Essays on Islamic Equity Investment

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Md Iftekhar Hasan Chowdhury

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For the ones I love, my wife is one.

ABSTRACT

This thesis presents three self-contained studies on Islamic equity investment. Each of these studies contribute to advance understanding of the mechanics of investing in the rapidly growing Islamic equity market.

The first study inspects the systematic risk exposure of a sample of equities domiciled in the United States that have transitioned to ethically screened, Shari'ah compliant, Islamic equities. The conjecture is that the anterior and posterior risk exposures will not be analogous. Our results indicate that Shari'ah compliance initially creates a shock in systematic risk, but transitional behaviors subsequently diverge. Particular screening ratios also behave similarly. In effect, the capital market reinforces the risk position and increases systematic risk. However, this is essentially a transition effect. Over the entire period, we find a downward trend in systematic risk. Shari'ah compliance makes the adopted equities less risky over the long-term with improved market information. Our findings hold even after controlling the screening ratios and conducting a number of robustness checks.

The second study examines pair-wise, net, and total return and volatility spillovers across Islamic equity markets from widely dispersed locations. Using the generalized VAR-based spillovers index, we find increasing interactions in return and volatility spillovers while the extent of spillovers has been asymmetric across the countries. Interestingly, we find the presence of persistent clustering of spillovers. These clustered countries lead Islamic equity return and

volatility spillovers in their respective regions. We do not find any supremacy of the cash and oil-rich GCC countries outside their region. Our results also highlight that in the crisis period, aggregate spillovers across the Islamic equity markets intensify. Additionally, we employ cross-section analyses to uncover the underlying macroeconomic variables influencing the magnitude of such spillovers. We find a convincing indication of geographic proximity along with economic linkages that explain the directions of return and volatility spillovers.

The third study explores the investment style of actively managed Islamic equity funds domiciled in both Islamic and non-Islamic countries. We find that Islamic funds initially overwhelmingly skewed to value stocks in Islamic countries and growth stocks in non-Islamic countries. However, there is an increasing shift from these styles to a deep blend orientation. Similarly, we report a trend from initial mid-cap stocks to large-cap stocks in Islamic countries. In contrast, there is a consistent extreme large-cap tilt in non-Islamic countries. We conjecture such deportment as an extrapolative consideration. After inspecting the apparent shift in style over the years, we reveal strong evidence of style shift, with a higher rate in Islamic countries. Collectively, the propensity is larger in asset types than in asset sizes. Islamic funds are more likely to alter their portfolio exposure in the sight of negative performance. More mature funds in Islamic countries are more likely to shift often. Funds from non-Islamic countries are less likely to shift when the market is relatively volatile.

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List of Acronyms

AAOIFI	Accounting and Auditing Organization for Islamic Financial Institutions
ADF	Augmented Dickey–Fuller (test)
ARCH	Autoregressive Conditional Heteroskedasticity (model)
BM	Book to Market (ratio)
CAPM	Capital Asset Pricing Model
CDF	Cumulative Distribution Function
CEPII	French Research Center in International Economics
DiD	Difference in Difference (model)
DJIM	Dow Jones Islamic Market
DJIMWI	Dow Jones Islamic Market World Index
EBIT	Earnings Before Interest and Taxes
EGARCH	Exponential Generalized Autoregressive Conditional Heteroskedasticity (model)
EGLS	Estimated Generalized Least Squares
EU	European Union
FDI	Foreign Direct Investment

FEVD	Forecast Error Variance Decomposition
FTSE	Financial Times Stock Exchange
GARCH	Generalized Autoregressive Conditional Heteroskedasticity (model)
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
ICB	Industry Classification Benchmark
ICM	Islamic Capital Market
IEF(s)	Islamic equity fund(s)
IEI(s)	Islamic equity index(es)
IEM(s)	Islamic Equity Market(s)
IFRS	International Financial Reporting Standards
IFSB	Islamic Financial Services Board
JB	Jarque–Bera (test)
LM	Lagrange Multiplier (test)

MB	Market to Book (ratio)
MENA	Middle East and North Africa
MLE	Maximum Likelihood Estimation
MNL	Multinomial Logit (model)
MNP	Multinomial Probit (model)
MSCI	Morgan Stanley Capital International
NAV	Net Asset Value
OECD	Organisation for Economic Co-operation and Development
OIC	Organisation of Islamic Cooperation
OR	Odds Ratio
PP	Phillips–Perron (test)
RBSA	Return-Based Style Analysis
SCE(s)	Shari’ah compliant equity(ies)
S&P	Standard & Poor's
SDS	Style Drift Score
SRI	Socially Responsible Investment
STAN	Structural Analysis Database

TNA	Total Net Asset
TNF	Total Net Flow
UAE	United Arab Emirates
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
US	United States
VAR	Vector Autoregression (model)
WDI	World Development Indicators

Chapter 1

Introduction

1.1 Overview

The Islamic finance sector, which operates according to Shari'ah, i.e., Islamic jurisprudence, came into the limelight in the 1970s (Alzahrani, 2019). The sector then amplified quite rapidly with subsequent regulatory changes. Notably, the Islamic Fiqh Academy[1] issued a decree in 1990, stating that Muslims were allowed to invest in Islamic common equities. In unison, the Islamic capital market (ICM) was also developed across nations. Thus far, the sector has shown stellar growth in the past three decades. The size of the Islamic capital market was estimated at US$2.4 trillion in 2017 and expected to surge to US$3.8 trillion by 2023 (Reuters, 2018).

Over the last decade, there has been increasing scholarly attention paid to the applied aspects of Islamic finance. With the onset of the Global Financial Crisis (GFC), Shari'ah compliant[2]

[1]Islamic Fiqh Academy as adopted by the Organisation of Islamic Cooperation (OIC) is a centre (based in Jeddah, Saudi Arabia) for advanced study of Islam in the realms of culture, science and economics. Read more: http://www.iifa-aifi.org/

[2]Shari'ah compliance criteria and regulations are integral to the ethical screening of Islamic investments. Screening is to screen out the investments by the doctrinal position of Shari'ah. An investment undergoes a 2-step screening to be eligible. First, business activities must be halal, and eject interest charges, speculation, exploitation, injustice activities, as well as specific involvements such as non-medicinal drug/alcohol, tobacco, pork, gaming, gambling, armament, and pornography. After that, there must be adherence to specific metrics set by Shari'ah scholars for leverage and liquidity level (El-Gamal, 2006; Chapra, 2008).

instruments were empirically shown to be resilient in the economic downturn. Initial studies mainly report the relative strength of Islamic banks (Čihák & Hesse, 2010). This also underlines the theoretical consensus that the system restricts leverage alongside high-risk taking activities. In this sphere, risk-return characteristics of Islamic funds, as well as Islamic bonds, are highlighted by contrast with their conventional counterparts (Hayat & Kraeussl, 2011). Hearn et al. (2012) argue that complete Shari'ah compliance segments the underlying market from the mainstream.

Recently, Hammoudeh et al. (2014) uncover the dependence structure of the Islamic equity market relative to their conventional counterparts, as well as highlight some common risk factors. In this regard, Yilmaz et al. (2015) specify the significant impact of firm fundamental and real economic factors in synchronizing Islamic equity value is inevitably weakening with recent global financialization. Yet, Islamic equity has arisen as an important asset class for faith-based investors seeking Shari'ah compliant returns. Over the years, Western countries have also developed a keen interest in asset-backed financial products and the risk-sharing tenets of Islamic investment, upholding their potential financial advantages to attract both Muslim and non-Muslim investors (El-Masry et al., 2016). Therefore, further in-depth investigation of the varied aspects and implications of Islamic equity investment is both timely and important. This thesis aims to contribute significant new knowledge on the Islamic equity market.

Structure-wise, equity is the main asset class of Islamic finance with approximately 40% of total Islamic financial assets under management. The Islamic equity market is considered the main platform of Islamic corporate investment. This thesis studies the inherited underlying aspects of

risk in Islamic equity markets through three self-contained empirical studies. Collectively, these essays provide valuable new insights on Islamic equity investment to market participants.

This chapter proceeds with a summary of each of the three essays and highlights their main findings and contributions to the pertinent Islamic finance literature. Following these sections, Sections 1.2 through to 1.4, the next section lists the research outputs. Lastly, Section 1.6 outlines the sequence of the remainder of the thesis.

1.2 Essay One

In the first essay, we study systematic risk in Shari'ah compliant equities (hereafter, SCE/SCEs). The theoretical expectation underpinning the essay is that adherence to Shari'ah compliance enhances optimism (Arouri et al., 2013). It is also reported that limited debt with a high asset-backed capital structure is resilient in the economic downturn (Merdad et al., 2015). Risk management notions thus suggest that Islamic equity adheres to moderate risk concerns. This arguably develops an expectation of a lower level of systematic risk for Islamic equity relative to their conventional counterparts. However, there is no consensus on this in the empirical literature. For instance, on the one hand, it is argued that due to the lower leverage point, Islamic equities should be involved with lower systematic risk (Ashraf & Mohammad, 2014; Ho et al., 2014; el Alaoui et al., 2016; Sensoy, 2016). Higher financial leverage will raise the required return to compensate for the higher risk to equity holders. This then also suggests that Islamic equities should be associated with a lower systematic risk to the market due to lower leverage. On the other hand, it is often claimed that the lack of diversification opportunities and systemic restraint

in Islamic equity markets might offset the advantage of limited leverage (Dewandaru et al., 2015; Nainggolan et al., 2016). Moreover, a structure with limited leverage is not necessarily immune to widespread indirect impacts of interest rate risk as a consequence of the economic interdependence of the agents with explicit ethical values (Shamsuddin, 2014; Umar et al., 2018). Recently, Grira et al. (2018) highlight that the cost of equity of Islamic banks is higher than their conventional counterparts. This suggests that the underlying market conditions regard Islamic banks riskier than their counterparts. In contrast, Mazouz et al., (2016) expose investors' positive reaction to adherence to Shari'ah compliance. Inclusion in Shari'ah compliant investment comes with more significant information disclosures, resulting in more analyst coverage (Rizvi & Arshad, 2018), which deters excessive risk-taking.

Given this background on SCEs, the first study undertakes an examination of the behavior of systematic risk and measures exposure over a sample of equities that have transitioned to be Shari'ah compliant over their lifetime and remain compliant to date. Exploring the transitional implications of such Shari'ah compliant equities in the capital market is critical to understanding the underlying systematic risk context. Thus, systematic risk exposure before and after the conversion is not expected to be analogous. It is important for both companies and investors as well as regulators to understand the dynamics of the systematic risk before and after the conversion. This motivates us to investigate whether the adoption of Shari'ah compliance impacts the extent of systematic risk.

Our investigation employs United States (US) data for several reasons. The ability of the US to adopt best global practices, as evident, for instance, by the Dow Jones Islamic Market™ World Index[3] , including stocks primarily from non-Muslim countries. Moreover, the most dominant constituent country by market capitalization weight is the US with 60.34%, whereas the collective share of Muslim countries is only 0.64% (DJIM, 2016). Additionally, Islamic finance has been shown to be compatible with the development of US financial regulation (Schmid, 2013).

We find that Shari'ah compliant status initially creates a shock in systematic risk, but the transitional behaviors afterward diverge. The underlying screening measures also exhibit identical patterns, implying that the Shari'ah compliance adopted firms struggle to uphold the restraints and relax them after the inclusion. The relaxation allows the capital market to reinforce their risk position, increasing beta in time. However, this is essentially a transition effect. There is a signal of capital market reaction as these equities are listed in the US. This is consistent with the literature and particularly with microstructure value effect theory (Mazouz et al., 2016). More importantly, over the entire period, we reveal a downward trend in systematic risk as the market appears to be optimistic in expectation over the long-term. The conditions to satisfy the Shari'ah compliant certificate make them less risky over the long-term. This is linked with other factors, such as improved market information (Rizvi & Arshad, 2018) as well as turnover and liquidity

[3]Dow Jones Islamic Market™ World Index Fact Sheet, as of June, 2016. Read more: http://www.djindexes.com.

aspects. Finally, we show that Shari'ah compliant firms have lower beta than non-Shari'ah firms, and the beta is even lower after the Shari'ah compliance.

This study makes a three-fold contribution. First, to the best of our knowledge, no prior study has investigated the transitional nature of systematic risk in SCEs. Thus, we bridge the gap in the emerging literature with a research approach that has been ignored in related strands of Islamic equity studies (Ashraf, 2016; el Alaoui et al., 2016; Elnahas et al., 2016; Mazouz et al., 2016; Nainggolan et al., 2016; Sensoy, 2016). Importantly, the investigation of transitional behaviors of systematic risk more directly justifies the immunity structure of Islamic equities. Second, the findings offer new insights for investors and academics and considerable implications for policymakers in the development of prudential structures for stock market stability. Shari'ah screening can be useful in moderating systematic risk effectively in the long run. Therefore, our results are important for the future of Islamic equity and its growth. The existence of a market segment that offers risk diversification opportunities and restricts leverage with a decrease in systematic risk can attract a lot of individual and institutional investors in highly integrated and connected global equity markets. Third, the study connects with studies on the long-standing heightened risk-return issue of Islamic equity finance and advances our understanding of SCEs.

1.3 Essay Two

In the second essay, we study the risk spillovers as well as market integration aspect of Islamic equity markets (hereafter, IEM/IEMs). We motivate this study with several episodes of economic shocks that have sparked an expansive area of exploration, including examining the

interrelationships and interdependencies across stock markets. Our main emphasis is on whether IEMs are relatively less exposed to exogenous economic shocks. This is mainly based on the notion of the idiosyncratic investment ideologies of these equity markets, as highlighted, limited debt with a high asset-backed capital structure. Though Islamic investment ideologies restrict the scope for several structured instruments as with their conventional counterparts (Chapra, 2008), the recent development of nationalized Islamic indexes has attracted more investors than in earlier years (Hammoudeh et al., 2014). This increased investor attention makes our study timely and relevant. We consider the real development of IEMs and investigate the hitherto ignored interactions of risk spillovers in 15 major Islamic national markets from widely dispersed locations where faith-based investors strive for Shari'ah compliant investments.

The issue of market integration in these emerging IEMs is another aspect we highlight in this essay. It is argued that intra-regional and inter-regional spillovers have intensified in more integrated markets. It is imperative to recognize if risk spillovers are induced by increasing integration with cross-border trade and investment that raises the likelihood of the spread of an economic shock from one market to other markets (Yu et al., 2010). That said, there has been modest growth of intra-trade in Islamic countries from 15% in 2005 to 20% in 2015 (Reuters, 2016). Lately, several Organization of Islamic Cooperation[4] (OIC) member countries have launched both bilateral and multilateral trade initiatives to augment the level of intra-trade activities. Furthermore, Gulf economies have seen an extensive capital outflow, particularly

[4]Organization of Islamic Cooperation (OIC) is the collective voice of the Muslim world (founded in 1969) to safeguard and protect Muslim interests in the spirit of promoting international solidarity. Read more: www.oic-oci.org.

during the recent loss of oil and gas value in international markets (Kissick et al., 2016). Most of the outward FDI projects are related to diversification efforts, but excessive outward capital outflow creates macroeconomic stress within the countries (Vahtra & Liuhto, 2005). Accordingly, we link the aspect of risk spillovers with economic rationale, unlike the majority of the related studies (Rizvi et al., 2015; Majdoub et al., 2016; Hkiri et al., 2017; Shahzad et al., 2017), that are silent on the underlying antecedents, i.e., macroeconomic covariates.

We find increasing interactions in return and volatility spillovers while spillovers have been asymmetric across the selected countries. The time-variant structure of spillovers also signposts that the magnitude of volatility spillovers is critically larger than return spillovers. Notably, we uncover the presence of persistent clustering with potential epicentres of spillovers. Interestingly, the cash and oil-rich GCC countries act as the main source of varying stresses and are more responsive to regional shock than external shock. This aligns with Balli et al. (2013) and Balcılar et al. (2015), who also argue a dynastic linkage and an economic openness among member countries. Additionally, we report a higher intensity of spillovers during the recent financial crisis, suggesting ameliorating risk transmission in the stress period (Shahzad et al., 2017). Sharing the same borders, as well as trade ties and investments, appear to have impacted the directions of spillovers over time. These findings are in consonance with Alotaibi and Mishra (2015) and Balli et al. (2017), who also highlight bilateral linkages in explaining the spillovers effect.

With this study, we extend the pertinent literature on the return and volatility spillovers in the emerging IEMs by providing new evidence on the extent of spillovers and their underlying sources. Hence it makes a two-fold contribution. First, our return and volatility spillovers analyses provide relevant and valuable insights for faith-based investors and cross-border portfolio managers who seek to diversify their investment across IEMs only when the outlet of the international investments qualify the faith (Shari'ah) criteria. The quantification of spillovers, i.e., sizes and paths, also creates risk awareness and enriches fund management strategies to reduce the risk of over-exposure to a national or regional crisis. Second, our cross-section analyses provide useful insights for policymakers who strive to synchronize prudential regulations to mitigate the impact of shock spillovers. Indeed, return and volatility spillovers in IEMs warrant continuous monitoring, not only because spillover shocks from one market may potentially spread to others, but also because the equity market is the main platform of Islamic corporate investment.

1.4 Essay Three

In the third essay, we study the investment styles alongside shifts in Islamic equity funds (hereafter, IEF/IEFs) in relation to the implicit notion of portfolio holdings. The last two decades have seen remarkable growth in socially responsible as well as ethically established investment funds as a significant investment stream. IEFs[5] fit this category. Recently, we witness a significant increase in the number of Islamic mutual funds domiciled in 34 jurisdictions, including non-

[5]Structure-wise, equity is the main asset class of Islamic funds (nearly 40%), thus Islamic portfolio managers invest mainly in Shari'ah compliant equity, i.e., stock (Peillex et al., 2018).

Organisation of Islamic Cooperation (OIC) countries as well as offshore domiciles[6]. Notably, the relativity and relevance of Islamic funds vary across nations or regions. That said, the role in Western economies is relatively modest compared to other types of investment, such as socially responsible investment (SRI), whereas it is much more firmly established in Muslim majority countries in Asia and Africa regions (El-Masry et al., 2016). Therefore, the investment style was often juxtaposed with their spectacular development both in Islamic and non-Islamic jurisdictions. There is a considerable contrast to the nature of the capital markets in Western and Islamic economic systems (Hearn et al., 2012).

It is often argued that religious mutual fund managers typically invest in small-cap and value stocks (Ferruz et al., 2012). This reflects the behavioral aspect of risk avoidance, a common feature of investment by religious faith-based investors, investing in well-established companies as well as secure income avenues (i.e., via dividend). To some extent, this is arguable, given that the decision to invest in value stocks is motivated largely by the leverage restraint in IEFs (Campbell & Vuolteenaho, 2004). Hence from a theoretical standpoint, it remains an area to be explored. On a related note, Hoepner et al. (2011) find that IEF is somewhat tilted to growth stocks. They also show that funds from predominantly Muslim economies exhibit a strong small-cap tilt. In this regard, Hayat and Kraeussl (2011) hypothesize that IEF is susceptible to investing in sub-optimally leveraged companies, which means high exposure to companies with difficulty in debt financing start-ups, typically small-cap companies. This size orientation is also arguable.

[6]Find more in the Islamic Financial Services Industry Stability Report 2018-2019, available at: https://www.ifsb.org/download.php?id=5231&lang=English&pg=/index.php.

Recently, Lettau et al. (2018) and Pastor et al. (2020) show that the majority of US-based funds hold large-cap stocks for the reason that small-cap stocks are more expensive to trade. They conjecture, in equilibrium, funds optimally choose the trade-off of trading cost versus potentially higher return of the small-cap stocks. The stated subtle contrasts, and the obscurity in related studies, inspired us to conduct this study.

Moreover, an emphasis on the aspect of style shift in IEFs is almost entirely absent in existing studies. Studies over time report that typical funds do not always operate as their names suggest (Chan et al., 2002; Kaplan, 2003). Empirical studies, for that reason, report the role of style shift in investigating investment styles. In this regard, Kamil et al. (2014) and Peillex et al. (2018) surmise that IEF managers are expected to be more sensitive to portfolios' idiosyncratic risks by adopting a more reactive stock-picking approach. We conjecture that style shift is important in the Islamic portfolio to explain the investment styles, especially in light of the Shari'ah compliant ideologies. Moreover, the impact of Shari'ah on consumers in Islamic countries is more potent than in non-Islamic countries, which may result in variations in investment styles. Similarly, one can expect variances in investment styles in Islamic countries and non-Islamic countries in view of the degree of competition and the aspect of the learning curve. Consequently, the degree of style shift is expected to be unalike.

We find that IEFs initially overwhelmingly skewed towards value stocks in Islamic countries (in consonance with Ferruz et al., 2012) and growth stocks in non-Islamic countries (in consonance with Wan-Ni, 2012). However, there is an increasing shift from these styles to a deep

blend orientation. Similarly, we report a trend from initial mid-cap stocks to large-cap stocks in Islamic countries. In contrast, there is a consistent extreme large-cap tilt in non-Islamic countries. This implies that most IEF managers by and large do not exploit the small-cap stock's premium, quadrate with the test of Lettau et al. (2018) and Pastor et al. (2020) in conventional counterparts. Further, we show that most IEFs drift in style, but the drift rate and the mean score are higher in Islamic countries. Collectively, IEF managers are more likely to alter their portfolio exposure to the market when they undergo negative returns and in the sight of a drop in total asset value. We note that the nature of style shift in IEFs is somewhat similar to that in conventional counterparts (Annaert & Van Campenhout, 2007; Cumming et al., 2009).

In general, the study's investigation is exploratory. Therefore, the scholarly contributions are broad, albeit explored from various standpoints for investors, both individual and institutional, Shari'ah scholars, and market regulators. First, to our knowledge, the aspects of holdings-based style analysis are almost entirely non-existent in extant Islamic equity fund related studies. This study contributes more directly to exploring Islamic fund investment styles that are instrumental in Islamic and non-Islamic jurisdictions. Consequently, it connects with preceding studies on the long-standing and complex investment style issue and advances our understanding of Islamic equity portfolio holdings (Girard & Hassan, 2008; Hayat & Kraeussl, 2011; Hoepner et al., 2011; Ferruz et al., 2012; Wan-Ni, 2012; Peillex et al., 2018). Second, the study can also help restricted faith-based investors to comprehend the subsequent comportment of the investments; for instance, the common tilt to the asset class of Islamic portfolios over time. Third, from the viewpoint of Islamic scholars and market regulators, the study provides useful

insights into the aspects of investment commitment and continuous monitoring. Though IEF managers are expected to be more sensitive to idiosyncratic risk by adopting a more reactive stock-picking approach, a shift in investment style also indicates that investors might not acquire what they projected in the investment course.

1.5 Research Outputs from the Thesis

Essay One

The first essay of this thesis (Chapter 2) is accepted for inclusion in the special issue on Islamic Finance of the *Global Finance Journal* (Balli, F., de Bruin, A., & Chowdhury, M. I. H. (2020). Transition to Islamic equities: Systematic risk and Shari'ah compliance. Global Finance Journal, 100552. doi: https://doi.org/10.1016/j.gfj.2020.100552).

I presented part of the essay in the Massey University, School of Economics and Finance, research seminar series, and at the 17th Annual European Economics and Finance Society Conference (EEFS), City, University of London, England (June 21-23, 2018).

Essay Two

The second essay of this thesis (Chapter 3) is published in the *North American Journal of Economics and Finance* (Balli, F., de Bruin, A., & Chowdhury, M. I. H. (2019). Spillovers and the Determinants in Islamic Equity Markets. The North American Journal of Economics and Finance, 50, 101040. doi: https://doi.org/10.1016/j.najef.2019.101040).

I presented part of the essay at the 2018 China Meeting of the Econometric Society (CMES), School of Economics (SOE), Fudan University, Shanghai, China (June 15-17, 2018) and

17th Annual European Economics and Finance Society Conference (EEFS), City, University of London, England (June 21-23, 2018).

1.6 Structure of the Thesis

The remainder of this thesis is organized as follows. Chapter 2 presents the first essay, which examines the transition of systematic risk in Shari'ah compliant equities. The second essay, which investigates the risk spillovers as well as underlying antecedents in Islamic equity markets, is presented in Chapter 3. Chapter 4 presents the third essay and explores the investment styles in Islamic equity funds. Each of these chapters progresses with an introduction followed by a review of related literature, a depiction of data, research methodologies employed, and empirical analyses with concluding remarks. Supplementary information, for instance, variable definitions, summary statistics, additional robustness, and econometric model derivations, are provided in the chapter-wise appendix. Finally, Chapter 5 outlines the key findings, implications, limitations, and future research avenues of each of the three empirical studies.

Chapter 2

Transition to Islamic Equities: Systematic Risk and Shari'ah Compliance

2.1 Introduction

The Islamic capital market is one of the fastest-growing sectors of the international capital market. The size of the industry was estimated at US$2.4 trillion in 2017 and expected to surge to US$3.8 trillion by 2023 (Reuters, 2018). However, such numbers undervalue the real size, ignoring Islamic, Shari'ah compliant equities as an asset class (Naveed, 2016). The number of Shari'ah compliant equities accelerated after the Islamic *Fiqh* Academy issued a decree in 1990 that allowed Muslims to invest in Shari'ah compliant common equities. The momentum is evident with the growing market share of Islamic finance even in countries with Muslim minorities, often supported by the development of national Islamic equity indices in Western economies, including the United States (El-Masry et al., 2016). As Schmid (2013), aptly emphasizes 'the United States cannot afford to miss the Islamic finance moment' since the current financial system is in pressing need of sustainable financial practices with more accountability and transparency (Kammer et al., 2015).

Islamic financial instruments promote risk-sharing, reduce leverage, and enable economic stability (World Bank, 2015). Theoretically, as well as from a market expectations perspective, limited debt with a high asset-backed capital structure, is resilient in the economic downturn (Merdad et al., 2015). Islamic finance, with such unique characteristics, hypothetically mitigates

risk concerns. Specifically, Shari'ah compliance and the associated ethical regulations imposed on business activities enhances optimism that Islamic equities restrain risk (Arouri et al., 2013). In essence, risk management notions suggest that Islamic equity adhere less risk concerns than typical equity. This arguably develops an expectation of a lower level of systematic risk for Islamic equity relative to their conventional counterparts. However, there is no consensus on this in the empirical literature. For instance, on the one hand, it is asserted that due to the lower leverage point, Islamic equities should be involved with lower systematic risk (el Alaoui et al., 2016). On the other hand, due to the nature of systemic restraint, it is claimed that Islamic equities should have higher systematic risk. Furthermore, limited leverage is not necessarily immune to widespread indirect impacts of interest rate risk because of economic interdependence among the agents with distinct ethical values (Shamsuddin, 2014). In a similar vein, Grira et al. (2018) report that Islamic banks hold a higher cost of equity than typical banks. This implies the market perceives Islamic banks have higher risks than their non-Islamic counterparts. Then again, inclusion in the Islamic investment regime comes with greater information disclosures and results in more analyst coverage, which could deter excessive risk-taking.

Our study is motivated by the ongoing ambiguity in the literature in relation to the risk associated with Islamic finance at an overarching level. Specifically, we aim to shed new light on the systematic risk exposure of Shari'ah equities. Systematic risk, which is often stated as market risk, i.e., the inherent uncertainty associated with aggregate market movements, cannot be eliminated via diversification alone. Consequently, it affects the entire system, not just a specific stock or sector (Sensoy, 2016). The only representation of systematic risk available to the investor

is the expected return with a reasonable risk adjustment. Thus it is important to explain the risk-adjusted comparative performance (Nainggolan et al., 2016). Systematic risk has been of scholarly interest for a long time (Hakim & Rashidian, 2004; Chapra, 2008; Chen et al., 2012), but particularly after the Global Financial Crisis, this interest has accelerated. Correspondingly, while there is accelerating interest in the Islamic equity investment - risk nexus, the extant literature is sparse and inconclusive.

Hence, in order to shed more light on risk associated with Islamic investment, we inspect the behaviors of systematic risk for a distinct list of Shari'ah compliant equities adopting panel data analysis. We sample over 100 listed US firms, which were initially with typical common equities, but later were accepted as Shari'ah compliant and continued with the status over approximately ten years. We conjecture that the systematic risk exposures before and after the conversion are not identical. We estimate market beta, i.e., the most acknowledged standard measure of systematic risk. First, we find that Shari'ah compliant status initially creates a shock in the beta, but transitional behaviors afterward diverge. We find that these firms adopt the screening ratios, which also affect their beta. However, after the conversion, they start relaxing the extent of restrictions as they hold those ratios to their limit. The relaxation allows the market to reinforce their risk position, thereby increasing beta. However, this is essentially a transition effect. Later, over the entire period, we find a downward trend in systematic risk. The conditions to satisfy the Shari'ah compliant certificate makes the firm less risky over the long-term. Our results hold even after controlling the screening ratios and following a difference-in-difference

estimation with a matched set of control samples as well as alternative assumptions as robustness checks.

This study makes a threefold contribution. First, to the best of our knowledge, no prior study has investigated the transitional nature of systematic risk in the Islamic equity market. Thus we bridge the gap in the emerging literature on systematic risk in Islamic equity markets. Second, the findings offer new insights for investors and academics and considerable implications for policymakers in the development of prudential structures on stock market stability. Third, it connects with studies on the long-standing heightened risk-return issue of Islamic finance (Ashraf, 2016; el Alaoui et al., 2016; Elnahas et al., 2016; Mazouz et al., 2016; Nainggolan et al., 2016; Sensoy, 2016) and advances our understanding of Shari'ah compliant equities.

The remainder of this paper is organized as follows. Section 2.2 presents a brief literature review, including research motivation and objectives. Section 2.3 presents data sources, samples, and some descriptive statistics to provide an empirical framework for the study. The empirical estimation with findings and insights are presented in section 2.4. Section 2.5 concludes with summary findings and explores implications and future research directions.

2.2 Literature Review

The process of achieving Shari'ah compliant status requires a firm to reduce leverage and moderate risk exposure. At the outset, we mention that since Shari'ah screening principles are

not interpreted either in the Holy Qur'an[7] or in the Hadith[8], it has resulted in multiple versions of Shari'ah screening standards (Ashraf, 2016). Major index data providers follow distinct screening guidelines approved by their Shari'ah boards beside the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI)[9]. Although there is no consensus on converting the descriptive Shari'ah rules into a system of checkable investment guidelines (Derigs & Marzban, 2008), the screening standards are not very different apart from the estimation of financial ratios and their tolerance level for leverage and liquidity. It is worth noting that a recent study finds that Shari'ah screening standards are insignificant in their effect on risk-adjusted performance (Ashraf & Khawaja, 2016).

Islamic equity investments caught attention primarily with the onset of the Global Financial Crisis (GFC) due to empirical evidence from different countries that such investments are resilient in the economic downturn (Merdad et al., 2015). The intuition is the rationale of linkages with limited leverage as well as real asset-backed transactions. This phenomenon encourages researchers (Arouri et al., 2013) to test the risk-return aspect of Islamic equities relative to their conventional counterparts. Several studies establish that higher leverage accentuates vulnerability (Chapra, 2008). Rogoff and Reinhart (2010) strongly confirm that the root cause of modern financial crises has been excessive debt. Earlier, Mandelker and Rhee

[7]Qur'an is the holy book of Islam. It is regarded as a revelation from God (Allah) to Prophet Muhammad. It provides the basis for Shari'ah and Hadith.

[8]Hadith is the record of actions and the silent approval of Prophet Muhammad. It elaborates on the directions of religious obligations; thus, often, Shari'ah principles are derived from Hadith.

[9]The Accounting and Auditing Organization for Islamic Financial Institutions, established in 1991 and based in Bahrain, is an Islamic international autonomous non-for-profit corporate body that prepares accounting, auditing, governance, ethics and Shari'ah standards for Islamic financial institutions and the industry. Read more: http://aaoifi.com/?lang=en.

(1984) showed that systematic risk has to increase if a company invests more heavily with debt. More recently, Chen et al. (2012) find a strong relationship between systematic risk exposure and debt maturity. However, the existing literature is inconclusive. Thus, for instance, on the one hand, Tan et al. (2014) report that financial leverage and systematic risk are not necessarily positively correlated. On the other hand, el Alaoui et al. (2016), focusing on Shari'ah compliant equities, in particular, find a direct, positively significant correlation between systematic risk and financial leverage. They infer that, in most cases, Shari'ah compliant stocks sustain with less risk than their counterparts.

In an exploration of how Islamic equities behave differently, Ho et al. (2014) find that Islamic indexes outperform their conventional counterparts during a crisis period because of low systematic risk, but the result is inconclusive for the non-crisis period. Ashraf and Mohammad (2014) seek to explore precisely whether Islamic equities perform better during the economic downturn. They show that Islamic equity indexes exhibit low systematic risk as compared with their benchmarks. Additionally, Balcılar et al. (2015) show that Islamic equity sectors generally exhibit positive risk exposures to market shocks generally, albeit with some exceptions. Some sectors exhibit negative risk exposure from global markets though only during the extreme volatility period. Importantly, Dewandaru et al. (2015) emphasis on exploring the multi-horizon nature of systemic risk using wavelet analysis across ten global sectors. They find that most Islamic sectoral indexes have a significantly low static systematic risk with equal average returns at longer horizons than their counterparts. Following their footsteps, Sensoy (2016) employs a conditional correlation method for a time-varying approach. The author infers that the level of

systematic risk in Islamic equity markets is relatively low compared with their counterparts, but there is no significant difference in the level of systematic risk during the crisis period. Interestingly, comparing with sustainable investment, Hakim and Rashidian (2004) find that the systematic risk of the Dow Jones Islamic Market World Index (DJIMWI) is larger than the Dow Jones Sustainability World Index.

Often researchers argue that the lack of diversification opportunities and systemic restraint in Islamic equity markets might offset the advantage of limited leverage (Dewandaru et al., 2015; Nainggolan et al., 2016). Moreover, even with limited financial leverage, an entity is not necessarily immune to widespread indirect impacts of interest rate risk as of economic interdependence among economic agents with distinct ethical values (Shamsuddin, 2014; Umar et al., 2018). Recently, Grira et al. (2018) report that Islamic banks hold a higher cost of equity than conventional counterparts, implying that the underlying market conditions hold Islamic banks with higher risks than their counterparts. In contrast, in studying DJIMWI, Mazouz et al., 2016 uncover that investors perceive adherence to Shari'ah compliance as positive news. The market reactions are significant and particularly strong for stocks that are listed in developing stock markets. This is because inclusion in the Islamic investment regime comes with greater information disclosures and results in more analyst coverage, which improve turnover and liquidity (Rizvi & Arshad, 2018).

The number of studies that directly analyze systematic risk in Islamic equities in relation to their conventional counterparts, is minimal and there is no consensus on whether Shari'ah

compliant equities have higher or lesser systematic risk. Importantly, most of these past studies explicitly investigate the effectiveness of limiting the success and failure of the system. Related studies beyond that of Islamic equity indexes (IEIs) or Islamic equity funds (IEFs) are quite limited, mostly attributable to the severe unavailability of historical time series data at the firm level (el Alaoui et al., 2016). Therefore, existing studies strongly relied on either IEIs or IEFs. The analysis of systematic risk in Islamic equities in relation to their conventional counterparts is not impartial as a result of varying investment universes in addition to rebalancing frequency or market timing aspects. Compared to conventional counterparts, there has also been an insufficient investigation, particularly of Islamic corporate finance (Elnahas et al., 2016).

Our study inspects the behavior of systematic risk and measures exposure over a sample of equities that have transitioned to be Shari'ah compliant over their lifetime and remain compliant to date. Exploring the transitional implications of such Shari'ah compliant equities in the capital market is critical to understand the underlying context of systematic risk. It is likely that limited leverage (i.e., threshold of 33% debt) and systemic constraint might result in a very different risk exposure. We surmise a structural type break at the time a firm is accepted as Shari'ah compliant, in line with Balli et al. (2020). Thus systematic risk exposure before and after the conversion is not expected to be analogous. The reason for this is that systematic risk is inherently dependent on two key aspects, i.e., business risk and financial leverage. The Shari'ah compliance structure impacts each of the aspects. This theoretical underpinning motivates us to test the following research hypothesis empirically:

Hypothesis: *Adoption of Shari'ah compliance impacts the extent of systematic risk. Mainly, Shari'ah compliant status should minimize market risk exposure, i.e., beta.*

We test our research hypothesis with United States (US) data for several reasons. The ability of the US to adopt best global practices, as evident, for instance, by the Dow Jones Islamic Market™ World Index, including stocks primarily from non-Muslim countries, makes the US an ideal context for our study. Moreover, the most dominant constituent country by market capitalization weight is the US with 60.34%, whereas the collective share of Muslim countries is only 0.64% (DJIM, 2016). Additionally, Islamic finance has been shown to be compatible with the development of US financial regulation (Schmid, 2013). Data availability is another important consideration.

We contribute to the literature with a research approach that has been ignored in related strands of Islamic equity studies. Most importantly, the investigation of transitional behaviors of systematic risk is more direct to justify Islamic investments' immunity structure. Thus we investigate the evolution of systematic risk as well as report the consequences of Shari'ah compliant status for a distinct list of equities.

2.3 Sample Construction, Data Description, and Empirical Modelling

This section presents the data selection process in detail. It then describes the empirical variables and develops the econometric methodology for the study.

2.3.1 Data and Summary Statistics

We collect data from the Bloomberg terminal. Specifically, we retrieve the Shari'ah compliant equity database of Ideal Ratings[10] through the Bloomberg terminal, which is well known for its granularity in the screening procedure. Following their business and financial screenings[11], which are broadly based on AAOIFI standards, we find in total 1,030 Shari'ah compliant common equities domiciled in and listed on the US exchanges as of September 2016. Our data selection time starts in October 2000 or at the earliest date of data availability and closes in September 2016. Since this study investigates those firms that started as conventional, i.e., with typical common equities and later were accepted as Shari'ah compliant at some stage of their life and remained Shari'ah compliant over the sample period, we mainly obtain newly compliant equities. From October 2006 to September 2010, i.e., in 4 years (48 months) window, we detect 272 new Shari'ah compliant equities. This inclusion window is intentional since it covers the GFC and, at the same time, implies empirical analysis for at best six years of data before and after the Shari'ah compliant standing. Note that Bloomberg receives updates on the compliant results from Ideal Ratings monthly. The system allows us to check the status of continuance from the rebalancing frequencies (via Bloomberg's backtesting) over ten years, i.e., 120 months, and we find that 182 equities continue to be Shari'ah compliant until September 2016. In particular, restricted equities and equities with insufficient trading information without

[10]Ideal Ratings provides Shari'ah screening, compliance, purification, benchmark and Islamic investment management and information services for firms that launces and manages Shari'ah compliant instruments. Read more: http://www.idealratings.com/.

[11]Equities are considered Shari'ah compliant only when they pass the following business and financial screenings. Business screening: In addition to Islamic prudential areas of business activities, income from non-compliant activities must not exceed 5% of total income. Financial screens: 3 core thresholds are - i. interest-bearing debt to asset must be less than 33%, ii. cash, cash equivalent and short-term investment to asset must be less than 33%, and iii. cash, cash equivalent and receivable to asset must be less than 50%. See Appendix A for the details.

a historical price series were left out to achieve satisfactory data quality. Finally, after applying all these screens, we find 118 Shari'ah compliant equities.

We further decompose these equities (Table 1.1), taking into account the sectoral characteristics of the Industry Classification Benchmark (ICB). The ICB defines a system of 10 industries, namely - Basic Materials, Consumer Goods, Consumer Services, Financials, Health Care, Industrials, Oil & Gas, Technology, Telecommunications, and Utilities. This decomposition is to identify whether or not there are significant differences across industry sectors. It also ensures the robustness of our empirical estimations.

The initial data set consists of daily closing prices in US dollars. For each equity i, we compute price return $r_{i,t}$ for the daily changes where $p_{i,t}$ is the closing price of the equity on day t based on the following formula:

$$r_{i,t} = ln\left(\frac{p_{i,t}}{p_{i,t-1}}\right) \qquad \text{eq1.0}$$

The return is calculated as a logarithmic ratio of the equity price to its lag. Note that only price return is considered as the principles of Islamic finance focus on capital appreciation rather than dividend income.

The Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965; Mossin, 1966) helps us to understand the sensitivity of the risk-return relationship. It contends the statistical expression, i.e., beta coefficient, as systematic risk, and the only relevant measure of volatility. The value is

expositional on market volatility. The model is in extensive use by financial managers and investors to estimate the nature of risk for the prevailing prediction (Fama & French, 2004; Bartholdy & Pearei, 2005; Andersen et al., 2006). The reason we hold onto the concept is a lack of a plausible alternative.

Table 1.1: Sectoral Classifications

Sector	Abbreviation	Number of Equities	Percentage (%)
Basic Materials	BMS	9	8
Consumer Goods	CNG	20	17
Consumer Services	CNS	9	8
Financials	FIN	8	7
Health Care	HTH	18	15
Industrials	IDS	18	15
Oil & Gas	OIL	15	13
Technology	TEC	18	15
Telecommunications	TEL	2	2
Utilities	UTI	1	1
Total	TOT	118	100

Notes: The table presents sectoral classifications and abbreviations with the number of equities for each of the sectors and percentage weight in the total sample.

Hence, the return of equity might be solely priced by the market beta (Brown & Walter, 2013). Following the approach of el Alaoui et al. (2016), we compute the monthly beta using daily stock return relative to market stock index S&P500 for each month. The S&P500 index has been a successful benchmark for equity performance. All return series are converted into excess returns by deducting the daily T-bill rate. The daily T-bill is the risk-free rate collected from the databank managed by Professor Kenneth R. French, 2016[12]. The excess return series will be cited

[12]Data is available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

as return throughout the rest of the chapter. We find the beta of equity i for a month t based on the following formula:

$$\beta_{i,t} = \frac{Cov(r_{i,t}, r_{m,t})}{Var(r_{m,t})} \qquad \text{eq2.0}$$

where $\beta_{i,t}$ is the slope of the regression line of the equity returns and the market returns (i.e., $r_{i,t} - r_f = \alpha_i + \beta_i(r_{m,t} - r_f) + e_{i,t}$). This delivers a time series of beta of each equity for the sample period. These betas capture the variation of expected returns.

We investigate systematic risk behaviors for the final sample of 118 equities over the period of October 2006 through to September 2016. To distinguish sectoral influence over systematic risk transition, each industry sector is recognized by an indicator variable. We then incorporate a dichotomous variable in the estimations. It takes the value of 0 for the period before the security is classified as Shari'ah compliant and one afterward when the security is Shari'ah compliant. This is more like a structural break in our analyses, in line with Balli et al. (2020) (referred to as 'break' hereafter). It allows us to inspect the anterior and posterior data to expose the effects of Shari'ah compliance. To control the firm-specific effects, we include security age (Lewis, 2015; Saravia et al., 2016) as well as market capitalization (Lewis, 2015; el Alaoui et al., 2016) in the regression equations. Age is measured by the date when the equity was listed on the stock exchange. Market capitalization is the outcome of shares outstanding multiplied by the daily closing price. It is well established that market capitalization, in other words, size, has a significant impact on the value of systematic risk. It is also linked with the ability to withstand economic shocks. Finally, a set of financial screening variables related to Ideal Ratings' metrics

such as debt to asset, cash to asset, with a related metric as interest expense over earnings before interest and tax, i.e., EBIT, are included to achieve robust analyses. Similar studies typically use these firm-specific variables. A summary of the variables included in our empirical model is provided in Table 1.2.

Table 1.2: Empirical Model Variables

Variables	Abbreviation
▪ Beta (monthly), as the main variable of interest.	β
▪ Break, a dichotomous variable takes the value of 0 for the period before qualifying as Shari'ah compliant and 1 afterward.	break
▪ Trend, a function to observe the change in time trend where the 1st observed date is normalized to 0 and then increases for the successive observations.	trend
Controls	
▪ Age, measured by the date when the equity was listed on the current exchange.	age
▪ Market capitalization, calculated as the current number of shares outstanding multiplied by the last closing price.	mkt_cap
▪ Debt to asset, i.e., leverage ratio, estimated as total debts divided by total assets.	debt_to_asset
▪ Cash to asset, i.e., quick asset ratio, estimated as total cash, cash equivalents, and receivables divided by total assets.	cash_to_asset
▪ Interest coverage reciprocal estimated as total interest expense divided by earnings before interest and tax, i.e., EBIT.	intexp_to_ebit

Notes: This table presents the definitions and abbreviations of the variables included in the empirical modeling and subsequent discussions.

Table 1.3 reports the descriptive statistics for the empirical variables. The mean of the monthly beta is 0.40, with a dispersion of 3.42. The average equity age is 17.16 years, whereas market capitalization is 3.68 billion (annualized). Sample firms are identified as mid-cap firms, which in general indicate a balance of growth and stability. Note that, at this stage, we do not control the aspect of the break for the variables. Therefore, the rest of the statistics are intuitive. Only the intexp_to_ebit metric is skewed to the left, but all others are positively skewed and peaked.

Table 1.3: Summary Statistics

Variable	Obs.	Mean	Median	Std. Dev.	Skewness	Kurtosis	J-B
β (beta)	19188	0.40	0.29	3.42	3.42	156.07	2e+07***
age	22774	17.16	18.00	7.77	0.52	2.52	1e+03***
mkt_cap	18602	307.31	28.47	1446.19	7.33	61.51	3e+06***
debt_to_asset	15817	49.16	11.53	564.70	37.18	1639.20	2e+09***
cash_to_asset	15817	29.10	25.24	20.47	1.06	4.17	4e+03***
intexp_to_ebit	15813	-12.01	0.00	799.34	-28.02	1897.57	2e+09***

Notes: This table presents the summary statistics for the dependent and independent variables. J-B (Jarque-Bera) test statistic is significant at 1% level. There is no presence of Unit Root (in the case of Levin, Lin & Chu t and/or Im, Pesaran & Shin W-stat; ADF - Fisher Chi-square; PP - Fisher Chi-square test statistics) for the relevant variables.

2.3.2 Econometric Model Specification

We follow Claessens and Yafeh (2012) approach and take guidance from a related study of el Alaoui et al. (2016) to analyze the behavior of systematic risk for Shari'ah compliant equities. Subsequently, we implement an economic equation based on the estimated Generalized Least Squares (GLS). GLS relaxes the assumption that errors are lacking a mutual relationship. It also removes heteroscedasticity in the panel data setup. In similar fashion to Daske et al. (2008), who highlight a regulatory change point at the time of adopting IFRS (International Financial Reporting Standards), we incorporate a dichotomous variable as break, assuming a structural break takes place at the time a firm turns to be Shari'ah compliant. This break highlights the systematic risk following becoming Shari'ah compliant. This approach also aligns with a recent study by Balli et al. (2020). Accordingly, we integrate the trend function to construct a time trend for the beta. In our study, time is a critical factor that directly affects the dependent variable. Thus trend here serves as a proxy variable and can capture not directly observable/measurable factors (Whistler

et al., 2004), such as information disclosures, capital market reaction as well as investor expectations in the course of Shari'ah compliant status. Trend value initializes at the 1st month that a firm appears, and then increases for the subsequent months. We consider firm size and age to control firm-specific effects. We also control time fixed effects. We then determine the following equation:

$$\beta_{i,t} = \alpha_{i,t} + \mathcal{D}_{i,t} break + \phi_1 mkt\_cap_{i,t} + \phi_2 age_{i,t} + \phi_3 trend * break + \phi_4 trend + \delta_t + \varepsilon_{i,t}$$

eq.3.0

where $\beta_{i,t}$ is the monthly beta of each equity, $\alpha_{i,t}$ is intercept, $break$ as a dichotomous variable takes the value of 0 for the period before Islamic compliancy and 1 afterward, $mkt\_cap_{i,t}$ is market capitalization, $age_{i,t}$ is listing age, $trend$ as a function to compute trend where the 1st observed month is normalized to zero and then increases for successive observations, $trend * break$ is to indicate trending point after becoming Shari'ah compliant, δ_t is the time fixed effects, and $\varepsilon_{i,t}$ is the error term.

2.4 Empirical Analyses and Findings

In this section, we first analyze the beta over breakpoint and trending direction while controlling both the firm-specific effects and time-fixed effects. We then check the screening measures, one after the other, before we continue our extended analysis and robustness measures.

2.4.1 Beta over Break and the Trending Direction

In Table 1.4, empirical estimates from equation 3.0 are reported for each of the sectors as well as for the sample in total. Estimations reveal the break coefficients are mostly negative and statistically significant, except for the Consumer Services, Health Care, and Telecommunications sectors. The break is specified as a structural change for each firm. The negatively significant coefficients (collectively at 1% level), in Table 1.4, signify the presence of shared qualities of Shari'ah compliant equities. This provides initial validation that becoming Shari'ah compliant creates a shock. Thus the structural change decreases the beta. However, shortly afterward, the trending point, i.e., trend*break interaction coefficient, indicates a strong market reaction. The beta increases as the shock effect of becoming Shari'ah compliant disperses. The trend*break coefficients are positive and statistically significant for most of the sectors (except Consumer Services), collectively at 1% level. This implies that the market, in effect, reinforces the risk position, increasing the beta over time. Another possible inference is that Shari'ah compliant status increases exposure and analysts coverage, which in turn would lead to an increase in stock turnover, corroborating several studies (Vijh, 1994; Greenwood & Sosner, 2002; Barberis et al., 2004; Claessens & Yafeh, 2012) that find a higher stock turnover ratio following addition to an index may increase a firm's beta. However, most of these studies explain this phenomenon by alternative friction or a sentiment aligned view, i.e., the tendency of certain investors to invest typically by category/habitats. In a like manner, recently, Mazouz et al. (2016) show that a stock exhibits a strong and significant increase in its beta following inclusions to the DJIMWI. They explain that the price reaction is likely to be driven by a shift in investor sentiment rather than changes in a firm's fundamentals. Additionally, it is also possible

that Shari'ah screening principles cannot fully mitigate market risk. It might be that these firms find it challenging to uphold their financial constraints and, accordingly, relax them to the limit, which reflects on their beta. Therefore, we also attempt to uncover the roles each of the possibilities play in later sections. However, more importantly, the trend exposes a negatively significant transition of systematic risk for all the sectors except Consumer Services over the entire period. This is intuitively appealing to the consequence of inimitable Shari'ah screening principles, which is more likely to take place with improved market information over the long-term. Hypothetically, we can plot the beta in relation to the breakpoint next to the subsequent trend and trend in the total period, as shown in Figure 1.1.

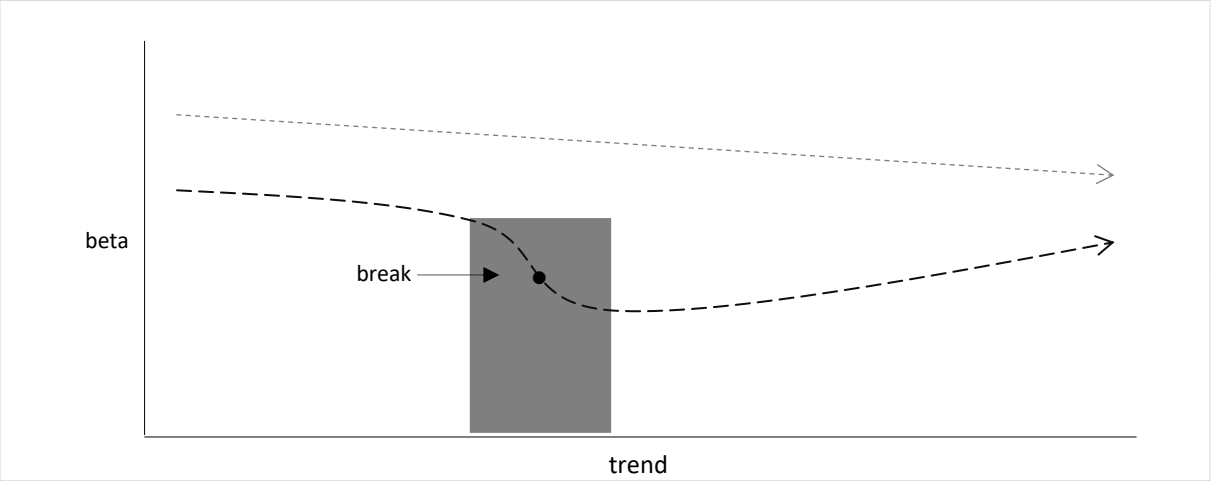
It is of note that as expected, the size exposes a plausible positive significant influence on systematic risk. This is in consonance with Rowe and Kim (2010), who also find market capitalization as the only variable with a significant positive impact on beta. However, the age reveals an ambiguous relationship, leaving room for further analysis.

Table 1.4: The Effect of Break on Beta and Trending Direction

Variable	BMS	CNG	CNS	FIN	HTH	IDS	OIL	TEC	TEL	Total†
break	-2.799***	-1.890***	-0.146	-12.621**	-0.095	-0.845***	-1.924**	-0.780***	-0.117	-0.891***
	(-3.31)	(-4.33)	(-0.33)	(-2.25)	(-0.33)	(-3.18)	(-2.56)	(-3.06)	(-0.43)	(-2.83)
trend*break	0.031***	0.021***	0.003	0.106**	0.006**	0.009***	0.025***	0.008***	0.014***	0.012***
	(3.82)	(4.75)	(0.73)	(2.22)	(2.25)	(3.96)	(3.38)	(3.22)	(5.35)	(3.78)
trend	-0.023***	-0.011***	-0.001	-0.093***	-0.005***	-0.005***	-0.012***	-0.005***	-0.010***	-0.008***
	(-5.18)	(-4.72)	(-0.51)	(-2.79)	(-2.84)	(-3.88)	(-2.84)	(-3.71)	(-4.94)	(-4.71)
mkt_cap	0.101***	0.118***	0.156***	0.109**	0.121***	0.124***	0.139***	0.124***	0.107***	0.124***
	(5.35)	(11.07)	(8.73)	(2.45)	(6.98)	(8.8)	(8.19)	(8.73)	(3.10)	(13.75)
age	-0.033***	-0.004	0.007	-0.111*	0.004	-0.025***	0.004	-0.006	0.003	-0.006***
	(-7.47)	(-1.44)	(1.25)	(-1.71)	(0.83)	(-9.53)	(0.86)	(-0.99)	(0.37)	(-3.07)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1328	3554	1202	698	3135	2928	2039	3210	311	18598
R^2	0.179	0.062	0.076	0.134	0.039	0.074	0.089	0.036	0.635	0.027
F-statistic	14.20***	11.64***	10.88***	8.17***	9.83***	17.90***	9.81***	9.24***	58.13***	25.73***

Notes: This table presents the regression results for the baseline equation 3.0. The dependent variable is the monthly beta of the firm. The explanatory variables are - break as a dichotomous variable that takes 0 for the period before Shari'ah compliance and 1 afterward, trend as a function to compute trend where the 1st observed month is normalized to 0 and then increases for successive observations, trend*break is to specify trending point after becoming Shari'ah compliant, mkt_cap is the natural log of market capitalization and age is the number of listing months for the firm. BMS refers to Basic Materials, CNG - Consumer Goods, CNS - Consumer Services, FIN - Financials, HTH - Health Care, IDS - Industrials, OIL - Oil & Gas, TEC - Technology, TEL - Telecommunications sectors. We employed estimated GLS and captured the coefficients. In the process, we applied the one-step weighting matrix while implementing White diagonal standard errors with covariance. The degree of freedom is corrected. †We consider sector fixed effects in the total sample regression. UTI, i.e., the Utility sector, is considered only in the total sample regression. *, **, and *** denotes statistical significance for the coefficient at 10%, 5%, and 1% levels, respectively. The *t* statistic is in parenthesis.

Figure 1.1: Systematic Risk – Trend in the Transition



Notes: Shaded area denotes the Shari'ah compliance adoption period, i.e., from October 2006 to September 2010. The grey trajectory refers to the total trend, whereas the black trajectory refers to the trend following the break.

2.4.2 Screening Measures

We now shift our focus to the financial screening variables in order to find theoretical sustenance for the initial results. First, we take debt to assets. Over time, studies typically use debt over assets, i.e., leverage ratio (el Alaoui et al., 2016) to analyze beta. In the case of cash allied metrics - cash, cash equivalents with short-term investments over assets, and cash, cash equivalents with receivables over assets, we find a strong positive correlation. Accordingly, the study takes on cash, cash equivalents with receivables over assets, i.e., quick asset ratio (Ashraf & Khawaja, 2016). We also include interest expense over earnings before interest and tax, i.e., EBIT as a reciprocal of interest coverage. The correlations among these three variables vary from +0.29 to -0.21, thus indicating no concern of a collinearity problem (see correlation coefficients in Table A1.1 in Appendix B). These metrics are now analyzed in the presence of break and trend. We expect the likelihood of stated measures to hold more

explanations on the systematic risk transition. Equations 4.1, 4.2 and 4.3 take on debt to assets, cash to assets, and interest expense to EBIT, respectively:

$$debt\_to\_asset_{i,t} = \alpha_{i,t} + \mathcal{D}_{i,t} break + \phi_1 trend * break + \phi_2 trend + \varepsilon_{i,t} \quad \text{eq.4.1}$$

$$cash\_to\_asset_{i,t} = \alpha_{i,t} + \mathcal{D}_{i,t} break + \phi_1 trend * break + \phi_2 trend + \varepsilon_{i,t} \quad \text{eq.4.2}$$

$$intexp\_to\_ebit_{i,t} = \alpha_{i,t} + \mathcal{D}_{i,t} break + \phi_1 trend * break + \phi_2 trend + \varepsilon_{i,t} \quad \text{eq.4.3}$$

where $debt\_to\_asset_{i,t}$, $cash\_to\_asset_{i,t}$ and $intexp\_to\_ebit_{i,t}$ are monthly debt over assets ratio, cash over assets ratio and interest expense over EBIT ratio of each equity respectively, $\alpha_{i,t}$ as intercept, $break$ as a dichotomous variable takes the value of 0 for the period before Islamic compliancy and 1 afterward, $trend$ as a function to compute trend where the 1st observed month is normalized to zero and then increases for successive observations, $trend * break$ is to indicate trending point after becoming Shari'ah compliant and $\varepsilon_{i,t}$ as the error term.

Debt to assets, i.e., leverage, is depicted as a vital capital structure variable in this study. Columns 2-4 of Table 1.5 report the effect of the break and transitional behaviors. We find the break coefficient as negatively significant for most of the sectors. This suggests that Shari'ah compliance restricts financial leverage, in line with the scholarly literature (Merdad et al., 2015). The trend*break coefficients are positively significant, apart from Consumer Services. This clearly indicates that once Shari'ah compliance is met, firms start to increase their debt to assets but hold to the limit. This behavior reflects on the beta. Debt creates a cost of interest expense in addition to the exposure to the market risk. Thus rising debt augments systematic risk considerably (Farooq, 2015). The trend in total is negatively significant apart from the Consumer Services, Health Care, and Oil & Gas sectors. The positively significant transition may be attributed to the mid-cap sample firms and their

growth potential. Columns 5-7 of Table 1.5 report the effect of the break and transitional behaviors for cash to assets. The negative break coefficients indicate shrinking quick assets apart from Basic Materials, Consumer Services, Oil & Gas, and Telecommunications sectors. The trend*break coefficient is positively significant for Financials, Health Care, and Technology sectors. In this regard, Bates et al. (2010) find that the increase in cash to asset ratio is tightly related to precautionary motives. The trend in total is negative as expected, apart from Consumer Goods, Services, Oil & Gas, and Telecommunications sectors. It suggests that Shari'ah compliance reduces liquidity over time. The positively significant transition for Consumer Goods and Services is probably a result of inherent cyclical shocks. Finally, we consider interest expense to earnings before interest and tax, i.e., EBIT, which is reciprocal of interest coverage ratio. Columns 8-10 of Table 1.5 report the effect of the break and transitional behaviors. Like debt to assets, the break coefficient for most of the sectors is negatively significant. The trend*break coefficient for most of the sectors is also positively significant. The trend in total is negatively significant as expected, indicating the payback strength over time.

In sum, first, we find a statistically significant negative break and later, positive trend*break coefficient for most of the sectors as well as for the sample in total. These results as a whole strengthen our initial insights that sampled firms modestly decrease the ratios and turn to be Shari'ah compliant, but after a while, increase those ratios and hold them to the limits. This attitude causes an increase in relative systematic risk after the break. In this regard, Ahmed (2010) claims that the principles of Islamic finance have much to offer to bring about a stable financial system, but the practice of the industry is drifting closer towards the conventional system.

Table 1.5: The Effect of Break on Screening Measures and Trending Direction

Sector	debt_to_asset			cash_to_asset			intexp_to_ebit		
	Break	trend*break	trend	break	trend*break	trend	break	trend*break	trend
BMS	-27.100***	0.236***	-0.148***	5.182***	-0.074***	-0.037***	-72.030***	0.611***	-0.359***
	(-6.46)	(6.26)	(-5.02)	(2.98)	(-4.75)	(-3.42)	(-5.07)	(4.67)	(-4.22)
CNG	-25.605***	0.248***	-0.089***	-5.198**	0.016	0.043***	-1.099	0.070	-0.176***
	(-8.00)	(8.94)	(-6.45)	(-2.10)	(0.88)	(4.46)	(-0.15)	(1.11)	(-3.71)
CNS	10.152	-0.048	0.172***	7.674**	-0.093***	0.042**	-30.140***	0.092	0.093*
	(0.88)	(-0.54)	(7.20)	(2.01)	(-3.00)	(2.19)	(-2.98)	(1.11)	(1.74)
FIN	-103.696***	0.808***	0.068	-157.392***	1.401***	-1.510***	55.400***	-0.438***	0.033*
	(-6.08)	(5.52)	(0.69)	(-7.38)	(7.27)	(-7.88)	(21.24)	(-20.43)	(1.71)
HTH	-43.105***	0.080	0.101**	-29.868***	0.221***	-0.143***	-19.140**	0.256***	-0.148***
	(-8.19)	(1.54)	(2.34)	(-8.90)	(7.79)	(-7.11)	(-2.15)	(3.20)	(-2.67)
IDS	-45.982***	0.420***	-0.333***	4.188	0.013	-0.051***	25.678***	-0.064	-0.187***
	(-7.26)	(7.38)	(-6.59)	(1.44)	(0.60)	(-4.04)	(2.79)	(-0.86)	(-4.03)
OIL	-65.806***	0.271***	0.142*	18.085***	-0.316***	0.225***	-12.468***	0.128***	-0.142***
	(-10.03)	(3.35)	(1.91)	(6.19)	(-12.22)	(12.23)	(-2.78)	(2.83)	(-3.24)
TEC	-17.750***	0.048	0.009	-3.992	0.089***	-0.080***	12.087***	-0.024	-0.043**
	(-5.11)	(1.47)	(0.36)	(-1.55)	(4.01)	(-5.37)	(3.80)	(-0.76)	(-1.96)
TEL	-103.573***	1.241***	-1.059***	36.981***	-0.425***	0.161***	-26.181***	0.442***	-0.433***
	(-45.73)	(42.47)	(-57.09)	(16.51)	(-17.82)	(8.84)	(-4.68)	(6.37)	(-6.28)
Total	-72.870***	0.563***	-0.267***	-6.070***	0.035***	-0.036***	-16.569***	0.233***	-0.205***
	(-17.68)	(14.32)	(-7.77)	(-4.87)	(3.47)	(-5.53)	(-3.04)	(4.83)	(-6.50)

Notes: This table presents the regression results for equations 4.1, 4.2, and 4.3, and shows the effect of the break on the screening measures and trending direction. We employed estimated GLS and captured the coefficients. In the process, we applied the one-step weighting matrix while implementing White diagonal standard errors with covariance. The degree of freedom is corrected. *, **, and *** denotes statistical significance for the coefficient at 10%, 5%, and 1% levels, respectively. The *t* statistic is in parenthesis. UTI, i.e., the Utility sector, is considered only in the total sample regression. BMS refers to Basic Materials, CNG - Consumer Goods, CNS - Consumer Services, FIN - Financials, HTH - Health Care, IDS - Industrials, OIL - Oil & Gas, TEC - Technology, TEL - Telecommunications sectors.

2.4.3 Beta over Break and the Trending Direction

We further analyze the transitional implications of systematic risk with the presence of the above discussed three screening measures. We extend equation 3.0 to 5.0 as:

$$\beta_{i,t} = \alpha_{i,t} + \mathcal{D}_{i,t}break + \phi_1 mkt\_cap_{i,t} + \phi_2 age_{i,t} + \phi_3 debt\_to\_asset_{i,t} + \phi_4 cash\_to\_asset_{i,t} + \phi_5 intexp\_to\_ebit_{i,t} + \phi_6 trend * break + \phi_7 trend + \delta_t + \varepsilon_{i,t}$$

eq.5.0

Table 1.6 reports empirical estimates from equation 5.0. In accordance with our initial results, the break coefficient is negative for most of the sectors. The negative sign again establishes that Shari'ah compliant status initially creates a shock in the beta. However, the Basic Materials sector appears insignificant while the Consumer Services sector is significant, but both the Health Care and Telecommunication[13] sectors remain insignificant with the presence of the screening measures. For the trend*break interaction, the respective coefficients are positively significant. This is departing from the nature of Shari'ah compliant equities. First, these firms adopt the screening ratios, which also affect their beta. Later, i.e., after becoming compliant, they relax the degree of restrictions as they now hold these screening ratios to the limit. The relaxation allows the capital market to reinforce the risk position. Consequently, the beta starts increasing after the break event. Moreover, it is also possible that there is a capital market reaction as in (Vijh, 1994; Mazouz et al., 2016), as these equities are listed in the United States. Importantly, in the entire period, the trend exhibits a negatively significant transition of systematic risk (except for Consumer Services). The market is optimistic in expectations over the long-term. Clearly, the conditions to satisfy the Shari'ah compliant certificate makes the firm less risky over time.

[13]Though we have long historical data, regrettably, we only have two adopted firms in the sector, which might be a reason for not getting a robust result for the sector. This is also apparent in the Dow Jones Islamic Market™ World Index, where the sector has less than 2% allocation (DJIM, 2016).

Firm size reveals a positive correlation with systematic risk as expected. The coefficient for all the sectors is positive as well as significant at 1% level. This aligns with Rowe and Kim (2010) and el Alaoui et al. (2016). Once again, age exposes an ambiguous relationship but remains unchanged with the same coefficient sign. Collectively, the negative coefficient at 1% significance provides provision for the lifecycle theory as suggested by Saravia et al. (2016) that systematic risk tends to drop in magnitude over the lifecycle.

It is apparent from the earlier studies that leverage is likely to have a positive relationship with systematic risk. Supporting these studies (e.g., Mandelker & Rhee, 1984; el Alaoui et al., 2016), we also find positively significant coefficients for the Consumer Goods, Services, Oil & Gas, and Telecommunication sectors. On the contrary, Health Care and Industrials are with negatively significant coefficients. In total, negative, statistically significant coefficients suggest the nature of mid-cap with potential development opportunities. It is expected that the quick asset ratio to have a positive relationship with systematic risk as cash holding is closely related to the counteractive intentions as a result of economic uncertainties. In contrast with rational expectations, we find negatively significant coefficients for Consumer Services and Financials. However, we see a positively significant coefficient for Technology and Telecommunications, which is not entirely a surprise as it reflects R&D activities, linked intrinsically with the increasing uncertainty in the sectors. In the case of the interest coverage reciprocal, we find a significant inverse relationship for Financials, Health Care, and Oil & Gas, but the association is positive for Telecommunications, consistent with the underlying expectancy.

Table 1.6: The Effect of Break on Beta and Trending Direction

Variable	BMS	CNG	CNS	FIN	HTH	IDS	OIL	TEC	TEL	Total†
break	-0.706	-2.057***	-0.783***	-6.987***	-0.216	-0.934***	-1.819**	-0.716***	0.014	-1.031***
	(-1.00)	(-4.55)	(-3.20)	(-3.17)	(-0.75)	(-3.80)	(-2.35)	(-2.69)	(0.05)	(-3.28)
trend*break	0.011*	0.023***	0.008***	0.055***	0.007***	0.010***	0.025***	0.007***	0.011***	0.013***
	(1.63)	(4.95)	(4.08)	(3.16)	(2.65)	(4.46)	(3.19)	(2.70)	(4.57)	(4.15)
trend	-0.010***	-0.012***	-0.001	-0.066***	-0.005***	-0.006***	-0.009**	-0.006***	-0.007***	-0.009***
	(-2.78)	(-4.79)	(-0.881)	(-8.94)	(-3.04)	(-4.44)	(-1.99)	(-4.34)	(-2.98)	(-5.29)
mkt_cap	0.113***	0.112***	0.208***	0.358***	0.142***	0.116***	0.123***	0.160***	0.153***	0.157***
	(10.11)	(11.62)	(10.88)	(4.23)	(8.10)	(8.25)	(7.03)	(10.47)	(2.65)	(17.55)
age	-0.037***	-0.004	0.004	-0.130	0.006	-0.030***	0.003	-0.002	0.002	-0.007***
	(-10.73)	(-1.49)	(0.70)	(-0.99)	(1.21)	(-7.45)	(0.59)	(-0.35)	(0.22)	(-3.94)
debt_to_asset	0.001	0.002**	0.001**	0.000	-0.000*	-0.000*	0.004**	0.000	0.002***	-0.000*
	(0.90)	(2.06)	(1.99)	(0.51)	(-1.82)	(-1.85)	(2.18)	(0.54)	(2.84)	(-1.80)
cash_to_asset	0.001	-0.000	-0.013***	-0.007***	0.000	-0.000	0.001	0.004***	0.003**	0.000
	(0.46)	(-0.11)	(-6.27)	(-4.94)	(0.11)	(-0.33)	(0.74)	(2.76)	(1.97)	(0.42)
intexp_to_ebit	0.000	-0.000	0.000	-0.034**	-0.000***	-0.000	-0.000*	-0.000	0.004***	0.000
	(0.84)	(-0.74)	(1.56)	(-2.56)	(-3.81)	(-1.56)	(-1.64)	(-1.40)	(27.84)	(0.66)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1140	3143	835	308	2775	2413	1639	2590	309	15341
R^2	0.371	0.072	0.510	0.457	0.057	0.088	0.134	0.065	0.844	0.042
F-statistic	28.59***	10.53***	71.41***	17.62***	10.48***	14.40***	10.89***	11.18***	133.29***	29.41

Notes: This table presents the regression results for the baseline equation 5.0. The dependent variable is the monthly beta of the firm. The explanatory variables are - break as a dichotomous variable that takes 0 for the period before Shari'ah compliance and 1 afterward, trend as a function to compute trend where the 1st observed month is normalized to 0 and then increases for successive observations, trend*break is to specify trending point after becoming Shari'ah compliant, mkt_cap is the natural log of market capitalization, age is the number of listing months, debt_to_asset is the leverage ratio, cash_to_asset is the quick asset ratio and intexp_to_ebit is the interest coverage reciprocal for the firm. BMS refers to Basic Materials, CNG - Consumer Goods, CNS - Consumer Services, FIN - Financials, HTH - Health Care, IDS - Industrials, OIL - Oil & Gas, TEC - Technology, TEL - Telecommunications sectors. We employed estimated GLS and captured the coefficients. In the process, we applied the one-step weighting matrix while implementing White diagonal standard errors with covariance. The degree of freedom is corrected. †We consider sector fixed effects in the total sample regression. UTI, i.e., the Utility sector, is considered only in the total sample regression. *, **, and *** denotes statistical significance for the coefficient at 10%, 5%, and 1% levels, respectively. The *t* statistic is in parenthesis.

2.4.4 Robustness/Sensitivity of the Analyses

2.4.4.1 Difference-in-Difference Estimations

To resolve the concern of selection bias in this study, we re-run our base regression with a matched set of a control sample. We do this by matching to the treated, i.e., Shari'ah compliant firms (Rosenbaum & Rubin, 1983; Meyer, 1995) with market capitalization and age against their sector. We have taken 118 more firms, considering one-to-one matching to our original sample firms and these non-Shari'ah compliant control firms. Accordingly, we match the control firms to the treated firms on the propensity of self-selecting into Shari'ah compliance. Thus, we have two groups - Shari'ah compliant firms, which are the treatment group and non-Shari'ah compliant firms, the control group. The treatment date is the date a firm is accepted as Shari'ah complaint. Accordingly, we are able to employ Difference-in-Difference estimations and extract the true effect of Shari'ah compliance on beta. Empirically, we extend the baseline model equation 3.0 as:

$$\beta_{i,t} = \alpha_{i,t} + \phi_1 Shari'ah + \phi_2 break + \phi_3 Shari'ah_{break} + \phi_4 trend + \phi_5 trend * break + \phi_6 X_{i,t} + \delta_t + \varepsilon_{i,t}$$

eq.6.0

where $\beta_{i,t}$ is the monthly beta of each equity, $\alpha_{i,t}$ as intercept, $Shari'ah$ is the treatment status where 0 indicates the non-Shari'ah firms and 1 indicates the Shari'ah firms, $break$ is the period where 0 indicates the period before and 1 after Shari'ah compliancy, the interaction effect with treatment and after treatment time, i.e., $Shari'ah_{break}$ is the difference-in-difference estimator, which captures if beta for Shari'ah compliant firms shifts more after being Shari'ah complaint

compared to the non-Shari'ah firms. Similar to the previous estimations, $trend$ is a function to compute trend where the 1st observed month is normalized to zero and then increases for the successive observations, $trend * break$ is to indicate trending point after the break, $X_{i,t}$ as a matrix includes market capitalization ($mkt\_cap_{i,t}$) and listing age ($age_{i,t}$), δ_t is the time fixed effects, and $\varepsilon_{i,t}$ is the error term.

Table 1.7 reports empirical estimates from equation 6.0. We find that the Shari'ah coefficient is negatively significant for most sectors, including the sample in total, meaning that Shari'ah compliant firms have lower beta than non-Shari'ah firms. Our main variable of interest, i.e., the difference-in-difference estimator, is $Shari'ah_{break}$. With a few exceptions, we find most of the sectors, including the total sample, are negative and statistically significant. It means the beta is lower after the treatment effect for the Shari'ah firms compared to their non-Shari'ah counterparts. The conditions to satisfy the Shari'ah compliant certificate makes the firm less risky over time. This is also linked with other factors, as hinted earlier, like improved market information as well as share turnover and liquidity. These results support our findings and are consistent with the recent literature. For instance, Rizvi and Arshad (2018) also find a lower sectoral beta for the Islamic market compared to the conventional market.

Table 1.7: Difference-in-Difference Estimations

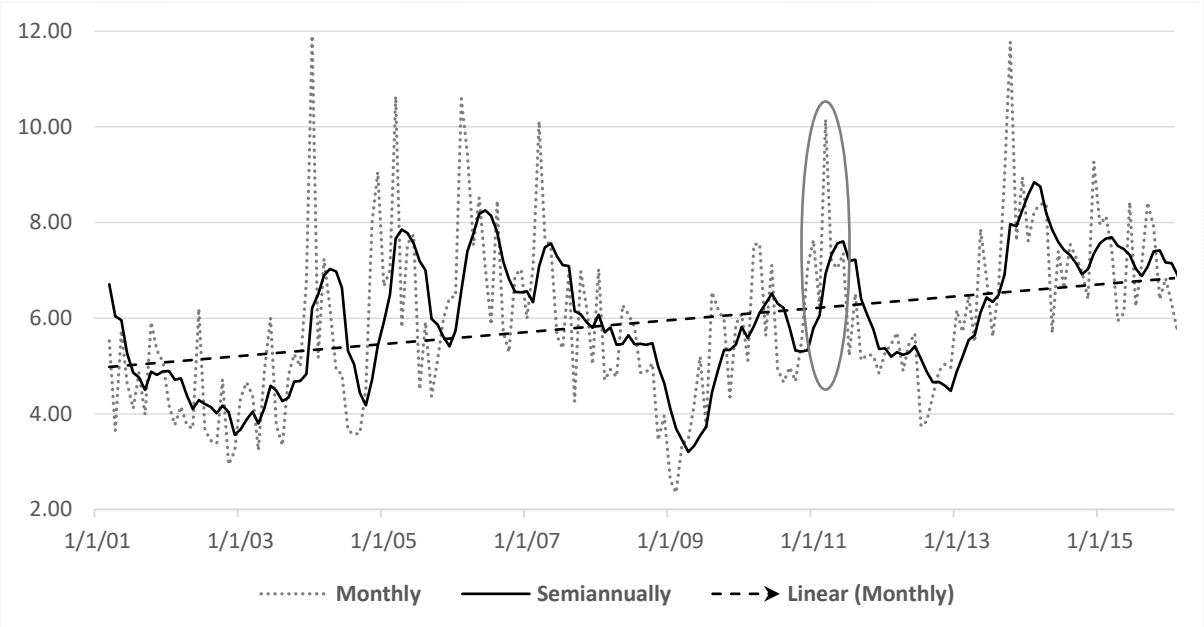
Variable	BMS	CNG	CNS	FIN	HTH	IDS	OIL	TEC	TEL	Total†
Shari'ah	-0.033	-0.315***	0.102	0.154	-0.298***	-0.144***	-0.231***	-0.287***	-0.179*	-0.261***
	-0.56	-8.80	1.53	0.97	-5.83	-2.81	-3.95	-5.92	-1.72	-9.65
break	-0.495	-0.809**	1.205*	4.101	1.334***	1.067*	-0.271	-0.419	-0.217	0.201
	-0.65	-2.25	1.90	1.36	2.70	1.88	-0.43	-0.67	-0.25	0.46
$\mathbf{Shari'ah_{break}}$	-0.327***	-0.011	0.174	-0.383	-0.147*	-0.134*	-0.362***	-0.064	-0.576***	-0.208***
	-3.22	-0.15	1.53	-1.44	-1.91	-1.71	-4.20	-0.76	-4.27	-4.88
trend*break	0.012	0.010***	-0.010**	-0.036	-0.008	-0.008	0.009	0.004	0.002	0.002
	1.55	2.91	-2.26	-1.49	-1.59	-1.43	1.48	0.67	0.20	0.50
trend	-0.008**	-0.003*	0.003***	0.014	0.005*	0.006**	-0.003	0.001	0.007*	0.001
	-2.02	-1.62	2.68	1.51	1.94	2.24	-1.06	0.24	1.67	0.33
mkt_cap	0.062***	0.012***	0.057***	0.093	0.041***	0.108***	0.135***	0.007***	0.040***	0.014***
	12.49	20.73	6.09	0.68	8.77	14.78	16.56	9.71	5.12	25.07
age	-0.006**	0.002	0.004	-0.036	0.003	-0.008***	0.010***	0.013***	-0.038***	0.002*
	-2.04	1.18	1.51	-1.17	1.15	-2.89	3.66	2.74	-4.70	1.90
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2684	7020	2736	1312	6190	5839	4078	6509	624	37204
R^2	0.132	0.046	0.025	0.019	0.032	0.041	0.082	0.030	0.378	0.016

Notes: This table presents the regression results for equation 6.0 and shows the Difference-in-Difference estimations. We employed estimated GLS and captured the coefficients. In the process, we applied the one-step weighting matrix while correcting the degree of freedom. †We consider sector fixed effects in the total sample regression. UTI, i.e., the Utility sector, is considered only in the total sample regression. *, **, and *** denotes statistical significance for the coefficient at 10%, 5%, and 1% levels, respectively. The t statistic is in parenthesis.

2.4.4.2 Trading Volume

Recently, Ciner (2015) find that trading volume can explain time variation in the CAPM beta. To shed further light, we examine the share turnover (based on the available data) to track the changes over time. We find multiple shifts along with a slightly upward trend. It is worth mentioning that most of our sample firms adopt Shari'ah compliance in late 2010. It might be trivial, but the pattern (Figure 1.2) is consistent with the nonsynchronous trading hypothesis that the increase in stock beta is dependent on the trading volume before and after the inclusion in a major index.

Figure 1.2: Stock Turnover – Trend in the Transition



2.4.4.3 Sectoral Indexes

To check the sector-wise market trend during the sample period, we acquire monthly beta of 10 sectoral indexes (both DJ and S&P) for the United States. Historical data (not reported) exposes upward systematic risk for the Consumer Goods, Financials, Industrials,

Health Care, and Oil & Gas sectors (Zhang, 2014; Sensoy, 2016); and downward for Technology and Telecommunications. Consumer Services seem relatively stable, but apparent structural shifts are observed in the Basic Materials and Utilities sectors. We find most of the sectors with downward systematic risk in the total time trend. Therefore, Shari'ah screening can be useful in moderating systematic risk in the long run. At this point, the implication can be of interest to typical setup, shifting the capital structure to be Shari'ah compliant.

2.4.4.4 Generalized Method of Moments

As a static model, estimated GLS could be problematic in the presence of possible endogeneity, given that financial variables are dynamic (Baltagi, 2008). Several studies recently highlight the dynamic panel technique based on the Generalized Method of Moments, i.e., GMM (Flannery & Hankins, 2012). GMM is robust to our sample data in case of likely departures from normality alongside the heterogeneity issue across firms. It takes the lagged dependent variable as a regressor and forms moment restriction. So the correlation between the lagged regressor and the error term is zero. Thus a non-parametric estimator can provide more reliable estimates.

We alter the baseline model equation 3.0 using GMM methodology where the lag of the dependent variable is used as one of the instruments:

$$\beta_{i,t} = \alpha_{i,t} + \theta_1\beta_{i,t-1} + \mathcal{D}_{i,t}break + \phi_1 mkt\_cap_{i,t} + \phi_2 age_{i,t} + \phi_3 trend * break + \phi_4 trend + \varepsilon_{i,t}$$

eq.7.0

Table 1.8: Generalized Method of Moments

Variable	BMS	CNG	CNS	FIN	HTH	IDS	OIL	TEC	TEL	Total
break	-0.053	0.205	-0.328	-4.884*	-0.004	-0.096	-0.356	-0.18	-0.444	-0.024
	(-0.16)	(1.34)	(-0.60)	(-1.78)	(-0.02)	(-0.54)	(-0.75)	(-0.89)	(-1.06)	(-0.38)
trend*break	0.009***	-0.000	0.004	0.047**	0.004*	0.002	0.010**	0.003*	0.009	0.003***
	(2.79)	(-0.31)	(0.91)	(2.00)	(1.85)	(1.32)	(2.41)	(1.89)	(1.57)	(6.33)
trend	-0.006**	-0.000	-0.003	-0.047**	-0.005***	-0.001	-0.006*	-0.006***	-0.002	-0.004***
	(-2.25)	(-0.16)	(-1.13)	(-2.35)	(-3.13)	(-1.18)	(-1.76)	(-4.48)	(-0.30)	(-9.88)
mkt_cap	0.130***	0.119***	0.180***	0.144	0.190***	0.223***	0.181***	0.169***	0.063	0.126***
	(2.85)	(12.07)	(4.22)	(1.18)	(8.3)	(11.14)	(7.19)	(10.25)	(0.64)	(35.08)
age	-0.019***	-0.005	-0.023**	-0.116	0.005	-0.027***	0.008	-0.005	-0.012	-0.008***
	(-2.98)	(-1.49)	(-2.24)	(-0.77)	(0.65)	(-8.87)	(0.88)	(-0.51)	(-0.57)	(-7.99)
AR1	0.03	0.06	0.22	0.02	0.01	0.02	0.37	0.00	0.00	0.00
AR2	0.12	0.57	0.38	0.80	0.94	0.18	0.45	0.14	0.02	0.80
j-statistic	0.02	0.19	0.98	0.87	0.11	0.65	0.15	0.32	0.39	0.48
R^2	0.13	0.09	0.04	0.01	0.05	0.11	0.06	0.13	0.15	0.10

Notes: This table presents the regression results for equation 7.0 and shows the Generalized Method of Moments (GMM) estimations. We employed Panel GMM and captured the coefficients. In the process, we applied 2-stage least squares instrument weighting matrix while correcting the degree of freedom. *, **, and *** denotes statistical significance for the coefficient at 10%, 5%, and 1% levels, respectively. The *t* statistic is in parenthesis. The *P* values are reported for AR1 and AR2 statistics alongside *J* statistic, i.e., the Sargan statistic is over-identification test of all instruments.

In Table 1.8, empirical estimates from equation 7.0 are reported. We find that the main variables, break, trend*break, and trend, have similar coefficient signs and are statistically significant with a few exceptions, emphasizing the results of Table 1.4. The insignificant AR2 and Sargan test statistics confirm the validity of our results.

2.5 Conclusions and Implications

This study investigates the evolution of systematic risk in Islamic compliant equities. We consider those equities, which were initially typical, but later turned and remained Shari'ah compliant. Investigating transitional patterns in systematic risk is critical to justify the immunity structure and is of interest to policymakers and investment management.

We find that Shari'ah compliant status initially creates a shock in systematic risk, but the transitional behaviors later diverge. The underlying screening measures also exhibit identical patterns, implying that these firms struggle to uphold the restraints and, therefore, relax them after the inclusion. The relaxation allows the capital market to reinforce their risk position, increasing beta in time. We also find a signal of capital market reaction as these equities are listed in the US. This is consistent with the literature and particularly with microstructure price effect theory (Mazouz et al., 2016). More importantly, we find a downward trend in systematic risk for the entire period as the market appears to be optimistic in expectation over the long-term. This is linked with other factors such as improved market information (Rizvi & Arshad, 2018) as well as share turnover and liquidity. From difference-in-difference estimations, we also find that Shari'ah compliant firms have lower beta than non-Shari'ah firms, and the beta is even lower

after the treatment for the Shari'ah firms compared to their non-Shari'ah counterparts. Moreover, firm size exposes a strong positive impact on systematic risk while age provides provision for the lifecycle theory. In the case of financial leverage, we witness the nature of mid-cap firm with potential growth opportunities.

This study offers a foundation to test systematic risk following the transition to Islamic compliant equities. Importantly, we provide new insights for scholars interested in the implications of the move to Shari'ah compliance, as well as for market regulators with an interest in the development of prudential structures that enhance stock market stability. Shari'ah regulators may also interpret our findings in relation to whether there is a case for stronger compliance conditions.

Our results are significant in only 2-10% of the total sample, which is not rare considering the related empirical studies (for instance, ~3% in Sensoy, 2016; ~1% in Nainggolan et al., 2016). It also indicates high variability in our data, which is most likely the underlying cause considering Shari'ah compliance that significantly alters the capital structure and changes the screening metrics.

We also note the limitations of our analysis, namely that it remains confined to a single breakpoint analysis. It is also possible that the conversion is often not a conscious corporate decision but a matter of interpretation of their financial ratios (Elnahas et al., 2016). Moreover, Azmat et al. (2016) question the development of Islamic instruments as conventional replicas.

In conclusion, our study has some inferences that create avenues for future research. The empirical approach can be tested in other regions or with an improved, broader sample. While we used standard CAPM beta to measure systematic risk, alternative measures such as the multi beta model or the accounting information-based model may also shed further light. Another future research direction would be to explore the transitional impact on the cost of equity capital.

Appendix A

IdealRatings Shari'ah Screening Methodology

Methodology

Equities are considered Shariah compliant only if they pass a series of market related guidelines and screened using a set of business and financial Shariah guidelines.

- **Business Activities Screens**

The core business of the companies considered for screening has to be Shariah-compliant. Companies are also only to be considered compliant from a business perspective if the cumulative revenue and non-operating interest income from non-compliant activities does not exceed 5% of their total income. Non-compliant income sources include the following

- Adult Entertainment
- Alcohol
- Cinema / Broadcasting
- Insurance companies
- Tobacco
- Financial services
- Investment services
- Gambling
- Hotels
- Defense
- Music
- Mortgage & Lease
- Interest income
- Pork

- **Financial Screens**
  - Interest-bearing debt over assets less than 33%
  - Cash, cash equivalents and short-term investments over assets less than 33%
  - Cash, cash equivalents and receivables over assets less than 50%

Examples:

1. Dana Gas: if you apply total debt to assets it would fail whereas IdealRatings passes the company.

2. Christian Dior: which is a clothing company and thus normally compliant from a business perspective but based on our research is involved in alcohol exceeding the acceptable thresholds.

http://www.idealratings.com/

Appendix B

Table A1.1: Correlation Matrix for Control Variables

Sectors		debt_to_asset	cash_to_asset$_1$	intexp_to_ebit	cash_to_asset$_2$
BMS					
	debt_to_asset	1			
	cash_to_asset$_1$	-0.12	1		
	Intexp_to_ebit	-0.04	0.06	1	
	cash_to_asset$_2$	-0.21	0.73	0.02	1
CNG					
	debt_to_asset	1			
	cash_to_asset$_1$	0.05	1		
	Intexp_to_ebit	0.02	0.05	1	
	cash_to_asset$_2$	-0.24	0.21	-0.01	1
CNS					
	debt_to_asset	1			
	cash_to_asset$_1$	0.07	1		
	Intexp_to_ebit	-0.03	-0.03	1	
	cash_to_asset$_2$	-0.14	0.70	-0.04	1
FIN					
	debt_to_asset	1			
	cash_to_asset$_1$	0.08	1		
	Intexp_to_ebit	-0.08	0.23	1	
	cash_to_asset$_2$	0.09	0.99	0.20	1
HTH					
	debt_to_asset	1			
	cash_to_asset$_1$	0.13	1		
	Intexp_to_ebit	0.00	0.00	1	
	cash_to_asset$_2$	0.13	0.73	0.03	1
IDS					
	debt_to_asset	1			
	cash_to_asset$_1$	0.07	1		
	Intexp_to_ebit	-0.01	-0.01	1	
	cash_to_asset$_2$	0.16	0.67	-0.02	1
OIL					
	debt_to_asset	1			
	cash_to_asset$_1$	0.23	1		
	Intexp_to_ebit	0.00	-0.02	1	
	cash_to_asset$_2$	0.25	0.80	-0.02	1
TEC					
	debt_to_asset	1			
	cash_to_asset$_1$	-0.01	1		
	Intexp_to_ebit	0.00	-0.05	1	
	cash_to_asset$_2$	0.02	0.55	-0.04	1
TEL					
	debt_to_asset	1			
	cash_to_asset$_1$	-0.21	1		
	Intexp_to_ebit	0.29	0.03	1	
	cash_to_asset$_2$	-0.53	0.67	-0.26	1

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STATEMENT OF CONTRIBUTION
DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS

We, the candidate and the candidate's Primary Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of candidate:	Md Iftekhar Hasan Chowdhury
Name/title of Primary Supervisor:	Dr Faruk Balli (Associate Professor)
Name of Research Output and full reference: Balli, F., de Bruin, A., & Chowdhury, M. I. H. (2020). Transition to Islamic equities: Systematic risk and Shari'ah compliance. *Global Finance Journal*. 100552.	
In which Chapter is the Manuscript /Published work:	Chapter 2 (Study 1)
Please indicate:	
• The percentage of the manuscript/Published Work that was contributed by the candidate:	-
and	
• Describe the contribution that the candidate has made to the Manuscript/Published Work:	
This paper is Chapter 2 in Md Iftekhar Hasan Chowdhury's PhD Dissertation, and while his supervisors have made the contribution, which is reflected by co-authorship, the paper is essentially the work of Md Iftekhar Hasan Chowdhury.	
For manuscripts intended for publication please indicate target journal:	
Candidate's Signature:	Md Iftekhar Hasan Chowdhury Digitally signed by Md Iftekhar Hasan Chowdhury Date: 2020.11.05 21:36:45 +13'00'
Date:	05.11.2020
Primary Supervisor's Signature:	FARUK BALLI Digitally signed by FARUK BALLI DN: cn=FARUK BALLI, c=NZ, o=MASSEY UNIVERSITY, ou=SCHOOL OF ECONOMICS AND FINANCE, email=f.balli@massey.ac.nz Date: 2020.11.05 21:54:16 +13'00'
Date:	05.11.2020

Chapter 3

Spillovers and Determinants in Islamic Equity Markets

3.1 Introduction

While interest in equity market return and volatility spillovers is not new, more recently, it has become an area of rapidly growing importance. With accelerating financialization paired with revolutionizing technology over the last decade, most financial markets today experience the effect of spillovers. This effect is persistent with overwhelming consequences, especially at times of financial distress. In recent years, several episodes of economic shocks and subsequent financial upheaval have sparked an expansive area of exploration, including examination of the interrelationships and interdependencies across stock markets. A growing number of researchers have devoted attention to investigate the return and volatility spillovers in developed and emerging capital markets (Kim & Rogers, 1995; Ng, 2000; Baele, 2005; Billio & Caporin, 2010; Diebold & Yilmaz, 2012; Kohonen, 2013; Diebold & Yilmaz, 2014; Clements et al., 2015).

Whether or not Islamic equity markets are relatively less exposed to exogenous economic shocks has also developed into a matter of some debate lately. This is mainly due to the idiosyncratic investment ideologies of these markets, namely, limited debt with a high asset-backed structure (Arouri et al., 2013; Shamsuddin, 2014). Existing studies in this regard offer, at best, mixed results (Rizvi et al., 2015; Yilmaz et al., 2015; Kenourgios et al., 2016; Hkiri et al., 2017; Shahzad et al., 2017). Moreover, these studies also bear a particularly close relationship with

each other, emphasizing certain regional or aggregate Islamic indexes. A few studies (Majdoub & Mansour, 2014; Majdoub et al., 2016) examine the integration of national IEMs but ignore the relationship hypothesis on the directions of spillovers. In contrast, we consider the real development of IEMs and investigate the hitherto ignored interactions of the spillovers solely among major Islamic nations. Unlike the majority of the past studies, we also highlight the underlying influential bilateral and macroeconomic factors behind the spillovers in IEMs. Thus we link the aspect of spillovers with economic rationale.

Intra-regional and inter-regional spillovers have intensified in more integrated markets (Kim et al., 2005; Yu et al., 2010). However, some studies, for instance, Majdoub and Sassi (2016), indicate weak integration in IEMs, which is then explained by Shari'ah compliance conditions. The emerging and frontier nature of most IEMs are yet another reason stated. Even though the Islamic finance industry is expected to reach $3.5 trillion by 2020, it remains centered primarily in the Gulf Cooperation Council[14] (GCC) oil-exporting countries (S&P Global Ratings, 2016).

Despite shrinking oil and gas revenues, GCC countries have retained their presence in the global economy. There has also been modest growth of trade in Islamic countries from 15% in 2005 to 20% in 2015 (Thomson Reuters, 2016). Although GCC countries dominate the total trade of Islamic countries as well as total intra-trade among Islamic nations, the trade between GCC countries and the rest of the Islamic countries is also increasing. This increase has been attributed

[14]Gulf Cooperation Council (GCC) is an intergovernmental political and regional economic union consisting of 6 Arab states of the Persian Gulf, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates (UAE).

to the surge in exports of manufactures by some Islamic countries, namely Turkey, Malaysia, and Indonesia (Ali et al., 2017). Moreover, lately, several Organisation of Islamic Cooperation (OIC) member countries have launched bilateral and multilateral trade initiatives to further augment the level of intra-trade further.

Financial liberalization has accelerated cross-border investment, which is often related to international diversification of equity capital. Recently, Gulf economies have seen an extensive capital flight, particularly during the recent loss of oil and gas value in international markets (Kissick et al., 2016). According to the World Investment Report, Qatar, Saudi Arabia, and the United Arab Emirates had sizeable foreign direct investment (FDI) outflows in the order of $7.902 billion, $8.359 billion, and $15.711 billion in 2016 (UNCTAD, 2017). Most of the outward FDI projects are related to diversification efforts, but such excessive outward capital flows create macroeconomic stress within the countries (Vahtra & Liuhto, 2005; Yu et al., 2010). This makes the empirical study of equity market spillovers and the macroeconomic variables influencing them, all the more timely and relevant in the context of our research.

We examine 15 IEMs from widely dispersed geographic locations where faith-based investors strive for Shari'ah compliant investments. Though Islamic investment ideologies limit the scope for several structured financial products (El-Gamal, 2006; Ilias, 2008; Hassan & Lewis, 2014), the recent development of Islamic indexes have attracted more investors than in earlier

years[15]. Together with the growing integration of IEMs, this increased investor attraction makes our study all the more relevant.

In this study, we aim to comprehend the return and volatility spillovers as well as market integration characteristics of IEMs. More explicitly, our first questions of interest are: What are the scopes and scales of return and volatility spillovers in major IEMs? And, to what extent does the GCC region contribute to the rest of the IEMs? These questions are of intrinsic interest and importance to policymakers and investors in the face of intensified market integration. We answer these questions by applying the directional spillovers perspective of Diebold and Yilmaz (2012), a relatively new technique in spillovers analysis. The utility of this estimation technique is its simplicity, as well as reliability, to precisely quantify the extent of spillovers. Most importantly, this methodology allows for some extensions. It is also used in recent studies and yielded robust results (see, e.g., Hkiri et al., 2017; Shahzad et al., 2017).

Second, we investigate the question: Do bilateral linkages and macroeconomic conditions of the countries explain the extent of the spillovers among IEMs? Empirical inquiry on the causes of return and volatility spillovers is much more limited. It is also imperative to recognize if spillovers are induced by increasing market integration. Increasing trade and investment raises the likelihood that a shock from one market may spread to other markets (Yu et al., 2010). Thus the impact of increasing bilateral trade and investment on spillovers is an empirical question. We

[15]The number of Islamic equities, i.e., those that meet the requirements of Shari'ah compliance criteria and subsequent regulations, amplified quite rapidly after Islamic Fiqh Academy issued a decree in 1990 stating that Muslims are allowed to invest in Islamic common equities.

answer this question with a gravity type of model using a variety of bilateral trade and economic/financial structure variables, which have recently emerged in the financial economics literature (Okawa & Wincoop, 2012). We obtain spillovers on a bilateral basis, and therefore, it is important to analyze the extent of the magnitude effect of each country. Therefore, we employ a gravity model in the spirit of recent studies by Balli et al. (2015) and Balli et al. (2017). In so doing, our analyses not only explore the return and volatility spillovers in IEMs but also recognizes the underlying causes of such spillovers. To the best of our knowledge, studies to date remain silent in answering these questions; neither have these estimation techniques been employed for the sampled Islamic countries.

We find increasing interactions in equity return and volatility spillovers, while the extent of spillovers varies widely across the markets. In relation to the magnitude of spillovers, we do not find any supremacy of the GCC frontier countries outside their region. They are more responsive to regional shocks than external shocks. However, we do find a time-variant structure of spillovers and notably, the presence of persistent clustering with the potential epicenter of spillovers, *viz*., Qatar - UAE - Saudi Arabia and Turkey - Malaysia - Indonesia. The cross-section analysis reveals the significance of bilateral and macroeconomic linkages to explain the strength of pair-wise spillovers. More specifically, sharing the same borders as well as trade ties and outward direct investments seem to have impacted the directions of spillovers over time. Similar to their conventional counterparts, we also infer that bilateral linkages limit diversification opportunities in IEMs.

We extend the pertinent literature on the return and volatility spillovers in the emerging IEMs by providing new evidence on the extent of spillovers and their underlying sources. The study makes a two-fold contribution. First, our return and volatility spillovers analyses provide relevant and valuable insights for faith-based investors and cross-border portfolio managers who seek to diversify their investment across IEMs. The findings also can create risk awareness and enrich fund management strategies. Second, our cross-section analyses provide useful insights for policymakers who strive to synchronize prudential regulations to mitigate the impact of shock spillovers. Indeed, return and volatility spillovers in IEMs warrant continuous monitoring because spillover shocks from one market may potentially spread to others and because the equity market is the main platform of Islamic corporate investment.

The remainder of this study is organized as follows. Section 3.2 presents a brief review of pertinent literature. In section 3.3, we describe data, provide initial statistics and develop the research methodologies. The empirical findings with analyses are presented in section 3.4. Lastly, we offer concluding remarks in section 3.5 while exploring implications and avenues for future studies.

3.2 Literature Review

Its relative nascency has recently given rise to increasing scholarly attention to the empirical aspects of Islamic finance. Most of these studies, either explicitly or implicitly, investigate the success and failure of the system (Abdelsalam & El-Komi, 2014, 2016). That said, the key current research strand is on the spillovers that take the decoupling hypothesis of IEMs

from their conventional counterparts and, more lately, the contagion hypothesis in the case of possible portfolio diversification opportunities.

Ajmi et al. (2014) provide evidence of significant linear and nonlinear causality between the DJIMWI, and the S&P typical stock market indexes for the US, Europe, and Asia. Hammoudeh et al. (2014) also find that the DJIMWI exhibits significant dependence on the US, Asia, and Europe conventional equity indexes and other major risk factors, including the US 10-year Treasury bond interest rate. Interestingly, Shamsuddin (2014) inspects the interest rate sensitivity of Islamic equity returns, and in contrast, and find that the collective portfolio of DJIMWI is immune to the change in and the conditional volatilities of the interest rate. In this regard, Yilmaz et al. (2015) state that firm ideologies, along with economic factors, had an important role in driving Islamic equity prices but that their role appears to have weakened in the last decade with an excessive increase in size and influence of capital markets. Nazlioglu et al. (2015) find strong evidence of risk transfers in the DJIMWI from the seemingly different major conventional equity markets, the US, Asia, and Europe. In an attempt to uncover the multi horizon nature of co-movement in Islamic and mainstream equity markets across the US and the Asia Pacific, Rizvi et al. (2015) find shock transmission through global events via excessive linkages before the subprime crisis. For the subprime crisis, they find evidence of conclusive contagion. In a recent study, Majdoub et al. (2016) assess inter-market linkages in Islamic and conventional index prices for Indonesia, France, the UK, and the US. They find linkages through long-run relationships for all markets except in the UK. In the short-run, they find a weak correlation for Indonesia with all markets for both sides of the index. Kenourgios et al. (2016) provide the strongest evidence to date on the decoupling of IEMs from the significant crises. They test

asymmetric conditional correlation dynamics across stable and crises period where the results in total fail to provide strong contagion indication. In a recent study, Ahmed (2018) infer that conventional stock returns exhibit more sensitivity to political risk than their Islamic counterparts in developed or developing countries. All of the foregoing studies mainly argue based on decoupling as well as contagion hypotheses and often infer that Shari'ah compliance conditions cannot entirely eliminate economic inter-dependence.

Overall, the IEM is also exposed to global shocks as well as to the contagion risks (Ajmi et al., 2014). Majdoub and Mansour (2014) inspect volatility spillovers from the US market into the emerging Islamic equity indexes of Qatar, Turkey, Malaysia, Pakistan, and Indonesia. They find weak evidence of spillovers in these markets. Abbes and Trichilli (2015) note that the US and the Japanese Islamic markets are segmented from most of the MENA and the Asian Islamic markets. They also note a high level of integration in the MENA (Bahrain, Kuwait, Oman, Egypt, Jordan, and Morocco) and the Asian Islamic markets (China, India, Indonesia, Korea, and Malaysia). Recently, studying Chinese and other Asian IEMs of India, Korea, Thailand, Malaysia, and Indonesia, Majdoub and Sassi (2016) show that IEMs reduce risk transmission, offering long-term portfolio diversification opportunities. In the case of the GCC region, Balli et al. (2013) find the higher impact of regional shocks over global shocks on the volatility of return in the typical equity sectors. Similarly, Balcılar et al. (2015) show that Islamic equity sectors, with some exceptions, exhibit positive risk exposure to developed market shocks in the same region. They conversely find negative risk exposure for a few sectors, but only during the extreme volatility period.

These extant studies primarily examine the presence of spillovers and their directions across the markets but remain silent on the size of spillovers and, most importantly, their determinants. Moreover, the number of studies that directly analyze return and volatility spillovers in IEMs compared to their conventional counterparts is still very limited. There is a divergence in the results and no consensus to date. Market integration issues remain arguable in the increasing regulatory convergence across the IEMs, offering empirical contexts for further studies. This study thus sheds light on the spillovers in major IEMs using a VAR-based spillover index framework, developed by Diebold and Yilmaz (2012) (henceforth, DY). The main advantage of this approach compared to various time series approaches such as causality, copula function, wavelet transform, G/ARCH family models, or the like as employed in earlier stated studies, is the ability to precisely quantify the magnitude and directions of spillovers. It also allows scope for some extensions. Recently, the DY approach of spillovers also have been utilized in Islamic finance studies; for instance, Hkiri et al. (2017) and Shahzad et al. (2017) analyze the extent of spillovers in Islamic and typical equity markets. These studies bear a particularly close relationship with each other, emphasizing either regional, aggregate, or developed country level Islamic indexes. We consider the real development of IEMs and solely investigate the return and volatility spillovers in major Islamic countries, hitherto ignored. Moreover, unlike these studies, we highlight the impact of bilateral and macroeconomic linkages on spillovers.

We conjecture that country-level macroeconomic variables reasonably drive the extent of return and volatility spillovers. Increasing cross-border trade and investment is likely to impact the behavior of national-level equity indexes (Allen et al., 2017). A few studies attempt to address

this conjecture. For instance, Balli et al. (2015) explore the shock spillovers from major developed markets (the US, Europe, Japan) that exert heterogeneous effects on the emerging markets (Asia, Middle East & North Africa). They find variables like bilateral trade intensity and foreign portfolio investment, along with the size of the capital market, play a significant role in explaining such spillovers. Similarly, Alotaibi and Mishra (2015) show significant return spillovers effect from the US and Saudi Arabia to the GCC markets. They explore the significant impacts of trade, share turnover ratio, and institutional quality on regional volatility spillovers from Saudi Arabia. Recently, Ahmed et al. (2017) expose the importance of macroeconomic variables in the transmission of international shock over several stress episodes to several emerging markets in Asia, Africa, and the Middle East. They find that countries with relatively superior institutional structures suffer less impact on financial markets. Interestingly, they find weak evidence for the previous run-up in capital flow and the negligible effect of the respective capital market size.

A clear message in the pertinent literature is that the extent of return and volatility spillovers is linked to a number of bilateral and macroeconomic variables. One of the main objectives of this study is to provide additional insights into the underlying determinants of such spillovers in the major IEMs.

3.3 Sample Construction, Data Description, and Empirical Modelling

This section presents the data selection process in detail. It then describes the empirical variables and develops the econometric methodology for the study.

3.3.1 Data and Summary Statistics

The first data set includes in total 15 national Islamic equity indexes of 6 GCC countries, *viz*., Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, with Egypt, Jordan, Morocco and Tunisia from the Middle East and North Africa (MENA countries); Turkey from Western Asia; Indonesia and Malaysia from Southeast Asia; and Bangladesh and Pakistan from South Asia. This wide selection of countries enables us to explore interregional and intraregional spillovers effects. The availability of data leads to the choice of countries. Note, these countries also hold a large number of constituent firms in the major global Islamic equity indexes. Table A2.1 in Appendix A exhibits the complete list of indexes with identification tickers/symbols. The data set consists of daily closing prices denominated in US dollars to preserve uniformity and sidestep currency risk effect. The initial sample period is from 16 July 2007 to 15 July 2017. This period is dictated by the availability of the Islamic equity index for all these emerging IEMs. However, the sample period and observation size differ across specifications since data availability varies across countries (Islamic equity index is available for all the sample countries from September 2010). We collected this set of data from DataStream (Thomson Reuters).

The second data set includes a total of ten bilateral and financial/economic structure variables of the countries in the first data set. The variables explained in the analyses include: (i) physical distance in kilometers, (ii) contiguousness, i.e., sharing borders, (iii) common colony, i.e., colonized by same colonizer and (iv) common language, i.e., sharing a common official language in the countries are extracted from the French Research Center in International Economics (CEPII)

database; (v) population, (vi) GDP, (vii) net FDI out i.e. net outflows of investment from a country to the rest of the world and (viii) domestic market capitalization, i.e., the share price multiplied by the number of shares outstanding for listed domestic firms are extracted from the World Bank's World Development Indicators (WDI) database; (ix) capitalization of Islamic equity index i.e. the share price multiplied by the number of ordinary shares in issue for each Islamic index constituent is collected from Morgan Stanley Capital International (MSCI)[16]; and (x) total bilateral trade i.e. the sum of exports and imports in the countries are extracted separately from STAN (OECD) Bilateral Trade Database. This dataset contains yearly data from 2010 to 2016/17 in US dollars. Table A2.2 in Appendix A exhibits the complete list of variables with description and source.

Table 2.1.1 reports statistical properties of the logarithmic return series for 15 IEMs. The average daily returns are close to zero (at four decimal places) and negative for all except Bangladesh, Indonesia, Malaysia, and Qatar. The negative mean is most likely a result of the Global Financial Crisis with subsequent stress episodes. It is worth noting that the mean returns for all indexes are smaller than their standard deviations, signifying no significant trends in the series. The standard deviations are relatively dispersed as expected since Islamic equity indexes constitute mostly small to medium-sized growth-oriented defensive stocks. The UAE (2.23%) with Turkey (2.19%) have the highest amount of dispersion, while Jordan and Malaysia have the least (both as 1.05%). Most of the series skewed to the left, providing evidence of left tailed distribution except Jordan with the longer right-tailed distribution. All series expose extreme

[16]See Appendix B for MSCI Copyright notice.

excess kurtosis (leptokurtic), i.e., higher than the normal distribution, indicating the likelihood of extreme observations. The standard Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1978) and Phillip-Perron (PP) (Phillip & Perron, 1988) tests reveal the series as stationary at 1% significance at their level itself. The Ljung-Box test (Ljung & Box, 1978) statistics Q and Q^2 are significant for most of the series, suggesting serial correlation up to the 12^{th} order. Further, ARCH LM (Lagrange multiplier) test (Engle, 1982) specifies the presence of conditional heteroscedasticity, i.e., ARCH behaviors in the distribution. These statistics support the use of the GARCH type method to extract stylized facts like the volatility of return series. The unconditional correlations of Islamic equity indexes with pair-wise typical benchmark indexes are positive and strongly high (>0.80), with the exceptions of Jordan and Tunisia (<0.60).

Table 2.1.2 reports the ordinary correlation matrix. We find most of the indexes as positively correlated, but the extent of the relationship is instead weak. The most significant correlated pair is UAE-Qatar (0.51), followed by Malaysia-Indonesia (0.50). We also find significant negative correlations for Qatar-Morocco (-.07) and Tunisia-Qatar (-.05) pair. Rationally, such weak positive correlations offer diversification opportunities (Rezayat & Yavas, 2006). Moreover, there is an indication of hedging prospects in negative or uncorrelated indexes (Baur & Lucey, 2010).

Table 2.1.1: Summary Statistics of IEMs (Return)

	Mean	Max.	Min.	Std. Dev.	Skew.	Kurt.	J-B	ADF	PP	Q(12)	$Q^2(12)$	ARCH LM (12)	Corr.	Obs.
BAH	-0.0010	0.1429	-0.1570	0.0149	-0.85	20.30	3.E+04***	-48.04***	-48.00***	21.04**	760.37***	45.10***	0.81***	2609
BAN	0.0002	0.1333	-0.1332	0.0137	-0.13	20.64	2.E+04***	-29.27***	-47.86***	72.27***	620.60***	36.99***	0.94***	1791
EGY	-0.0005	0.1198	-0.4065	0.0179	-6.76	153.02	2.E+06***	-36.65***	-36.32***	82.43***	28.86***	0.77	0.91***	1827
IND	0.0001	0.1631	-0.1663	0.0195	-0.26	10.60	6.E+03***	-45.65***	-47.61***	30.66***	364.97***	14.89***	0.93***	2609
JOR	-0.0002	0.0800	-0.0613	0.0105	0.08	10.36	4.E+03***	-41.27***	-41.27***	33.09***	274.82***	16.42***	0.45***	1827
KUW	-0.0005	0.1136	-0.1231	0.0146	-0.71	14.72	2.E+04***	-32.89***	-49.97***	48.49***	1149.70***	59.48***	0.90***	2609
MAL	0.0000	0.0584	-0.1100	0.0105	-0.44	10.99	7.E+03***	-46.65***	-46.72***	36.87***	358.49***	18.81***	0.94***	2609
MOR	-0.0001	0.0583	-0.0980	0.0118	-0.51	8.92	4.E+03***	-48.84***	-48.85***	23.85**	111.75***	7.33***	0.88***	2609
OMA	-0.0002	0.1196	-0.1690	0.0124	-1.37	34.07	1.E+05***	-47.35***	-47.25***	49.38***	329.76***	15.31***	0.88***	2609
PAK	-0.0001	0.0883	-0.1090	0.0155	-0.40	7.12	2.E+03***	-44.23***	-45.30***	85.44***	1462.50***	40.18***	0.84***	2609
QAT	0.0001	0.1165	-0.1587	0.0166	-0.42	14.51	1.E+04***	-48.52***	-48.46***	33.12***	397.46***	20.71***	0.95***	2609
S.AR	-0.0001	0.0958	-0.1521	0.0138	-1.85	28.26	7.E+04***	-33.29***	-48.69***	39.07***	634.01***	48.11***	0.92***	2609
TUN	-0.0005	0.1775	-0.1799	0.0118	-0.44	52.06	2.E+05***	-50.68***	-50.66***	16.29	516.95***	66.92***	0.59***	2336
TUR	-0.0001	0.1722	-0.1545	0.0219	-0.20	8.03	3.E+03***	-47.75***	-47.67***	28.81***	674.41***	27.74***	0.88***	2609
UAE	-0.0003	0.1925	-0.1938	0.0223	-0.57	15.51	2.E+04***	-32.98***	-49.45***	31.22***	602.88***	33.36***	0.92***	2609

Notes: Max., Min. and Std. Dev. refer to maximum, minimum, and standard deviation, respectively. J-B is the Jarque-Bera test for normality, while ADF (Augmented Dickey & Fuller) and PP (Phillip & Perron) are the tests of stationarity. Q and Q^2 are the Ljung-Box Q-test for serial correlation in regular and squared residuals, and ARCH LM is the Engle's Lagrange Multiplier test for ARCH effect, calculated using 12 lags of each Islamic equity index return series. Corr. is the ordinary un-conditional correlation of each Islamic equity index return series with their conventional counterparts. Lastly, Obs. is the number of observations. The results are for the whole sample period (16.07.2007-15.07.2017), with superscripts symbolizing *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. BAH, BAN, EGY, IND, JOR, KUW, MAL, MOR, OMA, PAK, QAT, S.AR, TUN, TUR, and UAE refer to Bahrain, Bangladesh, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Tunisia, Turkey, and United Arab Emirates, respectively.

Table 2.1.2: Correlation Matrix of IEMs (Return)

	BAH	BAN	EGY	IND	JOR	KUW	MAL	MOR	OMA	PAK	QAT	S.AR	TUN	TUR	UAE
BAH	1														
BAN	0.0063	1													
EGY	0.0979***	0.0401*	1												
IND	0.1583***	0.0344	0.0961***	1											
JOR	-0.0081	0.0075	0.0174	0.0398*	1										
KUW	0.3734***	0.0293	0.1444***	0.1646***	0.0149	1									
MAL	0.0907***	-0.0292	0.1159***	0.5045***	0.0364	0.1141***	1								
MOR	0.0789***	0.0055	0.0177	0.1414***	-0.0166	0.0960***	0.1653***	1							
OMA	0.2796***	0.0686***	0.0754***	0.2041***	0.0445*	0.2417***	0.1633***	0.0778***	1						
PAK	0.0517**	0.0044	0.0814***	0.0955***	0.0463*	0.1353***	0.1159***	0.0552***	0.0606***	1					
QAT	0.2500***	0.0189	0.1309***	0.2368***	0.1336***	0.2788***	0.1695***	-0.0733***	0.3379***	0.0604***	1				
S.AR	0.2493***	0.0008	0.1609***	0.2553***	0.0141	0.2961***	0.1782***	0.1053***	0.3134***	0.0875***	0.3509***	1			
TUN	0.0535**	0.0410*	-0.0043	0.1194***	0.0137	0.0868***	0.1436***	0.1700***	0.0845***	0.0262	-0.0498**	0.0841***	1		
TUR	0.0519**	0.0210	0.0805***	0.3132***	0.0266	0.1252***	0.3426***	0.1961***	0.0893***	0.0302	0.0001	0.1895***	0.2027***	1	
UAE	0.2640***	0.0017	0.1409***	0.2805***	0.1023***	0.2632***	0.2288***	-0.0250	0.3480***	0.1216***	0.5128***	0.4094***	0.0188	0.0900***	1

Notes: The results are for the whole sample period (16.07.2007-15.07.2017, balanced pairwise), with superscripts symbolizing *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. BAH, BAN, EGY, IND, JOR, KUW, MAL, MOR, OMA, PAK, QAT, S.AR, TUN, TUR, and UAE refer to Bahrain, Bangladesh, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Tunisia, Turkey, and United Arab Emirates, respectively.

Table 2.2 reports collective statistics of selected bilateral and financial/economic structure variables for the cross-section analysis. Relevant variables are averaged (2010 - 2016/17). We use a log scale for GDP, trade, distance, and population due to significant variations between the largest and smallest values and normalize FDI and market capitalizations to the percentage of respective GDP. The distance between countries is in the range of 2.14 (Qatar and Bahrain, 139.01 kilometers) to 4.10 (Bahrain and Indonesia, 7039.02 kilometers). In terms of per capita GDP, the most correlated pair is Kuwait-Oman (0.99). Oman also pairs with Bangladesh to a strong negative correlation (-0.80), which might result from bilateral trade dynamics. The highest average total bilateral trade, i.e., exports plus imports, is 19.99 for Indonesia with Malaysia, whereas the lowest is 12.93 for Tunisia with Bahrain. Compared to the respective GDP, the highest average annual net direct investment outflow is 6.39% for Kuwait, and surprisingly, the lowest is 0.04% for Pakistan despite concurrent political instability.

Table 2.2: Summary Statistics of Macroeconomic Variables

	Mean	Max.	Min.	Std. Dev.	Obs.
Distance (log)	3.45	4.10	2.14	0.40	105
Population (log)	7.31	8.40	6.12	0.73	15
GDP (log)	11.25	11.94	10.49	0.48	15
Per Capita GDP Correlation	0.39	0.99	- 0.80	0.52	105
Bilateral Trade (log)	16.64	19.99	12.93	1.45	210
FDI Outflow (%GDP)	1.53	6.39	0.04	1.94	15
Market Cap. Country (%GDP)	52.60	140.15	15.01	34.19	15
Market Cap. I_Index (%GDP)	4.32	15.22	0.16	4.92	15

Notes: Max., Min. and Std. Dev. refer to maximum, minimum, and standard deviation, respectively. Applicable variables are averaged for the period between 2010 and 2016/17. We use a log scale for distance, population, GDP, and bilateral trade as there are large discrepancies between the largest and smallest values and normalization of FDI outflow and market capitalization of both countries and Islamic indexes to the % of respective GDP. Table A2.2 in Appendix A exhibits the complete list of variables with descriptions and sources.

3.3.2 Econometric Model Specification

We calculate continuously compounded price return on the daily change where p_t is the closing price on day t, thus $r_t = ln\,(\frac{p_t}{p_{t-1}})$ for each national Islamic equity index.

$$r_{i,t} = ln(\frac{p_{i,t}}{p_{i,t-1}}) \qquad \text{eq.1.0}$$

Our empirical approach comprises 3-steps. First, we extract conditional variances as a proxy of daily volatilities. We then apply the DY spillover index to find pair-wise return as well as volatility spillovers. Finally, we develop a gravity type cross-section equation to explore the stimulus of such spillovers.

Looking through the statistical properties of 15 Islamic equity return series, we find volatility clustering given auto-correlation as well as conditional heteroscedasticity that signifies non-constant variances. Motivated by recent studies (Akçay et al., 1997; Darrat et al., 2003; Zaffaroni, 2009; Lama et al., 2015), we employ Exponential GARCH to extract conditional variances as a proxy of daily volatilities developed by Nelson (1991) and Nelson and Cao (1992). Specifically, we applied AR(1)-E-GARCH(1,1). This method does not require any restriction on the parameters since the equation itself is based on logarithmic variance. Therefore, the positivity of the variance is inevitably achieved. It captures major stylized features like volatility clustering in an innovation course. Intuitively, a shock at time *t−1* impacts the variance at time *t*, though a negative or a positive shock with the same magnitude might not affect evenly on volatility. Thus for an equity return, time series $r_t = \mu+\varepsilon_t$ where μ is the expected return, and ε_t is a zero mean white noise, $\varepsilon_t = \sigma_t z_t$. Accordingly, the conditional variance specified by a standard E-GARCH(1,1) can be stated as:

$$ln(\sigma_i^2) = \omega + \sigma(|z_{t-1}| - \mathrm{E}[|z_{t-1}|]) + \Upsilon z_{t-1} + \beta ln(\sigma_{t-1}^2)$$ eq.2.0

Table A2.3 in Appendix A reports the statistical properties of the volatility series for 15 IEMs. Like return series, volatility series also meet regularity conditions for subsequent analyses.

3.3.2.1 Directions of Spillovers

We adopt the Diebold and Yilmaz (2012) spillover index approach to measure the directions of return as well as volatility spillovers in IEMs. The index is based on the Forecast Error Variance Decomposition (FEVD) in the Generalized VAR of Koop et al. (1996) and Pesaran and Shin (1998). Unlike Cholesky Factorization, this setup benefits on variance decomposition that is invariant to the ordering of the variables. Thus, we identify the share of the forecast error variance of an IEMs x_i (for i = 1, 2, …, N), which can be attributed to the shock in another IEMs x_j (for j = 1, 2, …, N), where $i \neq j$. Accordingly, with generalized VAR perspective, the H-step-ahead forecast error variance decomposition is specified as:

$$\theta_{ij}^{g}(H) = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H-1} (\acute{e}_i A_h \Sigma e_j)^2}{\sum_{h=0}^{H-1} (\acute{e}_i A_h \Sigma \acute{A}_h e_i)}$$ eq.3.0

where Σ refers to the variance matrix for the error vector ε_t, duly σ_{jj} is the standard deviation of the error term for the j^{th} equation, and e_i is the selection vector with one as the i^{th} element and 0 if not, and A_h is the moving average coefficient from the forecast at time t.

Note that, the shocks to each variable are not orthogonalized in the generalized VAR perspective. Therefore, the sum of each row of the variance decomposition matrix is not

equivalent to 1 (Baruník et al., 2016). So each unit of the decomposition matrix can be normalized by the row sum as:

$$\tilde{\theta}_{ij}^{g}(H) = \frac{\theta_{ij}^{g}(H)}{\sum_{j=1}^{N} \theta_{ij}^{g}(H)} \qquad \text{eq.4.0}$$

Subsequently, by construction, $\sum_{j=1}^{N} \tilde{\theta}_{ij}^{g}(H)$ = 1 and $\sum_{i,j=1}^{N} \tilde{\theta}_{ij}^{g}(H)$ = N. This normalization of variance contributions eases us on various spillover measures to capture the degree of interdependence. The total spillovers index similarly measures the average contribution of spillovers from the shocks across 15 IEMs to the total forecast error variance as:

$$S^{g}(H) = \frac{\sum_{\substack{i,j=1 \\ i \neq j}}^{N} \tilde{\theta}_{ij}^{g}(H)}{N} \cdot 100 \qquad \text{eq.5.0}$$

We can now absolutely identify the directions of spillovers - our main objective in this spillover analysis. The directions of return or volatility spillovers that is given by a market *i* to all other markets *j* defined as:

$$S_{\cdot i}^{g}(H) = \frac{\sum_{\substack{i,j=1 \\ i \neq j}}^{N} \tilde{\theta}_{ji}^{g}(H)}{N} \cdot 100 \qquad \text{eq.6.0}$$

Similarly, the directions of return or volatility spillovers that is taken by a market *i* from all other markets *j* defined as:

$$S_{i \cdot}^{g}(H) = \frac{\sum_{\substack{i,j=1 \\ j \neq i}}^{N} \tilde{\theta}_{ij}^{g}(H)}{N} \cdot 100 \qquad \text{eq.7.0}$$

Net spillovers indeed reveal whether a market is a net sender (i.e., positive value) or net receiver (i.e., negative values). The straight variance from Eq. 6 and Eq. 7 is the net spillovers stated as:

$$S_i^g(H) = S_{\cdot i}^g(H) - S_{i\cdot}^g(H) \qquad \text{eq.8.0}$$

3.3.2.2 Determinants of Spillovers

After capturing return and volatility spillovers for each IEMs, we shift our focus to their underlying antecedent. We hypothesize that the extent of spillovers is linked with certain bilateral as well as standard Gravity factors (Portes & Rey, 2005; Aviat & Coeurdacier, 2007). Further, in the spirit of recent studies by Balli et al. (2015) and Balli et al. (2017), we specify a cross-section equation based on the standard Gravity Model of Trade, which is, however, extended with several economic/financial structure variables.

$$\begin{aligned} S_{\cdot i,i\cdot}^g(H) = \alpha_0 + \alpha_1 Dist_{i,j} + \alpha_2 Cont_{i,j} + \alpha_3 ComCol_{i,j} + \alpha_4 ComLan_{i,j} + \alpha_5 PopNum_i \\ + \alpha_6 GDP_i + \alpha_7 \rho_{GDP_{i,j}} + \alpha_8 Trade_{i,j} + \alpha_9 FdiOut_i + \alpha_{10} MktCapC_i \\ + \alpha_{11} MktCapI_i + \alpha_{12} GCC_{i,j} + \varepsilon_{i,j} \end{aligned} \qquad \text{eq.9.0}$$

where $S_{\cdot i,i\cdot}^g(H)$ is the pair-wise return or volatility spillovers; $Dist_{i,j}$ is the logarithm of total physical distance in kilometers between the capital cities of country *i* and country *j* to capture the so-called information frictions; $Cont_{i,j}$ is a binary variable that takes 1 if country *i* and country *j* share a border, and 0 otherwise; $ComCol_{i,j}$ is a binary variable to capture the common colonial relationship between country *i* and country *j* with a value of 1 if there is, and 0 if not; $ComLan_{i,j}$ a binary variable that takes 1 if country *i* and country *j* share at least

one common language, and 0 otherwise; $PopNum_i$ is the logarithm of the average annual population based on the de facto definition of the population for a country; GDP_i is the logarithm of average annual GDP of a country as a proxy for the economic condition; $\rho_{GDP_{i,j}}$ is the correlation of GDP per capita between country *i* and country *j* to find out the role of the business cycle; $Trade_{i,j}$ is the logarithm of average total annual bilateral imports and bilateral exports between country *i* and country *j*; $FdiOut_i$ is average net annual outflows of investment from country *i* to the rest of the world, and is normalized by GDP; $MktCapC_i$ is the average market capitalization of all listed domestic firms of a country to capture the size effect of the equity market, and is normalized by GDP; $MktCapI_i$ is the average market capitalization of the Islamic equity index of a country to capture the size effect of the IEMs, and is normalized by GDP; and $GCC_{i,j}$ is a binary variable that takes 1 for the GCC region and 0 otherwise to capture the regional impact of shocks on spillovers.

To undertake the regression, we extract the pair-wise spillovers values from the spillovers index table of 15 IEMs (Table 2.3.1 and Table 2.3.2) in a cross-section setup before we merge side by side with explanatory variables. Accordingly, total number of observations stands at 210 (15 X 15 = 225 - 15 (excluding diagonals) = 210).

3.4 Empirical Analyses and Findings

In this section, first, we analyze static pair-wise return and volatility spillovers. We then extend with dynamic analysis followed by a network diagram to illustrate the pair-wise directions of spillovers. Finally, we check the impact of bilateral and macroeconomic linkages on spillovers.

3.4.1 Return and Volatility Spillovers

Table 2.3.1 presents the static extent and directions of return spillovers within and across the 15 IEMs from 01.09.2010 to 15.07.2017 based on ten steps ahead FEVD on generalized VAR perspective. The total spillover index is approximately 21.85%, which signifies the level of unexplained variations in the return across the sample equity markets. As could be expected, the diagonal elements, i.e., idiosyncratic disturbances, appear to be the largest value of the spillovers table. This is, in fact, consistent with the view that IEMs is relatively less vulnerable to exogenous shocks. Probing further, UAE is found to be the biggest contributor to the directional spillovers (53.20%), followed by Qatar 45.52%, Malaysia 39.82%, and Saudi Arabia 38.46%. UAE is also captured as the top recipient of spillover from others (44.84%), followed by the same trio, Qatar, Malaysia, and Saudi Arabia, with spillovers from others explaining return forecast error variance in the order of 41.03%, 36.36%, and 36.00%. The highest pair-wise spillover appears 17.88% from UAE to Qatar, while the respective spillover from Qatar is 16.79%. The next noticeable pair-wise spillover is 16.05% from Malaysia to Indonesia; Indonesia, in turn, transfers 15.47%. From a macroeconomic standpoint, these varying degrees of interdependence signpost the strength of bilateral linkages. In net terms, three GCC countries, namely UAE, Qatar, and Saudi Arabia, turn out to be the net transmitters of return shocks, whereas the other three, i.e., Bahrain, Kuwait, and Oman, are net receivers of return shocks, mostly regional shocks. Turkey, along with two other Southeast Asian countries, Malaysia and Indonesia, also appears to be the net emitters of return shocks. Surprisingly, Bangladesh, with the least level of spillovers from others, is nearly isolated from the rest of the IEMs.

Table 2.3.2 exhibits the static extent of volatility spillovers from almost analogous directions but with higher magnitudes as of return spillovers. The total volatility spillover index is 28.78%. Saudi Arabia appears the highest contributor to the spillovers table (65.46%), whereas UAE remains the largest recipient of spillover from others (56.52%). The highest pair-wise spillover is 17.70% from Saudi Arabia to the UAE; in turn, UAE's spillover is 14.77%. Subsequent noticeable pair-wise spillovers are - in order, 16.56% from UAE to Qatar while Qatar sends back 10.65% (in net terms, 5.91%); next, 15.96% from Oman to Kuwait and in response, Kuwait replies with merely 4.33% (in net terms, 11.63%). Along with Qatar, Kuwait appears to be the heaviest net receivers of volatility shocks than what they emit. At this point, we can argue that the domination of regional shocks is probably due to the dynastic linkages, let alone economic openness among the GCC countries. This is in line with Balli et al. (2013) and Balcılar et al. (2015), who also find the higher impact of regional shocks on the typical equity markets. Lastly, Morocco is captured with minimum influence of volatility spillovers, resulting in isolation from the rest of the IEMs.

In sum, we find almost analogous directions of spillovers for return and volatility, but the magnitudes of volatility spillovers are higher than the return spillovers. The cash and oil-rich GCC frontier countries act as the main source of varying stresses, but they are certainly not superior to others outside the region. Moreover, there is an indication of clustering of spillovers among Qatar, UAE, and Saudi Arabia[17], and among Turkey, Malaysia, and Indonesia. These clustered countries also appear to be leading Islamic equity return and volatility spillovers in the respective regions.

[17]Alotaibi and Mishra (2015) also find higher volatility spillovers from Saudi Arabia to the UAE and Qatar equity markets.

Table 2.3.1: Return Spillovers in IEMs

	BAH	BAN	EGY	IND	JOR	KUW	MAL	MOR	OMA	PAK	QAT	S.AR	TUN	TUR	UAE	**From**
BAH	**88.79**	0.02	0.99	0.48	0.02	1.26	0.44	0.16	1.97	0.36	1.52	1.16	0.22	0.28	2.33	**11.21**
BAN	0.03	**96.93**	0.22	0.23	0.02	0.14	0.17	0.04	0.97	0.22	0.10	0.05	0.58	0.17	0.12	**3.07**
EGY	0.79	0.20	**86.00**	1.02	0.09	1.63	1.82	0.04	0.62	0.54	1.67	2.69	0.09	0.92	1.88	**14.00**
IND	0.36	0.21	0.73	**67.20**	0.10	0.81	16.05	0.40	0.64	1.55	1.57	1.74	0.08	5.92	2.64	**32.80**
JOR	0.02	0.05	0.03	0.26	**95.88**	0.07	0.15	0.09	0.27	0.28	1.54	0.02	0.04	0.44	0.84	**4.12**
KUW	1.06	0.48	1.51	0.94	0.07	**76.10**	1.47	0.61	2.34	0.70	2.91	4.88	0.12	2.07	4.73	**23.90**
MAL	0.18	0.22	0.78	15.47	0.16	1.00	**63.64**	1.29	1.35	1.51	1.31	2.11	0.66	7.87	2.44	**36.36**
MOR	0.04	0.17	0.08	0.51	0.23	0.51	1.30	**89.48**	0.14	0.49	2.18	0.11	2.09	2.13	0.53	**10.52**
OMA	1.11	0.32	0.44	0.90	0.24	2.24	2.00	0.20	**74.65**	0.46	5.01	5.41	0.11	0.52	6.39	**25.35**
PAK	0.10	0.09	0.64	2.61	0.15	0.68	2.76	0.69	0.46	**85.69**	1.02	2.81	0.25	0.70	1.35	**14.31**
QAT	0.82	0.03	1.01	1.46	1.05	2.42	1.15	1.41	4.12	0.79	**58.97**	6.84	1.40	0.63	17.88	**41.03**
S.AR	0.62	0.01	1.97	1.63	0.12	3.62	2.35	0.12	4.30	1.84	7.54	**64.00**	0.00	1.09	10.78	**36.00**
TUN	0.07	0.49	0.14	0.09	0.35	0.17	0.83	2.18	0.18	0.03	2.08	0.12	**90.11**	1.99	1.18	**9.89**
TUR	0.08	0.05	0.61	5.36	0.24	1.60	6.93	1.69	0.29	0.07	0.27	1.13	1.84	**79.72**	0.12	**20.28**
UAE	1.32	0.00	1.08	2.45	0.57	3.29	2.39	0.41	4.85	0.83	16.79	9.40	0.67	0.80	**55.16**	**44.84**
To	**6.61**	**2.35**	**10.24**	**33.40**	**3.42**	**19.43**	**39.82**	**9.33**	**22.51**	**9.69**	**45.52**	**38.46**	**8.16**	**25.54**	**53.20**	**Index**
Net	**-4.59**	**-0.72**	**-3.76**	**0.60**	**-0.69**	**-4.47**	**3.45**	**-1.18**	**-2.84**	**-4.62**	**4.49**	**2.46**	**-1.73**	**5.26**	**8.36**	**21.85%**

Notes: This table reports the directions of return spillovers across 15 IEMs from 01.09.2010 to 15.07.2017. FEVD is based on 15-variate VAR with two lags and ten-day predictive horizons, delivering pair-wise directions of spillovers (15 x 15 countries submatrix). 'From' denotes total directional spillovers from all others, i.e., off-diagonal row sums whereas 'To' denotes total directional spillovers to all others, i.e., off-diagonal column sums. 'Net' spillovers are the difference between the contribution to others and the contribution from others. Boldface values are for reporting/reference purposes. BAH, BAN, EGY, IND, JOR, KUW, MAL, MOR, OMA, PAK, QAT, S.AR, TUN, TUR, and UAE refer to Bahrain, Bangladesh, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Tunisia, Turkey, and United Arab Emirates, respectively.

Table 2.3.2: Volatility Spillovers in IEMs

	BAH	BAN	EGY	IND	JOR	KUW	MAL	MOR	OMA	PAK	QAT	S.AR	TUN	TUR	UAE	**From**
BAH	**70.45**	0.28	0.13	1.34	0.19	1.53	2.37	0.50	8.17	1.86	3.36	6.07	0.17	0.04	3.53	**29.55**
BAN	0.10	**80.88**	0.14	1.09	0.05	0.14	0.02	0.14	0.59	0.25	0.07	0.06	14.49	1.07	0.92	**19.12**
EGY	1.07	0.63	**90.84**	0.08	0.52	2.51	0.26	0.03	0.79	0.09	0.98	0.77	0.13	0.17	1.12	**9.16**
IND	0.73	0.16	0.19	**75.28**	0.14	0.20	12.42	0.67	0.03	0.84	0.41	0.72	0.01	7.48	0.73	**24.72**
JOR	0.35	0.75	0.08	1.56	**90.17**	3.40	0.05	0.53	0.98	0.59	0.37	0.10	0.31	0.44	0.31	**9.83**
KUW	4.07	2.22	0.78	0.46	1.22	**47.04**	1.46	0.07	15.96	0.60	7.41	8.72	0.02	1.41	8.55	**52.96**
MAL	0.20	0.15	0.03	12.92	0.00	0.19	**75.26**	0.23	0.58	1.75	0.48	1.37	0.02	5.99	0.83	**24.74**
MOR	1.35	0.07	0.10	0.33	0.27	0.15	0.82	**94.11**	0.04	0.24	0.78	0.63	0.55	0.25	0.32	**5.89**
OMA	4.88	1.48	0.23	0.53	0.08	4.33	1.60	0.01	**60.93**	4.11	4.52	9.20	0.06	0.78	7.24	**39.07**
PAK	6.14	0.13	0.11	3.60	0.04	0.88	6.01	0.06	0.40	**69.71**	2.63	4.86	0.14	2.36	2.94	**30.29**
QAT	3.95	0.39	0.13	0.83	0.13	6.28	1.08	0.35	4.55	3.54	**46.67**	14.82	0.02	0.69	16.56	**53.33**
S.AR	7.47	0.01	0.46	1.90	0.02	3.66	3.45	0.34	5.46	3.77	11.16	**47.11**	0.04	0.39	14.77	**52.89**
TUN	0.05	5.64	0.12	0.60	1.18	0.12	0.19	0.27	0.33	0.49	0.06	0.21	**90.14**	0.41	0.20	**9.86**
TUR	0.19	1.49	0.06	5.22	0.19	0.15	4.05	0.71	0.22	0.70	0.12	0.24	0.08	**86.26**	0.32	**13.74**
UAE	7.29	0.67	0.14	2.28	0.14	4.50	1.92	0.14	8.01	1.90	10.65	17.70	0.16	1.01	**43.48**	**56.52**
To	**37.85**	**14.06**	**2.69**	**32.75**	**4.16**	**28.05**	**35.72**	**4.06**	**46.12**	**20.72**	**43.01**	**65.46**	**16.19**	**22.50**	**58.34**	**Index**
Net	**8.30**	**-5.06**	**-6.46**	**8.03**	**-5.67**	**-24.91**	**10.98**	**-1.83**	**7.05**	**-9.58**	**-10.32**	**12.57**	**6.33**	**8.75**	**1.82**	**28.78%**

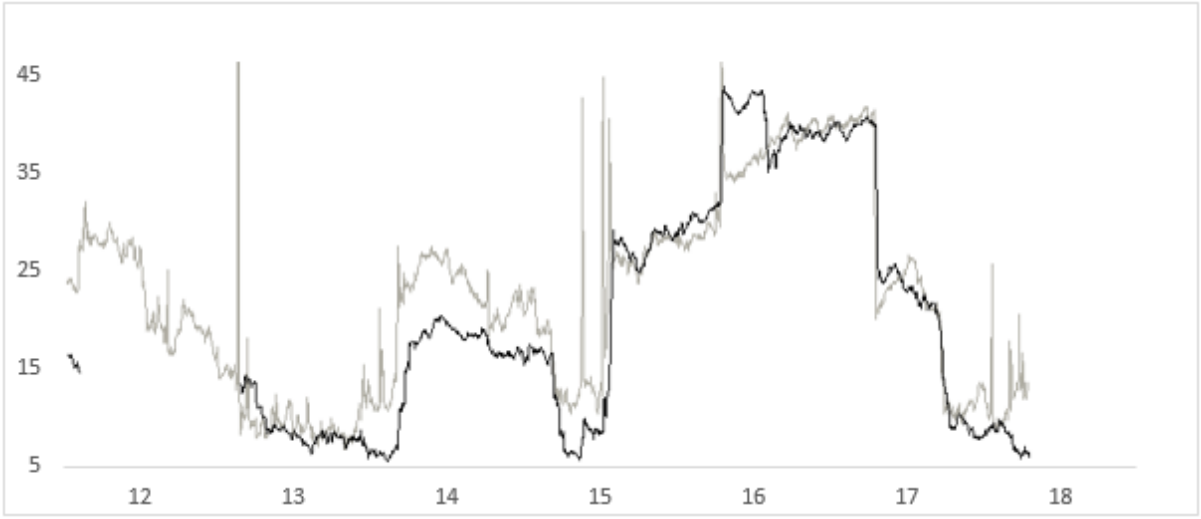
Notes: This table reports the directions of volatility spillovers across 15 IEMs from 01.09.2010 to 15.07.2017. FEVD is based on 15-variate VAR with two lags and ten-day predictive horizons, delivering pair-wise directions of spillovers (15 x 15 countries submatrix). 'From' denotes total directional spillovers from all others, i.e., off-diagonal row sums whereas 'To' denotes total directional spillovers to all others, i.e., off-diagonal column sums. 'Net' spillovers are the difference between the contribution to others and the contribution from others. Boldface values are for reporting/reference purposes. BAH, BAN, EGY, IND, JOR, KUW, MAL, MOR, OMA, PAK, QAT, S.AR, TUN, TUR, and UAE refer to Bahrain, Bangladesh, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Tunisia, Turkey, and United Arab Emirates, respectively.

3.4.2 Dynamic Analysis of Spillovers

The DY approach helps us to capture the evolution of the spillovers index over the period. In this regard, we consider two different rolling windows - Figure 2.1.1 exhibits 250-day, whereas Figure 2.1.2 exhibits 350-day estimations from 01.09.2010 to 15.07.2017. The black trajectory refers to total return, whereas the grey trajectory refers to the total volatility spillovers index. Both indexes exhibit similar patterns; in fact, it appears that the return spillovers index is closely tracking the volatility spillovers index. However, the magnitude of volatility spillovers is higher than return spillovers throughout the sample, with the exception in 2016. Overall, the indexes resemble similar drifts. We focus on the 250-day window as a standard for the subsequent analysis. Looking over Figure 2.1.1, we notice three different phases. First, there is a slow, steady declining phase until approximately mid-2013, which is probably a result of sluggish recovery with reduced financial stress after the Global Financial Crisis[18] (Shahzad et al., 2017) and subsequent European sovereign debt crisis. There has been a downturn in asset prices, a slowdown in capital flows, and a decrease in trades, imputable to the crises. Following that, a lumpy increasing phase (with a short-lived drop near 2015) continues until approximately late 2016, as a result of heightening uncertainty with Syrian civil war (i.e., ISIS escalation), geopolitical conflicts in the Middle East, and the Brexit referendum, indicating intensifying spillover in stress episodes. Finally, the index is found to be declining and remained subsiding until the end of the sample period (July 2017).

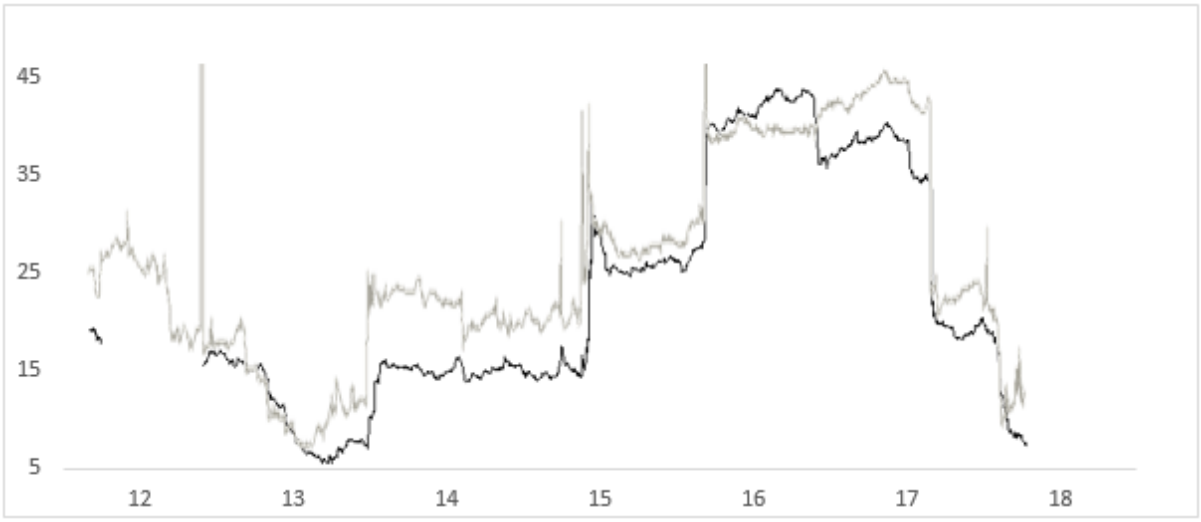
[18]Henceforth, GFC, i.e. started in late 2007, continued over 2008 and bottomed in early 2009 (Kashyap & Zingales, 2010).

Figure 2.1.1: Time-varying Total Return and Volatility Spillovers Index (250-day Window)



Notes: Dynamic spillover index. FEVD is based on 15-variate VAR with 250-day rolling windows and a predictive horizon of 10 days. The sample period is from 01.09.2010 to 15.07.2017; the index starts in mid- 2011. Black trajectory refers to the total return spillover index, whereas the Grey trajectory refers to the total volatility spillover index across.

Figure 2.1.2: Time-varying Total Return and Volatility Spillovers Index (350-day Window)



Notes: Dynamic spillover index. FEVD is based on 15-variate VAR with 350-day rolling windows and a predictive horizon of 10 days. The sample period is from 01.09.2010 to 15.07.2017; the index starts in late 2011. Black trajectory refers to the total return spillover index, whereas the Grey trajectory refers to the total volatility spillover index across.

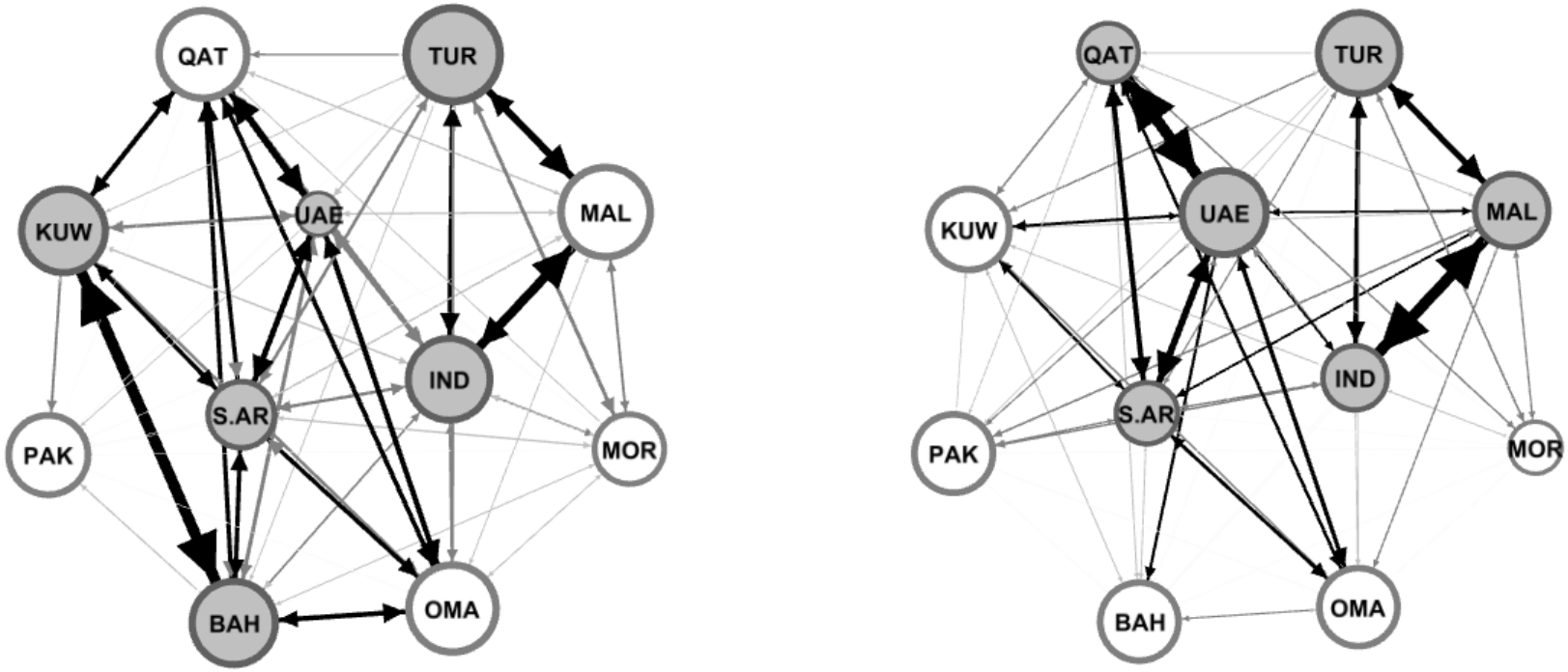
3.4.3 Network Diagram of Spillovers

So far, we have seen that the static extent of return and volatility spillovers are not symmetric across the selected IEMs. The dynamic nature of spillovers further indicates the degree of changing linkages, that is, directions of spillovers over time. We now shift our focus to the GFC, in light of the event being strong evidence of increasing financial integration. Also, as shown in Yilmaz (2010), the return and volatility spillovers behave very differently over time, during the crisis and non-crisis episodes. We divide our baseline sample period into two sub-samples - (i) during the crisis, from 16.07.2007 to 15.07.2009, and (ii) post-crisis, from 16.07.2009 to 15.07.2017. We exclude Bangladesh, Egypt, Jordan, and Tunisia due to the lack of data for the crisis period.

We employ an open-source software Gephi[19] to visualize the pair-wise directions of spillovers as a network diagram, following Diebold and Yilmaz (2014) and Demirer et al. (2018). In the network diagram, node size signifies the extent, i.e., larger node implies the higher impact of spillovers effect while the colors specify whether a market is a net sender (shade) or receiver (white) of spillovers. Node size is not absolute, but relative to their actual value. Node location is set by the forced directed layout algorithm[20] where the sum of the vectors decides which direction a node should move. Node location is adjusted in post-crisis estimation to ease comparison. Similarly, arrow width specifies the strength, i.e., the wider arrow implies stronger pair-wise spillovers. Note that, 11 markets produce 11 X 10 = 210 directions of spillovers; we then trim less imperative directions to improve the clarity of the network diagram. Arrow colors as light grey, grey and black correspond to first, median, and third quartile of all pair-wise (weakest to strongest) directions of spillovers.

[19]For more information see https://gephi.org, and Bastian et al. (2009).
[20]Fruchterman and Reingold (1991) algorithm is available on Gephi.

Figure 2.2.1: Network Plot of Pair-wise Directions of Return Spillovers

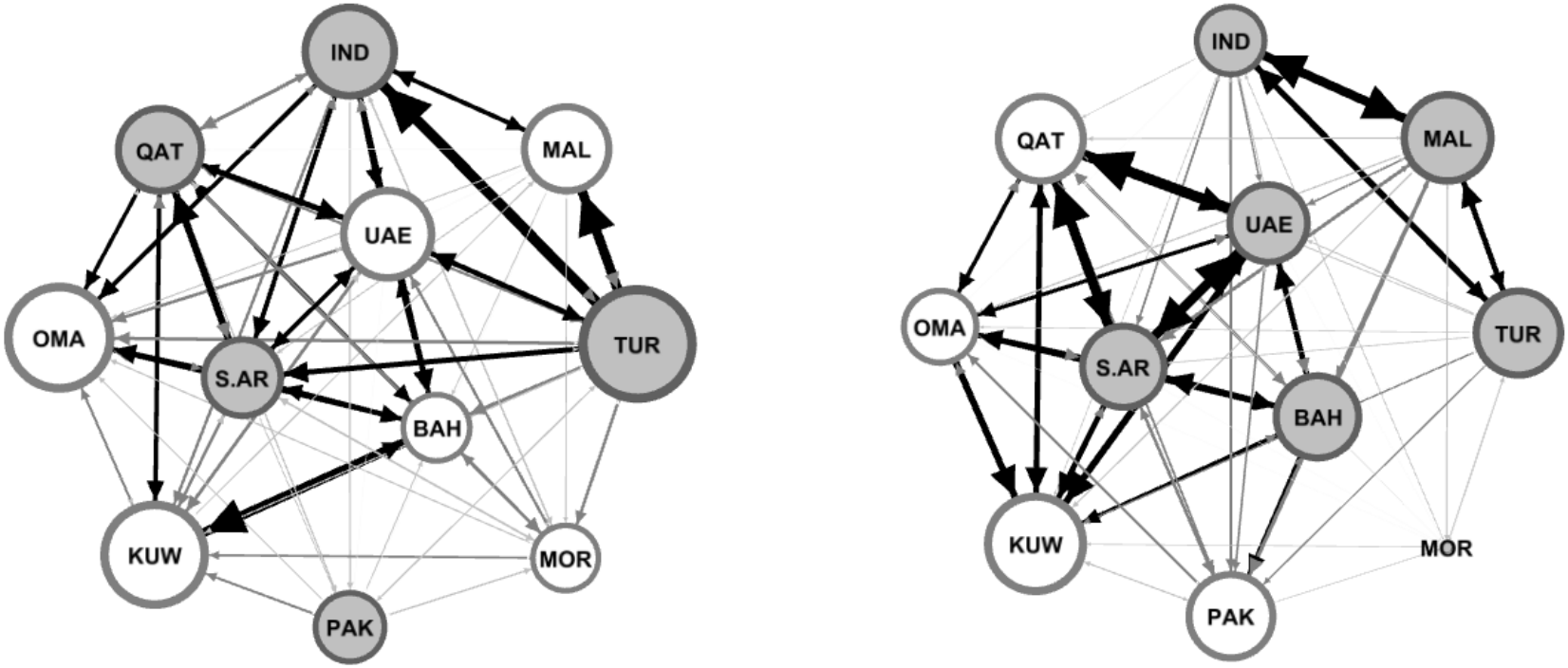


i: During crisis (16.07.2007-15.07.2009), Index: 41.29%

ii: Post crisis (16.07.2009-15.07.2017), Index: 24.88%

Notes: Pair-wise directions of return spillovers. FEVD is based on 11-variate VAR with a predictive horizon of 10 days. In a network diagram, node size signifies the extent, i.e., the bigger node implies a higher impact of a spillover effect. Node size is not absolute, but relative to the real value. Node colors specify whether a market is a net sender (shaded) or receiver (white) of return spillovers. Node location is set by a forced directed layout algorithm where the sum of the force vectors decides which direction a node should move (node location is adjusted in post-crisis to ease comparison). Arrow width specifies the strength, i.e., the wider arrow implies stronger pair-wise return spillovers. Note that, 11 markets produce 11 X 10 = 110 directions; we trim less imperative directions to refine the clarity of the network diagram. Arrow colors, i.e., light grey, grey, and black, correspond to first, median and third quartile of all pair-wise directions of spillovers. BAH, IND, KUW, MAL, MOR, OMA, PAK, QAT, S.AR, TUR, and UAE refer to Bahrain, Indonesia, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Turkey, and the United Arab Emirates, respectively.

Figure 2.2.2: Network Plot of Pair-wise Directions of Volatility Spillovers



i: During crisis (16.07.2007-15.07.2009), Index: 50.31%

ii: Post crisis (16.07.2009-15.07.2017), Index: 31.01%

Notes: Pair-wise directions of volatility spillovers. FEVD is based on 11-variate VAR with a predictive horizon of 10 days. In a network diagram, node size signifies the extent, i.e., the bigger node implies a higher impact of a spillover effect. Node size is not absolute, but relative to the real value. Node colors specify whether a market is a net sender (shaded) or receiver (white) of return spillovers. Node location is set by a forced directed layout algorithm where the sum of the force vectors decides which direction a node should move (node location is adjusted in post-crisis to ease comparison). Arrow width specifies the strength, i.e., the wider arrow implies stronger pair-wise volatility spillovers. Note that, 11 markets produce 11 X 10 = 110 directions; we trim less imperative directions to refine the clarity of the network diagram. Arrow colors, i.e., light grey, grey, and black, correspond to first, median and third quartile of all pair-wise directions of spillovers. BAH, IND, KUW, MAL, MOR, OMA, PAK, QAT, S.AR, TUR, and UAE refer to Bahrain, Indonesia, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Turkey, and the United Arab Emirates, respectively.

As could be expected, we find a higher intensity of return spillovers during the crisis period (Figure 2.2.1). The most significant directions of spillovers are between Kuwait and Bahrain, indicating increased interdependence during the crisis, but after the crisis, the extent of spillovers have been weak, thereby both markets evolved as net recipients of return shocks. In post-crisis, the linkages have been stronger between Qatar and UAE, while Saudi Arabia seems to play a stable role between them. Similarly, the linkages have been stronger between Indonesia and Malaysia, while Turkey plays a stable role. To wit, the findings from Figure 2.2.1 (ii) is consistent with Table 2.3.1

From Figure 2.2.2, we find a similar scenario for volatility spillovers. Indeed, the level of spillovers is quite higher during the GFC. The strong impact of Turkey over Indonesia (net spillover: 18.17%) and Malaysia (net spillover: 14.35%) is noticeable during the crisis, but the scales of volatility spillovers changed severely in post-crisis. The linkages between Indonesia and Malaysia have intensified with reduced volatility shocks from Turkey. The scales of volatility spillovers in Qatar, Saudi Arabia, and UAE also intensified after the crisis, and this indicates the clustering of spillovers. Lastly, Kuwait remains as the largest receiver of volatility shocks from all other GCC countries. GCC countries act as the main source of varying stresses to each other, with Saudi Arabia playing an active role, in line with Alotaibi and Mishra (2015). The findings from Figure 2.2.2 (ii) are consistent with Table 2.3.2.

Thus far, given the pair-wise spillovers are so different from each other, we now look further for the antecedents of these differences by examining macroeconomic characteristics in the next section.

3.4.4 Determinant Factors of Spillovers

We hypothesize that the macroeconomic characteristics of respective countries can be useful in explaining the magnitude of spillovers. In this regard, Table 2.4 reports the results from the regressions of Eq. 9 for the determinants of pair-wise return and volatility spillovers, respectively, across 15 IEMs.

According to the regressions, the main variables of interests, total bilateral trade, and net outflow of direct investment equity are statistically significant with sizeable effect and positively influence the extent of both return and volatility spillovers. This aligns with Alotaibi and Mishra (2015) and Balli et al. (2015), who also find that trade and investment are significant in explaining the spillovers effect. There can, therefore, be no doubt that increasing trade and investment are primarily the key indicators of the magnitude of spillovers. Then again, as could be expected, sharing the same borders positively play a significant role in the cross-border transmission of shock. It implies that a shock spills over inherently to the neighboring markets more rapidly (Yu et al., 2010).

We also find a positive significant coefficient for the per capita GDP correlation, which is highly intuitive[21]. The economic cycle sets the scope of return spillovers in equity markets. This is in line with Ehrmann and Fratzscher (2010), who states that a shock spreads from its epicenter to the cyclically correlated markets. Following the common shock issue of Andrews (2005) on cross-section dependence, we include an indicator variable that takes 1 for GCC region countries and 0 if not to capture the common regional shock impact. We find a positive

[21]According to Kose and Yi (2006), total bilateral trade intensity is linked with the increase in GDP correlations.

significant coefficient, which means volatility spillovers across GCC equity markets are mainly driven by common regional shock. Interestingly, we find the size of an IEM (i) is negatively related to the extent of return spillovers from another IEM (j). It means that the impact of a shock from others weakens with the growth of the local equity market. Though larger markets experience more stress as investors are better able to rebalance their portfolios (Eichengreen & Gupta, 2015), we fail to find a size impact on volatility spillovers. Thus volatility spillovers seem not to be affected by the market size.

In sum, the statistically significant coefficients alongside high adjusted R-squared values indicate the importance of sharing borders, total bilateral trade, and direct equity investment to explain the directions of spillovers in IEMs.

Though we deployed aggregate cross-sectional data on a Gravity model framework, one may argue that bilateral trade may affect return and volatility spillovers in the equity markets. The underlying spillovers can also affect the trend in bilateral trade. This certainly raises concerns for the causal effects. However, trade has been the central part of economic integration in the world. Financial assets trading and other economic factors evolve from bilateral trade. In this regard, Lane and Milesi-Ferretti (2008) report that bilateral equity investment is strongly correlated with trade's underlying patterns. It is also highlighted by Okawa and Wincoop (2012) who argue that trade is the causality for the integration of asset pricing and trading. A case to this point is the evolution of the EU integration. As equity markets return can be affected both by a country-specific and bilateral component, including market size variable, i.e., stock market capitalization and investment, perhaps minimize the causality concerns.

Table 2.4: Impact of Macroeconomic Variables on Spillovers

Variable	Return Spillovers		Volatility Spillovers	
Bilateral Distance ($Dist_{i,j}$)	0.22	(0.69)	0.77	(0.82)
Contiguous ($Cont_{i,j}$)	6.34***	(1.53)	4.86***	(1.41)
Common Colony ($ComCol_{i,j}$)	0.06	(0.38)	0.03	(0.32)
Common Language ($ComLan_{i,j}$)	0.04	(0.22)	-0.69**	(0.32)
Population ($PopNum_i$)	0.26	(0.24)	0.36	(0.36)
GDP (GDP_i)	0.69	(0.60)	-0.33	(0.63)
GDP Correlation ($\rho_{GDP_{i,j}}$)	0.49***	(0.17)	-0.42	(0.37)
Bilateral Trade ($Trade_{i,j}$)	0.28**	(0.13)	0.21**	(0.11)
FDI Outflow ($FdiOut_i$)	0.49***	(0.15)	0.34*	(0.18)
Market Cap. Country ($MktCapC_i$)	0.01	(0.01)	-0.01	(0.01)
Market Cap. I_Index ($MktCapI_i$)	-0.13**	(0.05)	0.03	(0.08)
GCC Region ($GCC_{i,j}$)	0.87	(0.92)	6.44***	(1.26)
Obs.	210		210	
Adjusted R-squared	59.49%		61.99%	
F-statistic	24.87***		27.51***	
Wald F-statistic	28.24***		18.93***	
Durbin-Watson Stat.	2.11		2.10	
Ramsey RESET Test (F-test Prob.)	0.20		0.62	

Notes: This table reports the regression results from Eq. 9. Dependent variable Return/Volatility Spillovers refers to the pair-wise Return/Volatility Spillovers. Explanatory variables - $Dist_{i,j}$ refers to the logarithm of total physical distance in between the capital cities of country *i* and country *j*; $Cont_{i,j}$ is a binary variable that takes 1 if country *i* and country *j* share a border, 0 if not; $ComCol_{i,j}$ is a binary variable that takes 1 if country *i* and country *j* share a common colonial relationship and 0 if not; $ComLan_{i,j}$ is a binary variable that takes 1 if country *i* and country *j* share a common language, and 0 if not; $PopNum_i$ refers to the logarithm of the average annual population of a country; GDP_i refers to the logarithm of average annual GDP of a country; $\rho_{GDP_{i,j}}$ is the correlation of GDP per capita between country *i* and country *j*; $Trade_{i,j}$ refers to the logarithm of average total annual bilateral imports and exports between country *i* and country *j*; $FdiOut_i$ refers to the average net annual outflows of investment from country *i* to the rest of the world (normalized by GDP); $MktCapC_i$ refers to the average market capitalization of all listed domestic firms of a country (normalized by GDP); $MktCapI_i$ refers to the average market capitalization of the Islamic equity index of a country (normalized by GDP); and $GCC_{i,j}$ is a binary variable that takes 1 for the GCC region and 0 if not. Superscripts are symbolizing *** p < 0.01, ** p < 0.05, * p < 0.10 and numbers in (.) are the HAC standard errors.

3.5 Conclusions and Implications

This study considers the real development of Islamic equity finance and investigates pair-wise, total, and net return and volatility spillovers, exclusively in 15 major IEMs. Equally important, unlike the majority of the past studies, we highlight the origins and drivers of spillovers with market integration.

Using the generalized VAR perspective of the spillover index, we find increasing interactions in return and volatility spillovers while the extent of spillovers has been asymmetric across the selected countries. We also find a time-variant pattern of spillovers where the magnitude of volatility spillovers has been critically higher than return spillovers. The GCC countries act as the main source of varying stresses to each other, that is, more responsive to regional shock than external shock. This is probably due to the dynastic linkages and economic openness among the member countries. To uncover the inter-regional and intra-regional spillovers more clearly, we employ network analysis. We find the presence of persistent clustering in spillovers among Qatar - UAE - Saudi Arabia and Turkey - Malaysia - Indonesia, signifying higher market integration. These countries also lead the spillovers in their respective region. Moreover, we find a higher intensity of spillovers during the recent financial crisis, suggesting increasing interdependence in the stress period.

Furthermore, the cross-section analyses expose the significance of common bilateral, economic/financial structural variables to explain the strength of return and volatility spillovers. More specifically, sharing a border, total bilateral trade, and outward investment seem to have impacted the directions of spillovers over time.

Our results are important for projecting equity return and volatility spillovers vis-à-vis bilateral and macroeconomic linkages, and thus, fostering our understanding of the interaction of the major IEMs. We provide relevant and valuable insights for restricted faith-based investors and cross-border portfolio managers. There are strong motivations to comprehend spillover sizes and paths, particularly for investors who seek to diversify their portfolios only across IEMs that match the faith criteria. They can identify the Shari'ah-compliant securities available for investment by an exact way of measuring the market risk. The specific clusters of return and volatility spillovers indicate possible contagion risk, which can restrict Islamic portfolio holders. Then again, bilateral trade linkages are strong on spillovers, indicating limited room for diversification as it deters investors from holding securities of close trading partners. On a positive note, investors can focus on the underlying market movements, learn their sensitivity to the spillovers, and implement volatility trading strategies accordingly. An important lesson for Shari'ah scholars/policymakers is to realize the importance of more liquid IEMs to minimize vulnerability to external shocks. We also note the nature of spillovers in IEMs with the macroeconomic shaping dynamics, are similar to the conventional counterparts.

To conclude, the DY spillover index does not necessarily distinguish the potential asymmetry in spillovers that originates as a result of positive and negative news (Baruník et al., 2016). Therefore, a future study can consider this issue, as often investors react more strongly to negative rather than positive shocks.

Appendix A

Table A2.1: List of Islamic Equity Indexes

	Index	Symbol	Available Year	Market Capitalization (US $)
1	MSCI Bahrain	MSBHRI$	2007	723,574,759.49
2	MSCI Bangladesh	MSBNGIL	*2010*	1,802,711,640.15
3	S&P Egypt	SBEGBS$	*2009*	455,525,575.53
4	MSCI Indonesia	MSINIQ$	2002	29,022,236,802.74
5	S&P Jordan	SBJOBSL	*2009*	1,113,547,883.35
6	MSCI Kuwait	MSKWSI$	2007	14,160,865,472.50
7	MSCI Malaysia	MSMYIS$	2002	46,138,342,248.82
8	MSCI Morocco	MSMOIS$	2002	3,271,299,402.13
9	MSCI Oman	MSOMIS$	2007	1,459,583,618.48
10	MSCI Pakistan	MSPQIS$	2002	1,755,237,802.44
11	MSCI Qatar	MSQTISE	2007	10,549,074,217.99
12	MSCI Saudi Arabia	MSSADI$	2007	98,107,926,665.55
13	S&P Tunisia	SPTUNS$	*2007*	155,222,331.84
14	MSCI Turkey	MSTKIS$	2002	7,417,602,619.47
15	MSCI UAE	MSUAISE	2007	6,963,570,057.14

Notes: We had access to index price data for Bangladesh from 01.09.2010, for Egypt and Jordan from 14.07.2010, for Tunisia from 31.07.2008 and rest of the countries from 16.07.2007 on DataStream. Market capitalization data is collected directly from MSCI©, and it is averaged for the period between 2010 and 2017.

Table A2.2: List of Macroeconomic Variables

Variables	Short Definition	Source
Bilateral Distance$_{ij}$ (log)	physical distance in kilometers between origin country i and country j	French Research Center in International Economics (CEPII)
Contiguousness$_{ij}$	a binary variable that takes one if origin country i and country j are sharing a border, and 0 otherwise	CEPII
Common Colony$_{ij}$	a binary variable that takes one if there is a common colonial relationship between country i and country j, and 0 otherwise	CEPII
Common Language$_{ij}$	a binary variable that takes one if origin country i and country j share at least one common language and 0 otherwise	CEPII
Population$_i$ (log)	the population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship	World Development Indicators, The World Bank Group (WDI)
GDP$_i$ (log)	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products	WDI
GDP Correlation$_{ij}$	correlation of real GDP per capita series between country i and country j	WDI, authors' calculations
Bilateral Trade$_{ij}$ (log)	trade is the sum of bilateral exports and bilateral imports of goods and services	STAN Bilateral Trade Database, OECD
FDI Out$_i$ (%GDP$_i$)	net outflows of investment from the reporting economy to the rest of the world, and is divided by GDP	WDI
Market Cap. Country$_i$ (%GDP$_i$)	market capitalization is the share price times the number of shares outstanding for listed domestic companies, as a share of GDP	WDI
Market Cap. I_Index$_i$ (%GDP$_i$)	it is the sum of share price multiplied by the number of ordinary shares in issue for each Islamic index constituent, as a share of GDP	MSCI©, S&P
GCC Region$_i$	a binary variable that takes 1 for GCC region, and 0 otherwise	-

Notes: Market Cap. I_Index refers to Market Capitalization of the Islamic Index for a country.

Table A2.3: Summary Statistics of IEMs (Volatility)

	Mean	Max.	Min.	Std. Dev.	Skew.	Kurt.	J-B	ADF	PP
BAH	0.0002	0.0039	0.0000	0.0003	5.39	46.63	2.2E+05***	-5.24***	-9.11***
BAN	0.0002	0.0024	0.0000	0.0002	4.55	28.63	5.5E+04***	-4.16***	-5.30***
EGY	0.0003	0.0029	0.0000	0.0002	5.41	54.18	2.1E+05***	-8.71***	-69.32***
IND	0.0004	0.0035	0.0001	0.0004	3.30	19.01	3.3E+04***	-3.88***	-4.17***
JOR	0.0001	0.0007	0.0000	0.0000	3.74	30.81	6.3E+04***	-7.75***	-8.06***
KUW	0.0002	0.0026	0.0000	0.0003	4.36	25.84	6.5E+04***	-3.53**	-4.22***
MAL	0.0001	0.0008	0.0000	0.0001	2.88	14.54	1.8E+04***	-4.44***	-4.42***
MOR	0.0001	0.0005	0.0000	0.0001	2.22	10.42	8.1E+03***	-7.35***	-6.78***
OMA	0.0001	0.0031	0.0000	0.0002	5.00	37.33	1.4E+05***	-5.73***	-8.61***
PAK	0.0002	0.0022	0.0000	0.0002	3.62	23.50	5.1E+04***	-8.10***	-7.82***
QAT	0.0003	0.0027	0.0000	0.0003	3.43	17.88	2.9E+04***	-5.83***	-6.90***
S.AR	0.0002	0.0041	0.0000	0.0004	4.49	29.83	8.7E+04***	-5.70***	-7.35***
TUN	0.0002	0.0237	0.0000	0.0007	27.25	833.77	6.7E+07***	-21.07***	-20.27***
TUR	0.0005	0.0036	0.0001	0.0004	4.20	26.52	6.8E+04***	-4.97***	-4.60***
UAE	0.0005	0.0058	0.0001	0.0006	3.95	23.25	5.1E+04***	-4.07***	-5.90***

Notes: Max., Min. and Std. Dev. refer to maximum, minimum, and standard deviation, respectively. J-B is the Jarque-Bera test for normality, while ADF (Augmented Dickey & Fuller) and PP (Phillip & Perron) are the tests of stationarity. The results are for the whole sample period (16.07.2007-15.07.2017), with superscripts symbolizing *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. BAH, BAN, EGY, IND, JOR, KUW, MAL, MOR, OMA, PAK, QAT, S.AR, TUN, TUR, and UAE refer to Bahrain, Bangladesh, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Tunisia, Turkey, and United Arab Emirates, respectively.

Appendix B

October 10, 2017

Iftekhar Hasan
Academic Research
Massey University
i.chowdhury@massey.ac.nz

MSCI Market Capitalizations

Dear Iftekhar Hasan,

1. I am in receipt of your request to utilize and reproduce certain proprietary data of MSCI Inc. ("MSCI") in your research.

2. The MSCI data to be made available to you shall consist of the next Indexes:
- MSCI Islamic Indexes

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Name of candidate:	Md Iftekhar Hasan Chowdhury
Name/title of Primary Supervisor:	Dr Faruk Balli (Associate Professor)
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Chapter 4

Islamic Equity Fund Investment Styles

4.1 Introduction

Over the years, mutual fund investment styles have intrigued and attracted the interest of numerous researchers (see, for example, Brown & Harlow, 2002; Chan et al., 2002; Barberis & Shleifer, 2003; Kaplan, 2003). Put simply, style investing is the underlying course of investment across broad asset classes rather than in individual securities. Generally, style investing refers to the stock investing objective of value or growth alongside market capitalization, i.e., the size of a fund's portfolio holdings. On the one hand, fund managers undertake a wide variety of approaches and adopt various criteria for stock selection (Chan et al., 2002). On the other hand, investors invest in a fund based on their risk-return (extrapolative) expectations (Barberis & Shleifer, 2003).

Assets in a style or class usually share common characteristics (Barberis & Shleifer, 2003). The fund market identifies two broad classes - growth and value stocks. Value stocks are those currently trading below their book or intrinsic value (i.e., high book-to-market, BM), while growth stocks are those companies expected to expand faster (i.e., high market-to-book, MB). In most cases, value stocks are from more established firms, while growth stocks are from relatively younger firms. Importantly, value stocks provide dividends, unlike growth stocks that typically refrain from dividend payouts and instead reinvest to expand. In this regard, to argue on the risk-

return sensation, Chan and Lakonishok (2004) verify a variety of indicators, together with beta and return volatility, and suggest that both value and growth stocks bear similar risk-return status. Additionally, Morningstar[22] categorizes funds into either value, growth, or blend categories. The blend, as a hybrid category, holds funds that mix stocks in the portfolio holdings. This category aims to diversify within the key investment styles in a single fund, take advantage of the stability and dividend income of the value segment as well as the potential capital yield income of the growth portion. Besides, there are also size categories based on the typical market capitalization of portfolio holdings, i.e., small, medium, and large-cap[23].

The last two decades have seen the remarkable growth of socially responsible as well as ethically established investment funds as a significant investment stream (Abdelsalam, Fethi, et al., 2014; Nainggolan et al., 2016). Islamic equity fund(s)[24] (IEF/IEFs), fit this category. Individual investors typically choose these funds based on their religious faith-based and ethical preferences, as well as personal situations and expectations. As such, juxtaposed with the spectacular development of IEFs both in Islamic and non-Islamic jurisdictions, changes in IEF style investing is of vital interest.

[22]The Morningstar database is the most encyclopaedic database for fund characteristics (Chan et al., 2002; Idzorek & Bertsch, 2004; Nainggolan et al., 2016).
[23]Large-cap stocks together account for the top 70% of the cumulative capitalization of each style zone; mid-cap the next 20%; and small-cap the rest 10% (Morningstar, 2008).
[24]Structure-wise, equity is the main asset class of Islamic funds (nearly 40%), thus Islamic fund managers invest mainly in Islamic equity, i.e., stock (Peillex et al., 2018).

Total assets under the Islamic financial system are expected to surge to US$3.8 trillion by 2024[25]. Sector-wise, Islamic funds are the third-largest contributor after Islamic banking and Ṣukūk (Islamic bonds). We witness a significant increase in the number of Islamic mutual funds from 1,161 in 2017 to 2018 to 1,292, with these funds domiciled in 34 jurisdictions, including non-Organisation of Islamic Cooperation (OIC)[26] countries (IFSB, 2019). Western countries too have developed a keen interest in asset-backed financial products/services and the risk-sharing principle of Islamic finance, upholding their Islamic financial services to attract both Muslim and non-Muslim investors (Čihák & Hesse, 2010).

Unlike typical funds, Islamic funds undertake a strict screening course in an attempt to select assets that meet both qualitative and quantitative criteria set by the Shari'ah criterion (Abdelsalam, Fethi, et al., 2014). More specifically, it screens investments to eject interest charges, speculation, uncertainty, exploitation, or injustice activities, which are strictly prohibited by Shari'ah. Moreover, there is also the devotion to specific metrics for leverage and liquidity level (El-Gamal, 2006). Notably, the relativity and relevance of Islamic funds vary across nations or regions though their impact is spreading worldwide. Their role in Western economies is relatively modest compared to other types of investment, such as socially responsible investment (SRI), whereas it is much more firmly established, specifically in Muslim majority countries in Asia and Africa regions (El-Masry et al., 2016). Like the typical fund, the Islamic fund refers to the

[25]An Inclusive Ethical Economy: State of the Global Islamic Economy Report 2018-2019, available at: https://haladinar.io/hdn/doc/report2018.pdf

[26]Organization of Islamic Cooperation (OIC) is the collective voice of the Muslim world (founded in 1969) to safeguard and protect Muslim interests in the spirit of promoting international solidarity. Read more: www.oic-oci.org.

standard practice of managing investment via methods that mix investors' financial objectives with religious considerations. Therefore, Islamic funds in both Islamic and non-Islamic countries are actively held in a sense that fund managers rebalance portfolios to attain the investment objectives (Peillex et al., 2018). Albeit, the objective might vary mainly with the core investment style.

Recently, Ferruz et al. (2012) assert that religious mutual fund investors make investments based on their social and personal values. They also report that religious mutual fund managers typically invest in small-cap and value stocks. This reflects the behavioral aspect of risk avoidance, a common feature of investment by religious faith-based investors, investing in more well-established companies as well as secure income avenues via dividends. Debatably, this is to some extent due to the leverage restraint in IEF that leans toward value stocks relative to that of growth stocks (Campbell & Vuolteenaho, 2004). By contrast, Hoepner et al. (2011) find evidence from 20 countries that IEF is somewhat tilted to growth stocks. They also find that funds from predominantly Muslim economies exhibit a strong small-cap tilt. In this regard, Hayat and Kraeussl (2011) hypothesize that IEFs are susceptible to investing in sub-optimally leveraged companies, which means high exposure to companies with difficulty in debt financing startups, typically small companies. However, this size orientation rationale is arguable. In a recent study, Pastor et al. (2020) find that funds typically tilt more to large-cap stocks for the reason that small-cap stocks are more expensive to trade. They conjecture, in equilibrium, funds optimally choose the trade-off of trading cost versus potentially higher return of the small-cap stock. In consonance, Lettau et al. (2018) report that the majority of the US-based funds overwhelmingly

hold large-cap stocks. Noteworthy also is the significant contrast to the substance of the capital markets in Islamic and Western economic systems (Hearn et al., 2012).

The subtle contrasts and vagueness in the foregoing studies, as well as the specificity of IEFs in Islamic and non-Islamic countries, inspired us in this study that aims to add to cumulative knowledge on IEF style investing across these two broad country groupings. The impact of Shari'ah on consumers in Islamic countries is more potent than in non-Islamic countries, which may result in variations in investment styles. One can also expect variances in Islamic countries' (mostly emerging to developing markets) and non-Islamic countries' (mostly developed markets) investment styles, due to variances in the degree of competition and the learning curve aspect. So, the degree of style shift may be unalike. Moreover, prior studies have explicitly relied on return-based style analysis (RBSA) to explain the investment style despite misclassification problems (Van Campenhout, 2002). This points to a potential research gap in relation to the implicit notion of portfolio holdings over time that avoids misclassification problems associated with RBSA. We aim to mitigate this gap with our study. Therefore, we investigate IEF investment styles based on portfolio holding-based style analysis.

A consistent investment style is an important aspect of portfolio management (Brown & Harlow, 2002). However, studies over time report that typical funds do not always operate as their names suggest (Chan et al., 2002; Kaplan, 2003). Then again, over time, a security's value deviates noticeably from the underlying value as styles turn out to be favorable or unfavorable (Barberis & Shleifer, 2003). Empirical studies, for instance, Brown and Harlow (2002) and Kaplan

(2003), for that reason, report the role of style shift in investigating investment styles. To our knowledge, the aspect of style shift is almost entirely non-existent in IEF related studies. A recent exception, albeit with an only oblique reference to style shift, is Peillex et al. (2018), who surmise that IEF managers are expected to be more sensitive to portfolios' idiosyncratic risks by adopting a more reactive stock-picking approach. We conjecture that style shift in Islamic portfolios is important to explain the investment styles and is more significant in light of the Shari'ah compliant ideologies.

Our analyses of an unbiased survivorship sample of 224 active IEFs domiciled in 22 countries for the period from 2004 to 2018, yield several in-depth findings. First, our historical portfolio holding-based style analysis reveals IEFs initially overwhelmingly tilt to value stocks in Islamic countries and growth stocks in non-Islamic domiciles. However, recently, IEF managers are moving to portfolios that are more tilted to blend style. Similarly, IEFs initially overwhelmingly pick mid-cap stocks in Islamic countries, but lately, the majority of them have been heavily skewed to large-cap stocks. We instead find a consistent large-cap tilt in non-Islamic domiciles. Further, our multinomial regressions quadrate these schemas, indicating a linkage between investment styles and historical returns. Second, from the common style drift analysis, we find most IEFs drift in style, but the drift rate (as well as mean score) is higher in Islamic countries than non-Islamic domiciles. Next, our portfolio-based style analysis finds that the propensity of style shift is higher in asset types than in asset sizes. IEF managers are more likely to alter their portfolio exposure to the market when they undergo negative returns and in the sight of a drop in total asset value. Collectively, IEFs shift in asset types more often once they secure an increase

in fund flow. The more mature fund is more likely to style shift in Islamic countries. Funds from non-Islamic domiciles are more likely to shift in asset types when the market is relatively stable. We also note that the nature of the IEF style shift is similar to that of conventional counterparts. Hence we argue that investment styles are induced by the shift of holding stock characteristics, both in asset type and size dimensions.

Our investigation is exploratory; therefore, scholarly contributions are broad. To the best of our knowledge, historical portfolio-based style analysis is almost entirely non-existent in extant Islamic fund related studies. This is the first study to contribute more directly to exploring the investment styles that are instrumental in Islamic and non-Islamic jurisdictions through a portfolio holdings lens. It connects with preceding studies on the long-standing and complex investment style issue and advances our understanding of Islamic equity portfolio holdings. Consequently, it can help restricted faith-based fund managers, as well as investors, to comprehend the subsequent comportment of Islamic investments.

The remainder of this article is organized as follows. Section 4.2 presents a brief review of pertinent literature and highlights the objectives of the study and states the research questions. We explain our sample and describe the data in section 4.3, and develop the research approach in section 4.4. The empirical findings/insights are in section 4.5. Lastly, we offer concluding remarks in section 4.6, exploring the implications of the study.

4.2 Literature Review

Over the last decade, several studies have analyzed IEFs. The key research strands are the risk-return characteristics (Hayat & Kraeussl, 2011; Hoepner et al., 2011) that take the effect of Shari'ah compliance (Ashraf, 2016; Nainggolan et al., 2016) as well as comparative performance in relation to conventional counterparts (Ashraf, 2013; Abdelsalam, Fethi, et al., 2014; El-Masry et al., 2016; Boo et al., 2017), and more lately, managerial skills in stock selection (Ferruz et al., 2012; Ashraf, 2013; Kamil et al., 2014) and performance persistence (Abdelsalam, Duygun, et al., 2014; Abdelsalam et al., 2015; Makni et al., 2016). However, when it comes to analyzing the investment styles in IEFs explicitly, the literature is limited. Despite strong interest in IEFs by investors, as well as portfolio managers, underlying investment styles have largely remained vague in the scholarly literature. We highlight next, the limited number of studies that provide some insights.

Crane et al. (2008) claim that religious belief is the first rationale for socially responsible investment, and it remains a vital dynamic over time. According to Peifer (2011), religious mutual funds in the US, consciously inject social as well as ethical concerns into economic decision-making. In a similar vein, Ferruz et al. (2012) assert that religious mutual funds commonly invest in value stocks. This probably arises from the aspect of risk avoidance, an investment commonality across the religious faith-based investors, investing in well-established companies as well as secure income avenues. To some extent, this is arguable, with the leverage restraint in IEF as the higher leverage of value stocks relative to that of growth stocks (Campbell & Vuolteenaho, 2004). In this regard, Girard and Hassan (2008) indicate a growth sector tilt in

Islamic equity indices (FTSE Islamic indices). Consistent with the underlying expectancy, Hoepner et al. (2011) also find the international investment style of IEFs appears somewhat tilted to growth stocks, conjecturing the aspect of relatively lower leverage of growth stocks. In contrast, BinMahfouz and Hassan (2012) find no significant growth stock tilt in IEF, particularly in the Saudi Arabian and other Asian, including Japanese funds. Recently, Omri et al. (2019) report that Islamic funds in Saudi Arabia are more value-oriented compared to their conventional counterparts.

Girard and Hassan (2008) signpost higher small-cap tilt in Islamic equity indices compared to conventional counterparts. Hassan et al. (2010) raise the same issue in the Malaysian Islamic unit trust fund. Hoepner et al. (2011) provide the strongest evidence that Islamic funds from predominantly Muslim economies display a strong small-cap preference. Similarly, Wan-Ni (2012) show that Christian indexes in the US and EU display some tilt to the small-size factor. Ferruz et al. (2012) also assert that religious mutual funds commonly invest in small-cap stocks. In this regard, Hayat and Kraeussl (2011) hypothesize that IEF is susceptible to investing in sub-optimally leveraged companies, which means high exposure to companies that have difficulty in debt financing, such as - startups, typically small-cap stocks. In contrast, BinMahfouz and Hassan (2012) find that Islamic mutual funds, particularly in Saudi Arabia, do not seem to be influenced to target small-cap stocks. Walkshäusl and Lobe (2012) indicate that Islamic indices in emerging markets exhibit a substantial large-cap bias in their investment. In a recent study, Omri et al. (2019) report that Islamic funds in Saudi Arabia display a large-cap preference. In this regard, Pastor et al. (2020) show that mutual fund picks large-cap stocks since small-cap stocks are more expensive to trade. They argue that a fund manager optimally

considers the trade-off of trading cost versus a potentially higher return of small-cap stocks in equilibrium. Lettau et al. (2018) find that the vast majority of mutual funds in the US overwhelmingly hold large-cap stocks.

Despite the rise in studies on IEF, their contributions have not reached a consensus on investment styles. One possible explanation for this broad and mixed empirical evidence might be that most of the studies implicitly regard IEF as invariable to their domicile exposure. Another reason could be the lack of emphasis on the dynamic aspects of style investment. That said, related studies explicitly rely on RBSA. This highlights a potential research gap that directly relates to portfolio holdings-based style analysis. Furthermore, investment styles shift over time (Brown & Goetzmann, 1997). This may ameliorate when security prices deviate considerably from their underlying values as specific styles turn out to be favorable or unfavorable on investment (Barberis & Shleifer, 2003). Thus a fund manager can motivate by economic reasons to alter portfolio holdings in anticipation of changing market conditions (Annaert & Van Campenhout, 2007). In this vein, Holmes and Faff (2008) also argue that prevailing market conditions can influence fund manager portfolio decisions. Put simply, any deviation from the stated investment objectives refers to a style shift/drift[27] (Cumming et al., 2009). However, in-depth analysis of IEF style shift is almost entirely non-existent in extant studies. Recently, Shahimi and Hanafi (2019) examine the style drift of Ṣukūk funds using RBSA and show that only a few of them indicate significant drift in style from the original objectives. Of relevance, Sha (2020) utilizes the rarely

[27]The terms style 'shift' and 'drift' are used interchangeably in the literature and are generally synonymous.

employed portfolio holdings-based style analysis to study mutual funds in China and finds that the change of holding stock characteristics induces style shift.

Accordingly, given the sparse attention in prior literature to IEF style considerations, our study has dual objectives. First, we inspect the investment style of IEFs based on their historical portfolio holdings. Second, we empirically test for the nature of IEF style shift. Hence, we pose the following research questions for our exploratory study:

1. Is there any style concentration in IEFs? If any, does this concentration vary in Islamic and non-Islamic countries?
2. Do IEFs go through style shifts like their conventional counterparts? If so, why?

4.3 Data Description

We identify the IEFs via Morningstar[28] over the 15 years. Our sample period is January 2004 to December 2018 and employs standard screens (i.e., Ethical Issue Strategy Focus: Shari'ah > Global Broad Category Group: Equity > Share Class: Oldest; see Appendix A Table A3.1 for specifics). The insertion of a fund with limited data raises some modelling issues; for instance, the low number of observations upsets the robustness of the analysis. Accordingly, the sample start date is confined to January 2004. In the sample period, some funds were born, but some funds also did not survive. We consider both; otherwise, it could yield the so-called survivorship problem (Abdelsalam, Fethi, et al., 2014). However, we only consider funds for which information for at least two years was available. We collect data on fund name, country of domicile,

[28]To the best of our knowledge, Morningstar has the most comprehensive data coverage for IEFs from all over the world, and is also known for the granularity in clarifying Shari'ah Compliance.

investment area, sale region, inception date, holdings type, Morningstar style box[29], total net assets, net flow, return, and management fee as of December 2018. We compute quarterly data to avoid calendar anomaly as well as missing values. We also convert monetary values into US$ if reported otherwise. Table A3.2 in Appendix A exhibits the complete list of variables with the definition.

From our initial screening, we find a total of 414 IEFs domiciled in 24 countries across the world. Of these, 289 funds were domiciled in Islamic countries, and the rest 125 funds domiciled in non-Islamic domiciles. Asia Pacific countries dominate both in the cases of investment area and region of sale (see Appendix A Figure A3.1 for more details). The descriptive statistics in Table 3.1 shows notable disparities in the fund's characteristics across the countries. For instance, nearly one-third of our sample funds have died. The attrition rate varies considerably in the sample countries; collectively, 26% in Islamic countries, while 46% in non-Islamic countries. It suggests, as reported by Hoepner et al. (2011) that Islamic investment services might develop smoother in Muslim majority countries. However, since the objective of this study is to examine the underlying investment styles of the IEF on the basis of historical portfolio holdings, we require portfolio holdings that are linked with investment styles. Morningstar records holdings that have been either voluntarily disclosed by the fund or the fund provides while Morningstar makes holdings requests on an ad-hoc basis (Gregory-Allen et al., 2019). However, we find nearly half

[29]Morningstar categorizes funds as small-growth, small-value, small-blend, mid-growth, mid-value, mid-blend, large-growth, large-value, and large-blend (Morningstar, 2008).

of our initial sample did not release such information[30], and the rate is significantly higher for Islamic domiciled (54%) compared to non-Islamic domiciled (28%) funds. This is inconsistent with the risk-sharing ideology of financial contracts that requires a high level of transparency in the Islamic financial system (Nainggolan et al., 2016). This is a major issue for the Shari'ah regulator, as well as fund managers as portfolio holdings information is important for investors' confidence.

We ultimately include 224 IEFs with full disclosure to portfolio holdings as well as investment styles. Of which, 134 funds domiciled in 5 Islamic countries, and the rest 90 funds domiciled in 17 non-Islamic countries. On average, IEFs are relatively young at 133 months and small at 62.40 million assets. Funds from Islamic countries are older (155 months) and larger (70.26 million) than those from non-Islamic countries (100 months, 50.24 million, respectively). The oldest (224 months) and largest (372.41 million) funds are domiciled in the United States. The average management fee is 1.45% of the total net asset. Islamic country domiciled funds charge significantly higher management fees, 1.69%, compared to those from non-Islamic countries, 1.08%. Not surprisingly, there is a significant variation across mean returns. The yearly return is nearly 5%, non-Islamic domiciled funds (5.84%) performed better than Islamic domiciled funds (4.42%).

[30]In exploring the disclosure practices of IEFs, Nainggolan and Trinugroho (2018) report that only about 25% of the IEFs disclose holdings data.

Table 3.1: Summary Statistics

	Domicile	No. of funds	Dead	%	Disclosure	%	Age (Mon.)	TNA ($, Mil.)	Fees (%)	Return (%)
Islamic Countries										
	Bahrain	10	7	70	-	-	-	-	-	-
	Indonesia	32	3	9	10	31	107	34.76	3.03	7.89
	Kuwait	18	15	83	1	6	182	57.70	1.50	6.02
	Malaysia	114	19	17	107	94	158	76.56	1.59	3.79
	Oman	2	-	-	-	-	-	-	-	-
	Qatar	3	-	-	-	-	-	-	-	-
	Saudi Arabia	105	30	29	14	13	169	59.21	1.57	6.62
	United Arab Emirates	5	2	40	2	40	80	6.96	1.88	3.49
	Subtotal/average	**289**	**76**	**26**	**134**	**46**	**155**	**70.26**	**1.69**	**4.42**
Typical Countries										
	Australia	2	-	-	1	50	89	17.72	1.50	-3.73
	British Virgin Islands	3	3	100	-	-	-	-	-	-
	Canada	1	-	-	1	100	117	15.32	2.50	5.47
	Cayman Islands	10	7	70	4	40	58	-	1.75	8.15
	France	1	-	-	1	100	111	0.95	1.00	2.55
	Guernsey	3	-	-	2	67	100	7.59	2.00	2.24
	Hong Kong	1	-	-	1	100	133	16.97	1.00	4.17
	India	2	-	-	2	100	194	20.25	1.25	15.46
	Ireland	21	14	67	16	76	67	29.02	1.39	-1.09
	Japan	2	1	50	2	100	70	22.89	1.00	1.46
	Jersey	2	-	-	2	100	143	42.16	1.38	-0.50
	Luxembourg	49	26	53	34	69	74	18.90	0.79	9.38
	Mauritius	3	1	33	1	33	98	-	0.50	5.63
	Singapore	2	2	100	2	100	143	3.36	1.00	8.42
	South Africa	11	2	18	11	100	139	58.66	0.93	4.00
	South Korea	1	1	100	1	100	38	0.09	0.80	31.96
	Thailand	3	-	-	3	100	142	2.89	1.61	10.95
	United Kingdom	2	-	-	-	-	-	-	-	-
	United States	6	1	17	6	100	224	372.41	0.88	5.99
	Subtotal/average	**125**	**58**	**46**	**90**	**72**	**100**	**50.24**	**1.08**	**5.84**
Entire Sample	**-**	**414**	**134**	**32**	**224**	**54**	**133**	**62.40**	**1.45**	**4.96**

Notes: The sample period is Jan. 2004 – Dec. 2018. TNA (total net asset) and return are the mean while fees are for the most recent year, i.e., 2018. Historically, the UK is considered together with three overseas territories, including British Virgin, Cayman, and Guernsey Channel Islands.

4.4 Research Design

Our empirical approach comprises 2-steps. First, we decompose the investment styles by asset types and asset sizes based on the portfolio holdings over time that underlies the well-known Morningstar style box, and then attempt to explore the investment styles over the core covariates.

There is no common consensus on style measures (Trzcinka, 1995). It is an investment return that manoeuvres the set of investment styles, which is only a multinomial statistic (Brown & Goetzmann, 1997). Though the issue of comparative performance is not our main concern, we employ standard multinomial regressions to relate the investment styles with the underlying covariates to identify relative concentration. In doing so, we use Morningstar style codes that reserve a multinomial distribution. We then take return alongside size, i.e., log of the total net asset, net flow, in addition to age. We deploy the following equation:

$$style_{i,t} = \alpha_{i,t} + \delta_1 return_{i,t} + \delta_2 TNA_{i,t} + \delta_3 TNF_{i,t} + \delta_4 age_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $style_{i,t}$ is a categorical variable acquired from the Morningstar's 'Equity Style Box', which categorizes style on a 9-point scale from small growth to mid blend to a large value, $\alpha_{i,t}$ is intercept, $return_{i,t}$ is the quarterly return, $TNA_{i,t}$ is the natural logarithm of the total net assets, $TNF_{i,t}$ is the total net flow at each quarter, $age_{i,t}$ is the age of the fund in the month, and $\varepsilon_{i,t}$ is the error term.

We employ multinomial regressions[31], which is an extension of the binomial response, where the dependent variable takes more than two discrete values. In this regard, Multinomial Logit and Probit models have been in much attention as a result of their suitability to discrete response analysis (McFaden & Train, 2000). Thus, it expedites our comparison in investment styles (see, for example, Brown & Goetzmann, 1997; Wilcox, 1999). Multinomial regressions have been widely utilized in typical fund studies, see Levinthal and Myatt (1994) and Arshanapalli et al. (2006), among others.

Second, we first check the style shift based on common return-based style analysis, i.e., RBSA (we explain in section 4.5.3). We then extract style shift based on portfolio holdings, both in asset types and asset sizes, to expose the underlying aspects. It has been disputed that a mutual fund's investment styles shift over time (Brown & Goetzmann, 1997). This is mostly for the reason that security values deviate considerably from intrinsic values as specific styles turn out to be favorable or unfavorable over time (Barberis & Shleifer, 2003). Style shifts, therefore motivated by economic reasons like market volatility or portfolio alteration in anticipation of changing economic conditions (Annaert & Van Campenhout, 2007). We attempt to explore the aspects of underlying variables as a source of shift in the IEF's investment style. We motivate with Cumming et al. (2009) and consider any deviation from the objective as style shift. Thus, style shift is our dependent variable, a discrete variable equal to 1 if a fund shifts and '0' otherwise. As a consequence, a fund can be a blend type in one quarter and value or growth in a different quarter or vice versa, similarly in size orientation.

[31]See Appendix B for the model derivation.

In the course, we evaluate the effect of a standard set of variables on the shift in investment style, including fund specific variables, return, TNA (as fund size), and TNF (as fund flow), variables closely related to management, the fee (i.e., management cost), age, as a proxy for fund experience, (Abdelsalam, Fethi, et al. (2014), and status, a binary format, 1 if live or 0 if dead as survivorship (El-Masry et al. (2016), alongside the variable that is broadly related to the market condition (as Islamic market volatility). All of the independent variables are lagged in one quarter. Table A3.3 in Appendix A depicts correlation coefficients for the independent variables, indicating no collinearity concern. We deploy the following equation:

$$shift_{i,t} = \alpha_{i,t} + \delta_1 return_{i,t} + \delta_2 TNA_{i,t} + \delta_3 TNF_{i,t} + \delta_4 age_{i,t} + \delta_5 fee_{i,t} + \delta_6 status_{i,t} + \delta_7 std_{i,t} + \varepsilon_{i,t} \quad (2)$$

In this setup, we use logit and probit models, where the conditional probability of the dependent variable is considered a function of the explanatory variables (Horowitz & Savin, 2001). In practice, the logit and probit regressions lead to analogous insights (McCulloch et al., 2000). There is no theoretical sustenance of why either logit or probit should be regarded as superior. The only disparity arises in their behavior in the severity of the 0–1 probability range that does not imply one functional preference over the other (Laton & Katsuura, 2001). Logit and probit models have been widely utilized in typical fund studies, see Ferris and Yan (2007) and Cumming et al. (2009), among others.

Considering cross-section and time dimensions in our dataset, we employ panel logit and probit regressions with random-effects. Two main reasons led to our choice. First, we have data constraints. One of our critical variables is the management fee, and this data is

static for a fund. Management fees rarely change, and currently no database provides a time-varying management fee for funds. Second, the panel fixed-effects estimate is not consistent under probit, and most data analysis software does not provide an option for fixed-effects.

4.5 Empirical Analyses and Findings

In this section, first, we analyze the portfolio holdings by specifics over the lifetime of the fund to explore the investment styles. We then highlight the underlying aspects of the investment styles. In the second part, we estimate the typical style drift score. Thereafter, we uncover the shift in style based on historical holdings to investigate the underlying reasons for the style shift.

4.5.1 IEF Investment Styles: Preliminary Investigation

Over time, both theory and practice have settled on two salient dimensions that define a fund's style: the inherent attributes (i.e., the value-growth-blend dimension) and the market capitalization (i.e., the small-mid-large size dimension) of the portfolio holdings (Brown & Harlow, 2002; Chan et al., 2002). We decompose the portfolio holdings over the lifetime of the fund, first, by asset type (i.e., value, growth, blend), and then by size (i.e., small, mid, large)[32]. It is premised on the Morningstar style box, schemes nine categories with which to classify as investment styles. Previous IEF studies overlook the time variation of investment styles, and heavily rely on returns-based style analysis. Our study mitigates these shortcomings. Figure 3.1 reflects the time series exposures of investment styles for Islamic

[32]The two methodologies to style characteristics, i.e., portfolio holdings and factor sensitivities to return, by and large, provide a similar reading of a fund's styles.

and non-Islamic jurisdictions separately, and the entire sample for the period from Q12004 to Q42018. Even from a preliminary examination, we can easily spot the variation as well as the evolution of investment styles in the IEF over time.

In the early years (till 2012), IEFs overwhelmingly tilt their portfolios toward high-BM value stocks in Islamic countries (see Figure 3.1.a.i). However, that tilt vanishes abruptly over the year as portfolios significantly shift their investment objectives, mostly toward core stocks, i.e., blend funds. There has been little exposure to growth stocks until recently (from 2014), nearly 25% of funds are identified as growth funds. Then again, initially, the majority of the portfolios considered mid-cap stocks (see Figure 3.1.b.i), consistent with the widely held view of small-cap bias (as earlier studies categorize either small-cap or large-cap funds (Hayat & Kraeussl, 2011; Hoepner et al., 2011). Nevertheless, we see a steadily increasing tilt to large-cap till 2014, and that tilt has been stable over the recent year; nearly 50% of funds hold large-cap stocks, in consonance with Pastor et al. (2020) as in the typical mutual fund market. In contrast, non-Islamic country funds tilt their portfolios mostly toward high-MB growth stocks (see Figure 3.1.a.ii). This is consistent with Walkshäusl and Lobe (2012) and Wan-Ni (2012), who report that Islamic indices in developed markets (the US and the EU) exhibit a strong growth-orientation in their investment behavior. There has been invariably slight exposure to value funds. Incidentally, Lettau et al. (2018) find that value funds are almost missing from the US equity market. Though we see an increasing tilt towards blend funds, but not as abruptly as in the case of the Islamic country. In the case of size exposure, except for a relatively small number of small- and mid-cap tilt (nearly 25%), most funds (almost 75%) overwhelmingly hold large-cap stocks (see Figure 3.1.b.ii).

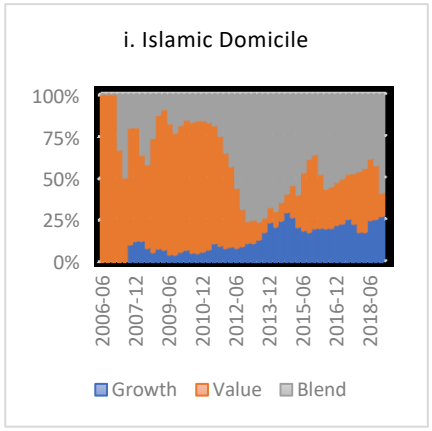
The conditional distribution of investment styles imparts some puzzling insights. First, we find IEFs initially significantly tilted to value stocks in Islamic countries, but in contrast, to growth stocks in non-Islamic domiciles. In keeping with the behavioral aspect of risk avoidance, as hypothesized by Ferruz et al. (2012), it also raises the religious norms on the risk-return contention, posed only in the Islamic countries. Over the recent year, Islamic fund managers are moving to the portfolios that are more tilted to the blend funds (see Figure 3.1.a.iii). This signifies an increasing trend of diversified portfolios. Moreover, most of the IEFs invest heavily in large-cap stocks (see Figure 3.1.b.iii), implying that most fund managers do not exploit the small-cap stock premium consonance with Lettau et al. (2018). An alternative explanation is that large-cap stock is more stable than mid- or small-cap stock, thus the safest bets for risk-averse investors. Looking over Figures 3.1.a.i-ii and Figures 3.1.b.i-ii, we notice, broadly, there is a qualitative sense of style consistency in non-Islamic countries. This requires a more in-depth analysis to ascertain whether the variances we find are intensifying from the shift in style, as we explain later in sections 4.5.3 and 4.5.4.

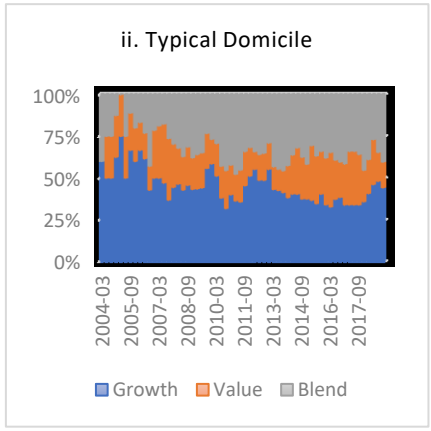
4.5.2 Underlying Style Aspects: Further Analysis

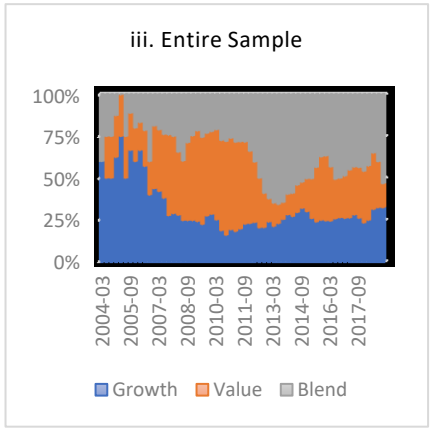
First, we plot the frequency of styles, i.e., the joint distribution of asset types and asset sizes of the sampled funds in Figure 3.2. We find the lowest frequency distribution for the small-cap growth funds. This category regularly reports relatively higher risk. This typifies the religious orientation, viz, risk avoidance in Islamic investments. Large-cap blend funds have the highest frequency distribution, unsurprising since they are typically the safest style. We set this category as the BASE OUTCOME in our multinomial regressions. The rest of the categories are intuitive.

Figure 3.1: Historical Evolution of Styles

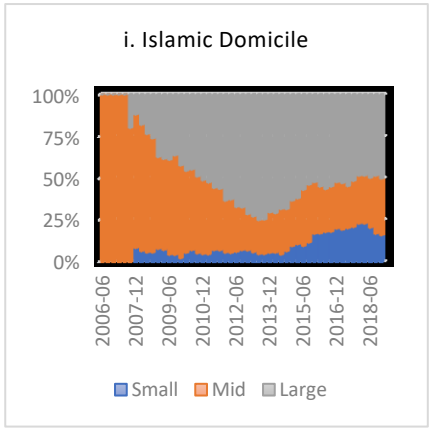
a. Investment Asset Class

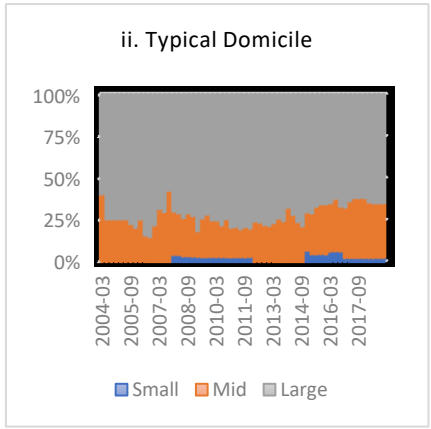


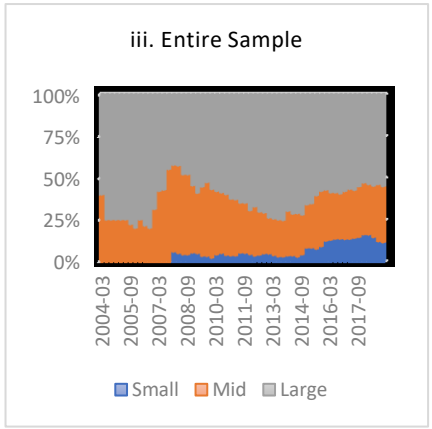




b. Investment Asset Sizes

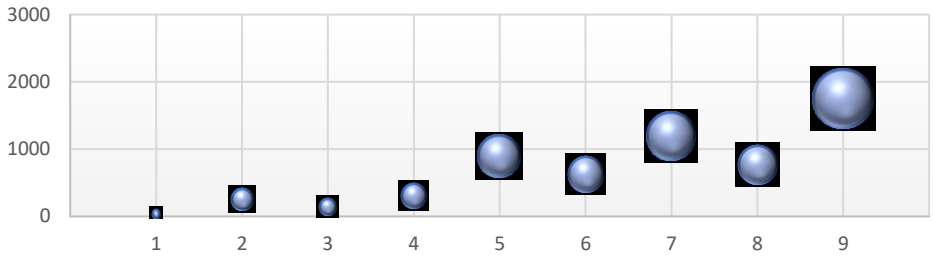






Notes: The Stack plots display the underlying investment styles over the sample period Jan. 2004 – Dec. 2018. Y-axis is in percentage, refers frequency distribution of the underlying investment Styles.

Figure 3.2: Frequency Distribution of Styles



Notes: The bubble chart plots the frequency distribution of investment styles where 1 refers Small Growth, 2 refers Small Value, 3 refers Small Blend, 4 refers Mid Growth, 5 refers Mid Value, 6 refers Mid Blend, 7 refers Large Growth, 8 refers Large Value, and 9 refers Large Blend.

We report the regressions coefficients of Multinomial Logit (MNL) and Multinomial Probit (MNP) models in Table 3.2. We find the return coefficients of mid-cap growth (MG), mid-cap value (MV) as well as large-cap growth (LG), large-cap value (LV) funds positively significant. Earlier, we have seen portfolios of IEFs more tilted towards value funds in Islamic countries and growth funds in non-Islamic countries. Thus, value funds from Islamic countries and growth funds from non-Islamic countries experience a higher style likelihood in the sight of positive return than the BASE OUTCOME. These relationships hold mostly in mid- to large-cap funds. For the small-cap funds (SG, SV, SB), we find negatively insignificant coefficients. This streamlines the lack of small-cap funds in comparison to the large-cap funds. Fund flow is mostly negligible, except the small-cap value (SV) funds (positively significant), indicating a higher likelihood. In the case of age, we find primarily positive and significant coefficient, except the large-cap growth (LG) and large-cap blend (LB) with negatively significant coefficients, signifying a higher probability of employing such styles by the younger funds.

Table 3.2: Investment Styles over Fund Fundamentals

Style	MNL				MNP			
	return	**TNA**	**TNF**	**age**	**return**	**TNA**	**TNF**	**age**
SG	-0.0307	0.1899	-0.0126	0.0049*	-0.0107	0.0622	-0.0066	0.0025*
	0.0169	0.1911	0.0233	0.0011	0.0075	0.0881	0.0118	0.0005
SV	-0.0059	-0.2033*	0.0222*	0.0028*	-0.0014	-0.1195*	0.0117*	0.0017*
	0.0078	0.0883	0.0076	0.0006	0.0043	0.0494	0.0053	0.0003
SB	-0.0032	-0.1850*	0.0123	0.0056*	-0.0002	-0.1092*	0.0074	0.0031*
	0.0097	0.1108	0.0125	0.0006	0.0049	0.0580	0.0070	0.0003
MG	0.0053*	-0.3946*	0.0020	0.0018*	0.0040*	-0.2196*	0.0011	0.0012*
	0.0075	0.0823	0.0136	0.0006	0.0040	0.0456	0.0076	0.0003
MV	0.0140*	-0.4431*	-0.0085	0.0044*	0.0097*	-0.2962*	-0.00527	0.0029*
	0.0049	0.0544	0.0094	0.0004	0.0033	0.0371	0.0064	0.0002
MB	-0.0033	-0.3441*	-0.0096	0.0035*	-0.0013	-0.2234*	-0.0061	0.0022*
	0.0054	0.0607	0.0103	0.0004	0.0035	0.0396	0.0068	0.0003
LG	0.0077*	0.1425*	0.0042	-0.0028*	0.0059*	0.1043*	0.0023	-0.0019*
	0.0045	0.0527	0.0066	0.0005	0.0032	0.0365	0.0046	0.0003
LV	0.0156*	-0.0093	-0.0057	0.0022*	0.0104*	-0.0106	-0.0039	0.0014*
	0.0051	0.0574	0.0081	0.0004	0.0034	0.0379	0.0056	0.0003
LB	BASE OUTCOME				BASE OUTCOME			
	Prob > chi2 = 0.00; Pseudo R-squared = 0.025 Log Likelihood: -10429.803				Prob > chi2 = 0.00; Pseudo R-squared = N/A Log Likelihood: -10426.972			

Notes: This table reports the results of multinomial regressions where the dependent variable is nine underlying investment styles (small-growth (SG), small-value (SV), small-blend (SB), mid-growth (MG), mid-value (MV), mid-blend (MB), large-growth (LG), large-value (LV), large-blend (LB)) and the independent variables are return, total net asset (TNA), net flow (TNF) and age. MNL and MNP denote Multinomial Logit and Probit, respectively. Standard errors are reported underneath coefficients. * $p < 0.1$.

Collectively, mid- to large-cap value funds, mostly in Islamic countries and growth funds mostly in non-Islamic countries, experience a higher style likelihood in the sight of positive return.

Having investigated underlying investment styles in IEFs, we next turn our attention to inspect the aspects of the apparent shift in style over the period in sections 4.5.3 and 4.5.4.

4.5.3 IEF Style Consistency: Style Drift Score Analysis

The decision to maintain a consistent investment style is an important aspect of portfolio management (Brown & Harlow, 2002). Studies over time, confirm a positive relationship between investment style consistency and performance. At this point, first, we investigate IEF consistency employing the style drift (RBSA) score approach of Idzorek and Bertsch (2004). The style drift score measures the variability of a fund's effective asset style in conjunction with the average effective asset style. We calculate the average style drift score (SDS) based on 36-month moving windows by month as:

$$\overline{SDS} = \sqrt{\frac{1}{T-1} \bullet \sum_{i=1}^{n} \cdot \sum_{t-1}^{T} \cdot (w_{it} - \overline{w}_i)^2} \quad (3)$$

where T is the total number of quarters, n is the number of asset classes, $w_{i,t}$ is asset class weight for asset class i at period t, and $\overline{w}_i$ is the average asset class weight for asset class i.

Table 3.3 reports the style drift and mean score statistics by Islamic and non-Islamic countries as well as for the entire sample. We find nearly 82% of funds drift in style, and the drift is higher in the Islamic countries (90%) compare to non-Islamic countries (71%). Collectively, nearly 18% of funds do not drift, indicating perfect style consistency, which is again higher in non-Islamic countries. This is, to some extent, consistent with our historical style analysis (see Figures 3.1.a.i-ii and Figures 3.1.b.i-ii). Note that a lower score indicates lower amounts of style drift, and a higher score indicates higher style drift. We find the mean drift score as high as 28.82, compared to the typical fund (Idzorek & Bertsch, 2004), which is once again higher in the Islamic countries (30.38) compared to non-Islamic countries (25.89).

On a related note, Chan et al. (2002) report that style shift is more notable in value funds (i.e., in Islamic countries). All in all, they explain this disparity with the agency or behavioral safeguards in fund management.

Table 3.3: Style Drift and Score

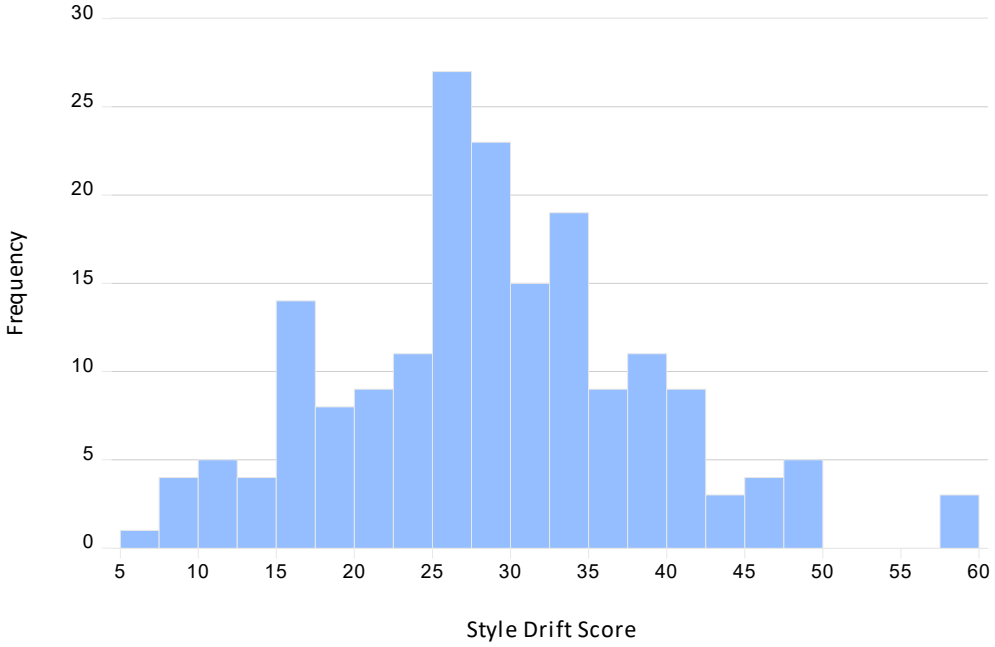
Focus	Islamic Domicile		Typical Domicile		Entire Sample	
	number	%	number	%	number	%
Style Drifts	120.00	90	64.00	71	184.00	82
Score	30.38	-	25.89	-	28.82	-
Not Drifted	14.00	10	26.00	29	40.00	18

Notes: This table reports the style drift and score statistics by Islamic and non-Islamic countries as per Idzorek and Bertsch (2004).

Figure 3.3 displays the frequency distribution of style drift scores (minimum 7.48 and maximum 58.13), highlighting the magnitudes.

Second, we check style shift as the evolution of a fund's investment style overtime and separately mark if they shift in asset types (growth, value, blend) and asset sizes (small, medium, large). Consistent with style drift, we find nearly 80% of funds shift from their stated styles. Notably, the shifting propensity is higher in asset type than in asset size dimensions.

Figure 3.3: Frequency Distribution of Style Drift Scores



Notes: This chart plots the distribution of style drift scores, the Y-axis shows frequency, and X-axis shows style drift scores. The average style drifts score is based on 36-month moving windows by monthly from 2004 to 2018.

4.5.4 IEF Style Shift: In-depth Testing and Discussion

Table 3.4.1 reports the results for style shift in asset types, and similarly, Table 3.4.2 reports the results for style shift in asset sizes to expose the underpinnings of the style shift. Subsequently, we also report the marginal effects. Additionally, we split our analysis into Islamic and non-Islamic countries to seek more insights.

First of all, we find the negatively significant coefficient for return in both Islamic and non-Islamic countries, indicating the likelihood of a shift in investment style. Specifically, funds with negative returns are more likely to shift compared to the funds with positive income. In that sense, Islamic fund managers seek to change their exposure to the market when they experience negative returns. To some extent, it refers to the practice of

consciously deviating from the stated objective to secure higher relative performance (Annaert & Van Campenhout, 2007). However, this finding is not conclusive as we find insignificant coefficients in both Islamic and non-Islamic countries as well as collectively when we test shifts in asset sizes. In the case of fund size, we find consistently negative and mostly significant coefficients regardless of Islamic and non-Islamic countries. It suggests that investment size is an important issue of the size effect in style shift. Islamic funds are more likely to shift in the sight of a drop in total asset value. The coefficient of fund flow is positively significant for the entire sample, but only when the fund shifts in asset types. Therefore, collectively it might specify, IEFs shift in asset types more often once they secure an increase in fund flow, consistent with the style shift in private equity funds (Cumming et al., 2009). However, individually, the coefficients are insignificant in both Islamic and non-Islamic countries; fund flow certainly is not strongly related to style shift.

The fee coefficient is negatively significant for Islamic countries, indicating funds with relatively lower management fees are more likely to shift in their investment styles. In contrast, we find the opposite sign for non-Islamic countries, indicating funds with relatively higher management fees are more likely to shift. The impact of fund age is positive but significant only for Islamic countries. This result can be explained with the learning rationale resulting from the development of Islamic markets. More established funds are more likely to style shift as they mature. An alternative explanation is that young funds will style-drift less often in order to signal the screening ability within the stated objectives. Moreover, surviving funds are more likely to shift in asset sizes, considering significant and strong positive correlation with fund age (see Table A3.3).

Annaert and Van Campenhout (2007) report that the style shift is mainly induced by the response of a fund's investment strategies to publicly available information variables, and particularly to volatility shocks. This signposts that the mutual fund manager alters market exposure in the sight of market conditions, i.e., volatilities. Accordingly, we extract volatility of the MSCI World Islamic Index, which reflects Shari'ah investment principles and is designed to measure the performance of the world Islamic equity market (with 484 constituents from 24 countries) as a proxy of the Islamic market condition. Precisely, we extract quarterly volatilities based on weekly returns in the sample period. We find negative coefficients, but results are statistically significant only in the non-Islamic country segment and in the entire sample when funds shift in asset types. It means Islamic funds from non-Islamic countries are more likely to shift in asset type when the market is relatively less volatile. This is probably for the reason that it is easier to find valuable securities when market conditions are particularly steady (Cumming et al., 2009). While the variable has a negative sign, in neither instance is the coefficient statistically significant in Islamic domicile. In other words, the Islamic country fund is not susceptible to trending market conditions.

Note, in the binomial regressions, Logit and Probit coefficients vary by a level[33], and therefore we sidestep to interpret the magnitudes. Instead, we estimate their marginal effects, although statistically significant, the scales in terms of economic impact seems negligible for both fund specific variables and variables closely related to management. However, we find noticeable significant implications of market volatility on style shift (negative, nearly 30% collectively, and 52% in non-Islamic domicile). We also estimate OR (Appendix A Table A3.4), and results remain mostly consistent.

[33]According to Norton and Dowd (2018), the logit coefficients are larger by about 1.6, resulting from variances in normalizations.

Table 3.4.1: IEF Style Shift in asset types

Variables	Islamic Domicile		Typical Domicile		Entire Sample	
	Logit	*Probit*	*Logit*	*Probit*	*Logit*	*Probit*
return	-0.0133*	-0.0067*	-0.0183*	-0.0100*	-0.0144*	-0.0075*
	0.0065	0.0034	0.0081	0.0044	0.0050	0.0026
TNA	-0.0447	-0.0243	-0.1001*	-0.0570*	-0.0736*	-0.0402*
	0.0326	0.0173	0.0456	0.0252	0.0246	0.0132
TNF	0.0173	0.0098	0.0130	0.0084	0.0145*	0.0086*
	0.0122	0.0067	0.0093	0.0053	0.0073	0.0041
fee	-0.3836*	-0.2137*	0.0468	0.0223	-0.2155*	-0.1161*
	0.1339	0.0719	0.1334	0.0707	0.0796	0.0425
age	0.0008*	0.0004*	0.0001	0.0001	0.0005	0.0003
	0.0004	0.0002	0.0011	0.0006	0.0004	0.0002
status	-0.2638	-0.1490	0.1648	0.0857	0.0117	0.0048
	0.1926	0.1016	0.1947	0.1029	0.1342	0.0707
std.	-2.1082	-1.0768	-4.7262*	-2.5137*	-2.9862*	-1.5461*
	1.5273	0.7835	2.0829	1.0716	1.2197	0.6264
Obs.	3,641	3,641	2,140	2,140	5,781	5,781
Prob > chi2	0.000	0.000	0.020	0.020	0.000	0.000
Pseudo R-squared	0.097	0.098	0.011	0.012	0.074	0.075
Log-Likelihood	-1235.035	-1234.604	-727.223	-726.871	-1968.899	-1967.587
Marginal Effects (at the Mean)						
return	-0.0013*	-0.0013*	-0.0020*	-0.0021*	-0.0015*	-0.0015*
	0.0006	0.0006	0.0009	0.0009	0.0005	0.0005
TNA	-0.0045	-0.0047	-0.0110*	-0.0118*	-0.0077*	-0.0080*
	0.0032	0.0033	0.0050	0.0052	0.0025	0.0026
TNF	0.0017	0.0019	0.0014	0.0017	0.0015*	0.0017*
	0.0012	0.0013	0.0010	0.0011	0.0008	0.0008
fee	-0.0382*	-0.0408*	0.0052	0.0046	-0.0224*	-0.0230*
	0.0132	0.0136	0.0147	0.0147	0.0083	0.0084
age	0.0001*	0.0001*	0.0001	0.0001	0.0001	0.0001
	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
status	-0.0263	-0.0285	0.0182	0.0178	0.0012	0.0009
	0.0192	0.0194	0.0215	0.0214	0.0140	0.0140
std.	-0.2101	-0.2058	-0.5214*	-0.5220*	-0.3110*	-0.3063*
	0.1519	0.1496	0.2280	0.2218	0.1266	0.1240

Notes: This table reports the results of panel random-effects logit and probit regressions where the dependent variable is style shift (equal to 1 if a fund shifts in asset types and 0 otherwise) and the independent variables are return, TNA (fund size), and TNF (fund flow), management fee, fund age, status (equal to 1 if live or 0 if dead fund) and market condition (as Islamic equity market volatility). Standard errors are reported underneath coefficients. * $p < 0.1$.

Table 3.4.2: IEF Style Shift in asset sizes

Variables	Islamic Domicile		Typical Domicile		Entire Sample	
	Logit	*Probit*	*Logit*	*Probit*	*Logit*	*Probit*
return	0.0065	0.0031	-0.0057	-0.0036	0.0030	0.0012
	0.0094	0.0044	0.0125	0.0057	0.0074	0.0034
TNA	-0.2244*	-0.1052*	-0.2955*	-0.1451*	-0.2404*	-0.1158*
	0.0501	0.0236	0.0684	0.0335	0.0370	0.0178
TNF	-0.0013	-0.0005	0.0026	0.0014	0.0003	0.0004
	0.0245	0.0111	0.0207	0.0099	0.0152	0.0070
fee	-0.6568*	-0.3206*	0.4847*	0.2092*	-0.2139*	-0.1073*
	0.2107	0.1056	0.2392	0.1076	0.1312	0.0611
age	0.0011*	0.0006*	0.0008	0.0005	0.0013*	0.0007*
	0.0005	0.0003	0.0020	0.0009	0.0005	0.0002
status	2.5069*	1.0261*	0.3937	0.1729	1.2025*	0.5310*
	0.7350	0.2697	0.3464	0.1553	0.2866	0.1210
std.	-0.0042	-0.0203	-2.0065	-0.9723	0.1220	0.0376
	2.0853	0.9850	3.2725	1.5119	1.7332	0.8108
Obs.	3,641	3,641	2,140	2,140	5,781	5,781
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R-squared	0.048	0.049	0.043	0.044	0.034	0.035
Log-Likelihood	-666.884	-665.995	-323.671	-322.315	-1003.812	-1002.696
Marginal Effects (at the Mean)						
return	0.0003	0.0003	-0.0002	-0.0003	0.0001	0.0001
	0.0004	0.0004	0.0004	0.0005	0.0003	0.0003
TNA	-0.0086*	-0.0093*	-0.0104*	-0.0117*	-0.0097*	-0.0105*
	0.0019	0.0020	0.0023	0.0026	0.0014	0.0016
TNF	-0.0001	-0.0001	0.0001	0.0001	0.0001	0.0001
	0.0009	0.0010	0.0007	0.0008	0.0006	0.0006
fee	-0.0252*	-0.0283*	0.0171*	0.0169*	-0.0086*	-0.0097*
	0.0079	0.0091	0.0082	0.0086	0.0053	0.0055
age	0.0001*	0.0001*	0.0001	0.0001	0.0001*	0.0001*
	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
status	0.0962*	0.0905*	0.0139	0.0140	0.0485*	0.0481*
	0.0240	0.0215	0.0122	0.0126	0.0109	0.0106
std.	-0.0002	-0.0018	-0.0709	-0.0788	0.0049	0.0034
	0.0800	0.0869	0.1153	0.1222	0.0699	0.0735

Notes: This table reports the results of panel random-effects logit and probit regressions where the dependent variable is style shift (equal to 1 if a fund shifts in asset sizes and 0 otherwise) and the independent variables are return, TNA (fund size), and TNF (fund flow), management fee, fund age, status (equal to 1 if live or 0 if dead fund) and market condition (as Islamic equity market volatility). Standard errors are reported underneath coefficients. * p < 0.1.

The separate analysis based on fund orientation explores the substance of some standard variables for style shift in the IEF. Though any shift inevitably means an attempt to increase investment yield, it also alters the risk-return profile of the investors (Chan et al., 2002; Chan & Lakonishok, 2004)[34].

4.6 Conclusions and Implications

This study investigates the investment styles in IEFs based on a survivorship bias-free sample, consisting of 224 funds across Islamic countries and non-Islamic countries, from January 2004 to December 2018. We consider the study to be pertinent for several reasons. There are theoretical arguments on whether IEFs tilted towards specific investment styles, given that they typically implement negative screening and monitoring strategies. Some facts stand out in our empirical analyses, and results can be explored from a variety of standpoints.

First, from the historical portfolio holdings perspective, we find Islamic funds initially overwhelmingly tilted to high-BM value stocks in Islamic countries (in consonance with Ferruz et al., 2012) and high-MB growth stocks in non-Islamic domiciles (in consonance with Wan-Ni, 2012). However, over recent years, Islamic fund managers are moving to portfolios that are more tilted to blend types. This is a new finding, signalling increasing diversification attempts in IEFs. Similarly, Islamic funds initially overwhelmingly picked mid-cap stocks in Islamic countries, but the majority have been heavily skewed to large-cap stocks over the recent years. However, we find consistent large-cap bias in non-Islamic domiciles, implying, most IEFs by and large do not exploit the small-cap stock's premium, quadrate with the test

[34]Several studies confirm a positive relationship of a fund's investment style consistency with the persistence of performance over time.

of Pastor et al. (2020) and Lettau et al. (2018) in conventional counterparts. Further, our multinomial regressions confirm these subtleties are instrumental in the underlying variables, particularly past performance.

Second, from the style drift inspection, we find notable variants in Islamic and non-Islamic countries. Collectively, nearly 82% of sampled Islamic funds drift in style, but the drift rate is higher in Islamic countries compare to non-Islamic domiciles. The mean drift score is also higher in Islamic countries than that in non-Islamic domiciled funds. This is not entirely surprising, given that IEFs typically implement negative screening and continuous monitoring. Importantly, we examine the style shift in a binomial structure. We find that the propensity to shift is higher in asset types than in asset sizes of portfolio holdings. Islamic fund managers are more likely to alter their portfolio exposure to the market when they undergo negative returns and in the sight of a drop in asset value. Collectively, they shift in asset types more often once they secure an increase in fund flow. In Islamic countries, the more established fund is more likely to style shift as it mature. Notably, IEFs from non-Islamic countries are more likely to shift in asset types when the market is relatively less volatile. We note that the nature of style shift in IEFs is similar to that in conventional counterparts (Annaert & Van Campenhout, 2007; Cumming et al., 2009).

Apart from scholarly contributions to the related literature, this study offers important, though broad, implications for investors, both individual and institutional, Shari'ah scholars as well as market regulators. First, the study can help investors comprehend the subsequent comportment of their investments; for instance, the common tilt to the asset class of Islamic portfolios. We believe that historical portfolio holding-based style analysis

presents more useful insights to investors trying to explore investment styles. However, we echo Nainggolan et al. (2016), and reiterate here the need for IEFs to improve their portfolio disclosure practices. As reported earlier, around half of our initial sample of IEFs did not release style-related portfolio holdings information. Yet such disclosure shortcomings are at odds with the high level of transparency called for in Islamic finance principles. Therefore, heightened attention to improved IEF portfolio disclosure is a recommendation arising from the study.

Second, from the viewpoint of Islamic scholars as well as market regulators, the study provides insight into the aspects of investment commitment and continuous monitoring. For instance, Shari'ah regulators mandate Islamic portfolios adhere to the stated screening strategies alongside investment style (Peillex et al., 2018). Investors rely on the published statement on investment style in a fund's prospectus when selecting a fund by their investment objectives or strategies. Therefore, a shift in investment style indicates that investors might not acquire what they projected in the investment course (Bams et al., 2016). Additionally, a longstanding argument has been that a manager's ability to execute the style mandate consistently might also significantly impact investment success. This would be a further valuable IEF analysis; we leave it for our future work. Another compelling extension of our study would be to examine other patterns of style shift, for instance, those that arise from an industry emphasis. Further, our analysis was limited to Islamic equity funds. Other major Islamic funds, such as index funds and fixed-income funds, may similarly provide valuable insights on portfolio holdings-related style shifts.

Appendix A

Table A3.1: Initial Selection Criteria

Ethical Issue Strategy Focus	We extract IEFs from the Morningstar database via Ethical Issue Strategy Focus, which allows for identification of the sub-style within ethical investing - Shari'ah Focus. Shari'ah funds emphasize compliance with Islamic law for investment practices. A fund may have both Shari'ah Compliant and Socially Responsible attributes but can only have a single Ethical Issue Focus. If Shari'ah Compliant is indicated, the fund must receive the Shari'ah Ethical Issue Focus. Morningstar extracts this information from the Investment Objective Section of a fund's prospectus.
Global Broad Category Group	We rely on Global Broad Category Group, which is broader or more granular than the local categories that constitute the global category to screen equity fund.
Share Class	We take the oldest share class for a fund that aligns with the oldest share class criteria. We exclude 'Virtual Class', also known as a convenience class. A Virtual Class is an investment whose performance is quoted in another currency or allows investors to purchase shares in a currency other than the base currency. Thus such a class does not have a separate financial profile but rather is merely a currency translation of another share class.

Notes: Data Point Definition, Morningstar Direct, 2019-2020.

Table A3.2: Definitions of Variables

Abbreviation	Variable	Definition
style	Morningstar Style Box	Morningstar classifies fund style as large-cap, mid-cap, or small-cap based on the market capitalization of the fund's stock holdings; and as value, blend, or growth based on the value-growth orientation of the stock holdings. The nine possible combinations of these characteristics correspond to the nine squares of the Morningstar Style Box - size is displayed along the vertical axis, and style is displayed along the horizontal axis. Note, blend means a mixture of growth and value stocks or mostly core stocks.
return	Total Return	Return is computed each month by taking the change in monthly net asset value (NAV), reinvesting all income and capital gains during that month, and dividing by the starting NAV. Reinvestments are made using the actual reinvestment NAV, and the daily payoff is reinvested monthly. Morningstar does not adjust total returns for sales costs (such as front-end loads, deferred loads, and redemption fees), providing a clearer picture of a fund's performance. However, the total returns do account for management, administrative, 12b-1 fees, and other costs taken out of the fund's asset.
TNA	Net Assets - Share Class	Size is estimated using share-class level total net assets.
TNF	Estimated Fund - Level Net Flow	Flow is estimated using share-class level total net flows.
fee	Management Fee	The management fee is the most recently reported actual percentage that was deducted from an investment's average net assets to pay the investment's management.
age	Fund Age	Age is determined based on the fund's inception date.
status	Survivalism	Status is whether the fund is live or dead based on dormancy, obsoletion, or liquidation data points.
std.	Market Condition	We extract volatility of the MSCI World Islamic Index, which reflects Shari'ah investment principles and is designed to measure the performance of the world Islamic equity market (with 484 constituents from 24 countries) as a proxy of the market condition.

Notes: Data Point Definition, Morningstar Direct, 2019-2020

Figure A3.1: Investment Area and Region of Sale

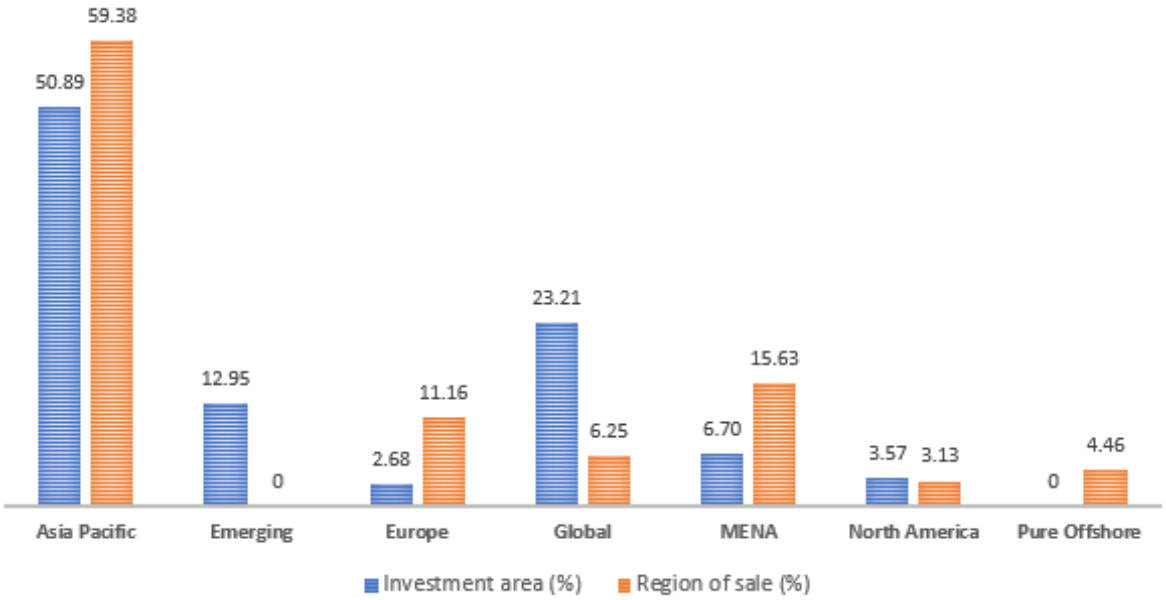


Table A3.3: Correlation Coefficients

Variable	return	size	flow	fee	age	status	std.
return	1						
TNA	0.0089	1					
TNF	-0.0144	0.0792*	1				
fee	-0.0203	-0.1155*	-0.0031	1			
age	0.0180	0.0623*	-0.0142	-0.0464*	1		
status	0.0143	0.2598*	0.0422*	0.1192*	0.3064*	1	
std.	-0.2623*	-0.0837*	0.0089	-0.0491*	0.0561*	-0.1173*	1

Notes: This table reports the coefficients of ordinary correlations for the independent variables. * $p < 0.1$.

Table A3.4: Odds Ratios (Logistic Regressions)

	Variables	Islamic Domicile	Typical Domicile	Entire Sample
(Table: 3.4.1)	return	**<1**	**<1**	**<1**
	TNA	<1	**<1**	**<1**
	TNF	≈1	≈1	**≈1**
	fee	**<1**	>1	**<1**
	age	**>1**	>1	>1
	status	<1	>1	>1
	std.	<1	**<1**	**<1**
(Table: 3.4.2)	return	>1	<1	>1
	TNA	**<1**	**<1**	**<1**
	TNF	≈1	≈1	≈1
	fee	**<1**	**>1**	**<1**
	age	**>1**	>1	**>1**
	status	**>1**	>1	**>1**
	std.	≈1	<1	>1

Notes: <1 means negative relationship, ≈1 means independent relationship, >1 means a positive relationship; boldface refers to statistical significance.

Appendix B

The logit model is based on the cumulative logistic probability function in which the probability of Y is given as:

$$P(Y_i) = F(x_i'\beta) = \frac{exp\ (x_i'\beta)}{1 + exp\ (x_i'\beta)}$$

where the predicted probability of Y is limited to 0 and 1, conditional on the values of the explanatory variables, $F(x_i'\beta)$ is the cumulative distribution function (i.e., CDF) of the logistic distribution, x_i' contains the explanatory variables, and β is a set of parameters to be estimated by maximum likelihood estimation (i.e., MLE). This setup is typically stated as a binomial logit model.

However, the probit model is instead based on the cumulative standard normal distribution function where the variable Y is directly modeled as:

$$P(Y_i) = F(x_i'\beta) = \Phi\ (x_i'\beta)$$

where $F(x_i'\beta)$ is the CDF of the standard normal distribution, $\Phi(\cdot)$ symbolizes the value of the cumulative standard normal distribution. Similarly, the parameters to be estimated by MLE, and the setup is typically stated as the binomial probit model.

We estimate the marginal effects in conjunction with the coefficients from the logit and probit regressions, as the interpretation of the coefficients is complicated in a sense that such coefficients cannot be interpreted as the marginal effects on the dependent variable.

Specifically, it is the slope of the probability for a covariate at a covariate set point. The average marginal effect is calculated as:

$$\partial p_i / \partial x_i = F'(\bar{x}_i' \beta)\beta_i$$

where $F'(\bar{x}_i' \beta) > 0$, which is why the coefficients and marginal effects of the logit and probit regressions have the same signs.

An important extension of the binomial response is the multinomial regressions, where the dependent variable takes more than two discrete values. The multinomial logit structure is stated as:

$$P_{ij} = P(Y_i = j) = \frac{exp\ (w_i' Y_j)}{\sum exp\ (w_i' Y_j)}$$

In the process, one set of coefficients will be normalized to 0, so j-1 sets of coefficients will be estimated. The coefficients of other alternatives are interpreted in reference to the normalized coefficient that is the base outcome. Similarly, the multinomial probit structure is specified as:

$$P_{ij} = P(Y_i = j) = \Phi\ (x_{ij}' \beta)$$

Chapter 5

Conclusion

This thesis contributes to the cumulative body of literature on Islamic equity investment with three novel empirical studies, correspondingly reported in three independent essays. In the sections that follow, we highlight the findings, insights, and implications of each of these essays. We also underline on an essay-wise basis, limitations of our studies and provide suggestions for future research.

5.1 Essay One

The first study investigates the evolution of systematic risk in Shari'ah compliant equities. We consider those equities, which were initially typical, but later turned and remained Shari'ah compliant. We find that Shari'ah compliant status initially creates a shock in systematic risk, but the transitional behaviors later diverge. The underlying screening measures also exhibit identical patterns, implying that these firms struggle to uphold the restraints and, therefore, relax them after the inclusion. The relaxation allows the capital market to reinforce their risk position, increasing beta in time. We also find a signal of capital market reaction as these equities are listed in the US. This is consistent with the literature and particularly with microstructure price effect theory (Mazouz et al., 2016). More importantly, we find a downward trend in systematic risk for the entire period as the market appears to be optimistic in expectation over the long-term. This is linked with other factors such as improved market information (Rizvi & Arshad, 2018) as well as share turnover and liquidity.

From difference-in-difference estimations, we also find that Shari'ah compliant firms have lower beta than non-Shari'ah firms, and the beta is even lower after the treatment for the Shari'ah firms compared to their non-Shari'ah counterparts. Moreover, firm size exposes a strong positive impact on systematic risk, while age provides provision for the lifecycle theory. In the case of financial leverage, we witness the nature of mid-cap entities with potential growth opportunities.

This study offers a robust foundation to test systematic risk following the transition to Islamic compliant equities. Investigating transitional patterns in systematic risk is critical to justify the immunity structure and is of interest to policymakers and investment management. Importantly, we provide new insights for scholars interested in the implications of the move to Shari'ah compliance, as well as for market regulators with interest in the development of prudential structures that enhance stock market stability. Shari'ah regulators may also interpret our findings in relation to whether there is a case for stronger compliance conditions.

We note the limitations of our study, namely that it remains confined to a single breakpoint analysis. It is also possible that the conversion is often not a conscious corporate decision but a matter of interpretation of their financial metrics (Elnahas et al., 2016). Moreover, Azmat et al. (2016) question the development of Islamic instruments as conventional replicas. Several future research directions arise from these observations and pose some possible research questions for future exploration: i) What happens when the firms decide to become non-Shari'ah compliant after a period of being Shari'ah compliant? Does the impact of Shari'ah compliance reverse? Does the duration of the Shari'ah

compliance matter? Though no firm has reverted to non-Shari'ah compliance yet, it is quite possible that in the future, there may be some firms that move back to non-Shari'ah compliance. It will be a nice stand-alone study if we get a substantial number of such firms. ii) What could Islamic instruments that are not conventional replicas look like? The design of new variants that conform to Shari'ah requirements and do not simply replicate extant standard instruments would be a valuable exercise for academics in partnership with practitioners. Additionally, the empirical approach we used in our study has some inferences that create avenues for future research with testing extended to other regions. Moreover, while we used standard CAPM beta to measure systematic risk, alternative measures such as the multi beta model or the accounting information-based model may also shed further light. Another future research direction would be to explore the transitional impact on the cost of capital.

5.2 Essay Two

We consider the real development of Islamic equity investment and investigate pair-wise, total, and net return and volatility spillovers, exclusively in major Islamic equity markets. Equally important, unlike the majority of the past studies, we highlight the origins and drivers of spillovers with market integration. Using the generalized VAR perspective of the spillover index, we find increasing interactions in return and volatility spillovers while the extent of spillovers has been asymmetric across the selected countries. We also find a time-variant pattern of spillovers where the magnitude of volatility spillovers has been critically higher than return spillovers. The GCC countries act as the main source of varying stresses to each other, that is, more responsive to regional shock than external shock. This is probably due to the dynastic linkages and economic openness among the member countries (Alotaibi and

Mishra, 2015). To uncover the inter-regional and intra-regional spillovers more clearly, we employ network analysis. We find the presence of persistent clustering in spillovers, signifying higher market integration. These countries also lead the spillovers in their respective region. Moreover, we find a higher intensity of spillovers during the recent financial crises, suggesting increasing interdependence in the stress period. Furthermore, the cross-section analyses expose the significance of common bilateral financial structural variables to explain the strength of return and volatility spillovers. More specifically, sharing a border, total bilateral trade, and outward investment seem to have impacted the directions of spillovers over time (in consonance with Balli et al. 2015).

Our results are important for projecting equity return and volatility spillovers vis-à-vis bilateral and macroeconomic linkages, and thus, fostering our understanding of the interaction of the major Islamic equity markets. We provide relevant and valuable insights for faith-based investors and cross-border portfolio managers. There are strong motivations to comprehend the directions of spillovers, in particular, for restricted investors who seek to diversify their portfolios only across Islamic equity markets. The specific clusters of return and volatility spillovers indicate possible contagion risk, which can restrict Islamic portfolio holders. Then again, bilateral trade linkages are strong on spillovers, indicating limited room for diversification as it deters investors from holding securities of close trading partners. On a positive note, investors can focus on the underlying market movements, learn their sensitivity to the spillovers, and implement volatility trading strategies accordingly. An important lesson for Shari'ah scholars/policymakers is to realize the importance of more liquid Islamic capital markets to minimize vulnerability to external shocks. We also note the

nature of spillovers in Islamic equity markets with the macroeconomic shaping dynamics are similar to the conventional counterparts.

We note that the DY spillover index does not necessarily distinguish the potential asymmetry in spillovers that originates as a result of positive and negative news (Baruník et al., 2016). Therefore, a future study can consider this issue, as often investors react more strongly to negative rather than positive shocks. A study of this phenomenon is opportune. Further, the empirical strategies we adopted could also be performed with an improved broader sample that includes both Islamic and non-Islamic countries.

5.3 Essay Three

In the final study, we investigate the investment styles in IEFs based on a survivorship bias-free sample. We consider the study to be pertinent for a variety of reasons. From the historical portfolio holdings perspective, we find Islamic funds initially overwhelmingly tilted to high-BM value stocks in Islamic countries, concurring with Ferruz et al. 2012, and high-MB growth stocks in non-Islamic domiciles. However, over recent years, Islamic fund managers are moving to portfolios that are more tilted to blend types. This is a new finding, indicating increasing diversification attempts in IEFs. Similarly, Islamic funds initially overwhelmingly picked mid-cap stocks in Islamic countries, but the majority have been heavily skewed to large-cap stocks over recent year. However, we find consistent large-cap bias in non-Islamic domiciles, implying, most IEFs by and large do not exploit the small-cap stock's premium, quadrate with the test of Lettau et al. (2018) in conventional counterparts. Further, our multinomial regressions confirm these subtleties are instrumental in the underlying variables, particularly past performance. From the historical style drift inspection, we find notable

variants in Islamic and non-Islamic countries. Collectively, nearly 82% of sampled Islamic funds drift in style, but the drift rate is higher in Islamic countries compare to non-Islamic domiciles. The mean drift score is also higher in Islamic countries than that in non-Islamic domiciled funds. This is not entirely surprising, given that Islamic equity funds typically implement negative screening and continuous monitoring. Importantly, we examine the style shift in a binomial structure. We find that the propensity to shift is higher in asset types than in asset sizes of portfolio holdings. Islamic fund managers are more likely to alter their portfolio exposure to the market when they undergo negative returns and in the sight of a drop in asset value. Collectively, they shift in asset types more often once they secure an increase in fund flow. In Islamic countries, the more established fund is more likely to style shift as it mature. Notably, Islamic fund from non-Islamic countries is more likely to shift in asset types when the market is relatively less volatile. We note that the nature of style shift in IEF is similar to that in conventional counterparts.

The implications of our results are broad and can be explored from a variety of standpoints. First, the study can help both individual and institutional investors comprehend the subsequent comportment of their investments; for instance, the common tilt to the asset class of Islamic portfolios. We believe that historical portfolio holding-based style analysis presents more useful insight to investors trying to explore investment styles. However, we echo Nainggolan et al. (2016), and reiterate the need for IEFs to improve their portfolio disclosure practices. It is reported that nearly half of our initial sample of IEFs did not release style-related portfolio holdings information. Yet such disclosure shortcomings are at odds with the high level of transparency called for in Islamic finance principles. Therefore, heightened attention to improved IEF portfolio disclosure is a recommendation arising from

the study. Second, from the viewpoint of Islamic scholars as well as market regulators, the study provides insight into the aspects of investment commitment and continuous monitoring. For instance, Shari'ah regulators mandate Islamic portfolios adhere to the stated screening strategies alongside investment style (Peillex et al., 2018). Investors rely on the published statement on investment style in a fund's prospectus when selecting a fund by their investment objectives or strategies. Therefore, a shift in investment style indicates that investors might not acquire what they projected in the investment course.

We sidestep arguments that relate to the manager's ability to execute the style mandate consistently, yet this might significantly impact investment success. This would be a further valuable IEF analysis; we leave it for our future work. Another compelling extension of our study would be to examine other patterns of style shift, for instance, those that arise from an industry emphasis. Further, our analysis was limited to Islamic equity funds. Other major Islamic funds, such as index funds and fixed-income funds, may similarly provide valuable insights on portfolio holdings-related style shifts.

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