFOLIO	
Standard Deviation (Annualized)	5.81%
Skewness	-0.54%
VaR at 95% (ex post)	-0.53%
Sharpe Ratio	1.78

Source: Author's work, data from Bloomberg.

The two-year portfolio achieved higher annualized returns with less risk as measured by standard deviation and Sharpe ratio. As measured by annualized return and standard deviation, the two-year portfolio enjoyed 50% more profit while taking on 5.5% less risk than the five-year portfolio. The two-year portfolio also had a Sharpe ratio almost 50% higher than the five-year counterpart.

Skewness measures were -0.7 and -0.54 for the five- and two-year portfolios, where the higher negative value of the five-year skewness indicates a more risky portfolio. The measured VaR at 95% for the two-year portfolio also indicated its statistically less risky nature, with a 5% chance of a negative return of 0.53% versus -0.62% for the five-year portfolio. Taken together, the portfolio statistics indicate less volatility during the measured period for the shorter-dated portfolio.

Period analysis of the two-year Islamic portfolio shows a stronger outperformance compared to the five-year data (Table 4.28).

Table 4.28 Period analysis, two-year Islamic portfolio

Period Analysis	Up	Down	Total
Number	499	231	730
Percentage	68.36%	31.64%	100.00%
Average	0.19	-0.28	-0.09
Standard Deviation	0.26%	0.34%	0.60%
Max. Sequence	27	4	31
Ave. Sequence	3.12%	1.45%	4.57%

Source: Author's work, data from Bloomberg.

Days with a positive performance were more than 100% higher than days with a negative performance, while the longest sequence of positive days was almost seven times that of negative days. The following shows the positive and negative days of the two-year portfolio, illustrating the higher level of volatility at the beginning versus the end of the period (Figure 4.4).

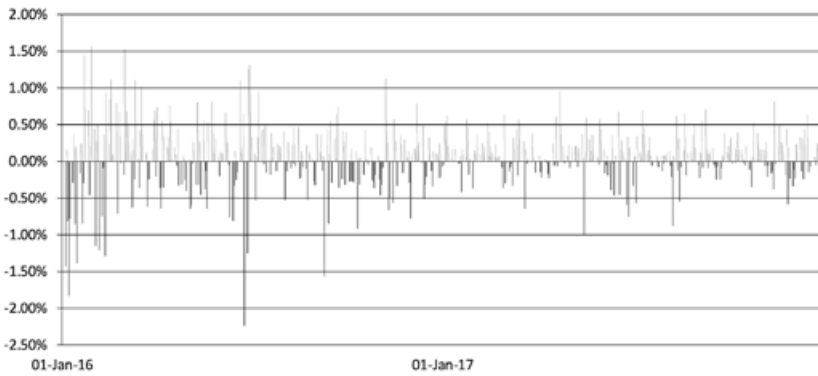


Figure 4.4 Up and down days, two-year Islamic portfolio

Source: Author's work, data from Bloomberg.

A best–worst days analysis indicates the occurrence and range of the highest and lowest set of price movements. Of note, the figures indicate a higher upside volatility during Q1 2016, while negative volatility was more evenly spread during the first calendar year. Also of note is that neither upside highs or downside lows were recorded in the second calendar year (Table 4.29).

Table 4.29 Best and worse performance, two-year Islamic portfolio

Best–Worst	Performance	Date
Best 1	1.56%	29/01/2016
Best 2	1.53%	01/03/2016
Best 3	1.44%	22/01/2016
Worst 1	-2.24%	24/06/2016
Worst 2	-1.83%	07/01/2016
Worst 3	-1.56%	09/09/2016

Source: Author's work, data from Bloomberg.

A final method of understanding portfolio returns is through attribution analysis, also called contribution analysis. Ignoring total return for each individual security, attribution analysis seeks to determine the source of total return as a percentage contribution to a portfolio's return. Identifying contribution by security and asset class aids in the monitoring of portfolios and the identification of securities that may not be performing in line with their peers.

Table 4.30 Contribution, five-year Islamic portfolio

Security	Investment Focus	Asset Class	% of Portfolio	% of Contribution	Total Return
ALCOMUS AB	Al Rajhi – Commodity Fund USD	Money Market	1.17%	0.10%	6.49%
JDSUKUK AB	Jadwa Global sukuk	Fixed Income	4.66%	0.63%	10.77%
WISEX US Equity	Azzad Wise Capital Fund	Fixed Income	4.39%	1.16%	22.54%
EFHGSPF LX	EFH Global sukuk Plus Fund	Fixed Income	4.60%	0.79%	13.91%
BPIHIPA LX	BNP Paribas Islamic Hilal Income Fund	Fixed Income	4.58%	0.73%	12.85%
EMDYLQR JY	Emirates Global sukuk Fund	Fixed Income	4.65%	0.97%	17.37%
AMANX US	International equities	Equity	9.96%	9.04%	96.74%
IMANX US	International equities	Equity	9.70%	10.39%	121.28%
BAJAMJE AB	Japanese equities	Equity	8.97%	8.58%	97.34%
ISDU LN	U.S. equities	Equity	10.33%	7.83%	75.21%
ADJEX US	International equities	Equity	10.18%	8.29%	82.44%
AMAGX US	International equities	Equity	10.20%	10.07%	108.95%
PUBASIT MK	Emerging market equities	Equity	12.97%	3.79%	21.06%
SPAL LN	Source Physical Palladium P-ETC	Alternative	1.83%	1.33%	49.67%
SCREITS LX	SC Global Real Estate Fund	Alternative	1.81%	0.59%	25.66%
Totals			100.00%	64.29%	

Source: Author's work, data from Bloomberg.

Contribution Analysis, Five- and Two-Year Portfolios

Unsurprisingly for a period of bull market equity performance, the seven equity funds in the five-year Islamic portfolio fill the top seven contribution slots with a total contribution of nearly 58% of the total return contributed by the 15 securities in the portfolio. The IMANX fund, which presently holds over 97% of its assets in developed economy shares (of which 86% of the total is in U.S. shares), delivered over 120% total return during the five-year measurement period, indicating a substantial potential contribution to a portfolio. The average contribution for the seven equity positions was 8.28% (Table 4.30).

However, performance rarely does not involve tradeoffs. The outperformance of the high-contribution securities came at a cost as measured by risk. Volatility measures (standard deviation and Sharpe ratio) for the highest-performing positions were six to eight times higher or more than the lowest contributors (Table 4.31).

The contribution of the six Fixed Income and Money Market asset categories to total return during the five-year period was only 4.38% compared to 57.99% for the seven Equity contributors, representing 24.05% and 72.31% of the portfolio, respectively. Yet the contribution to portfolio risk by the Equity portion of the allocation was understandably large, with an average Sharpe ratio of 0.82 and an average standard deviation of 10.97%. Compare these to the average Sharpe ratio of 2.46 and average standard deviation of 1.25% for the combined Fixed Income and Money Market positions, which are significantly lower in both cases by large margins. These figures indicate perfect compliance with the precepts of the Efficient Frontier, where increased risk generally equates to higher returns and, conversely, lower risk equates to lower returns.

Contributions to return by asset category in the five-year Islamic portfolio do not match the weightings of each category within the portfolio, as is shown in Table 4.32.

The asset allocation exercise resulting in this portfolio included rules that insured that all asset categories are represented in the portfolio within minimum and maximum ranges. A pure profit-seeking investor with no aversion to risk would possibly ignore those rules, opting instead to invest only in Equities, as they make by far the largest contribution per percentage of allocation. Equities contribute the highest positive factor while all the other asset categories are slightly to much lower. Every percentage point of portfolio allocation in Equities provides 1.25 times the proportional share of profit output, while the others produce negative proportional profit share (i.e., their factor rank is below 1.00).

For the two-year Islamic portfolio much of the story is the same (Table 4.33).

Table 4.31 Risk measurement analysis, five-year Islamic portfolio

Security	Investment Focus	Asset Class	% of Portfolio	% of Contribution	Total Return	Standard Deviation	Sharpe Ratio
IMANX US	International equities	Equity	9.70%	10.39%	121.31%	11.31%	1.02
AMAGX US	International equities	Equity	10.20%	10.07%	108.92%	10.15%	1.01
AMANX US	International equities	Equity	9.96%	9.04%	96.70%	9.65%	0.97
BAJAMJE AB	Japanese equities	Equity	8.97%	8.58%	97.34%	12.59%	0.87
ADJEX US	International equities	Equity	10.18%	8.29%	82.48%	12.86%	0.69
ISDU LN	U.S. equities	Equity	10.33%	7.83%	75.19%	10.04%	0.87
PUBASIT MK	Emerging market equities	Equity	12.97%	3.79%	21.06%	10.22%	0.30
SPAL LN	Source Physical Palladium P-ETC	Alternative	1.83%	1.33%	49.67%	21.21%	0.38
WISEX US Equity	Azzad Wise Capital Fund	Fixed Income	4.39%	1.16%	22.61%	1.19%	0.86
EMDYLRQ JY	Emirates Global sukuk Fund	Fixed Income	4.65%	0.97%	17.37%	1.49%	1.09
EFHGSPF LX	EFH Global sukuk Plus Fund	Fixed Income	4.60%	0.79%	13.91%	1.75%	0.97
BPIHIPA LX	BNP Paribas Islamic Hilal Income Fund	Fixed Income	4.58%	0.73%	12.87%	1.56%	0.68
JDSUKUK AB	Jadwa Global sukuk	Fixed Income	4.66%	0.63%	10.77%	1.44%	0.90
SCREITS LX	SC Global Real Estate Fund	Alternative	1.81%	0.59%	25.66%	8.76%	0.40
ALCOMUS AB	Al Rajhi – Commodity Fund USD	Money Market	1.17%	0.10%	6.49%	0.07%	10.25
Totals			100.00%	64.29%			

Source: Author's work, data from Bloomberg.

Table 4.32 Contribution and weights, five-year Islamic portfolio

Asset Category	% of Portfolio	% of Contribution	% of Return	Factor
Money Market	1.17%	0.10%	0.15%	0.13
Fixed Income	22.88%	4.28%	6.67%	0.29
Equities	72.31%	57.99%	90.20%	1.25
Alternatives	3.64%	1.92%	2.98%	0.82
Totals	100.00%	64.29%	100.00%	

Source: Author's work, data from Bloomberg.

Table 4.33 Contribution, two-year Islamic portfolio

Security	Investment Focus	Asset Category	% of Portfolio	% of Contribution	Total Return
ISDE LN	Emerging market, Asia-Pacific	Equity	11.57%	6.14%	54.95%
BAJAMJE AB	Japanese equities	Equity	11.89%	4.96%	40.73%
IMANX US	International equities	Equity	11.68%	4.79%	41.53%
AMAGX US	International equities	Equity	11.57%	4.46%	38.80%
AMANX US	International equities	Equity	11.61%	3.89%	33.05%
SCUSEPA LX	U.S./North American equities	Equity	11.87%	3.87%	32.04%
SPAL LN	Source Physical Palladium P-ETC	Alternative	1.59%	1.33%	93.57%
CRESGPA ID	Oasis Crescent Global Property Equity Fund	Alternative	2.25%	0.93%	38.41%
BADISIN UH	MASHREQ AL-ISLAMI INCOME FUN	Fixed Income	5.11%	0.48%	8.44%
SCINCSU LX	SC GLOBAL SUKUK FUND-S USD	Fixed Income	5.34%	0.47%	7.87%
RASGLIU LX	RASMALA GLB SUKUK-GSFI	Fixed Income	4.55%	0.44%	8.68%
ALHGSUK UH	AL HILAL GLOBAL SUKUK FUND	Fixed Income	4.91%	0.39%	7.03%
FTGSIAU LX	FRANKLIN GBL SUKUK-IAUSD	Fixed Income	4.58%	0.38%	7.43%
ALCOMUS AB	Al Rajhi – Commodity Fund USD	Money Market	1.48%	0.05%	3.27%
Totals			100.00%	32.58%	

Source: Author's work, data from Bloomberg.

The period 2016–2017 witnessed an exceptionally strong bull run in most global equity markets. It is no surprise, then, that the two-year return Islamic portfolio performance (32.58%) was roughly half of the five-year performance (64.29%) despite the lack of an additional half year. Equities contributed even more of total return, from 72.31% (five-year) to more than 86% (two-year) portfolio return.

Again this performance was paid for with additional risk (Table 4.34).

Table 4.34 Risk measurement analysis, two-year Islamic portfolio

Security	Asset Category	% of Portfolio	% of Contribution	Standard Deviation	Sharpe Ratio
ISDE LN	Equity	11.57%	6.14%	14.70%	1.21
BAJAMJE AB	Equity	11.89%	4.96%	12.63%	1.06
IMANX US	Equity	11.68%	4.79%	10.43%	1.28
AMAGX US	Equity	11.57%	4.46%	9.38%	1.33
AMANX US	Equity	11.61%	3.89%	8.50%	1.26
SCUSEPA LX	Equity	11.87%	3.87%	8.84%	1.18
SPAL LN	Alternative	1.59%	1.33%	22.07%	1.33
CRESGPA ID	Alternative	2.25%	0.93%	17.84%	0.76
BADISIN UH	Fixed Income	5.11%	0.48%	1.19%	2.09
SCINCSU LX	Fixed Income	5.34%	0.47%	1.18%	1.96
RASGLIU LX	Fixed Income	4.55%	0.44%	1.23%	2.11
ALHGSUK UH	Fixed Income	4.91%	0.39%	2.09%	0.97
FTGSIAU LX	Fixed Income	4.58%	0.38%	2.35%	0.79
ALCOMUS AB	Money Market	1.48%	0.05%	0.09%	8.32
Totals		100.00%	32.58%		

Source: Author's work, data from Bloomberg.

As in the five-year case, standard deviation of Equities (average 10.75%) and Alternatives (average 19.96%) is much higher when compared to Fixed Income (average 1.61%) and Money Market funds (average 0.09%). Also, in the case of contribution to portfolio performance as a factor of percentage of allocation, Equities do the heavy lifting. Different in the two-year case is the reversal of fortune in Alternatives, which now have a strongly positive factor of performance contribution versus portfolio weight (Table 4.35).

Table 4.35 Contribution and weights, two-year Islamic portfolio

Asset Category	% of Portfolio	% of Contribution	% of Return	Factor
Equity	70.19%	28.11%	86.44%	1.23
Alternative	3.84%	2.26%	6.95%	1.81
Fixed Income	24.49%	2.16%	6.61%	0.27
Money Market	1.48%	0.05%	0.18%	0.12
Totals	100.00%	32.58%	100.00%	

Source: Author's work, data from Bloomberg.

COMPARISON OF THE OPTIMIZED ISLAMIC GROWTH PORTFOLIO TO CONVENTIONAL GROWTH PEERS

The analysis of the five-year and two-year Islamic Growth portfolio performance and risk characteristics is, by nature, neutral. There is no evidence that either risk or reward were “better” or “worse” for the Islamic portfolio as there are no points of reference for comparison. In this section an effort is made to make comparisons of the Islamic portfolios against meaningful peers.

In the section “Creating the ‘Guessed’ Asset Allocation and Optimizing within Asset Classes” earlier in the chapter, an effort was made to identify the asset allocations of self-identified Growth strategy mutual funds from major global asset managers. These allocations were used as a guide for the allocation among asset categories of an Islamic portfolio in order to provide comparable percentage allocations among the four traditional asset classes: Money Market, Fixed Income, Equity and Alternative.

Previous sections identified the process to identify an investible universe, then narrowed down the available securities to a Buy List that comprises assets that meet global regulatory and professional standards.

If the result is a robust Islamic portfolio that matches conventional (non-Islamic) peers in terms of security selection and asset allocation, then performance and risk comparisons between them should be illuminating.

The Conventional Peers

Four conventional (non-Islamic) mutual funds that are self-identified as having a Growth strategy were selected for the comparative analytics. These are:

- Credit Suisse Lux Portfolio Fund Growth USD, ISIN: LU0078042453
- UBS (Lux) Strategy Fund – Growth, ISIN: LU0033040865
- Fidelity Asset Manager 70% Fund, ISIN: US3160693012
- Franklin Templeton Growth Allocation Fund, ISIN: US35472P8775.

These four portfolio strategy funds were chosen simply due to their commonality, that is, they are issued and managed by some of the world's largest asset management businesses. There are others that could also be used for comparison, such as the global Growth strategy portfolios from JPMorgan and BlackRock. Additional comparisons could be found among smaller asset management firms. However, it is considered that measuring the Islamic Growth portfolio against these four is sufficient to demonstrate its performance and risk characteristics relative to commonly assembled similar portfolios from four significant asset managers. Importantly, all the peer funds listed here at available to the "common man," that is, they have low minimum purchase amounts and can be easily accessed by investors small and large almost globally, reflecting the global reach of their parent management companies.

Each of these peer funds are part of a family of funds from the fund managers. Each family has hundreds of mutual funds in many asset categories with equally many types of investment strategies in many single-asset categories, for example money market funds, bond funds, equity funds and alternative funds. However, all these families of mutual funds also include what are called "portfolio funds," meaning they are mutual funds comprising investment in multiple asset categories to mimic a portfolio that would be constructed for an individual or institutional client. The portfolio funds are widely available to investors in the classic investment strategies: Income, Balanced and Growth.²⁶ These three investment strategies represent the range of investment risk most investors seek, from low (Income), to medium (Balanced) to high (Growth). Embedded in these portfolio funds is the manager's asset allocation for each of these typical investment strategies, that is, a portfolio fund identified as having a Growth strategy will indicate the manager's allocation among asset categories for that strategy. A Growth strategy by nature will have higher-risk allocations, and an Income strategy will have lower-risk allocations. Higher-risk allocations generally mean a higher proportion of riskier assets such as Equities, and a lower allocation for lower-risk assets such as Fixed Income.

Among the sales materials for these Growth mutual funds are statements indicating long-term portfolio goals and asset allocations that lean heavily toward Equity investments, usually 70% or 80% of total portfolio assets. Importantly, these so-called peers are managed by several of the asset management companies with the largest volumes of total AUM in the world. Among them UBS alone is said to manage close to \$3 trillion, Credit Suisse nearly \$1.4 trillion, Fidelity almost \$2.5 trillion and Franklin Templeton approaching \$725 billion. One may assume these four managers—with combined AUM of nearly \$8 trillion—are likely to have the resources, information and data, and human expertise to reasonably assemble Growth strategy portfolios and portfolio funds that meet contemporary professional and regulatory standards, and that reflect the scholarship underpinning MPT.

These comparative peers are also heavy users of Bloomberg financial data services, Bloomberg portfolio construction tools and similar tools available from other vendors. One may assume that the portfolio construction process used by them is similar to the one described and used here for the Islamic Growth portfolio described earlier.

The asset allocations among asset categories for these peers are taken directly from their year-end 2017 fact sheets, as can be seen in Table 4.36.

Table 4.36 Growth mutual fund allocations by asset category

Asset Category	Credit Suisse	UBS	Fidelity	Franklin	Islamic Growth
Money Market	4.40%	-	4.33%	1.76%	1.17%
Fixed Income	13.95%	29.10%	22.40%	11.70%	22.88%
Equity	73.97%	70.90%	73.27%	81.71%	72.31%
Alternative	7.68%	-	-	4.83%	3.64%
Totals	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Author's work, data from fund fact sheets.

While there is variance in every category, the range of allocations among asset categories are sufficiently similar to be considered Growth strategies in all cases due to the preponderance of Equity in each. The fund from Franklin Templeton is the most problematic, as its combined holdings of Equity and Alternative assets is a good deal higher than its peers. Below we shall see whether this indicates the potential for higher return, higher risk or neither of these assumptions.

Performance and Risk Comparisons, Islamic vs. Conventional Peers

If one considers these funds as similar peers constructed using similar processes, then the first comparison to make is five-year performance as measured by cumulative return (Figure 4.5).

On visual inspection the five-year Islamic Growth portfolio seems to have closely tracked at least two of its conventional peers. For the five-year period the Islamic portfolio's cumulative performance was essentially identical in shape among the aggregate, that is, from the starting point it is visually confirmed that positive and negative market price changes affected all these comparables nearly equally. Yet, also quite clear is that these portfolios did not perform identically. Total return on the Islamic Growth, Franklin and Fidelity portfolio funds is superior to that on the UBS and Credit Suisse portfolio funds.

We can decompose the monthly performance of each of these Growth portfolios, as can be seen in Table 4.37.

Table 4.37 Monthly and annual returns, Islamic portfolio and conventional peer comparison growth mutual funds

2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Islamic Growth (Passive)	2.97%	0.75%	1.67%	1.56%	0.83%	-2.55%	3.90%	-2.33%	3.93%	2.98%	1.56%	1.95%	17.22%
Credit Suisse Lux Portfolio Fund Growth	3.18%	-0.79%	0.80%	2.25%	-1.85%	-3.57%	3.15%	-1.73%	4.35%	2.95%	0.02%	0.42%	9.18%
UBS (Lux) Strategy Fund - Growth	2.91%	0.39%	1.79%	2.12%	-0.33%	-2.21%	3.40%	-2.03%	3.46%	3.52%	1.34%	1.12%	15.48%
Fidelity Asset Manager 70% Fund	3.52%	0.23%	1.85%	1.96%	0.63%	-2.19%	4.67%	-1.90%	4.61%	2.77%	1.73%	2.25%	20.12%
Franklin Growth Allocation Fund	3.53%	0.19%	1.86%	1.64%	0.82%	-2.36%	4.86%	-1.66%	4.61%	3.65%	1.86%	2.27%	21.26%
2014	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Islamic Growth (Passive)	-3.04%	4.85%	0.12%	0.01%	2.54%	2.29%	-1.02%	3.25%	-2.90%	2.00%	1.49%	-0.81%	8.78%
Credit Suisse Lux Portfolio Fund Growth	-3.34%	4.12%	-0.09%	0.76%	1.61%	1.63%	-1.18%	1.39%	-4.00%	0.13%	0.80%	-2.20%	-0.36%
UBS (Lux) Strategy Fund - Growth	-2.79%	3.28%	0.49%	0.26%	2.26%	1.61%	-0.71%	2.45%	-2.29%	1.39%	2.06%	-1.39%	6.63%
Fidelity Asset Manager 70% Fund	-2.22%	4.98%	-0.41%	-0.06%	2.46%	2.28%	-2.46%	3.04%	-3.04%	1.81%	1.52%	-1.16%	6.74%
Franklin Growth Allocation Fund	-2.23%	4.93%	-1.21%	-0.13%	2.17%	2.35%	-2.54%	3.54%	-2.87%	1.87%	1.67%	-1.21%	6.34%
2015	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Islamic Growth (Passive)	-0.79%	4.81%	-0.18%	0.99%	0.51%	-2.13%	-0.10%	-5.64%	-2.56%	7.36%	-0.20%	-1.34%	0.74%
Credit Suisse Lux Portfolio Fund Growth	-0.44%	3.81%	-1.39%	1.91%	-0.17%	-2.03%	0.23%	-5.69%	-2.90%	5.42%	-1.11%	-1.63%	-3.99%
UBS (Lux) Strategy Fund - Growth	-0.67%	4.75%	-0.74%	0.97%	0.97%	-2.97%	1.55%	-6.76%	-3.47%	6.59%	0.07%	-2.94%	-2.67%
Fidelity Asset Manager 70% Fund	-0.71%	5.14%	-0.51%	1.28%	1.22%	-2.38%	0.84%	-6.74%	-3.66%	6.68%	0.32%	-2.17%	-0.70%
Franklin Growth Allocation Fund	-0.89%	5.07%	-0.46%	1.16%	1.03%	-2.65%	1.49%	-7.09%	-3.68%	6.59%	-0.07%	-2.29%	-1.79%

2016	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Islamic Growth (Passive)	-6.04%	0.77%	6.88%	1.14%	1.15%	1.53%	4.28%	-0.04%	0.99%	-3.39%	0.79%	0.15%	8.21%
Credit Suisse Lux Portfolio Fund Growth	-4.69%	-0.84%	5.55%	1.13%	0.09%	0.20%	2.54%	-0.03%	0.61%	-1.91%	-0.14%	1.43%	3.95%
UBS (Lux) Strategy Fund – Growth	-5.19%	-0.95%	5.13%	0.16%	1.05%	-1.14%	4.01%	1.31%	0.80%	-0.23%	0.48%	2.46%	7.89%
Fidelity Asset Manager 70% Fund	-5.36%	-0.75%	6.45%	1.56%	1.02%	-0.07%	4.00%	0.88%	0.75%	-2.24%	0.88%	1.80%	8.93%
Franklin Growth Allocation Fund	-6.41%	-0.96%	7.11%	1.47%	1.03%	-0.60%	4.14%	0.30%	0.98%	-2.41%	0.53%	1.88%	7.05%
2017	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Islamic Growth (Passive)	3.40%	3.66%	1.70%	1.87%	2.80%	0.75%	2.42%	1.48%	2.59%	4.14%	3.68%	0.85%	29.34%
Credit Suisse Lux Portfolio Fund Growth	2.05%	2.67%	0.84%	1.00%	1.42%	0.01%	2.37%	0.30%	1.50%	2.07%	1.64%	1.41%	17.28%
UBS (Lux) Strategy Fund – Growth	2.08%	3.04%	1.33%	1.59%	2.16%	-0.06%	2.72%	0.85%	1.53%	2.62%	0.84%	1.60%	20.32%
Fidelity Asset Manager 70% Fund	3.38%	3.17%	1.17%	2.27%	2.14%	0.62%	2.96%	1.03%	2.00%	2.55%	2.27%	1.70%	25.26%
Franklin Growth Allocation Fund	3.19%	3.57%	1.61%	2.29%	2.90%	0.25%	3.36%	0.94%	2.19%	2.81%	2.19%	0.96%	26.26%

Source: Author's work, data from Bloomberg.

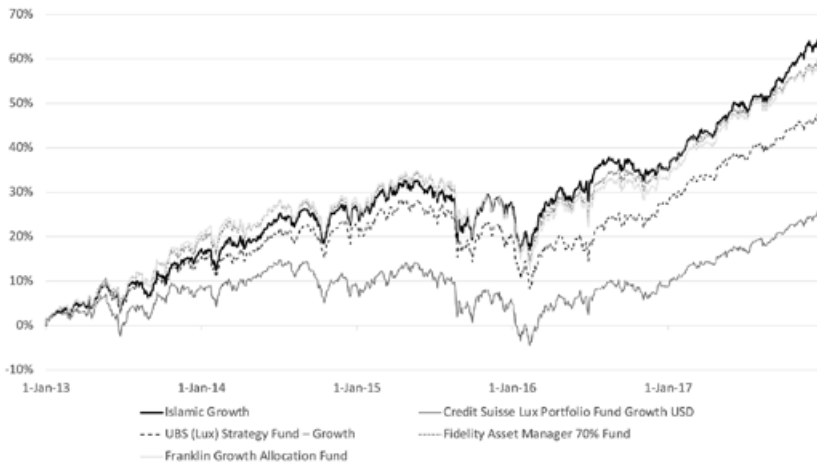


Figure 4.5 Cumulative performance of Islamic portfolio and conventional peers, 2013–2017

Source: Author's work, data from Bloomberg.

The performance and risk metrics of each portfolio can be further broken down as shown in Table 4.38. The table also allows a comparison to be made between the Islamic Growth portfolio and its conventional peers.

Importantly, the comparative benchmark embedded in Table 4.38's risk/return measures comprises 75% Dow Jones Islamic Market index (DJIMT, total return) and 25% Dow Jones sukuk Index (DJSUKUK, also total return). Arguably this may bias the results in favor of the Islamic Growth portfolio, but at the same time the subject of this study is Islamic asset management and the opportunities that may exist in an all-sharia portfolio allocation for the "common man." The hybrid index used here avoids those elements of investing that are considered taboo among Muslims, so as a benchmark it reflects what peer funds should be measured against. The inverse, that is, comparing the Islamic Growth portfolio to a conventional (non-Islamic) hybrid benchmark, would seem incompatible with the objectives of this research. This hypothesis does not ask whether an Islamic portfolio outperforms or underperforms against a benchmark, but rather against conventional peers. However, a benchmark is essential for the comparative risk measures such as the Sharpe ratio.

The data now allows the observation of performance and risk metrics. At first glance, what is evident is a relatively tight distribution of **total returns** among three of the five portfolios, where the Islamic Growth portfolio, as the

Table 4.38 Performance, risk and return: Islamic portfolio and conventional mutual funds

5 Years Beginning 01/01/2013	Islamic Portfolio	Credit Suisse Lux Portfolio Fund Growth	UBS (Lux) Strategy Fund – Growth	Fidelity Asset Manager 70% Fund	Franklin Growth Allocation Fund
Return					
Total Return	64.29%	26.07%	47.65%	60.36%	59.12%
Total Return (Annualized)	10.45%	4.75%	8.03%	9.70%	9.60%
Maximum Return (Monthly)	1.93%	2.00%	1.65%	1.83%	2.11%
Minimum Return (Monthly)	-2.99%	-3.22%	-2.85%	-3.23%	-3.81%
Mean Return (Annualized)	10.74%	5.07%	8.41%	10.30%	10.19%
Risk					
Standard Deviation (Annualized)	6.15%	6.65%	6.34%	7.19%	7.72%
Skewness	-0.70%	-0.72%	-0.57%	-0.62%	-0.72%
VaR at 95% (ex post)	-0.62%	-0.65%	-0.64%	-0.73%	-0.77%
Risk/Return (75% DJIMT -25% DJSUKUK)					
Sharpe Ratio	1.20	0.91	0.91	0.98	0.91
Jensen's Alpha	2.11%	-2.21%	0.49%	0.88%	0.31%
Information Ratio	0.58	-0.99	-0.09	0.43	0.38
Treynor Ratio	0.08	0.04	0.07	0.07	0.06
Beta (ex post)	0.87	0.93	0.87	1.03	1.11
Correlation	0.9433	0.9295	0.9142	0.9488	0.9533
Capture Ratio	0.80	0.86	0.79	0.96	1.03

Source: Author's work, data from Bloomberg.

highest performer at 64.29%, registers in first place and Credit Suisse registers last, having the lowest performance at 26.07%. More meaningfully, we can also conclude that the Islamic Growth portfolio comes first when measured by annualized **mean return**, at 10.74%. In terms of absolute cumulative and mean returns, therefore, the indication is that the Islamic Growth portfolio has superior performance to all four conventional peers.

Performance, however, is normally associated with risk. During this measurement period the Islamic Growth portfolio achieved the lowest level of risk among the five peers as measured by **standard deviation**, at 6.15%. But standard deviation assumes a normal distribution of the data. If data is not normally distributed, another measure is helpful: **skewness**. All five portfolios show a nonsymmetrical negative skew, with the five portfolios falling in a tight

range from -0.57 to -0.72. Negative skews indicate that all five had frequent smaller monthly gains and a few larger monthly losses. The -0.70 skew of the Islamic Growth portfolio indicates a higher extreme of small gains and large losses, an inferior result compared to two of the peers but a superior one to two others, with the three “best” portfolios (including Islamic Growth) highly clustered.

With **Value at Risk** measurements at 95% confidence, however, the picture improves. Here the Islamic Growth portfolio indicates the lowest level of probable loss among the five portfolios. But again the data is relatively tightly clustered, between -0.62% and -0.77%, indicating similar risk of potential loss characteristics among all five portfolios.

The most commonly used industry measure of portfolio risk is the **Sharpe ratio**, where a higher measurement indicates a risk-adjusted higher return compared to the risk-free rate. Here the Islamic Growth portfolio stands out among its peers with the highest Sharpe ratio by a large margin, indicating that it achieved the highest level of performance above the risk-free rate and relative to the volatility it experienced during the measurement period. This indicates substantially superior performance compared to its peers.

These are standalone comparisons of each of the five portfolios. In the next analysis we compare the Islamic Growth portfolio to the four conventional peers using common comparative analytics. In this case we use the hybrid benchmark from which we measure each of the portfolios.

Jensen’s Alpha is a common measure of risk versus reward. Jensen’s Alpha attempts to discover whether the risks taken by the portfolio manager are compensated with additional return. In this exercise, the four peers are measured against the hybrid benchmark, where:

$R(p)$ = the realized return of each portfolio (individually measured against the benchmark)

$R(d)$ = the realized return of the benchmark

$R(f)$ = the risk-free rate of return for the time period, established by Bloomberg²⁷

B = the Beta of each portfolio with respect to the benchmark.

The formula is:

$$\text{Jensen's Alpha} = R(p) - (R(f) + B \times (R(d) - R(f)))$$

In the measurements above, the indication is that the four peer portfolios display inferior risk-adjusted return compared to the Islamic Growth portfolio, that is, they showed substantial negative (Credit Suisse) to slightly positive (UBS, Fidelity and Franklin) Jensen’s Alpha results. This indicates that the Islamic Growth portfolio earned more than enough extra return to compensate for the risk it took during the measured period when compared to the four

peers, that is, there was a more efficient tradeoff between risk and reward with the Islamic Growth portfolio compared to the conventional peers.

An **Information ratio** measures a portfolio's performance against a benchmark, unlike the Sharpe ratio's performance measure against a risk-free rate. This allows for comparisons where an asset management client, for example, is sensitive to benchmark performance, indicating a desired level of risk-adjusted return not to a risk-free rate but to an index. The Sharpe ratio:

$$\text{Sharpe ratio} = (R_p - R_f)/\sigma_p$$

measures the return of the portfolio minus the risk-free rate, divided by the standard deviation of the portfolio's excess return (i.e., the standard deviation of the portfolio's performance less the risk-free rate in each measured time period). The Information ratio

$$\text{Information ratio} = (R_p - R_f)/S_{p-1}$$

starts with the same differential between the portfolio's performance and the risk-free rate, but uses the tracking error as the denominator instead of the standard deviation of excess returns. The tracking error is the standard deviation of the portfolio's performance less the benchmark in each measured time period.

This measurement is quite useful for measuring the risk-adjusted performance of the Islamic Growth portfolio against its conventional peers. The results indicate that in each case there is either a negative or moderately positive Information ratio compared to the Islamic Growth portfolio, meaning the conventional peers underperformed the benchmark Islamic Growth portfolio in the measured time period.

The **Treynor ratio**, or also commonly known as the Treynor measure, is another useful risk-reward metric. It attempts to measure the units of additional performance that are added with each additional unit of risk, where investors ideally seek more units of the former and fewer of the latter.

The Treynor ratio is regarded as a risk-adjusted measure. It is computed by subtracting the risk-free rate from the annualized mean return per unit of Beta, which corresponds to the benchmark. A portfolio's historical risk-adjusted performance improves with the Treynor ratio as a higher ratio reflects better performance. This measure can also be employed to calculate the excess return added from an additional unit of systematic risk.

The Treynor ratio is simply the average return of a portfolio less the average risk-free rate, divided by the portfolio's Beta as measured against an index or benchmark. In this study, we measure each conventional portfolio's Treynor ratio by averaging its return over the measured period, subtracting the Bloomberg-defined average risk-free rate during that time period, and then

dividing the sum by the conventional portfolio's Beta as measured against the hybrid benchmark.

As measured against the benchmark used here, all five portfolios register a small positive Treynor ratio (remembering that the Beta used in these calculations is based on the hybrid benchmark). Note here, however, the correlation among the three best-performing conventional peers, with a range of only 0.06 to 0.07 for the Treynor ratio (Credit Suisse registers at 0.04). Such close results for the Treynor ratio would make an investor somewhat indifferent in choosing among the conventional peers versus the Islamic Growth portfolio, whose Treynor ratio is double the Credit Suisse result at 0.08 but not significantly above the other conventional peers. However, with the highest Treynor ratio, the Islamic Growth portfolio again indicates superior results.

Beta measures the strength and direction of the performance movements of a portfolio versus a benchmark. In our case, it is the covariance of a portfolio to the hybrid benchmark, divided by the variance to the benchmark. A Beta of greater than 1.0 indicates the two move in the same direction, but with the measured portfolio exhibiting stronger movements than the benchmark. In other words, a Beta of greater than 1.0 indicates higher volatility. It is not surprising, then, that the two U.S.-managed funds indicate Betas greater than 1.0 when measured against the benchmark. They also have the highest standard deviation among all five of the portfolios, which correlates with the higher Beta results. The two Swiss portfolios—Credit Suisse and UBS—both have a Beta less than 1.0 but greater than zero, again indicating movements in the same direction as the benchmark but also less volatility in those movements. The Islamic Growth Beta measure is more similar to that of the Swiss portfolios than the American-managed ones.

Systematic risk is calculated by using the CAPM. This calculation involves dividing the slope of the regression line of the portfolio and benchmark return by the previously chosen period of time.

This indicates that there may be a significant difference in manager style between the two American and two Swiss peer portfolios, where the Betas greater than 1.0 indicate more risk-taking among the Americans, and conversely less risk-taking by the Swiss, all on supposedly identical portfolio investment strategies. The Beta of the Islamic Growth portfolio may indicate that it has the same risk-aversion characteristics as the Swiss comparative portfolios.

Correlation is performed in our calculations by comparing a portfolio to the hybrid benchmark. In this case, the performance changes for each of the 1,823 daily performance points (the number of days of reporting for the period from 1 January 2013 through 31 December 2017) are summed for both, and then each data point is squared and summed for both. The standard correlation

formulation of the Credit Suisse portfolio to the hybrid benchmark would then be (where HB is the hybrid benchmark):

$$\text{Correlation}_{\text{PCS}} = \frac{1,823 \times ((\text{SUM}(\text{CS}, \text{HB}) - (\text{SUM}(\text{CS}) \times (\text{SUM}(\text{HB}))) / \text{SquareRoot}((1,823 \times \text{SUM}(\text{CS}^2) - \text{SUM}(\text{HB})^2) \times (1,823 \times \text{SUM}(\text{HB}^2) - \text{SUM}(\text{HB})^2))}{1,823 \times \text{SUM}(\text{HB}^2) - \text{SUM}(\text{HB})^2)}$$

Table 4.38 indicates a relatively strong correlation of all five portfolios to the hybrid benchmark, all within the range of 0.9142 to 0.9533. Despite their tight bunching, the lowest two are the Swiss portfolios relative to the benchmark and the highest two are the U.S. portfolios. Perhaps this is another indication of some kind of bifurcation between Swiss-managed portfolios and U.S.-managed portfolios, all with the same stated Growth investment strategy.

The relatively high degree of correlation should not be a surprise. All four portfolios have a large amount of Equity and Alternative assets, and a relatively smaller portion of less-volatile Fixed Income and Money Market assets. All four invest equities into global markets that themselves show high correlation.

The **Capture ratio** evaluates how much more of a market upswing a manager delivers compared to a reference benchmark. In our case the formula is simply the quotient of dividing the upside Capture ratio by the downside Capture ratio, where each ratio is determined by the up or down returns of a peer portfolio divided by the return of the Islamic Growth portfolio, and the quotient multiplied by 100.

The Capture ratio measures the relative gain of an investor from the portfolio compared to the benchmark. It is measured by taking the ratio between portfolio return and benchmark return, computed daily. Next, the mean of this is calculated and divided by the particular time period.

Upside and downside capture are useful when seeking a nonsymmetric correlation to market movements. Investors as rational persons seek more upside than downside, and normally want a manager to exceed the market's upside movements while having fewer losses than a market's downside movements, an asymmetric expectation. In some ways this is a superior measure of performance, in that it removes the bias toward symmetric comparisons found in standard deviation, Beta and Jensen's Alpha.

The Credit Suisse and UBS portfolios, perhaps predictably given the variance in the other measures mentioned earlier, capture less of the movements of the benchmark (0.86 and 0.79, respectively), while the two American portfolios display greater capture (0.96 Capture ratio for Fidelity, 1.03 for Franklin). This indicates that the Swiss portfolios were unable to capture the benchmark's upside gain and downside loss as well as the Fidelity and Franklin funds did.

Passive vs. active management: effort to replicate the active Islamic portfolio

The measures above use a passive Islamic Growth portfolio. In other words, the portfolio was set with a fixed asset allocation among asset categories on 1 January 2013 and left with that allocation for the entire five-year measurement period. There was no effort to simulate sales and purchases, nor react to changing market conditions. This is, in fact, unrealistic as the initial asset allocations by security and asset class will become quickly distorted. Eventually, the highest-performing securities will dominate the allocation compared to the lower-performing securities.

Without doubt the conventional peer portfolios were actively managed. Each month there were changes to the four portfolios, increasing or decreasing allocations in each of the asset categories. This dynamic is what earns management fees for the portfolio manager.

The result is the comparison of a passive portfolio—Islamic Growth—to four actively managed portfolios, the conventional peers. This raises the question: How can one simulate the past to provide a proxy for an actively managed Islamic Growth portfolio? If this proxy is acceptable, what are the performance dynamics between the proxy (actively managed) Islamic Growth portfolio and the conventional peers?

To address this question the managers of each of the four conventional peers were approached and asked to provide their month-to-month asset allocation by asset categories. Each manager provided this information, which was then tabulated in Excel for the entire 60-month observation period. Then, the ranges of allocations among the four in Money Market, Fixed Income, Equities and Alternatives were established. Finally, from these ranges a midpoint was calculated for each asset category's percentage of the peer portfolio.

A new Islamic Growth dataset was run, but this time without the fixed allocations by asset category. Instead, the ratios of asset categories were reset according to the midpoint of the peer portfolios for each month of the dataset. While this is an imperfect method to simulate active management, it does reflect the general consensus among the four peer conventional portfolio managers on asset allocation among asset categories for each of the 60 months. It is believed that the general consensus on monthly changes in global economic and market conditions among the asset management units of Credit Suisse, UBS, Fidelity and Franklin Templeton is at least partially observable from the changes in their portfolio asset category allocations.

The new portfolio is called Islamic Growth Active. It serves as a proxy for what may have been a true actively managed portfolio. While security selections do not change, the asset category allocation ratios do change on a monthly basis.



Figure 4.6 Comparative cumulative portfolio performance, 2013–2017

Source: Author's work, data from Bloomberg.

The results of the Islamic Growth Active portfolio were then compared to the four peer portfolios. Initially, it is observed that the Islamic Growth Active portfolio not only continues to be the top performer in terms of total return, but actually increases the differential with the conventional peers (Figure 4.6).

The previously examined portfolio performance and risk measurements were calculated, as can be seen in Table 4.39.

The results for the critical performance and risk metrics are again compared:

Changes to Islamic Growth Portfolio, Passive to Active

- Total return improves, from 64.29% to 68.51%, and is still the top performer.
- Mean return, annualized, improves from 10.74% to 11.32%, and is still the top performer.
- Standard deviation increases, from 6.15% to 6.31%, but remains the lowest among the portfolios.
- Skewness remains unchanged, and is still near the higher end of the range among the peers.
- VaR at 95% remains virtually unchanged, from -0.62% to -0.64%, yet remains the top scorer, but now along with UBS.
- Sharpe ratio increases from 1.20 to 1.23, and remains the highest when compared to conventional peers.

Table 4.39 Performance, risk and return: Islamic Active portfolio and conventional mutual funds

5 Years Beginning 01/01/2013	Islamic Portfolio (Active)	Credit Suisse Lux Portfolio Fund Growth	UBS (Lux) Strategy Fund – Growth	Fidelity Asset Manager 70% Fund	Franklin Growth Allocation Fund
Return					
Total Return	68.51%	26.07%	47.65%	60.36%	59.12%
Total Return (Annualized)	11.01%	4.75%	8.03%	9.70%	9.60%
Maximum Return (Monthly)	1.85%	2.00%	1.65%	1.83%	2.11%
Minimum Return (Monthly)	-3.09%	-3.22%	-2.85%	-3.23%	-3.81%
Mean Return (Annualized)	11.32%	5.07%	8.41%	10.30%	10.19%
Risk					
Standard Deviation (Annualized)	6.31%	6.65%	6.34%	7.19%	7.72%
Skewness	-0.70%	-0.72%	-0.57%	-0.62%	-0.72%
VaR at 95% (ex post)	-0.64%	-0.65%	-0.64%	-0.73%	-0.77%
Risk/Return					
Sharpe Ratio	1.23	0.91	0.91	0.98	0.91
Jensen's Alpha	2.39%	-2.21%	0.49%	0.88%	0.31%
Information Ratio	0.72	-0.99	-0.09	0.43	0.38
Treynor Ratio	0.09	0.04	0.07	0.07	0.06
Beta (ex post)	0.89	0.93	0.87	1.03	1.11
Correlation	0.9390	0.9295	0.9142	0.9488	0.9533
Capture Ratio	0.82	0.86	0.79	0.96	1.03

Source: Author's work, data from Bloomberg.

In reviewing the comparative data (the peer comparables versus the Islamic Growth Active) there are areas of some important change. The differentials between the peer portfolios and the Islamic Growth Active portfolio are slightly wider for Jensen's Alpha, indicating an improvement on return given the risk taken in the portfolio. The same is true for the Information ratio, indi-

cating improved ability to sustain outperformance relative to the benchmark for the Islamic Growth Active portfolio.

There do not appear to be significant changes between the Islamic Growth Active portfolio and the conventional peers for Treynor ratio, Beta, correlation and Capture ratio, all of which indicate a portfolio's movement compared to a benchmark, although in most cases the results indicate a slightly superior performance.

These results indicate the potential for an actively managed Islamic portfolio to continue its observed outperformance vis-à-vis conventional peers. Again, while the method to mimic active management is imperfect, it is perhaps an improvement from the perfectly passive Islamic Growth portfolio examined earlier.

PERFORMANCE AND RISK, OPTIMIZED ISLAMIC VS. CONVENTIONAL PEERS

The above examines various performance and risk metrics to understand the similarities and differences between an Islamic portfolio and what may be considered conventional peers. We have focused here on:

- Total return
- Mean return (annualized)
- Standard deviation
- Skewness
- VaR at 95%
- Sharpe ratio
- Jensen's Alpha
- Information ratio
- Treynor ratio
- Beta
- Correlation
- Capture ratio

These 12 measurements are only a portion of the dozens of other possible single measurements and comparative measurements that could be made. However, these 12 are very frequently included in measurements of portfolio risk and return both in academia and in practice, and seem to dominate asset management analysis to a large degree. One may consider them to be at least sufficient in testing the hypothesis, "A sharia-compliant optimized portfolio, constructed identically to conventional (non-Islamic) portfolios, will demonstrate superior return and risk characteristics compared to its conventional peers."

This checklist provides a basic indication of whether an Islamic Growth portfolio is superior or inferior to conventional peers, as stated by the hypothesis:

CONFIRMATION OF HYPOTHESIS

MEASUREMENT	CONFIRMATION
Total Return	Confirmed
Mean Return (Annualized)	Confirmed
Standard Deviation	Confirmed
Skewness	Not confirmed
VaR at 95%	Confirmed
Sharpe Ratio	Confirmed

In five of the six measures the hypothesis is confirmed, lending credibility to the hypothesis's conclusion that an equally constructed Islamic portfolio will deliver more profits with less risk than conventional peers, both for the passive and for the simulated managed Islamic Growth portfolios.

There are, of course, significant problems with the data and portfolio constructions above. Among these are:

- The sharia-compliant investible universe is very small compared to the number of securities available to non-Islamic portfolio managers, leading to outcomes that are difficult to assess given the scarcity of data from one and an abundance of data of the other.
- The available data on the sharia-compliant investible universe is sometimes incomplete, leading to the rejection of certain securities that may otherwise have contributed a different outcome in the preparation of the Buy List and the ultimate performance of the Buy List.
- Comparing a purely passive portfolio to an actively managed portfolio is problematic. One has no human involvement over time, while the other has daily human intervention. Creating a proxy for an actively managed Islamic portfolio helps bridge this gap, but only partially.

Despite these significant challenges there is something to be said about the Islamic Growth portfolio. In very precise areas of measurement, not the least of which are total return and standard deviation, the Islamic Growth portfolio indicates superior performance to conventional mutual fund peers.

Considering an Identical Conventional Peer to the Islamic Portfolio

Before concluding this section, we next consider constructing a conventional, non-Islamic portfolio using a procedure that is as identical as possible to that procedure used in constructing the Islamic portfolio. Here the process includes:

- Identifying the entire investible universe of conventional mutual funds and ETFs in each asset category.
- Sorting and filtering the universe to reduce the dataset to a minimum acceptable number of investment securities in each asset category.
- Using the same optimization methodology to shortlist the Buy List of securities in each asset category.
- Subjecting the Buy List to the same initial portfolio allocation (i.e., fixed initial weights in each category), then using the Bloomberg optimization module to derive a final optimized conventional portfolio that includes each of the asset categories.
- Back testing the conventional, optimized portfolio, then comparing that to the Islamic Growth portfolio (passive) and the conventional peers.

The above methodology should result in two portfolios—Islamic Growth and Conventional Growth—that are crafted as closely as possible to one another, indicating that the resulting risk and return metrics may be meaningfully compared. Both will have undergone the same five iterative optimization steps, one for each of the four asset categories and one for the portfolio, for a total of ten different optimization exercises.

The Conventional Investible Universe

Bloomberg is again used for the initial identification of the conventional universe of mutual funds and ETFs. Here, 375,262 mutual funds and ETFs were discovered within the Bloomberg dataset. Bloomberg does not permit the inclusion of more than 5,000 securities in a dataset that is going to be processed through their optimization module (as computing power, while enormous, is still limited, and measuring correlation coefficients among hundreds of thousands of securities would require more processing capacity than is available). So, the first goal is to reduce the dataset to no more than 5,000 securities.

The filtering conducted on the 375,262 mutual funds is as follows:

- Remove duplicates (i.e., multiple share classes, reporting only the primary share class of any security).
- Remove securities with an inception date later than 1 January 2013 (the five-year rule, which is common among some of the largest asset managers).

- Retain securities listed as mutual funds, ETFs and exchange-traded certificates (ETCs; i.e., remove those securities that are not strictly among these three types, e.g., master limited partnerships).
- Remove securities where USD is not the primary currency.
- Remove securities that allow leverage (to be comparable to Islamic equivalents, where leverage is generally not permitted).
- Remove securities that do not have daily redemption (i.e., daily liquidity).
- Remove any security listed as or resembling private equity or hedge funds.
- Remove securities with less than \$200 million AUM (meeting the minimum criteria of several of the largest asset managers for third-party mutual fund adoption).
- Remove securities domiciled in countries known for capital exchange controls (e.g., China, Pakistan, Indonesia).
- Remove securities that follow long-/short-trading strategies (short trading is prohibited by sharia).

Table 4.40 shows the results of this series of filtering.

The result is a list of funds consisting of only a fraction of the total number of mutual funds and ETFs listed on Bloomberg (1.28%), yet (1) is still a sizeable dataset for these investment products, and (2) number under 5,000, the upper limit of Bloomberg's optimization module.

Examining this subset allows a summary look at the dispersion by asset category (Table 4.41).

Table 4.40 Filtering conventional mutual funds and ETFs

Filter	Number of Funds	% of Total
Total fund base	375,262	100.00%
Removing all the duplicates, using the primary share class	133,978	35.70%
Using funds with inception date as of 01/01/2013 or older	76,445	20.37%
Only mutual funds, ETFs and ETCs	48,009	12.79%
Currency, USD only	11,422	3.04%
No leverage allowed	10,749	2.86%
Daily liquidity only	9,484	2.53%
Removing private equity and hedge funds	8,205	2.19%
AUM > \$200 million	4,897	1.30%
Removing capital exchange control countries	4,839	1.29%
Removing long/short funds (hedge-fund style)	4,815	1.28%
Final number of funds for examination	4,815	1.28%

Source: Author's work, data from Bloomberg.

Table 4.41 *Distribution of conventional mutual funds by asset category*

Asset Category	Number of Funds	Total AUM (\$)	% of Funds	% of AUM
Money Market	310	3,288,908,280,000	6.44%	15.63%
Fixed Income	1,506	4,713,946,461,000	31.28%	22.40%
Equity	2,787	12,644,059,764,000	57.88%	60.09%
Alternative	212	396,586,157,000	4.40%	1.88%
Totals	4,815	21,043,500,662,000	100.00%	100.00%

Source: Author's work, data from Bloomberg.

The subset contains over \$21 trillion in AUM, about a quarter of the current investible global universe of mutual funds and ETFs. AUM has a relatively normal distribution among the asset categories, where bond and stock funds make up almost 90% of all funds and over 80% of AUM.

The funds are well aged also, as indicated in Table 4.42 and Table 4.43.

Table 4.42 *Track record by AUM, conventional mutual funds*

Years since Inception	Money Market (\$)	Fixed Income (\$)	Equity (\$)	Alternative (\$)	Total (\$)	% of AUM
5–10	70,673,024,000	1,011,644,233,000	1,154,232,617,000	118,480,122,000	2,355,029,996,000	11.19%
10–15	355,906,747,000	942,587,724,000	2,002,896,666,000	152,268,495,000	3,453,659,632,000	16.41%
15–20	193,291,265,000	622,304,330,000	2,210,072,427,000	36,948,955,000	3,062,616,977,000	14.55%
20–25	526,257,383,000	667,946,937,000	1,675,922,887,000	56,133,042,000	2,926,260,249,000	13.91%
> 25	2,142,779,861,000	1,469,463,237,000	5,600,935,167,000	32,755,543,000	9,245,933,808,000	43.94%
Totals	3,288,908,280,000	4,713,946,461,000	12,644,059,764,000	396,586,157,000	21,043,500,662,000	100.00%

Source: Author's work, data from Bloomberg.

Table 4.43 *Track record by number of funds, conventional mutual funds*

Years since Inception	Money Market	Fixed Income	Equity	Alternative	Total	% of Funds
5–10	19	415	539	93	1,066	22.14%
10–15	43	267	714	63	1,087	22.58%
15–20	27	220	505	17	769	15.97%
20–25	63	166	483	22	734	15.24%
> 25	158	438	546	17	1,159	24.07%
Totals	310	1,506	2,787	212	4,815	100.00%

Source: Author's work, data from Bloomberg.

Notable among this subset of the conventional investible universe is that nearly 80% of all mutual funds and ETFs have more than ten years of history, with nearly one quarter having life spans of more than 25 years. The funds with more than ten years' track record enjoy AUM approaching \$20 trillion. These figures point to the immaturity of the Islamic mutual funds and ETF industry, with AUM among them a small fraction of the AUM in conventional asset management. This points to the disparity between the minuscule size of the existing Islamic asset management industry and the current size of the global Muslim population, accounting for approximately one quarter of the world's 7.5 billion people.

Greater detail is available on the conventional investment universe, but it is not necessary in this study of Islamic asset management. Rather, the process now takes the subset of the conventional universe and uses the historic data of each of the 4,815 securities to define an optimized portfolio allocation along the same path taken with the Islamic portfolio.

Optimizing the Conventional Peer Portfolio

As mentioned earlier, we start with the same allocation as the Islamic Growth portfolio, using the same hypothetical client (but, perhaps, non-Muslim) and his initial portfolio contribution. A typical Growth strategy portfolio is determined in the same fashion (using a horizontal view of current asset category allocations common in Growth strategy mutual funds). The allocation parameters are set by category for subsequent optimization within each asset category (Table 4.44).

Table 4.44 Hypothetical allocation by category with \$ amounts

Conventional Portfolio Size:		\$5,000,000	
Typical Growth Portfolio		% of Portfolio	Allocation (\$)
Money Market		5.00%	250,000
Fixed Income		20.00%	1,000,000
Equity		65.00%	3,250,000
Developed Market Equities	82.16%	53.40%	2,670,200
Developing Market Equities	17.84%	11.60%	579,800
Alternative		10.00%	500,000
Totals		100.00%	5,000,000

Source: Author's work.

Table 4.45 *Optimized conventional portfolio*

Asset Category	Securities	% of Portfolio	% of Category
Money Market			
GRFX US Equity	FEDERATED GOVT RESERVE-P	1.57%	
SSIX US Equity	STATE ST INST LIQ RES-PREM	1.22%	2.79%
Fixed Income			
DRCAX US Equity	DREYFUS CA AMT-FR MUNI-Z	6.87%	
FIIGX US Equity	FIRST INVEST INV GRD-A	5.31%	
MSNYX US Equity	MFS NEW YORK MUNICIPAL-A	3.90%	
PRHAX US Equity	PGIM MUNI HIGH INCOME-A	3.92%	20.00%
Equity			
JKD US Equity	ISHARES MORNINGSTAR LARGE-CA	13.85%	
VHT US Equity	VANGUARD HEALTHCARE ETF	13.85%	
BOSVX US Equity	BRIDGEWAY OMNI S/C VALUE FD	12.79%	
ACWD LN Equity	SPDR ACWI	12.91%	
GDISAAI LX Equity	JUPITER JGF-INDIA SEL-L USD	7.80%	
IIF US Equity	MORGAN STANLEY INDIA INVEST	3.80%	65.00%
Alternatives			
PACL LN Equity	PACIFIC ALLIANCE CHINA LAND	6.84%	
DFITX US Equity	DFA INTL RL EST SECS	5.37%	12.21%
Totals		100.00%	100.00%

Source: Author's work, data from Bloomberg.

Table 4.46 *Islamic vs. conventional allocations*

Asset Category	Islamic	Conventional	Variance
	% of Portfolio	% of Portfolio	
Money Market	1.17%	2.79%	-1.62%
Fixed Income	22.88%	20.00%	2.88%
Equities	72.31%	65.00%	7.31%
Alternatives	3.64%	12.21%	-8.57%
Totals	100.00%	100.00%	

Source: Author's work, data from Bloomberg.

From the Bloomberg mutual fund and ETF data comprising the 4,815 investment products there are 310 labeled Money Market and which meet all the earlier-listed filtering criteria. These are inputted into the Bloomberg optimization module using the same rules as with the Islamic Money Market products, and all but a handful of the 310 are removed. The remaining conventional Money Market funds are then set aside and the same optimization exercise is done with the 1,506 Fixed Income funds, the 2,807 Equity funds and 212 Alternative funds, using the same rules as used in constructing the optimized Islamic Growth portfolio. Then, optimization is done among asset categories in the same fashion as with the Islamic portfolio. The optimized conventional portfolio resulting from this process is shown in Table 4.45.

Importantly, there are immediate visual clues that the Conventional Growth portfolio allocation is different than its Islamic Growth peer. Despite the equal construction methodologies the allocations are far from a perfect match, as shown in Table 4.46.

What can one make of this? There is more than a small variance between Conventional and Islamic Equity and Alternative allocations. This could be, in part, due to the much larger dataset and much more varied selection of investment products in the conventional investible universe. Recall that the Islamic universe consisted of 64 securities, of which only 31 survived the stricter Filter 1 version of filtering. Compare that to the 212 conventional shortlisted Alternative category mutual funds and ETFs (with nearly \$400 billion AUM), the smallest among the conventional asset categories at 4.4% of funds, versus only \$63 billion in the *entire* Islamic mutual fund and ETF universe.

It is not within the scope here to understand why there is sometimes a substantial variance between allocations in conventional and Islamic optimized portfolios despite the identical construction methodology. What is known, however, is that the Bloomberg portfolio optimizer will not take into consideration that one portfolio is Islamic and the other is not. The software is secular. Instead, it approaches the optimization of the datasets identically. Correlation coefficients are measured for each security and matched with all securities to determine an optimal outcome. Both Islamic and conventional optimizations will follow that methodology first determined by Markowitz (1952), with no variation.

Comparative Performance, Islamic vs. Conventional Peer

Now that a conventional portfolio has been identically constructed, the performance compared to the Islamic and the conventional peers can be examined, as is shown in Figure 4.7.



Figure 4.7 Comparative cumulative portfolio performance, 2013–2017

Source: Author’s work, data from Bloomberg.

The end result is eye-opening: the Conventional Growth portfolio constructed identically to the Islamic Growth portfolio has the highest total return among the six portfolios (Table 4.47). The Islamic Growth portfolio comes in second place.

Importantly, the Islamic Growth portfolio has lost its position as the investment portfolio with the highest total return, falling to second position after the Conventional Growth portfolio (passive in both cases, with no effort to reflect active management). However, the Islamic Growth (passive) portfolio still outperforms the four conventional peers. And the Islamic Growth Active

Table 4.47 Total return: Islamic Growth, Conventional Growth and peer mutual funds

Credit Suisse Lux Portfolio Fund Growth USD	UBS (Lux) Strategy Fund – Growth	Fidelity Asset Manager 70% Fund	Franklin Growth Allocation Fund	Conventional Growth (Passive)	Islamic Growth (Passive)
26.07%	47.65%	60.36%	59.12%	75.40%	64.29%

Source: Author’s work, data from Bloomberg.

Table 4.48 Performance, risk and return: Islamic Growth, Conventional Growth and peer mutual funds

5 Years as of 01/01/2013	Conventional Growth (Passive)	Islamic Growth (Passive)	Credit Suisse Lux Portfolio Fund Growth USD	UBS (Lux) Strategy Fund – Growth	Fidelity Asset Manager 70% Fund	Franklin Growth Allocation Fund
Return						
Total Return	75.40%	64.29%	26.07%	47.65%	60.36%	59.12%
Total Return (Annualized)	11.91%	10.45%	4.75%	8.03%	9.70%	9.60%
Maximum Return (Monthly)	2.95%	1.93%	2.00%	1.65%	1.83%	2.11%
Minimum Return (Monthly)	-3.50%	-2.99%	-3.22%	-2.85%	-3.23%	-3.81%
Mean Return (Annualized)	12.24%	10.74%	5.07%	8.41%	10.30%	10.19%
Risk						
Standard Deviation (Annualized)	6.53%	6.15%	6.65%	6.34%	7.19%	7.72%
Skewness	-0.56%	-0.70%	-0.72%	-0.57%	-0.62%	-0.72%
VaR at 95% (ex post)	-0.63%	-0.62%	-0.65%	-0.64%	-0.73%	-0.77%
Risk/Return (75% DJIMT -25% DJSUKUK)						
Sharpe Ratio	1.29	1.20	0.91	0.91	0.98	0.91
Jensen's Alpha	2.91%	2.11%	-2.21%	0.49%	0.88%	0.31%
Information Ratio	0.90	0.58	-0.99	-0.09	0.43	0.38
Treynor Ratio	0.09	0.08	0.04	0.07	0.07	0.06
Beta (ex post)	0.91	0.87	0.93	0.87	1.03	1.11
Correlation	0.9280	0.9433	0.9295	0.9142	0.9488	0.9533
Capture Ratio	0.83	0.80	0.86	0.79	0.96	1.03

Source: Author's work, data from Bloomberg.

portfolio, at 68.51% total return, is even closer to the superior performance of the Conventional Growth (passive).

To further illustrate the return and risk metrics, Table 4.48 shows the common measurements.

The annualized mean return of the Conventional Growth portfolio is nearing 20% higher than the Islamic Growth portfolio, and equally higher or more so against the conventional peers. While its standard deviation is higher than the Islamic Growth portfolio, it is well within the range of the conventional peers. The Sharpe ratio for Conventional Growth portfolio is well above the conventional peers, and a few percentage points higher than the Islamic Growth portfolio.

Importantly, the Conventional Growth portfolio has slightly superior levels of Capture ratio, but as measured by the Information ratio the Conventional Growth portfolio witnessed sustained benchmark outperformance versus the Islamic Growth portfolio. The Jensen's Alpha measure is nearly 40% higher than for Islamic Growth, indicating a superior return for the measurable risk.

Both the Conventional Growth and the Islamic Growth portfolios are completely unmanaged. They demonstrate, explicitly, no human intervention after the initial optimization and allocation. Yet both demonstrate superior performance to the managed mutual funds from the conventional peers. While Conventional Growth (passive) beats Islamic Growth (passive), we should bear in mind that both the passive and active versions of Islamic Growth showed superior performance and risk measures compared to the conventional peers.

These results hint at the conclusions reached by Brinson, Singer and Beebower (1991) (also known as "BSB") and Fama (1970) on performance contributions. In their research, BSB identified security selection, market timing and investment policy (the latter, more broadly, the process of asset allocation) as critical factors of portfolio management success or failure. They identified that a very large percentage of variation in portfolio outcomes—whether above or below relevant indexes—was due to asset allocation decisions. Subsequent studies, in particular Ibbotson (2010), indicated that allocation choices may account for more than 100% of the variation in portfolio return as selection and timing could contribute negative results.

Fama (1970) preceded BSB with an exposition on the "random walk," where perfect distribution of information insured that the negative effects of costs, timing and selection resulted in fund managers being incapable of beating their indexes. In other words, empirical evidence suggests that unmanaged portfolios can do just as well, or perhaps better, than managed ones. That two of the six portfolios examined here are unmanaged and yet were the highest performing during the measurement period indicates again that this may prove to be a valid assumption.

NOTES

1. However, a portfolio of mutual funds and ETFs may in fact mimic a portfolio held by a large institutional investor. The difference is only in the structure of the holdings. Since almost no single entity has the resources to allocate efficiently in all markets, large institutional investors seek best-of-class managers in each asset category (and sub-categories). Such managers are given direct mandates by the institutional investor. Smaller investors essentially do (or should do) the same thing. While they normally cannot directly give a mandate to the best-of-class managers (who may or may not manage similarly invested mutual funds in parallel with direct mandates), they can purchase a mutual fund that is either managed by the best-of-class managers or mutual funds that have similar performance.
2. U.S. citizens and entities are generally not permitted to purchase offshore (non-U.S.-domiciled) investment products for tax reasons, so the U.S. mutual fund and ETF markets are largely for onshore U.S. investors. In other words, investors in the United States are usually constrained to only one domicile for mutual funds and ETFs, the United States.
3. Subjective criteria include years in business and, for international investors outside the United States, exchange and domiciliation issues. U.S. investors would not be interested in foreign exchange controls or domiciliation matters when investing in U.S.-domiciled securities. Other subjective criteria, however, are universally applied by many managers, such as the relationship of a particular mutual fund unit to its parent company, the turnover of employees, the length of time a particular management team has been together on the same fund and other measures that are not easily quantifiable.
4. As an indication of how seriously regulators approach this subject, visit http://www.financial-ombudsman.org.uk/publications/technical_notes/archcru-final-decision-feb12.pdf, where the Ombudsman of the Financial Conduct Authority of the United Kingdom decided in favor of the clients. In this case the financial advisor sold an investment product later found to be inappropriate for the client. The financial advisor was sanctioned by the regulator and forced to repay entirely the client's investment losses.
5. There are many more factors that underlie the choice of investment strategy for a given Client Profile, but these are outside the scope of this study. For more on the fundamentals of creating an IPS (also called the Policy Portfolio, see Maginn et al., 2007, p. 231).
6. For example, an international equity mutual fund that is available onshore in the Saudi market.
7. Onshore mutual funds are those funds established for sale primarily or uniquely to residents of their country of domicile; for example, a Saudi onshore mutual fund is sold generally only to persons resident in Saudi Arabia. Offshore mutual funds are generally sold to any person or entity who can buy the fund (and almost always without domestic tax implications for the buyer). Ireland and Luxembourg

dominate the offshore mutual fund industry due to their ability to simultaneously “passport” for sales in the European Union.

8. A multi-asset-class, globally allocated portfolio will have a section for global equities, which will itself be an optimized portfolio of equities from both developed and developing equity markets.
9. Small trading sizes are not efficient due to minimum fees and commissions incurred when buying securities. If, for example, this portfolio were allocated 12% to emerging market equities (\$600,000 of \$5 million), and if Malaysia were to represent 3% of all emerging market equities, then the Malaysian position of the portfolio would be \$18,000, or 0.36% of the total portfolio. Trading costs on this small position would not justify the position. In this case one would be better off purchasing an emerging markets equity mutual fund.
10. Bloomberg is only one of many. The same analytical tools are available on Reuters, as well as numerous off-the-shelf portfolio analysis software packages commercially available everywhere. All perform the mathematical functions indicated above, using historic pricing of a security or portfolio to indicate results.
11. Here is a common dilemma in asset management, where expected future returns are based on historic annualized returns. If a mutual fund loses a management team responsible for historic below-average performance, can one reasonably expect a new management team to improve performance? This cannot be known with any degree of precision without interviewing the former and new managers, understanding team dynamics for decision making, and examining historic and new IPSs. Numerous studies have been done on attribution analysis, or the contributions to over- or underperformance by existing managers. It is not within the scope of this study to explain attribution analysis as it applies to mutual fund selection. Suffice it to say that professional asset management requires drilling down to the manager level for quantitative and qualitative data from which decisions are made based on probabilities, where those decisions may or may not exclude a security from future selection.
12. For more detail on this controversy see the original fatwa, or sharia guidance, that was issued in English by the AAOIFI in February 2008 (the Arabic version was issued three months prior), https://islamicbankers.files.wordpress.com/2008/09/aaofi_sb_sukuk_feb2008_eng.pdf.
13. Commonly in the asset management industry an Information ratio from 0.40 to 0.60 is considered adequate, while a ratio above 0.60 indicates a very high amount of added performance above risk.
14. See <https://www.thestreet.com/story/14229200/1/global-stocks-are-now-worth-more-than-the-global-economy-and-that-s-worrying.html>.
15. The Dow Jones Global Index comprises 7,575 stocks worldwide, while the Islamic equivalent, the Dow Jones Islamic Market World, comprises 2,651 stocks. See S&P Sharia Indices under Research at <http://us.spindices.com/indices/equity/dow-jones-islamic-market-mena-index-usd>.

16. The methodology used by Dow Jones for sharia screening of stocks is found under the rubric Methodology at <http://us.spindices.com/indices/equity/dow-jones-islamic-market-mena-index-usd>.
17. See https://research-doc.credit-suisse.com/docView?language=ENG&format=PDF&sourceid=csplusresearchcp&document_id=1071583721&serialid=J5yMXIRJvfnMRo%2F26sXGb92xh7MkFirw5X%2Bj3R5kq7g%3D.
18. See <https://www.bloomberg.com/view/articles/2017-03-17/think-global-to-avoid-shrinking-u-s-stock-market>.
19. See <https://www.strategyand.pwc.com/media/file/Alternative-investments.pdf>.
20. See <http://www.mckinsey.com/industries/private-equity-and-principal-investors/our-insights/the-64-trillion-question>.
21. Open architecture means that the asset manager (or financial advisor) must choose the best-fit fund in an optimized asset allocation, not only his or her firm's own fund. This regulation is strictly enforced in most developed jurisdictions.
22. These securities are identified as the Credit Suisse Lux Portfolio Fund Growth USD, ISIN: LU0078042453; Franklin Growth Allocation Fund, ISIN: US35472P8775; UBS (Lux) Strategy Fund – Growth USD, ISIN: LU0033040865; and Fidelity Asset Manager 70% Fund, ISIN: US3160693012.
23. As commonly measured, an 88% developed and 12% emerging market capitalization split is reasonable, see https://uswealthmanagement.com/images/Annual-Market-Review-2017_USFA_1-685675.pdf. However, it is also equally reasonable to attribute some portion of developed market capitalization to profits derived from emerging market operations. Therefore the 82%/18% distribution here will be retained for convenience.
24. Security concentration limits are also of regulatory concern, in particular, “prudent man” regulations that disallow portfolios with overly concentrated positions, that is, undiversified.
25. Bloomberg provides on the Internet a relatively concise and detailed explanation of what the risk model does. However, it is proprietary software owned by Bloomberg and used worldwide by professional asset managers. Bloomberg does not disclose the precise mathematical modeling done by this software as it is protected intellectual property. All similar commercially available allocation tools also do not disclose their “black box” software code. For more information on the Bloomberg portfolio optimization tools see <https://www.bloomberg.com/professional/product/portfolio-risk-analytics/> and for more information on a typical application of the Bloomberg Risk Model see <https://www.bloomberg.com/professional/blog/optimize-portfolio-make-factor-bet/>.
26. As mentioned earlier, the three strategies can come under other rubrics. Income is sometimes labeled Moderate and Growth is sometimes labeled Aggressive, for example. But, consistently, these and other mutual fund families have portfolio mutual funds with low-, medium- and higher-risk profiles, almost always equal to the Income, Balanced and Growth nomenclatures.

27. Jensen's Alpha, as with all other portfolio metrics, is calculated by Bloomberg. However, Bloomberg uses industry-standard measurements. There is no variation in measuring a factor like Jensen's Alpha between Bloomberg and any other portfolio management software.

5. Discussion of findings

This study set out to examine the entire process of what may be considered Islamic asset management before then looking at the results. The first step was to determine whether asset management did or did not incorporate spiritual constraints, and, if yes, which parts of asset management are in fact spiritual. We have determined that the foundation theory of asset management—the amalgam of diversification theory and optimization theory that are described in MPT, based primarily on the initial work of Markowitz (1952) and Sharpe (1964)—consists essentially of mathematical constructions that have no spiritual components. What is clear, however, is that portfolio constraints can be, and often are, made based on moral choices, whether by the Methodist Church of America, the Bill & Melinda Gates Foundation or the Norwegian SWF. Sharia investing is just another version of investing with the same type of moral constraint, a constraint that limits the investible universe just like any other type of constraint. In terms of asset management, the constraints imposed by Islam's sharia principles are relatively straightforward, primarily avoiding any investment that in any way incorporates interest, insuring investing is done in the real economy, and making sure that all investments avoid those activities determined to be repugnant to Islam (e.g., alcohol sales, pork production, gambling). As an aside, one can see the parallels between sharia-compliant investing and those types of constraints espoused by SRI or ESG investing, both of which share many of the same precepts as sharia-compliant investing. In this sense, this study contributes to the literature on morally constrained investing.

Further steps in this study discovered the processes commonly used by current major asset management firms to select the investment products used for investing their clients' portfolios and identified the sharia-compliant investment universe—two areas of research that had not previously been conducted elsewhere. The study then combined the universal core asset management investment processes with the Islamic mutual funds and ETF universe, taking the surviving investment securities through optimization exercises by asset category and among asset categories, embedding in the latter process the core principles of MPT, that is, diversification and optimal correlation.

Finally, this study used two forms of the Islamic portfolio—the unmanaged passive portfolio and a proxy for an actively managed portfolio—as benchmarks to compare conventional (non-Islamic) investing. One was taken directly from the industry from similar-strategy mutual funds among some of

the best-known names in asset management. The other was a conventional portfolio constructed identically to the Islamic portfolio. Comparative metrics were those commonly used in the industry, for example annualized return, standard deviation, Sharpe ratio, Information ratio and Capture ratio.

The results indicate that, according to the metrics commonly used in the asset management industry, Islamic portfolios have the potential to stand shoulder-to-shoulder with their conventional (non-Islamic) peers. The passive and proxy active Islamic portfolios outperformed the conventional peer mutual funds for nearly every risk and return metric. The only portfolio with superior overall metrics was the conventional construction, but even then the variance was not substantial. In other words, this study showed that global, multi-asset-class, sharia-compliant portfolio constructions are more than just a theoretical construct. They can and perhaps should be real-world applications in the global asset management industry.

One of the first questions one may ask is, “Why are the Islamic portfolios (passive and active) indicating that they can outperform, or at least perform equally to, conventional (non-Islamic) peer mutual funds?” As indicated in the literature review in Chapter 1, a search of the existing literature does not address multi-asset investing. There is no other study that rigorously addresses multi-asset portfolio optimization with sharia. Studies to date have almost uniquely focused on the risk and return metrics of single asset categories, mostly in Islamic Equities but also in Islamic Fixed Income. Because real-world investors (e.g., pension funds, endowments, insurance companies and households) normally have a large majority of their portfolio holdings in these two asset categories (i.e., bonds and stocks) regardless of the investment strategy, we can look at their Islamic equivalents (sukuk for bonds and sharia-compliant equities for stocks) and the principles of sharia followed in asset management for hints that may suggest the reason for the potential outperformance of Islamic multi-asset portfolios (or, at worst, their near-equal performance). Intuitively, we can make several guesses.

Sharia compliance requires a high degree of “connectivity” between holders of sukuk (Islamic bonds) and underlying assets. In principle, sukuk holders should have a direct line of sight between themselves and the tangible assets that underlie the security, ideally actual ownership. Again, in principle, sukuk cannot be based solely on the full faith and credit of the issuer (issuer guarantee), but, more importantly, must be based on a hard legal link between the sukuk holder and the underlying tangible assets. A comparison can be made with conventional debt capital markets, where “full faith and credit” bonds are guaranteed only by the issuer, with no or little direct recourse to underlying assets in the event of default. On the other hand, asset-backed bonds can be entirely or partially guaranteed by the underlying assets, and in many cases with a partial guaranty by the issuer or no guaranty at all. Having direct

access to tangible assets is a form of bond buyer protection in that there is direct recourse to underlying collateral. Combined, one can assume that these required factors of sukuk act as credit enhancements, and in the real world of bond default, investors are more quickly able to claim collateral assets in asset-backed bonds than in full faith and credit only bonds.

Sharia compliance in equities requires the removal of securities where the underlying business relates to pork, alcohol and so on. But these well-known restrictions actually have very little impact on reducing the investible equity universe. Instead, the biggest reduction in securities is from removing all financials (banks, insurance companies) and companies that are heavily indebted. Financial equities can arguably be said to be more volatile securities in global capital markets, so removing them from any Buy List implies that that amount of volatility contribution is eliminated. Further, the removal of any companies with more than 33% balance sheet debt (or 25% per some sharia guidelines)—a universal sharia compliance requirement—means highly leveraged companies will not appear on a sharia equity Buy List. Such companies, it can be argued, are more volatile than less-leveraged companies, particularly during market downturns and their recoveries.

Sharia compliance requires that all investments are made in “real economy” assets, that is, assets that are linked to the real economy. As such, all securities that have no underlying assets are automatically removed. This includes all derivatives and products constructed from them (e.g., structured products). Given the high volatility of derivatives following the global financial crisis, it is no surprise that excluding them may have contributed to the superior performance of sharia portfolios compared to many conventional peers during any post-crisis measurement period.

While these characteristics of sharia-compliant investment securities seem intuitively correct, they lack the statistical proofs needed to support the hypothesis. Further evidence is necessary, so this study indicates at least one major area where additional work is required.

Girard and Hassan (2008) concluded that there are no significant statistical differences between Islamic and conventional indexes, and where there are differences these relate to the results of sharia filtering. Here, they point out that the restriction on balance sheet leverage makes Islamic indexes more heavily weighted toward growth stocks, while conventional indexes are weighted more toward value stocks, thus explaining much of any visible statistical difference. Hoepner, Rammal and Rezac (2011) conclude much the same, finding also that growth stocks, which have a very different risk–reward tradeoff than other categories of stocks, tend to be overweight in Islamic indexes.

Without examining causality, other authors have pointed to either underperformance or outperformance of Islamic equity indexes when compared to conventional peers. Al-Khazali, Lean and Samet (2014) make reasonable claims

for Islamic index outperformance during bear markets, particularly extremely stressed downward markets, but without hinting at the sources of these behaviors. Ho et al. (2014) also point toward the outperformance of Islamic equity indexes during crises, but again do not determine causality. Camgoz, Kose and Seval (2019) cannot determine any significant difference between sharia and conventional index performance, with Tukenmez, Saka and Kizgin (2019) essentially being in agreement.

Limited research indicates the outperformance of sukuk versus conventional bonds. El Mosaïd and Rachid Boutti (2014) arrive at this result for a five-year period straddling the global financial crisis, but do not refer to the underlying causes for this outperformance.

The purpose of this work is not to demonstrate why sharia-compliant investing in global capital markets is superior or inferior to conventional portfolio investing. It is worthwhile, however, at least taking a cursory glance at the possible causes for the outperformance witnessed in the portfolio constructions in this book, accepting that these constructions are not perfect substitutes for observation of real-world Islamic asset managers. As yet, these managers do not exist, so up to now proxies have needed to be created to substitute for what would be real-world investing.

Islamic investing is by nature constrained investing. But diversification theory explains that investors can maintain returns while reducing risks (or increase returns while holding risk constant) by increasing their investible universe. Sharia screening (and any type of SRI or ESG screening) reduces the investible universe. This leads again to the question, "Why are the Islamic portfolios (passive and active) outperforming conventional peers?" Current scholarship does not provide conclusive answers to this question. What has been achieved here is an indication that following sharia has the potential to create improved risk-adjusted returns compared to conventional investing, but the explanation for those superior returns is subject to further study.

6. Implications for theory and practice

Global assets under professional management are estimated at \$100 trillion. The amount is not trivial. The global asset management industry is widespread, employs hundreds of thousands of professionals, originates vast amounts of research and innovation and plays an important role in global financial market intermediation.

Practitioners of asset management have long followed academia's lead in their profession. The advanced software nearly universally used by asset managers for portfolio optimization are embedded with the same mathematical formulas that originated from seminal works of scholars. Several of these scholars have won Nobel Prizes for their theoretical contributions, which are used daily in the work of presumably tens of thousands of asset managers. While more than a generation passed between the publication of "Portfolio Selection" by Markowitz and the widespread use of Modern Portfolio Theory in portfolio allocation, means-variance optimization is now ubiquitous worldwide.

The core emphasis of Modern Portfolio Theory is diversification across industry, geography, currency and asset category. There is an abundant literature on multi-asset investing, in particular on the global market of multiple asset classes (the seminal work being Black and Litterman, 1992). Because the processes and underlying concepts of Modern Portfolio Theory are essentially amoral (i.e., they do not deal with moral issues), they fully apply to any type of investing constrained by moral choice, for example SRI, ESG and sharia. Importantly, the only difference between unconstrained and morally constrained investing is security selection, not theory.

More recently some academic literature in the field of Islamic finance as it relates to asset management has focused on the special constraint of sharia, where numerous scholars have studied the performance relationship between mostly pairs, that is, Islamic and conventional indexes, or Islamic and conventional mutual funds. However, there has never been an effort to date to describe and analyze the Islamic investible universe, or the Islamic market portfolio, nor how to use that universe for multi-asset investing, achieving globally diversified, optimized Islamic portfolios in the process, and then using the results of that process to make comparisons to conventional peers. This study is the first ever to do that, providing a foundation of information and knowledge on the results of sharia-compliant, multi-asset, optimized portfolio

investing pursued in accordance with established theory on asset allocation and portfolio optimization.

Let us recall here that the global asset management industry has decades of historic activity behind it. During those decades the industry benefited from an enormous volume of academic work that contributed almost all the underlying processes, measures and techniques used in portfolio construction, asset pricing, performance attribution and even the psychology of investors.

What resulted is the global industry we have today, which is founded on well-established practices that have been honed by regulatory oversight and occasional judicial intervention to produce a process that we commonly call asset management. Let's pause here and consider this. The oft-cited \$100 trillion in global assets under management operates under a system of rules that have multiple input components. First and foremost, academic theory has long driven the security selection, asset allocation and performance measurement functions of asset management. As described in the section "Modern Portfolio Theory and Theoretical Foundations of Asset Management" in Chapter 1, foundation knowledge contributed by Markowitz, Sharpe, Fama, Jensen, Treynor, Brinson and Beebower, and others is embedded in every aspect of portfolio management.

But looking down on these processes have been regulators seeking to protect investors from their asset managers. Regulators forced an even-handed treatment of security selection. They required investment strategies that mirror Client Profiles. They instituted global standards for performance measurement. The regulatory impact on asset management has been substantial by any definition, so that today we can also say that regulators have played a significant role in building the existing global infrastructure for asset management in parallel with those who contributed theory.

This study was undertaken to extend the theoretical constructs of Modern Portfolio Theory in a unique fashion that should be relevant to practitioners who may have Muslim clients seeking sharia investing solutions. As highlighted above, there are no objectionable elements of Modern Portfolio Theory for Muslims, even considering the case of the risk-free rate embedded in the CAPM. The theoretical contribution here is the reconstruction of the asset management process from the ground up, starting with contributing theories of asset management, but within the context of sharia.

Here we started with defining the asset management process, first by outlining those theories that underlie asset management. We know from Markowitz (1952) that all assets have price movements with positive, negative or random correlation to other assets. He indicates that investors seek higher returns for a given amount of risk, or lower risk with a given amount of return. We know that portfolios can be optimized such that their final point can lie on the Efficient Frontier, the point where no additional return with less risk can be

achieved, due to the unique circumstances of correlation among assets in the market portfolio. Then came Tobin (1958) with the concept of the risk-free rate, where investors have a choice between risky and riskless investments. To complete the loop, Sharpe (1964) delivered the concept of the market portfolio and the Capital Market Line, where risky assets are added to a portfolio that starts with only riskless assets until the slope of the Capital Market Line is equal to the slope of the Efficient Frontier, or what is called the point of optimality. This optimality is the obsessive goal of asset managers everywhere, who engineer diversified portfolios from multiple asset classes in order to objectively seek and find the optimal portfolio for their client assets.

This study replicates the process performed daily by asset managers but with a focus on sharia-compliant investing. The market portfolio from Markowitz and Sharpe is first defined, while regulatory and professional practice constraints are added to insure we remain in the realm of feasibility. The result is data on the visible Islamic investible universe, narrowed to mutual funds and ETFs to match the professional practice of five major asset management banks.

Tobin's risk-free rate is not altered for Muslims, but as we've seen from other studies this may not be necessary since Muslim risk-free rates may be at or near those in the conventional markets (and, in any event, there is still no harmony among sharia scholars in selecting a substitute for the conventional risk-free rate, so substitutes are allowed under the concept of *ijtihad*). Optimization software (the Bloomberg portfolio optimization module) subsequently used for Islamic portfolio construction is the same software used by tens of thousands of asset managers worldwide (including in the Muslim world), and embeds the same risk-free rate commonly used in asset management.

The resulting securities Buy List is subjected to optimization within and among asset classes, reflecting the search for Sharpe's point of optimality. The result is Islamic portfolios that can be said to include the market portfolio, have an acceptable risk-free rate and are allocated in such a way that correlations are optimized, thus achieving the point of optimality.

In this sense this study successfully extended the primary components of Modern Portfolio Theory to the Islamic asset space. However, the next step was to determine some form of utility. Do these Islamic portfolios perform differently from conventional peers? Is there any value in this extension of Modern Portfolio Theory?

The Islamic Growth strategy constructed in Chapter 4 was subjected to various comparisons with conventional managed peers. The first compared the static Islamic portfolio to similar, but managed, multi-asset Growth strategies from major international asset managers. The results were favorable for the Islamic construction, which proved to have superior performance characteristics than conventional managed peers. The second involved a proxy for active management of the Islamic portfolio to provide a better comparison

with actively managed conventional portfolios. Again, the results were very favorable for the Islamic portfolio. Only when a static conventional portfolio was constructed did the Islamic portfolio come in second place in terms of risk and return, but the differences were not particularly significant.

These comparisons generally confirmed the hypothesis that equally constructed sharia portfolios will outperform conventional portfolios. In several cases where the underlying comparisons were more heterogeneous, that is, they were not absolutely identical but generally so, Islamic portfolios held their own in comparison to conventional peers.

What this indicates is that the theories expounded by Markowitz, Tobin and Sharpe apply equally to sharia-compliant assets within a portfolio constructed according to Modern Portfolio Theory. There is no contradiction, therefore, in extending Modern Portfolio Theory into the Islamic asset space.

A specific implication for professional practice is that this kind of multi-asset, diversified investing with a sharia constraint is not only possible, but also perhaps superior. Muslims with financial assets among their savings, both individuals and institutions, may now consider the option of avoiding investment management that violates their principles of faith. An alternative appears to be now available, where sharia, professional best-practice, regulatory considerations and fundamental theory are all mutually respected.

Consider now the case of major asset management banks, with millions of customers around the globe and holding in fiduciary confidence tens of trillions of dollars of client assets in global asset allocation portfolios. We know without guessing that a certain number of these assets are owned by Muslim clients, and that among those Muslims are some who likely seek sharia in all aspects of their lives. Many if not the vast majority of Muslims don't eat pork, don't drink alcohol and actively follow the mandate to pray five times daily. They observe Ramadan fasting and Eid celebrations. Many if not most can recite numerous verses from the Holy Quran, and profess to live spiritual lives in accordance with sharia. One must ask, are these Muslims satisfied with honoring sharia in every aspect of their lives except their investments? The answer is likely, decidedly not.

We know from the survey conducted for this study that among the five asset management banks that took part there is variation in the rules applied for third-party mutual fund adoption. Among the banks there are those that allow third-party funds with assets under management as low as \$50 million (while one has a minimum AUM per mutual fund of \$300 million) and with a three-year minimum track record. What this indicates is that there are at least some asset management banks (but perhaps not all) that could adopt the global Islamic market portfolio identified here (see "The Final Set of Investible Securities" in Chapter 4) while maintaining regulatory and professional standards that are common in the industry. Creating the bank's Buy

List of Islamic-qualified securities is the first step in delivering Islamic asset management.

The remainder of the processes are virtually identical to existing practice. Again, no asset management bank will ignore well-grounded and nearly universally applied Modern Portfolio Theory in constructing optimized portfolios in the investment strategies most common in private banking, that is, Income, Balanced and Growth. All use the same portfolio optimization module in Bloomberg or one of the many competing software programs. Applying these processes to sharia-compliant assets poses no difficulties whatsoever.

In other words, now that this study has disclosed the steps to creating an Islamic market portfolio, as well as those common filters required to meet regulatory and professional best-practice standards, there are no barriers to completing the actions needed to deliver Islamic asset management—that is, optimized multi-asset-category portfolios—for customers seeking this service.

Think of the processes universally followed when a woman from Jeddah (or Abu Dhabi, Kuwait or Doha) enters a typical private bank in Geneva, Zurich, London or Paris. The woman is told that the bank requires a minimum account size, typically \$1 million or \$5 million. Forms are prepared, she provides her passport, documents are signed and the account is opened and subsequently funded. During this process the bank officer will go through a standardized, rules-driven checklist to complete both due diligence (source of funds) and a Client Profile (use of funds). Client profiles are mostly homogeneous in the industry, that is, they ask questions of the client related to expected return, aversion to risk, investment experience and other assets; questions that overall give guidance to the selection of an investment strategy among the low- to high-risk choices. At the end of this process the woman signs a discretionary management agreement confirming the investment strategy to be followed by the bank in investing her wealth.

This particular woman from Jeddah (or her counterparts from other Muslim countries, or even Muslims resident in these European financial capitals) very likely prefers sharia-compliant over conventional investing. She also very likely does not consider her savings as exempt from sharia. In her ideal world, the investments will fit her constraints, that is, they will, like all other parts of her life, conform to the precepts of sharia.

This process has been repeated countless times in jurisdictions worldwide for what must be millions of existing clients of private banking, wealth management and asset management (all essentially the same business). Given that some number of these clients are devout Muslims who care about sharia investing, this study provides an indication that any asset management bank or firm can stay true to Modern Portfolio Theory and all its consequences and offer a credible, feasible Islamic asset management service.

7. Limitations, and future research

This study covers a five-year period, 2013–2017, when the sharia-compliant investible universe was still relatively infant compared to the conventional investment universe, and remains so through today. The ratio of conventional assets in mutual funds and ETFs to sharia-compliant assets is nearly 800 to 1, meaning the availability of Islamic investment products is quite limited. Further, conventional mutual funds have been utilized by investors since the 1930s, and widely owned by individual and institutional investors since the 1960s. Islamic mutual funds, on the other hand, have come about only relatively recently and their paltry number indicates narrow, and not widespread, ownership. Worsening this view of the Islamic investible universe, this study concluded that only 55 securities would fit within the regulatory and professional best-practice standards of what might be a nascent Islamic asset management industry. This is a far cry from the thousands of securities that would presumably be allowed in the process of constructing a conventional (non-Islamic) portfolio.

This highlights an important limitation of this study: the number of Islamic mutual funds and ETFs is low, and the availability of data-rich historic performance tables is much lower than in the wider industry. The resulting dataset is therefore substantially smaller. The lack of a data-rich environment from which to conduct analysis of Islamic portfolio construction and performance is a major limitation.

The second major limitation of this study lies in the methodology. Since no one has ever actually conducted multi-asset, optimized, Islamic asset management according to international best-practice standards, there are no Islamic asset managers with a record of measurable performance. The initial Islamic Growth portfolio constructed in Chapter 4 was passive throughout the entire five-year measured history. An effort was made to replicate active management in the Islamic Growth Active portfolio, but it can be considered a weak proxy. Comparing the passive and the proxy active Islamic portfolios to conventional (non-Islamic) peer mutual funds is therefore problematic. Some critics may say this is like comparing apples with oranges, since the human involvement in an actively managed mutual fund will be dramatically different from any attempt to replicate it, Islamic or not.

That said, there are no doubt degrees of similarity between the two portfolios, first and foremost their stated investment strategy. Any investor seeking

higher returns with lower risk will certainly find the Islamic Active portfolio of significant interest, as there are abundant similarities in portfolio construction.

What the above implies—regarding the limited investible universe and lack of real-world examples of Islamic asset management—is that there are two factors that could open areas for further inquiry:

1. The Islamic investible universe is growing, and eventually may reach a size and level of diversity where it will be considered sufficiently equal for making comparisons with the conventional (non-Islamic) universe of mutual funds and ETFs.
2. The results displayed here should motivate at least a small number of industry practitioners to create and manage sharia-compliant portfolios. Over time the results will become clearer, in particular whether the addition of a sharia constraint helps or hinders portfolio performance.

This means that there is ample room for further research on the outcomes of Islamic asset management. Future studies may produce improved methods of creating proxies for actively managed Islamic portfolios, giving a higher degree of precision in the comparison with conventional peers. Additional work could provide greater precision in identifying the investible universe in places where Muslims actually live (e.g., Saudi Arabia, Malaysia, Europe), taking into consideration cross-border regulatory constraints that limit the availability of investment products. As time passes, the same processes as described in this book could cover larger and more meaningful time periods, including periods of financial market stress, thus determining with greater accuracy the superiority or inferiority of Islamic asset management.

In short, there are numerous limitations to this study, of which only a few have been mentioned here. But, as the first of its kind, this study does indicate possible outcomes in constructing sharia-compliant, multi-asset portfolios according to Modern Portfolio Theory. This being the first study of real-world, multi-asset, portfolio optimization with sharia, there are virtually unlimited possibilities in future scholarship to test and validate the conclusions found here.

Annex: survey questions for major asset management banks

SURVEY

Thank you for accepting to participate in this survey. The results will be tabulated for use in the doctoral research of John A. Sandwick. Your participation is anonymous and [neither] your name [nor] your bank will be mentioned in [conjunction with the] final published results.

Please fill in the response lines below as best you can, and return this sheet via scan and e-mail to john@sandwick.ch.

1. ASSETS UNDER MANAGEMENT

What are assets under management at your institution (worldwide, estimated)?

a. Private banking / private wealth management clients	
b. Institutional asset management (institutional clients)	
c. Total assets under management (private & institutional clients)	

2. ROLE OF MUTUAL FUNDS

What is the role played by mutual funds in your bank's asset allocation?

a. Percent (%) of mutual fund assets in private client / wealth management managed client portfolios	
b. Percent (%) of mutual fund assets in institutional asset management client portfolios	
c. Level at which a client account goes from all mutual funds to straight securities (i.e., when does asset allocation go directly into stocks and bonds, not stock funds and bond funds, e.g., at \$10 million, \$50 million?)	

3. MUTUAL FUND SELECTION CRITERIA

What are your bank's selection criteria for 3rd-party mutual fund adoption?

a. Minimum Fund AUM (e.g., \$100 million)	
b. Minimum Fund Track Record (e.g., minimum 5-year track record)	
c. Maximum Liquidity / Redemption Rights (e.g., maximum weekly liquidity)	
d. Minimum Gate (e.g., manager closes gate at 5% redemptions)	
e. Domiciliation Exclusions (e.g., you exclude Labuan, DIFC, Saudi Arabia, others)	
f. Other criteria (i.e., other key selection criteria)	

References

- Abdelsalam, O., Fethi, M., Matallin, J. C. and Tortosa-Ausina, E. (2014). On the comparative performance of socially responsible and Islamic mutual funds. *Journal of Economic Behavior and Organization*, 103, Supplement, S108–S128. <https://doi.org/10.1016/j.jebo.2013.06.011>.
- Abdulazeem, A. (2016). Critical review of the tools of ijtihād used in Islamic finance. *Islamic Economic Studies*, 24(1), 77–94. Retrieved from <https://islamicmarkets.com/publications/critical-review-of-the-tools-of-ijtihad-used-in-islamic>.
- Abdullah, A. (2018). A life cycle approach to Islamic wealth management and risk tolerance. *Journal of Islamic Finance*, 7(2), 1–13.
- Abdullah, F., Hassan, T. and Mohamad, S. (2007). Investigation of performance of Malaysian Islamic unit trust funds. *Managerial Finance*, 33(2), 142–153. <https://doi.org/10.1108/03074350710715854>.
- Abdul-Rahim, R., Abdul-Rahman, A. and Ling, P.-S. (2019). Performance of shariah versus conventional funds: Lessons from emerging markets. *Journal of Nusantara Studies*, 4(2), 193–218. <http://dx.doi.org/10.24200/jonus.vol4iss2pp193-218>.
- Abu-Alkheil, A., Khan, W. A., Parikh, B. and Mohanty, S. K. (2017). Dynamic co-integration and portfolio diversification of Islamic and conventional indices: Global evidence. *Quarterly Review of Economics and Finance*, 66, 212–224. <https://doi.org/10.1016/j.qref.2017.02.005>.
- Affaneh, I., Boldin, R. J. and Albohali, M. (2013). Islamic market indices: A comparison with conventional world indices based on the adjusted Sharpe ratio. *International Journal of Business, Accounting and Finance*, 7(1), 87–101.
- Alam, N., Arshad, S. and Rizvi, S. A. R. (2016). Do Islamic stock indices perform better than conventional counterparts? An empirical investigation of sectoral efficiency. *Review of Financial Economics*, 31, 108–114. <https://doi.org/10.1016/j.rfe.2016.06.003>.
- Alankar, A., Blaustein, P. and Scholes, M. S. (2013). *The cost of constraints: Risk management, agency theory and asset prices*. Stanford University Graduate School of Business Research Paper No. 2135. <https://doi.org/10.2139/ssrn.2337797>.
- Alexakis, C., Pappas, V. and Tsikouras, A. (2016). Hidden cointegration reveals hidden values in Islamic investments. *Journal of International Financial Markets, Institutions and Money*, 46, 70–83. <https://doi.org/10.1016/j.intfin.2016.08.006>.
- Al-Khazali, O., Lean, H. H. and Samet, A. (2014). Do Islamic stock indexes outperform conventional stock indexes? A stochastic dominance approach. *Pacific-Basin Finance Journal*, 28, 29–46. <https://doi.org/10.1016/j.pacfin.2013.09.003>.
- Alswardan, M. W. (2013). Saudi Arabian sukuk market: Recent trends and development. *The Business Review*, 21(2), 108–118.
- Alwi, S., Ahmad, R., Hashim, I. Z. A. and Naim, N. M. (2019). Investigating the Islamic and conventional mutual fund performance: Evidence from Malaysia equity market. *Journal of Modern Accounting and Auditing*, 15(7), 371–384. <https://doi.org/10.17265/1548-6583/2019.07.004>.

- Ashraf, D. (2014). Does Shari'ah screening cause abnormal returns? Empirical evidence from Islamic equity indices. *Journal of Business Ethics*, 209–228. <https://doi.org/10.1007/s10551-014-2422-2>.
- Ashraf, D., Felixraj, K., Khawaja, M. and Hussain, S. M. (2017). Do constraints on financial and operating leverage affect the performance of Islamic equity portfolios? *Pacific-Basin Finance Journal*, 42, 171–182. <https://doi.org/10.1016/j.pacfin.2017.02.009>.
- Azmat, S., Skully, M. and Brown, K. (2017). The (little) difference that makes all the difference between Islamic and conventional bonds. *Pacific-Basin Finance Journal*, 42, 46–59. <https://doi.org/10.1016/j.pacfin.2015.12.010>.
- Bahloul, S., Mroua, M. and Naifar, N. (2017). Further evidence on international Islamic and conventional portfolios diversification under regime switching. *Applied Economics*, 49(39), 3959–3978. <https://doi.org/10.1080/00036846.2016.1273496>.
- Bahlous, M. and Mohd. Yusof, R. (2014). International diversification among Islamic investments: Is there any benefit. *Managerial Finance*, 40(6), 613–633. <https://doi.org/10.1108/MF-08-2013-0225>.
- Balcilar, M., Demirel, R. and Hammoudeh, S. (2015). Global risk exposures and industry diversification with Shariah-compliant equity sectors. *Pacific-Basin Finance Journal*, 35, 499–520. <https://doi.org/10.1016/j.pacfin.2015.09.002>.
- Berk, J. B. (2005). Five myths of active portfolio management. *Journal of Portfolio Management*, 31(3), 27–31. <https://doi.org/10.3905/jpm.2005.500350>.
- Binmahfouz, S. and Hassan, M. K. (2012). A comparative study between the investment characteristics of Islamic and conventional equity mutual funds in Saudi Arabia. *Journal of Investing*, 21(4), 128–144.
- Black, F. and Litterman, R. (1992). Global portfolio optimization. *Financial Analysts Journal*, 48(5), 28–43. <https://doi.org/10.2469/faj.v48.n5.28>.
- Bose, S. and Mcgee, R. W. (2008). *Islamic Investment Funds: An Analysis of Risks and Returns*. Florida International University Chapman Graduate School of Business Working Paper. Retrieved from https://scholar.google.com/scholar?hl=en&q=ISLAMIC+INVESTMENT+FUNDS:++AN+ANALYSIS+OF+RISKS+AND+RETURNS&btnG=&as_sdt=1,5&as_sdtp=.
- Brinson, G., Hood, L. and Beebower, G. (1986). Determinants of portfolio performance. *Financial Analysts Journal*, 42(4), 39–44. Retrieved from <http://www.jstor.org/stable/4478947>.
- Brinson, G. P., Singer, B. D. and Beebower, G. L. (1991). Determinants of portfolio performance II: An update. *Financial Analysts Journal*, 47(3), 40–48. <https://doi.org/10.2469/faj.v47.n3.40>.
- Camgoz, C., Kose, K. A. and Seval, B. (2019). Risk and return characteristics of Islamic indices: An empirical approach. *Istanbul Business Research*, 47(2), 124–153. <https://doi.org/10.26650/ibr.2018.47.2.0008>.
- Charles, A., Darné, O. and Pop, A. (2015). Risk and ethical investment: Empirical evidence from Dow Jones Islamic indexes. *Research in International Business and Finance*, 35, 33–56. <https://doi.org/10.1016/j.ribaf.2015.03.003>.
- Chen, H. and Ngo, T. (2016). Leverage-based index revisions: The case of Dow Jones Islamic Market World Index. *Global Finance Journal*, 32, 1–19. <https://doi.org/10.1016/j.gfj.2016.06.007>.
- Dah, M., Hoque, M. and Wang, S. (2015). Constrained investments and opportunity cost – evidence from Islamic funds. *Managerial Finance*, 41(4), 348–367. <https://doi.org/10.1108/MF-06-2014-0179>.

- de la O González, M., Jareño, F. and El Haddouti, C. (2019). Sector portfolio performance comparison between Islamic and conventional stock markets. *Sustainability (Switzerland)*, 11(17). <https://doi.org/10.3390/su11174618>.
- Dewandaru, G., Bacha, O. I., Masih, A. M. M. and Masih, R. (2015). Risk–return characteristics of Islamic equity indices: Multi-timescales analysis. *Journal of Multinational Financial Management*, 29, 115–138. <https://doi.org/10.1016/j.mulfin.2014.11.006>.
- Dewandaru, G., Masih, R., Bacha, O. and Masih, M. (2014). *The Role of Islamic Asset Classes in the Diversified Portfolios: Mean Variance Spanning Test*. MPRA Paper No. 56857. Retrieved from <http://mpr.ub.uni-muenchen.de/56857/>.
- Dewi, M. K. and Ferdian, I. R. (2012). Evaluating performance of Islamic mutual funds in Indonesia and Malaysia. *Journal of Applied Economics and Business Research*, 2(1), 11–33.
- Doeswijk, R., Lam, T. and Swinkels, L. (2014). The global multi-asset market portfolio, 1959–2012. *Financial Analysts Journal*, 70(2), 26–41. <https://doi.org/10.2469/faj.v70.n2.1>.
- el Alaoui, A. K. O., Bacha, O. I., Masih, M. and Asutay, M. (2016). Shari'ah screening, market risk and contagion: A multi-country analysis. *Journal of Economic Behavior and Organization*, 132, 93–112. <https://doi.org/10.1016/j.jebo.2016.10.023>.
- El Khamlichi, A. Aroui, M. and Teulon, F.. (2014). Persistence of performance using the four-factor pricing model: Evidence from Dow Jones Islamic Index. *Journal of Applied Business Research*, 30(3), 917–928.
- El Mosaïd, F. and Rachid Boutti, R. (2014). Sukuk and bond performance in Malaysia. *International Journal of Economics and Finance*, 6(2), 226–235. <https://doi.org/10.5539/ijef.v6n2p226>.
- Elfakhani, S., Hassan, M. K. and Sidani, Y. (2005). *Comparative Performance of Islamic vs. Secular Mutual Funds*. Retrieved from https://www.isfin.net/sites/isfin.com/files/comparative_performance_of_islamic_versus_secular_mutual_funds.pdf.
- Elton, E. and Gruber, M. (1997). Modern Portfolio Theory, 1950 to date. *Journal of Banking and Finance*, 21(11–12).
- Elton, E., Gruber, M., Brown, S. and Goetzmann, W. (2014). *Modern Portfolio Theory and Investment Analysis*, 9th edn. New York: John Wiley and Sons.
- Fabozzi, F. J., Gupta, F. and Markowitz, H. M. (2002). The legacy of Modern Portfolio Theory. *Journal of Investing*, 11(3), 7–22. <https://doi.org/10.3905/joi.2002.319510>.
- Fama, E. F. (1970). Efficient capital markets: A Review of theory and empirical work. *Journal of Finance*, 25(2), 383–417.
- Farooq, M. O. (2014). Islamic interbank benchmark rate “IIBR.” *Journal of Islamic Business and Management*, 4(2), 1–5. Retrieved from <http://thomsonreuters.com/iibr/>.
- French, C. R. (2003). The Treynor Capital Asset Pricing Model. *Journal of Investment Management*, 1(2), 60–72.
- Fu, Y., Wright, D. and Blazenko, G. (2020). Ethical investing has no portfolio performance cost. *Research in International Business and Finance*, 52, 101117. <https://doi.org/10.1016/j.ribaf.2019.101117>.
- Ghoul, W. (2008). Risk management and Islamic finance: Never the twain shall meet? *Journal of Investing*, 17(3), 96–105.
- Gibson, R. C. (2007). The Rewards of Multiple-Asset-Class Investing. *Journal of Financial Planning*, 12(3), 50–59. Retrieved from <https://search.proquest.com/>

- openview/58cc3ca24083202e7df1e678f78b8add/1?pq-origsite=gscholar&cbl=4849.
- Girard, E. and Hassan, K. (2008). Is there a cost to faith-based investing: Evidence from FTSE Islamic indices. *Journal of Investing*, 17(4), 112–122.
- Godlewski, C. J., Turk-ariss, R. and Weill, L. (2011). *Do Markets Perceive Sukuk and Conventional Bonds as Different Financing Instruments?* BOFIT Discussion Papers 6/2011. Retrieved from <http://www.bof.fi/bofit>.
- Guyot, A. (2011). Efficiency and dynamics of Islamic investment: Evidence of geopolitical effects on Dow Jones Islamic market indexes. *Emerging Markets Finance and Trade*, 47(6), 24–45. <https://doi.org/10.2753/REE1540-496X470602>.
- Hakim, S. A., Hamid, Z. and Meera, A. K. M. (2016). Capital asset pricing model and pricing of Islamic financial instruments. *Journal of King Abdulaziz University, Islamic Economics*, 29(1), 21–39. <https://doi.org/10.4197/Islec.29-1.2>.
- Hakim, S. and Rashidian, M. (2004). *How Costly Is Investors' Compliance with Sharia?* 11th Economic Research Forum Annual Conference. Sharjah, UAE, 1–19. Retrieved from [http://ejournal.narotama.ac.id/files/How Costly is Investors' Compliance with Sharia.pdf](http://ejournal.narotama.ac.id/files/How%20Costly%20is%20Investors'%20Compliance%20with%20Sharia.pdf).
- Hanefah, M. M., Noguchi, A. and Muda, M. (2013). Sukuk: Global issues and challenges. *Journal of Legal, Ethical and Regulatory Issues*, 16(1), 107–120.
- Hassan, M. K., Paltrinieri, A., Dreassi, A., Miani, S. and Selip, A. (2018). The determinants of co-movement dynamics between sukuk and conventional bonds. *Quarterly Review of Economics and Finance*, 68, 73–84. <https://doi.org/10.1016/j.qref.2017.09.003>.
- Hayat, R. and Kraeusl, R. (2011). Risk and return characteristics of Islamic equity funds. *Emerging Markets Review*, 12(2), 189–203. <https://doi.org/10.1016/j.ememar.2011.02.002>.
- Hazny, M., Hasim, H. and Yusof, A. (2020). Mathematical modelling of a shariah-compliant capital asset pricing model. *Journal of Islamic Accounting and Business Research*, 11(1), 90–109. <https://doi.org/10.1108/JIABR-07-2016-0083>.
- Herold, U., Maurer, R., Stamos, M. and Thanh Vo, H. (2007). Total return strategies for multi-asset portfolios. *Journal of Portfolio Management*, 33(2), 60–76. <https://doi.org/10.3905/jpm.2007.674794>.
- Ho, C. S. F., Abd Rahman, N. A., Yusof, N. H. M. and Zamzamin, Z. (2014). Performance of global Islamic versus conventional share indices: International evidence. *Pacific-Basin Finance Journal*, 28, 110–121. <https://doi.org/10.1016/j.pacfin.2013.09.002>.
- Hoepner, A. G. F., Rammal, H. G. and Rezec, M. (2011). Islamic mutual funds' financial performance and international investment style: Evidence from 20 countries. *European Journal of Finance*, 17(9–10), 829–850. <https://doi.org/10.1080/1351847X.2010.538521>.
- Ibbotson, R. G. (2010). The importance of asset allocation. *Financial Analysts Journal*, 66(2), 18–20. <https://doi.org/10.2469/faj.v66.n2.4>.
- Idzorek, B. T. M. (2010). Asset Allocation Is King. *Morningstar Advisor*, (April/May), 28–31. Retrieved from [https://pways.co.il/images/agent_added_value_files/Asset %20Allocation%20Is%20King%20-%204.pdf](https://pways.co.il/images/agent_added_value_files/Asset%20Allocation%20Is%20King%20-%204.pdf).
- Jain, A. (2012). *Shariah-Compliant Portfolio Management: A More Suitable and Balanced Risk–Return Matrix?* Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2285927.
- Jensen, M. C. (1968). The performance of mutual funds in the period 1945–1964. *Journal of Finance*, 23(2), 389–416. <https://doi.org/10.2307/2325404>.

- Jorion, P. (1992). Portfolio optimization in practice. *Financial Analysts Journal*, 48(1), 68–74.
- Kamil, N. K. M., Alhabshi, S. O., Bacha, O. I. and Masih, M. (2014). Heads we win, tails you lose: Is there equity in Islamic equity funds? *Pacific-Basin Finance Journal*, 28, 7–28. <https://doi.org/10.1016/j.pacfin.2013.09.004>.
- Kassim, S. H. and Kamil, S. (2012). Performance of Islamic unit trusts during the 2008 global financial crisis: Evidence from Malaysia. *Asian Academy of Management Journal*, 17(2), 59–78.
- Kasuma, K. A. and Silva, A. C. (2014). *Sukuk Markets: A Proposed Approach for Development*. Policy Research Working Papers. Retrieved from http://econ.worldbank.org/external/default/main?pagePK=64165259&piPK=64165421&theSitePK=469382&menuPK=64166093&entityID=000158349_20141204142423.
- Lashgari, M. (2014). Socially Responsive Investments : A case for Islamic Finance. *Journal of Applied Business and Economics*, 16(4), 31–41.
- Low, S.-W. and Ghazali, N.A. (2007). The price linkages between Malaysian unit trust funds and the stock market: Short run and long run interrelationships. *Managerial Finance*, 33(2), 89–101.
- Lummer, S. and Reipe, M. (1994). Introduction: The role of asset allocation in portfolio management. In J. Lederman and R. A. Klein (eds), *Global Asset Allocation: Techniques for Optimizing Portfolio Management*. New York: John Wiley and Sons, pp. 1–6.
- Maginn, J. L., Tuttle, D. L., McLeavey, D. W. and Pinto, J. E. (eds) (2007). *Managing Investment Portfolios: A Dynamic Process* (Vol. 3). Hoboken, NJ: John Wiley & Sons.
- Makni, R., Benouda, O. and Delhoumi, E. (2015). Large scale analysis of Islamic equity funds using a meta-frontier approach with data envelopment analysis. *Research in International Business and Finance*, 34, 324–337. <https://doi.org/10.1016/j.ribaf.2015.02.014>.
- Makni, R., Benouda, O. and Delhoumi, E. (2016). International evidence on Islamic equity fund characteristics and performance persistence. *Review of Financial Economics*, 31, 75–82. <https://doi.org/10.1016/j.rfe.2016.06.002>.
- Markowitz, H. M. (1952). Portfolio selection. *Journal of Finance*, 7(1), 77–91. <https://doi.org/10.1111/j.1540-6261.1952.tb01525.x>.
- Mazouz, K., Mohamed, A. and Saadouni, B. (2016). Stock return comovement around the Dow Jones Islamic Market World Index revisions. *Journal of Economic Behavior and Organization*, 132, 50–62. <https://doi.org/10.1016/j.jebo.2016.05.011>.
- Merdad, H., Hassan, M. K. and Alhenawi, Y. (2010). Islamic vs. conventional mutual funds performance in Saudi Arabia: A case study. *Islamic Economics*, 23(2), 157–193.
- Naifar, N. (2016). Do global risk factors and macroeconomic conditions affect global Islamic index dynamics? A quantile regression approach. *Quarterly Review of Economics and Finance*, 61, 29–39. <https://doi.org/10.1016/j.qref.2015.10.004>.
- Naifar, N., Mroua, M. and Bahloul, S. (2017). Do regional and global uncertainty factors affect differently the conventional bonds and sukuk? New evidence. *Pacific-Basin Finance Journal*, 41, 65–74. <https://doi.org/10.1016/j.pacfin.2016.12.004>.
- Nainggolan, Y., How, J. and Verhoeven, P. (2016). Ethical screening and financial performance: The case of Islamic equity funds. *Journal of Business Ethics*, 137(1), 83–99. <https://doi.org/10.1007/s10551-014-2529-5>.
- Najeeb, S. F., Bacha, O. and Masih, M. (2014). *Does a Held-to-Maturity Strategy Impede Effective Portfolio Diversification for Islamic Bond (Sukuk) Portfolios?*

- A Multi-scale Continuous Wavelet Correlation Analysis*. 4th Islamic Banking and Finance Conference, MPRA Paper No. 56956. Retrieved from <http://mpra.ub.uni-muenchen.de/56956/>.
- Naqvi, B., Rizvi, S. K. A., Mirza, N. and Reddy, K. (2018). Religion based investing and illusion of Islamic Alpha and Beta. *Pacific-Basin Finance Journal*, 52, 82–106. <https://doi.org/10.1016/j.pacfin.2018.02.003>.
- Nasr, A. B., Lux, T., Ajmi, A. N. and Gupta, R. (2016). Forecasting the volatility of the Dow Jones Islamic Stock Market Index: Long memory vs. regime switching. *International Review of Economics and Finance*, 45, 559–571. <https://doi.org/10.1016/j.iref.2016.07.014>.
- Nechi, S. and Smaoui, H. E. (2018). Interbank offered rates in Islamic countries: Is the Islamic benchmark different from the conventional benchmarks? *Quarterly Review of Economics and Finance*, 74, 75–84. <https://doi.org/10.1016/j.qref.2018.05.003>.
- Peillex, J., Erragragui, E., Bitar, M. and Benlemlih, M. (2018). The contribution of market movements, asset allocation and active management to Islamic equity funds' performance. *Quarterly Review of Economics and Finance*, 74, 32–38. <https://doi.org/10.1016/j.qref.2018.03.013>.
- Pristiwati, Y. and Widianingsih, N. (2019). Analysis of capital asset pricing model according to shariah. *International Journal of Economics, Business, and Accounting Research*, 3(3), 171–184.
- Rahim, S. A. and Ahmad, N. (2016). Event study on sukuk announcement using CAAR and extended CAPM to islamic indexes in Malaysia. *Journal of Global Business and Social Entrepreneurship*, 4(5), 91–103.
- Rajjaque, M. S., Tang, K. B. and Alam, N. (2013). A comparative performance of conventional and Islamic unit trusts: Market timing and persistence evidence. *Journal of Financial Services Marketing*, 18, 316–326. <https://doi.org/10.1057/fsm.2013.24>.
- Reddy, K., Mirza, N., Naqvi, B. and Fu, M. (2017). Comparative risk adjusted performance of Islamic, socially responsible and conventional funds: Evidence from United Kingdom. *Economic Modelling*, 66, 233–243. <https://doi.org/10.1016/j.econmod.2017.07.007>.
- Saâdaoui, F., Naifar, N. and Aldohaiman, M. S. (2017). Predictability and co-movement relationships between conventional and Islamic stock market indexes: A multiscale exploration using wavelets. *Physica A: Statistical Mechanics and Its Applications*, 482, 552–568. <https://doi.org/10.1016/j.physa.2017.04.074>.
- Sadaf, R. and Andleeb, S. (2014). Islamic Capital Asset Pricing Model (ICAPM). *Journal of Islamic Banking and Finance*, 2(1), 187–195.
- Selim, T. H. (2008). An Islamic capital asset pricing model. *Humanomics*, 24(2), 122–129.
- Shaikh, S. A., Ismail, M. A., Ismail, A. G., Shahimi, S. and Muhammad, M. H. (2019). Comparative analysis of Shari'ah-compliant portfolios: Evidence from Pakistan. *Journal of Islamic Accounting and Business Research*, 10(3), 466–487. <https://doi.org/10.1108/JIABR-10-2016-0121>.
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), 425–442. <https://doi.org/10.2307/2329297>.
- Tahir, I. and Brimble, M. (2011). Islamic investment behaviour. *International Journal of Islamic and Middle Eastern Finance and Management*, 4(2), 116–130. <https://doi.org/10.1108/17538391111144515>.
- Tobin, J. (1958). Liquidity preference as behavior towards risk. *Review of Economic Studies*, 25(2), 65–86.

- Trabelsi, N. and Naifar, N. (2017). Are Islamic stock indexes exposed to systemic risk? Multivariate GARCH estimation of CoVaR. *Research in International Business and Finance*, 42, 727–744. <https://doi.org/10.1016/j.ribaf.2017.07.013>.
- Tukenmez, N. M., Saka, H. and Kizgin, M. (2019). Conventional and Islamic indices: A comparison on performance. *Muhasebe ve Finansman Dergisi*, 415–430. <https://doi.org/10.25095/mufad.607189>.
- Tumewang, Y. K. (2018). Can Yale endowment model be applied for Islamic pension fund? *Journal of Islamic Monetary Economics and Finance*, 3, Special Issue, 99–124. <https://doi.org/10.21098/jimf.v3i0.787>.
- Umar, Z. (2017). Islamic vs conventional equities in a strategic asset allocation framework. *Pacific-Basin Finance Journal*, 42, 1–10. <https://doi.org/10.1016/j.pacfin.2015.10.006>.
- Usmani, M. T. (2002). *An Introduction to Islamic Finance*. The Hague: Kluwer Law International.
- Vishwanath, S. R. and Sabahuddin, A. (2009). An Overview of Islamic sukuk bonds. *Journal of Structured Finance*, 14(4), 58–67.
- Walkshäusl, C. and Lobe, S. (2012). Islamic investing. *Review of Financial Economics*, 21(2), 53–62. <https://doi.org/10.1016/j.rfe.2012.03.002>.
- Wilson, R. (2007). *Islamic Asset Management*. SGIA Research Working Papers Series, SGIARWP07-01. Retrieved from <https://www.dur.ac.uk/resources/sgia/SGIARWP07-01.2doc.pdf>.
- Wood, B. R. W., Mottahedeh, R. W. and Wood, R. W. (2014). Islamic debt-equivalents take center stage. *Journal of Taxation of Financial Products*, 11(4), 15–19.
- Xiong, J. X., Ibbotson, R. G., Idzorek, T. M. and Chen, P. (2010). The equal importance of asset allocation and asset management. *Financial Analysts Journal*, 66(2), 22–30.
- Yilmaz, M. K., Sensoy, A., Ozturk, K. and Hacıhasanoglu, E. (2015). Cross-sectoral interactions in Islamic equity markets. *Pacific-Basin Finance Journal*, 32, 1–20. <https://doi.org/10.1016/j.pacfin.2014.12.008>.
- Zulkhibri, M. (2015). A synthesis of theoretical and empirical research on sukuk. *Borsa Istanbul Review*, 15(4), 237–248. <https://doi.org/10.1016/j.bir.2015.10.001>.

Further reading

- Abdullah, M.F., Hassan, M. K. and Rahman, A.A. (2019). Prospects for Islamic Derivatives in Bangladesh. In M. Rashid, M. K. Hassan and S. Aliyu (eds), *Islamic Corporate Finance*. London: Routledge, p. 17.
- Abubakar, M., Hassan, M. K. and Haruna, M.A. (2019). Cryptocurrency Tide and Islamic Finance Development: Any Issue? In Choi, J.J. and Ozkan, B. (eds), *Disruptive Innovation in Business and Finance in the Digital World, International Finance Review*, 20, Emerald Publishing Limited, 189–200.
- Adejoke, A.U.G., Hassan, T., Ramadili Mohd, S.M. and Hassan, M. K. (2013). Is the long term-profit rate of Malaysian Sukuk a good predictor or short term profit rate? In Hassan, M. K. and Mahlknecht, M. (eds), *Capital Markets Review*, 21, 67–87.
- Ahmad, A. U. F. and Hassan, M. K. (2006). The time value of money concept in Islamic finance. *American Journal of Islamic Social Sciences*, 23(1), 66.
- Ahmed, H., Hassan, M. K. and Rayfield, B. (2018). When and why firms issue sukuk? *Managerial Finance*. <https://doi.org/10.1108/MF-06-2017-0207>
- AlAbbad, A., Hassan, M. K. and Saba, I. (2019). Can Shariah board characteristics influence risk-taking behavior of Islamic banks? *International Journal of Islamic and Middle Eastern Finance and Management*. <https://doi.org/10.1108/IMEFM-11-2018-0403>
- Alalmal, S., Al-Awadhi, A.M., Hassan, M. K. and Turunen-Red, A. (2018). Capital Structure Determinants in Saudi Arabia: A Natural Experiment. *Journal of Islamic Accounting and Business Research*.
- Alam, N., Hassan, M. K. and Haque, M. A. (2013). Are Islamic bonds different from conventional bonds? International evidence from capital market tests. *Borsa Istanbul Review*, 13(3), 22–29. <https://doi.org/10.1016/j.bir.2013.10.006>
- Alhenawi, Y. and Hassan, M. K. (2013). What does the US REIT market have in store for nonconventional investors? The case of Shariah compliance. *The Journal of Investing*, 22(4), 61–82. <https://doi.org/10.3905/joi.2013.22.4.061>
- Alhomaidi, A., Hassan, M. K., Hippler, W. J. and Mamun, A. (2019). The impact of religious certification on market segmentation and investor recognition. *Journal of Corporate Finance*, 55, 28–48. <https://doi.org/10.1016/j.jcorpfin.2018.08.012>
- Alhomaidi, A., Hassan, M. K., Zirek, D. and Alhassan, A. (2018). Does an Islamic label cause stock price comovements and commonality in liquidity? *Applied Economics*, 50(59), 6444–6457. <https://doi.org/10.1080/00036846.2018.1486023>
- Alkhan, A. M. and Hassan, M. K. (2019). Tawarruq: Controversial or Acceptable? *Arab Law Quarterly*, 33(4), 307–333.
- Al-Suwailem, S. and Hassan, M. K. (2012). An Islamic perspective of financial engineering. In , Hassan, M. K. Mahlknecht, M. (eds), *Islamic Capital Markets: Products and Strategies*, 385–400.
- Ashraf, A. and Hassan, M. K. (2019). Islamic venture capital financing. In M. Rashid, M. K. Hassan and S. Aliyu (eds), *Islamic Corporate Finance*. New York: Routledge, pp. 74–97.

- Aziz, Zeti Akhtar, Azleena Idris and Yousuf Sultan. (2019). Responsible Finance – Ethical and Islamic Finance: Meeting the Global Agenda, Responsible Finance and Investment Foundation (RFI) and Islamic Financial Services Board (IFSB), Kuala Lumpur, Malaysia. Retrieved from https://ceif.iba.edu.pk/pdf/Responsible_Finance_Ethical_and_Islamic_Finance_Meeting_TheGlobal_Agenda.pdf.
- Azmat, S., Hassan, M. K., Ghaffar, H. and Azad, A. S. (2020). State contingent banking and asset price bubbles: The case of Islamic banking industry. *Global Finance Journal*, 100531. <https://doi.org/10.1016/j.gfj.2020.100531>
- Bahoo, S., Hassan, M. K., Paltrinieri, A. and Khan, A. (2019). A model of the Islamic sovereign wealth fund. *Islamic Economic Studies*. <https://doi.org/10.1108/IES-05-2019-0003>
- Bekri, M., Hassan, M. K. and Alam, N. (2017). On the dependency structure of Islamic assets. In Hassan, M. K. *Handbook of Empirical Research on Islam and Economic Life*. Cheltenham: Edward Elgar Publishing, pp. 602–623.
- Bin Mahfouz, S. and Hassan, M. K. (2012). A Comparative Study between the Investment Characteristics of Islamic and Conventional Equity Mutual Funds in Saudi Arabia. *The Journal of Investing*, 21(4), 128–143. <https://doi.org/10.3905/joi.2012.21.4.128>
- Bin Mahfouz, S. and Hassan, M. K. (2013). Sustainable and socially responsible investing. *Humanomics*. <https://doi.org/10.1108/H-07-2013-0043>
- Castro, E., Hassan, M. K., Rubio, J. F. and Halim, Z. A. (2020). Relative performance of religious and ethical investment funds. *Journal of Islamic Accounting and Business Research*. <https://doi.org/10.1108/JIABR-04-2019-0084>
- Chuwani, N. N., Eves, C., Hoang, V. N., Isik, I. and Hassan, M. K. (2017). How efficient are alternative financial institutions? An empirical investigation of Islamic REITs in Malaysia. *Journal of Real Estate Literature*, 25(1), 107–139.
- Dharani, M., Hassan, M. K. and Paltrinieri, A. (2019). Faith-based norms and portfolio performance: Evidence from India. *Global Finance Journal*, 41, 79–89. <https://doi.org/10.1016/j.gfj.2019.02.001>
- El-Din, S. E. D. T. and Hassan, M. K. (2007). Islam and speculation in the stock exchange. In Hassan, M. K. and Lewis, M. K. (eds), *Handbook of Islamic Banking*, Cheltenham: Edward Elgar Publishing, pp. 240–255.
- Elfakhani, S. M., Hassan, M. K. and Sidani, Y. M. (2007). Islamic mutual funds. In Hassan, M. K. and Lewis, M. K. (eds), *Handbook of Islamic Banking*, Cheltenham: Edward Elgar Publishing, pp. 256–276.
- Elnahas, A. M., Hassan, M. K. and Ismail, G. M. (2017). Religion and ratio analysis: Towards an Islamic corporate liquidity measure. *Emerging Markets Review*, 30, 42–65. <https://doi.org/10.1016/j.ememar.2016.09.001>
- Elnahas, A. M., Hassan, M. K. and Ismail, G. M. (2017). Religion and mergers and acquisitions contracting: The case of earnout agreements. *Journal of Corporate Finance*, 42, 221–246. <https://doi.org/10.1016/j.jcorpfin.2016.11.012>
- Erragragui, E., Hassan, M. K., Peillex, J. and Khan, A. N. F. (2018). Does ethics improve stock market resilience in times of instability? *Economic Systems*, 42(3), 450–469. <https://doi.org/10.1016/j.ecosys.2017.09.003>
- Girard, E. C. and Hassan, M. K. (2008). Is there a cost to faith-based investing: Evidence from FTSE Islamic indices. *The Journal of Investing*, 17(4), 112–121. <https://doi.org/10.3905/JOI.2008.17.4.112>
- Goud, Blake and Hassan, M. Kabir. (2011). Islamic Finance in the United States. In M. K. Hassan and M. Mahlknecht (eds), *Islamic Capital Markets: Products and Strategies*, (609). Chichester: John Wiley and Sons, pp. 279–303.

- Grassa, R. and Hassan, M. K. (2015). Islamic finance in France: Current state, challenges and opportunities. *International Journal of Islamic Economics and Finance Studies*, 1(1), 65–80.
- Grira, J., Hassan, M. K., Labidi, C. and Soumaré, I. (2019). Equity pricing in Islamic banks: International evidence. *Emerging Markets Finance and Trade*, 55(3), 613–633. <https://doi.org/10.1080/1540496X.2018.1451323>
- Grira, J., Hassan, M. K. and Soumaré, I. (2016). Pricing beliefs: Empirical evidence from the implied cost of deposit insurance for Islamic banks. *Economic Modelling*, 55, 152–168. <https://doi.org/10.1016/j.econmod.2016.01.026>
- Halim, Z. A., How, J., Verhoeven, P. and Hassan, M. K. (2019). Asymmetric information and securitization design in Islamic capital markets. *Pacific-Basin Finance Journal*, 101189. <https://doi.org/10.1016/j.pacfin.2019.101189>
- Halim, Z. A., How, J., Verhoeven, P. and Hassan, M. K. (2019). The value of certification in Islamic bond offerings. *Journal of Corporate Finance*, 55, 141–161. <https://doi.org/10.1016/j.jcorpfin.2018.09.002>
- Hassan, A., Hassan, M. K., Rubio, J., Ozkan, B. and Merdad, H. (2017). Coskewness in Islamic, socially responsible and conventional mutual funds: an asset pricing test. *International Journal of Business and Society*, 18, S1.
- Hassan, M. K. (2005). Return Volatility, Predictability and Dynamic Relationships in the Stock Markets of the Member Countries of the Organization of Islamic Conference. 7 In M. Iqbal (ed), *Islamic Perspectives on Sustainable Development*. Palgrave-MacMillan, New York, pp. 185–213.
- Hassan, M. K. (Ed.). (2016). *Handbook of Empirical Research on Islam and Economic Life*. Cheltenham: Edward Elgar Publishing.
- Hassan, M. K., Alam, A. W. and Sarac, M. (2020). Circular Economy, Sustainable Development and the Role of Islamic Finance. In M. K. Hassan and M. Sarac (eds). *Sustainability, Growth and Finance from Islamic Perspective*. Istanbul: Istanbul University Press, pp. 1–26.
- Hassan, M. K., Aliyu, S. and Hussain, M. (2019). A contemporary review of Islamic finance and accounting Literature. *The Singapore Economic Review*, 1–38. <https://doi.org/10.1142/S0217590819420013>
- Hassan, M. K., Aliyu, S., Paltrinieri, A. and Khan, A. (2019). A review of Islamic investment literature. *Economic Papers: A journal of applied economics and policy*, 38(4), 345–380. <https://doi.org/10.1111/1759-3441.12230>
- Hassan, M. K., Aliyu, S., Saiti, B. and Halim, Z.A. (2020). A Review of Islamic Stock Market, Growth and Real Estate Finance Literature. *International Journal of Emerging Markets*. Retrieved from <https://doi.org/10.1108/IJOEM-11-2019-1001>.
- Hassan, M. K. and Girard, E. (2010). Faith-based ethical investing: The case of Dow Jones Islamic indexes. *Islamic Economic Studies*, 17(2), 1–31.
- Hassan, M. K and Girard, E. (2011). Shari'ah-consistent investment vehicles in Malaysia. In Ariff, M. and Iqbal, M. (eds), *The Foundations of Islamic Banking: Theory, Practice and Education*. Cheltenham: Edward Elgar Publishing, pp. 153–184.
- Hassan, M. K. and Hippler, W. (2014). Entrepreneurship and Islam: an overview. Available at SSRN 3263110.
- Hassan, M. K., Karim, M. S. and Muneezac, A. (2020). A Conventional and Shari'ah Analysis of Bitcoin. *Arab Law Quarterly*, 1(aop), 1–35.
- Hassan, M. K. and Kayed, R. N. (2009). The global financial crisis, risk management and social justice in Islamic finance. *Risk Management and Social Justice in Islamic Finance*, 1(1), 33–58.

- Hassan, M. K., Kayed, R. N. and Oseni, U. A. (2013). *Introduction to Islamic Banking and Finance*. England: Pearson Education Limited.
- Hassan, M. K., Khan, A. N. F. and Ngow, T. (2010). Is faith-based investing rewarding? The case for Malaysian Islamic unit trust funds. *Journal of Islamic Accounting and Business Research*. <https://doi.org/10.1108/17590811011086732>
- Hassan, M. K. and Lewis, M. K. (Eds.). (2014). *Handbook on Islam and Economic Life*. Cheltenham: Edward Elgar Publishing.
- Hassan, M. K. and M. Mahlkecht (Eds.), *Islamic Capital Markets: Products and Strategies*, (609). Chichester: John Wiley and Sons.
- Hassan, M. K., Miglietta, F., Paltrinieri, A. and Floreani, J. (2018). The effects of Shariah board composition on Islamic equity indices' performance. *Business Ethics: A European Review*, 27(3), 248–259. <https://doi.org/10.1111/beer.12185>
- Hassan, M. K., M., Muneeza, A. and Sarea, A. (Eds.) (2020). *Impact of COVID-19 and Islamic Social Finance*. Singapore: Routledge, Taylor and Francis.
- Hassan, M. K. and Ngene, G. (2012). Momentum and Nonlinear Price Discovery in Sovereign Credit Risk and Equity Markets of the Organization of Islamic Cooperation (OIC) Countries. *Jurnal Ekonomi Malaysia*, 46(2), 101–114.
- Hassan, M. K., Paltrinieri, A., Dreassi, A., Khan, A. and Bahoo, S. (2020). A bibliometric review of takaful literature. *International Review of Economics and Finance*, 69(C), 389–405.
- Hassan, M. K., Rashid, M. and Aliyu, S. (Eds.). (2019). *Islamic Corporate Finance*. London: Routledge.
- Hassan, M. K., Rashid, M., Wei, A. S., Adedokun, B. O. and Ramachandran, J. (2019). Islamic business scorecard and the screening of Islamic businesses in a cross-country setting. *Thunderbird International Business Review*, 61(5), 807–819. <https://doi.org/10.1002/tie.22038>
- Hassan, M. K., Rubio, J. F., Hassan, M. K. and Merdad, H. J. (2012). Non-parametric performance measurement of international and Islamic mutual funds. *Accounting Research Journal*. <https://doi.org/10.1108/10309611211290176>
- Hassan, M. K. and Saraç, M. (Eds) (2020). *Islamic Perspectives on Sustainable Financial System*. Istanbul: Istanbul University Press (IUPRESS).
- Hassan, M. K., Saraç, M. and Khan, A. (Eds) (2020). *Sustainable Development Goals and Islamic Finance*. London: Palgrave-McMillan.
- Hassan, M. K., Sheikh, S. and Kayhan, S. (2020). *Introduction to Islamic Banking and Finance*. Singapore: World Scientific Press.
- Hassan, M. K. and Soumaré, I. (2015). Guarantees and profit-sharing contracts in project financing. *Journal of business ethics*, 130(1), 231–249. <https://doi.org/10.1007/s10551-014-2201-0>
- Hassan, M. K. and Yu, J. S. (2007). Stock Exchange Alliances in Organization of Islamic Conferences (OIC) Countries. *Networks Financial institute Working Paper*.
- Hayat, R. and Hassan, M. K. (2017). Does an Islamic label indicate good corporate governance? *Journal of Corporate Finance*, 43, 159–174. <https://doi.org/10.1016/j.jcorpfin.2016.12.012>
- Jung-Suk Yu and Hassan, M. K. (2009). Rational Speculative Bubbles in the OIC Stock Markets. *IJUM Journal of Economics and Management*, 17(1), 97–131
- Kayed, R. N. and Hassan, M. K. (2010). Islamic entrepreneurship: A case study of Saudi Arabia. *Journal of developmental entrepreneurship*, 15(4), 379–413.
- Kayed, R. N. and Hassan, M. K. (2011). The global financial crisis and Islamic finance. *Thunderbird International Business Review*, 53(5), 551–564. <https://doi.org/10.1002/tie.20434>

- Kayed, R. N., Mahlknecht, M. and Hassan, M. K. (2012). The Current Financial Market Crisis: Lessons Learned, Risks and Strengths of Islamic Capital Markets Compared to the Conventional System. In M. K. Hassan and M. Mahlknecht (eds), *Islamic Capital Markets: Products and Strategies*, (609). Chichester: John Wiley and Sons, pp. 359–384.
- Kim, D. W., Yu, J. S. and Hassan, M. K. (2018). Financial inclusion and economic growth in OIC countries. *Research in International Business and Finance*, 43, 1–14. <https://doi.org/10.1016/j.ribaf.2017.07.178>
- Kim, D. W., Yu, J. S. and Hassan, M. K. (2020). The influence of religion and social inequality on financial inclusion. *The Singapore Economic Review*, 65(1), 193–216. <https://doi.org/10.1142/S0217590817460031>
- Lahsasna, A. and Hassan, M. K. (2012). The Shariah process in product development and approval in ICM. In M. K. Hassan and M. Mahlknecht (eds), *Islamic Capital Markets: Products and Strategies*, (609). Chichester: John Wiley and Sons, pp. 23–68.
- Lahsasna, A., Hassan, M. K. and Ahmad, R. (2018). *Forward Lease Sukuk in Islamic Capital Markets*. London: Palgrave Macmillan.
- Mehri, M., Hassan, M. K. and Jouaber-Snoussi, K. (2017). Optimal Carried Interest: Adverse Selection in Islamic and Conventional Venture Capital and Private-Equity Funds. *Emerging Markets Finance and Trade*, 53(7), 1458–1476. <https://doi.org/10.1080/1540496X.2016.1166424>
- Mehri, M., Hassan, M. K., Safa, M.F. and Siraj, I. (2020). Do determinants of fees differ between Islamic and conventional funds? *International Journal of Finance and Economics*, 1–25.
- Mehri, M., Jouaber-Snoussi, K. and Hassan, M. K. (2017). Profit-sharing ratio as a screening device in venture capital. In Hassan, M. K. (Ed.), *Handbook of Empirical Research on Islam and Economic Life*. Cheltenham: Edward Elgar Publishing, pp. 579–601.
- Merdad, H. E. S. H. A. M. and Hassan, M. K. (2013). Islamic mutual funds' performance in Saudi Arabia. In K. Hunt-Ahmed (Ed.), *Contemporary Islamic finance: Innovations, applications and best practices*, Chichester: John Wiley and Sons, pp. 303–322.
- Merdad, H., Hassan, M. K. and Al-Henawi, Y. (2010). Analysis of Islamic versus conventional mutual funds in Saudi Arabia. *Journal of King Abdul Aziz University, Islamic Economics*, 23(2), 161–198.
- Merdad, H. J., Hassan, M. K. and Hippler III, W. J. (2015). The Islamic risk factor in expected stock returns: an empirical study in Saudi Arabia. *Pacific-Basin Finance Journal*, 34, 293–314. <https://doi.org/10.1016/j.pacfin.2015.04.001>
- Merdad, H., Hassan, M. K. and Khawaja, M. (2016). Does faith matter in mutual funds investing? Evidence from Saudi Arabia. *Emerging Markets Finance and Trade*, 52(4), 938–960. <https://doi.org/10.1080/1540496X.2015.1025655>
- Mnif, E., Jarbouï, A., Hassan, M. K. and Mouakhar, K. (2020). Big data tools for Islamic financial analysis. *Intelligent Systems in Accounting, Finance and Management*, 27(1), 10–21. <https://doi.org/10.1002/isaf.1463>
- Oseni, U. A., Ahmad, A. U. F. and Hassan, M. K. (2016). The legal implications of 'Fatwā shopping' in the Islamic finance industry: problems, perceptions and prospects. *Arab Law Quarterly*, 30(2), 107–137.
- Oseni, U. A. and Hassan, M. K. (2014). The regulation and supervision of sukuk in global capital markets. In Hassan, M. K. and Lewis, M. K. (eds), *Handbook on Islam and Economic Life*. Cheltenham: Edward Elgar Publishing.

- Oseni, U. A. and Hassan, M. K. (2015). Regulating the governing law clauses in Sukuk transactions. *Journal of Banking Regulation*, 16(3), 220–249. <https://doi.org/10.1057/jbr.2014.3>
- Oseni, U., Hassan, M. K. and Ali, N. (2020). Judicial Support for the Islamic Financial Services Industry: Towards Reform-oriented Interpretive Approaches. *Arab Law Quarterly*, 34, 1–23.
- Oseni, U. A., Hassan, M. K. and Hassan, R. (Eds.). (2019). *Emerging Issues in Islamic Finance Law and Practice in Malaysia*. Bingley: Emerald Group Publishing.
- Oseni, U. A., Hassan, M. K. and Matri, D. (2013). An Islamic Finance Model for the Small and Medium-Sized Enterprises in France. *Journal of King Abdul Aziz University: Islamic Economics*, 26,(2), 157–186.
- Paltrinieri, A., Hassan, M. K., Bahoo, S. and Khan, A. (2019). A bibliometric review of sukuk literature. *International Review of Economics and Finance*. <https://doi.org/10.1016/j.iref.2019.04.004>
- Rashid, A., Hassan, M. K. and Shah, M. A. R. (2020). On the role of Islamic and conventional banks in the monetary policy transmission in Malaysia: Do size and liquidity matter? *Research in International Business and Finance*, 52, 101123. <https://doi.org/10.1016/j.ribaf.2018.10.006>
- Rashid, M. and Hassan, M. K. (2014). Market values of Islamic Banks and ethical identity. *American Journal of Islamic Social Sciences*, 31(2), 43–79.
- Rashid, M., Hassan, M. K., Amin, N. and Samina, Q. S. (2017). Shari'ah compliant companies in Bangladesh. *Journal of Islamic Economics Banking and Finance*, 13(2), 129–143.
- Rashid, M., Hassan, M. K. and Yein, N. Y. (2014). Macroeconomics, investor sentiment and Islamic stock price index in Malaysia. *Journal of Economic Cooperation and Development*, 35(4), 219–234.
- Sabah, N. and Hassan, M. K. (2019). Pricing of Islamic deposit insurance. *Economics Letters*, 178, 91–94. <https://doi.org/10.1016/j.econlet.2019.01.013>
- Samad, A. and Hassan, M. K. (2006). The performance of Malaysian Islamic bank during 1984–1997: An exploratory study. *International journal of Islamic financial services*, 1(3), 1–14.
- Selim, M. and Hassan, M. K. (2019). Interest-free monetary policy and its impact on inflation and unemployment rates. *ISRA International Journal of Islamic Finance*. <https://doi.org/10.1108/IJIF-06-2018-0065>
- Selim, M. and Hassan, M. K. (2020). Qard-al-Hasan-based monetary policy and the role of the central bank as the lender of last resort. *Journal of Islamic Accounting and Business Research*. <https://doi.org/10.1108/JIABR-12-2017-0190>
- Selim, M., Hassan, M. K. and Rahman, M. (2019). Financing Super-Infrastructures Using ISTISNA-SUKUK Based Monetary POLICY for Faster Economic Development. *Journal of Economic Cooperation and Development*, 40(4), 139–161.
- Smolo, E. and Hassan, M. K. (2011). The potentials of mushārahah mutanāqisah for Islamic housing finance. *International Journal of Islamic and Middle Eastern Finance and Management*. <https://doi.org/10.1108/17538391111166476>
- Wahab, A. R. A., Lewis, M. K. and Hassan, M. K. (2007). Islamic takaful: Business models, Shariah concerns and proposed solutions. *Thunderbird International Business Review*, 49(3), 371–396. <https://doi.org/10.1002/tie.20148>
- Yousfi, O. and Hassan, M. K. (2014). Moral hazard in Islamic profit–loss sharing contracts and private equity. In Hassan, M. K. and Lewis, M. K. (eds), *Handbook on Islam and Economic Life*. Cheltenham: Edward Elgar Publishing, pp. 353–369.

- Zaher, T. S. and Kabir Hassan, M. (2001). A comparative literature survey of Islamic finance and banking. *Financial Markets, Institutions and Instruments*, 10(4), 155–199. <https://doi.org/10.1111/1468-0416.00044>
- Zaman, Q. U., Hassan, M. K., Akhter, W. and Brodmann, J. (2019). Does the interest tax shield align with maqasid al Shariah in finance? *Borsa Istanbul Review*, 19(1), 39–48. <https://doi.org/10.1016/j.bir.2018.07.004>
- Zaman, Q. U., Hassan, M. K., Akhter, W. and Meraj, M. A. (2018). From interest tax shield to dividend tax shield: A corporate financing policy for equitable and sustainable wealth creation. *Pacific-Basin Finance Journal*, 52, 144–162. <https://doi.org/10.1016/j.pacfin.2017.01.003>

Index

- Aberdeen Asset Management 96
absorption of mutual funds 15
American Bankers Association 40
Amundi Asset Management 65, 66
annualized return 83, 87, 125, 126
assets under management (AUM) xiv,
xvi, 13, 15–6, 21–2, 36, 42–5,
47–8, 50, 51, 53–6, 58, 60–69, 71,
72, 75, 84–6, 139, 155–8, 171,
173, 177
see also Islamic asset management
Attribution Analysis 18, 20, 22–3, 132,
161
AUM *see* assets under management
- benchmarks 23, 54, 90, 93, 97, 111, 122,
166
Beta 17, 89, 144, 147–9, 151–3, 162
Black and Litterman 18, 101
Bloomberg 32, 35–6, 38, 41, 48, 49,
50–56, 59, 61–2, 64, 70, 72–5, 81,
84–6, 90, 91–2, 97–8, 104–109,
111–15, 117, 118, 120–5, 127–37,
139, 140–41, 144, 146–7, 150–51,
154–9, 160–62, 164–5, 172, 174
BNP Paribas 66, 93, 106, 107, 115, 118,
120–21, 133–4
bonds xv, 9, 10, 11, 14, 23, 25, 28, 34,
36, 45, 92–3, 98, 101, 102, 117,
167, 169, 177
Buy List of qualifying securities 31, 73,
78–82, 84–5, 100, 124, 137, 154,
168, 172–4
- Capital Asset Pricing Model (CAPM) 8,
11, 17–19, 23–4, 26–32, 38, 171
see also Islamic CAPM
Capital Market Line 13, 17, 34, 77
CAPM *see* Capital Asset Pricing Model
capture ratio 90, 92, 94–5, 97–8, 105,
121, 148–9, 152–3, 161, 167
- “common man” xvii, 12, 14, 39, 48, 60,
67–8, 75, 81, 101, 138, 144
conventional asset management xvi, xvii,
2, 4, 76, 78, 81, 97
Conventional Growth portfolio 158, 160,
161
correlation 4, 5, 9, 17, 20, 34, 70, 73, 77,
83, 90–94, 96, 98, 101, 102, 104,
111, 117, 121, 144, 147–9, 151–3,
155, 160, 162, 166, 171
Cost of funds indexes, e.g., LIBOR 27,
28, 29
Credit Suisse 42, 79, 102, 138–42,
144–51, 161–2, 165
- David Swensen, Yale endowment model
69, 70
derivatives 3, 5, 25, 97, 168
diversification xiv, 5, 6, 10, 15, 16, 18,
19, 22–3, 33, 48, 67, 69, 77, 82–3,
92, 94, 96, 98, 99, 114, 117, 124,
166, 169, 170
domiciliation 36, 43–4, 46–7, 57, 163
Dublin 51, 101
- Efficient Frontier 6, 13, 16, 17, 34, 36,
133, 171
Efficient Markets Hypothesis 18
Emirates NBD Asset Management 74,
92, 93, 105–107, 115, 118, 120,
133–4
Environmental, Social & Governance
investing 95, 166, 169, 170
ETFs *see* exchange-traded fund
exchange controls 57–9, 61–3, 65, 73,
85, 155, 163
exchange-traded funds (ETFs) 12, 24,
49, 54, 57–61, 65, 69, 75, 77–81,
83–5, 90, 95–9, 101, 107–13, 119,
121–2, 154–6, 158–9, 163, 166,
172, 175–6

- Fidelity Asset Management 66, 79, 102, 138–44, 146, 149, 150–51, 161–2, 165
- financial crisis 2, 5, 7, 10, 11, 12, 23, 63, 70, 168–9
- Franklin Templeton 65, 79, 102, 120–21, 138–9, 150
- gate 43–4, 46–7, 178
- hedge funds 11, 14, 23, 34–5, 46, 97, 155–6
- HSBC 42, 65, 96
- Ijtihad 25–7, 172
- Indexes
 - Dow Jones 5, 9, 29, 48, 94–5, 100, 140, 144, 164–5
 - S&P xviii, 5, 164
 - see also* Islamic indexes
- Information ratio 73, 89, 91–3, 96–7, 104, 146, 152–3, 161, 164, 167
- International Monetary Fund 15, 37
- investment policy portfolio 18, 22, 40, 162
- Investment strategies 76, 82, 102, 138, 165, 174
- Islamic asset management xvi, xvii, 2–5, 9–10, 12–14, 22, 26, 29, 32, 36, 42, 49, 59, 67, 72, 76, 77, 81, 91, 108, 144, 157, 166, 174–6
- Islamic CAPM 24–6, 28–32
- Islamic finance xv, xvi, xviii, 2, 4, 8, 24–8, 30, 38, 66, 70–71, 170
- see also* sukuk
- Islamic Growth portfolio 91, 97, 105, 136, 138–9, 144–9, 152, 154, 158, 160–61, 175
- Islamic indexes 2–6, 8, 168
- Islamic Interbank Benchmark Rate 28
- Jensen 17–18, 20–21, 29, 30, 88, 144–6, 149, 151–3, 161–2, 165, 171
- LIBOR 100, 119
- Lipper 35, 36
- London Metals Exchange 91
- Luxembourg xv, 28, 38, 42, 51, 56, 84, 101, 164
- Malaysia 6, 8, 10, 36, 51, 56–7, 59, 60, 71–2, 74, 83–5, 119, 164, 176
- Markowitz 13, 16–22, 28, 36, 160, 166, 170–73
- mean-variance 17, 19, 20, 22, 34–5, 37
- Mirabaud 42
- Mixed Allocation 49, 53–4, 62, 68, 70, 76, 85–6, 99, 100
- Modern Portfolio Theory (MPT) xvi, 3, 12–16, 18–22, 24–5, 27, 31–3, 36–8, 40, 41, 77, 79, 80, 86, 99, 114, 119, 139, 166, 170–74, 176
- money market funds 8, 34, 36–7, 49, 53–4, 62, 68–70, 85–6, 91–2, 94, 96–7, 102–106, 115–20, 122, 132–3, 135–9, 148–9, 156–9
- Morningstar 22, 35, 36, 81
- MPT *see* Modern Portfolio Theory
- multi-asset portfolio investing xiv, xvi, xvii, 2, 10–12, 18, 20, 22, 25, 31–2, 68, 77, 80, 99, 100, 114, 164, 167, 170, 172–6
- multiple asset categories xiv, 15, 16, 34, 68, 98, 99, 113–18, 133–4
- mutual fund xiv, xv, xvi, 2, 3, 5–8, 11–12, 14–16, 22, 24, 30, 35–7, 43–51, 53–7, 59, 60, 62–6, 68–81, 83, 85, 88, 90–91, 94–5, 98, 99, 100–105, 107–108, 119–20, 122, 137–9, 154–8, 161, 163–7, 170, 172–3, 175–7
- filtering rules, Filter 1 57, 59, 64–6, 73
- filtering rules, Filter 2 57, 59, 60, 62–4, 66, 69, 70, 73
- filters (size, track record, domiciliation, etc.) 43–4, 47, 57, 60, 62–4, 66–7, 83
- exempted from filter rules 59, 65, 73
- NCB Capital 65
- Nobel Prizes 2, 13, 18, 170
- Oasis Crescent Asset Management 120, 123, 136
- Optimization Rules 114, 116

- Pictet 42
- Policy Portfolio 33, 41, 78, 81, 82, 83, 101, 114, 163
- portfolio constraints xiv, xv, xvi, xvii, 6, 8, 10–12, 14, 21, 40–41, 67–8, 77, 80, 81, 97, 101–102, 108, 110, 117, 122, 124, 163, 166, 169–170, 172–4, 176
- private equity 14, 23, 26, 48, 69, 155–6
- Prudential Assurance 68
- “prudent man” regulations x, 36, 40, 45–6, 63, 65–7, 70, 73, 75, 77, 81, 85, 99, 108, 114, 120, 165
- real estate investment trusts (REITs) 10, 97
- REITs *see* real estate investment trusts
- Reuters xviii, 28, 35–6, 38, 50, 164
- riba* 24–8, 30, 38
- risk-free rate 11, 13, 24, 26–31, 38, 77, 88–9, 127, 145–7, 171–2
- Riyad Capital 65
- Saturna Asset Management 69
- Saudi Arabia 28, 36, 38, 51, 56–7, 59, 66, 68, 71–2, 74, 76, 82–4, 164, 176, 178
- SEDCO Capital 98, 99, 111, 120
- sharia-compliant investible universe xvii, 2, 12, 24, 31, 36, 39, 41–2, 54, 63–4, 67, 75, 78, 79, 153–4, 166, 170, 172, 175–6
- Sharpe 8, 13, 17, 19, 20, 22, 29, 34, 92, 95, 101, 130, 134, 137, 144, 151, 162, 166, 171–3
- ratio 4, 12, 34, 73, 88–9, 91–3, 95–8, 102, 104, 120–21, 127, 130, 132, 145–6, 152–3, 161, 167
- Sheikh Mohammad Taqi Usmani 28, 38
- Sheikh Yusuf DeLorenzo 27, 28
- skewness 51, 87, 126–7, 130, 144–5, 151–3, 162
- socially responsible investing (SRI) 2, 3, 11–12, 95, 166, 169, 170
- SRI *see* socially responsible investing
- standard deviation 87, 89, 95–6, 98, 120–2, 126–8, 130–31, 134, 137, 144–5, 149, 151–4, 161–2
- sukuk xv, xvi, 2, 3, 7–10, 28–31, 36, 38, 48–9, 51, 53, 60, 66–7, 69, 77, 92–4, 99, 100, 106–107, 115, 118, 120, 122, 133–4, 144, 164, 167, 169
- superior performance 7, 17, 77, 93, 145, 152, 154, 161, 168, 172
- survival rates 70
- Swiss Association of Asset Managers 39, 40
- Code of Conduct 39, 40
- Tobin 13, 17, 21, 23, 172–3
- total return 22, 87, 93, 95–8, 104, 119, 121–2, 125, 129, 132–6, 140, 144, 150, 152–4, 160–61
- track record 7, 43–4, 46–7, 54–8, 60, 64–7, 72–3, 75, 78, 85, 95, 98, 156, 173, 177
- Treynor measure 89, 147, 152–3
- UBS 42, 79, 102, 138–42, 144, 146–7, 149–52, 161–2, 165, 173
- VaR at 95% 88, 126–7

