Essays on Determinants of Integration of Islamic and Conventional Financial Markets

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For the ones I love.

Abstract

This dissertation contains a series of essays, three in total, which examine the determinants of integration of Islamic and conventional financial markets. Academic and commercial interest in Islamic finance has increased in recent years, meaning that the area is commonly seen as a reasonable alternative to mainstream finance. It is notable, however, that growing awareness of Islamic finance has emerged alongside several relevant concerns surrounding the poor performance of Shariah-compliant indices. The limitations include minimal access to risk management tools, low regulatory standards in Islamic finance, and suboptimal governance framework.

With the large expansion of Islamic finance in recent years, sukuks (Islamic bonds), which are the Shariah-compliant substitute to conventional bonds, are now becoming more prominent. Although numerous studies have examined the impact of global shocks on conventional bond spreads, little attention has been paid to explore the effect of global shocks to the sukuk spreads. Therefore, the objective of the first study was to examine the impact of factors affecting the conventional bond and sukuk markets, including financial factors, economic policy uncertainty, US and EU macroeconomic news. Using an ordinary least squares approach, the results indicated that for regions and countries such as the GCC (Gulf Cooperation Council), Malaysia, Indonesia, Turkey, and Singapore, global shocks play a vital role in explaining sukuk spreads. Furthermore, employing a matched sample featuring firms from these regions and countries revealed that European and US macroeconomic announcements and economic policy uncertainty have significantly greater impact on sukuk spreads than on conventional bond spreads.

The second study builds on the directional spillovers from sukuk markets to Shariah-compliant equity markets and vice versa. The directions and magnitudes of spillovers are quite disperse among different countries and Islamic equity markets. Novel to the literature, we find that profitability and liquidity positions of the Islamic equity markets are highly influential on the magnitude of spillovers. We create a matched sample for 38 firms that issued both sukuks and Islamic equities. Implementing

similar spillover models, we indicate that firm-level profitability and liquidity positions of firms are essential in modelling the magnitude of the spillovers between sukuks and equities.

Finally, the third study explores spillovers from regional and global equity markets to sectoral equity indices for several different regions/countries. First, we investigate the connectedness of sectoral equity return spillovers and explore the different patterns and magnitudes of spillovers. Next, we look for the determinants of sectoral equity return spillovers. We find the regional and global markets spillovers on sector equity indices are highly dispersed across different markets. Novel to the literature, we examine the liquidity and financial positions of the sectors and find that sector positions are highly influential in explaining the extent of the spillovers. Particularly, our exploration evidences that regional and global spillovers to specific sector equity markets jump significantly when a sector has higher debt and lower interest expense coverage. Similarly, higher profit margins of the sector make it less vulnerable to global and regional shocks. We also find market capitalization of the sectors inversely affects the extent of the spillovers originating from global and regional markets.

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Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER ONE: Introduction

The purpose of this chapter is to outline the three essays that constitute this dissertation, each of which focus on the topic of Islamic and conventional financial markets. The contribution to the literature made by each essay is outlined, as well as the motivating factors for each essay. The chapter closes with a description of the overall thesis structure.

1.1. Background of the Study

The global financial crisis that occurred between 2008 and 2009, known as the GFC, has been examined, empirically and theoretically, from multiple perspectives. Two prominent strands of inquiry are the causes of the GFC and its implications (e.g. Brunn et al., 2016; Foster & Magdoff, 2009; Grosse, 2017; Jackson, 2018). The available literature reviews and meta-analyses are relatively conclusive in indicating that the following confluence of factors led to the GFC: firstly, the subprime crisis; secondly, the monetary policy adopted by the Federal Reserve between 2000 and 2001,[1] thirdly the Lehman Brothers bankruptcy; and finally, the emergence of novel financial products. The liquidity crunch has also been implicated in the GFC, particularly in terms of public debt crises, financial market losses, and a broad economic recession across the developing and developed countries. Resulting from this, investment, spending, consumption, employment, and income fell on the whole (e.g., Bekiros, 2014; Kenourgios & Padhi, 2012; Syriopoulos, Makram, & Boubaker, 2015; Wang, 2014).

Faced with the question of the origin and implications of the GFC, a critical question for practitioners, policymakers, and researchers relates to the issue of mitigating its effects, and also preventing similar scenarios in the future. Despite the fact that notable studies and statements have been published (Fitoussi et al., 2009; Shiller, 2012; Soros, 2009), no solution exists that benefits from

[1] As noted by Shiller (2012), the Federal Reserve reduced its rate on 11 occasions, moving from 6.5% to 1.75% between May 2000 and December 2001

full consensus. Nevertheless, to ensure that investors are reassured and confident, and to control financial risk and speculation, thus offering stable returns, it appears that it is essential and urgent to reform finance, to modernise and reorganise financial systems, and to regulate and restructure financial markets (Arouri et al., 2013; Bresser-Pereira, 2010).

With this setting in mind, the availability of strategies other than those used in conventional finance, including the existence of the sphere of Islamic finance, is a highly relevant factor (Jouini et al., 2009). The framework that underlies Islamic finance relies on what is known as Shariah law, which implies and encourages a specific business context characterised by socially responsible investment, sustainable banking and finance, and highly regulated finance. Ethical principles directly influence Islamic finance, such as when interest rates are prohibited for household lending, or when investments are forbidden in commercial organisations associated with the production of alcohol, pork products, or ammunition. Shariah law also forbids excessive risk and speculation, and it suggests that commercial banks should engage in profit and loss sharing with investors.

Over the past 10 years, Islamic finance has grown in various sectors, including Shariah-compliant financial instruments (e.g., sukuk), Islamic banks, and Islamic mutual funds and stock indices (Nasr, Lux, Ajmi, & Gupta, 2016; Raza & Ashraf, 2019). The definition of Islamic equity investments as an investment in a company's share capital that is not in violation of any tenet in Shariah law. Sukuk refers to partial ownership in an asset as opposed to a debt obligation, which means that the investor who establishes a position in sukuk has a common share in asset ownership, which is associated with the investment. Hence, this does not service the debt that is owed to the bond's issuer[2]. The moral and ethical underpinnings of Shariah law mean that Islamic investments are associated with caution, forward-thinking, and sustainability. This may correlate, and many promising results suggests that it does currently, with favourable performance, particularly in volatile periods with high conventional financial risk.

[2] Ayub, (2013) and Kuran, (2004) offers further detail on the characteristics, rules, and tenets of Islamic finance.

At year's end in 2018, the overall asset worth as the Islamic financial industry amounted to $2.19 trillion, and the growth rate was 8.5% (IFSB, 2019). More recent statistics suggest that Islamic banks, in 2018, were operating in a range of Islamic and non-Islamic countries with a combined asset value of $1.557 trillion (IFSB, 2019). The growth rate was particularly high in non-Islamic countries, including North America and Europe (Pollard & Samers, 2007). The growth rate of Islamic finance has been considerable, ranging from 15% to 25%, since the GFC in 2008. One of the main ways to account for this incredible level of growth relates to the fact that many investors, including corporate entities, have regarded Islamic equities as more stable assets in comparison to conventional equity (Tabash, 2018). The sukuk market has exhibited particularly high levels of growth recently, where – between 2006 and 2018 – the market expanded from $33.606 billion to $530.4 billion (IFSB, 2019). Additionally, non-Islamic issuers in Asia, Africa, and Europe have been developing an interest in this emerging market. Thus, in the wake of the GFC, the sukuk market in particular has arisen as a novel and growing phenomenon, complementing the conventional financial system. It exists as an alternative approach to raising capital to satisfy the financial requirements of firms, and to encourage economic development marked by stability (Zulkhibri, 2015).

The main factor that drives the Islamic financial industry, after Islamic banking, is the sukuk market, and it is prevalent in both Islamic and non-Islamic countries, including Japan, the US, and the UK (e.g., S&P Global Ratings, 2020; IFSB, 2019). A growing number of studies examining the phenomenon of sukuk, and many are adopting the perspective of traditional financial theories. At present, the available studies have examined issues such as Markowitz portfolio theory (Alam et al., 2013; Naifar & Hammoudeh, 2016; Naifar et al., 2017; Najeeb et al., 2017; Raei & Cakir, 2007), pecking order/trade-off theory (Azmat et al.,2014; Klein & Weill, 2016; Mohamed et al., 2015; Nagano, 2016, 2017), and the Fama and French model of asset pricing (Klein et al., 2017; Shafron, 2019). The primary focal point for these research projects has been to examine the advantages of diversified portfolios for institutional and individual investors, as well as the firm's decision to issue sukuk rather than conventional bonds, along with the religious beliefs of investors. A range of studies

in this area have attempted to investigate the potentially divergent ways in which conventional bonds and sukuk behave (Alam et al., 2013; Ariff et al., 2017; Azmat et al., 2017; Balli et al., 2020; Cakir & Raei, 2007; Haque et al., 2017; Maghyereh & Awartani, 2016; Nagano, 2016, 2017; Naifar & Hammoudeh, 2016b; Naifar et al., 2017, among others).

Other prominent areas of research interest in the literature include the stock market perspective of sukuk and bonds (Fauzi et al., 2017; Godlewski et al., 2013), structural changes (Aloui et al., 2015b; Naifar et al., 2016), co-movements and connections between sukuk and bonds (Aloui et al., 2015; Alaoui et al., 2015a; Sclip et al.,2016), shifts in the price regime (Aloui et al., 2015c), and the impact of interest rates on the sukuk market (Akhtar et al., 2017). As a case in point, the study undertaken by Godlewski et al. (2013) outlined contrasting perspectives. In particular, they suggest that, in practice, sukuk and conventional bonds have identical features, which would indicate that there may be no differences in the effect of the announcement of both types of securities on the stock market. In addition, one study examined the co-movement mechanism between Islamic stock indices and sukuk in GCC member states, where time-frequency analysis was conducted, and which revealed strong dependence between the two asset classes (Aloui et al. 2015a). Across time and frequency, the level of co-movement was different, but the long-term horizon was dominant. Another study examined positive co-movements between sukuk and the Dubai financial market stock index, which suggested that the low liquidity of sukuk may have restricted efficiency in the allocation of Islamic portfolio management (Alaoui et al. 2015). In addition, Sclip et al. (2016) examined the dynamic connections between sukuk and conventional markets using the GARCH DCC model, which offered data to support the existence of a strong correlation between sukuk and the conventional stock market.

Given the fact that structural changes exist in the connections between sukuk and the stock market, Aloui et al. (2015b) offered evidence of the negative and strong correlation between sukuk and Islamic stock markets. The study undertaken by Akhtar et al. (2017) focused on the effect of interest rate announcement news on sukuk, Islamic, conventional bond, and conventional stock markets. The researchers reported that announcement news had a minimal effect on the sukuk market

when considered against conventional market. An unexpected result was reported in that interest rate news had a greater effect on the Islamic stock market compared to the conventional stock market. Finally, the study conducted by Aloui et al., (2018) reported on a strong and positive correlation in the short-term between international sukuk and Islamic stock indices in the GCC market, but in the long-term, the correlation was negative.

The studies considered at this point indicate that a research activity on the co-movement between sukuk and Islamic equity markets has been increasing in recent years. Nevertheless, in the literature on Islamic finance, relatively little attention and time has been focused on examining the determinants of sukuk, as well as the linkages between Shariah equities and sukuk between varying markets. Hence, the present thesis is distinct from prior studies in several respects. The aim of the first study was to focus on the influence of factors that affect the conventional bond and sukuk markets, which include uncertainty regarding economic policy, financial factors, and macroeconomic news relating to the US and the EU. The results of this study suggested that, for the GCC member states, Indonesia, Turkey, Malaysia, Singapore, and other regions and countries, sukuk spreads could be explained by global shocks. In the second study, directional spillovers from sukuk markets to Shariah-compliant equity markets, and vice versa, were built on. The magnitudes and directions of spillovers were identified as dispersed between various countries and Islamic equity markets. Moreover, to identify the primary factors that connected these markets, it was identified that liquidity and profitability positions in the Islamic equity markets had a strong influence on spillover magnitude. Finally, the last study examined spillovers in global and regional equity markets to sectoral equity indices for multiple regions and countries. The results indicate that such spillovers are dispersed between various markets. In turn, the researcher sought to examine the determinants of sectoral equity return spillovers, and it was revealed that sector positions are strongly impacted by liquidity and financial positions in accounting for the extent of spillovers.

The remainder of this chapter separated into several sections; firstly, in Sections 1.2 to 1.4, an overview of the first, second, and third essays, along with the contribution of each essay to the existing body of knowledge, is given; secondly, in Section 1.5, an overview of the research outputs is given; and thirdly, Section 1.6 outlines the structure of the thesis as a whole.

1.2. Essay One: Economic uncertainties, macroeconomic announcements and sukuk spreads

The first of the three essays in this thesis focuses on the influence of financial factors, global economic policy uncertainty, and EU and US macroeconomic announcements on conventional bond and sukuk spreads. The financial factors that were considered were liquidity, default risk differentials, and maturity. In particular, the essay offers evidence on the way in which financial factors, as well as EU and US macroeconomic announcements, can affect matched samples of conventional bonds and sukuk issued by the same company over an identical period.

Although diverse features of sukuk have been examined from multiple perspectives in the literature, including their compliance, performance, and originality, these financial instruments have been hailed as potentially viable alternatives to financing, which are consistent with both sustainable financial planning and portfolio theory. Financial engineering has established a range of sukuk structures to enable both private and public entities to engage in funding. At the same time, it is possible for investors to incorporate sukuk into their portfolios, which play a key role in strategic approaches to diversification (Oakley, 2011).

Most prior studies that have addressed sukuk are theoretical, and they focus principally on offering accounts of sukuk structures, and developing them, typically emphasising legal issues (Zulkhibri, 2015; Amrani, Hamza, and Mostapha, 2017; Paltrinieri, et al., 2019). In addition, prior studies have demonstrated that sukuk tend to have higher stability compared to conventional bonds, and the average yield to maturity associated with sukuk is typically higher than conventional bonds (Fathurahman and Fitriati, 2013; Safari et al., 2013; Bacha and Mirakhor, 2013; Ahmed et al., 2015; Kamso, 2013; Hanifa et al., 2014; Ahmed et al., 2014; Bacha et al., 2015; Ramasamy et al., 2011). Nevertheless, studies have reported that bonds and sukuk are correlated in a significant way on the

basis of their yields (Mosaid and Bouti, 2014; Naifar, 2016; Maurer, 2010; Alam, 2009; Miller et al., 2007), and that they are significantly and causally related (Naifar, 2017; Safari et al., 2013; Ahmad et al., 2012). Additionally, several studies published in the literature have demonstrated that strong dependence exists between sukuk and Islamic stocks (Aloui et al., 2015a and Aloui et al., 2015b), and sukuk yields have been associated with a high dependence with the stock market (Naifar, et al., 2016 and Sclip et al., 2016). Regardless of whether the sukuk in question is equity-based (which tend to have comparable features stocks) or debt-based (which tend to have features comparable to convertible bonds in standard finance), the anticipated response from the market should be dissimilar compared to bonds. As a matter of fact, it has been reported sukuk display contrasting behaviours to bonds in differing economic scenarios (Hassan et al. 2018).

With the exception of the religious principles that underlie the structural features of sukuk, sukuk and conventional bonds – when the same country issues them – are strikingly similar. Despite the fact that standardisation is absent, an appealing feature is the fixed-income profit associated with sukuk. Speaking in theoretical terms, investors who would like to avoid risk are likely to favour bonds as opposed to stocks, and reasonable fixed income opportunities are difficult to discern. Hence, the yield spread indicator can be used excessively and accurately to ascertain the price of an individual or a collection of bonds. Multiple factors affect the question of whether yield spreads grow or narrow, such as credit risk, economic conditions, and supply and demand. The chief contribution of this essay to the literature is that it differentiates between conventional bond and sukuk spreads, meaning that other factors have to be assessed. Theories of bond pricing, which necessitate the functionality of default risk, maturity, and liquidity, are useful. The degree of liquidity risk exists in the sukuk market as a consequence of the structural differences, along with the limited status of sukuk assets. Furthermore, turnover ratio is higher in conventional bonds as compared to sukuk investments.

In view of the reasons given previously, it is possible for a substantial change in spreads to arise from just one permanent or long-lasting shock. The default risk perception is, as a consequence, different in the bond and sukuk markets. In the case of sukuk, these assist in facilitating risk sharing

with respect to the default between the creditor and the borrower, while it is only the borrower who is exposed to the risk of default in conventional bond markets. In the context of economic recession, the frustration experienced by sukuk borrowers may be lower compared to that of conventional bond borrowers, and this may influence sukuk spreads (yield spreads). With respect to maturity, long-term sukuk may be a more favourable investment as a result of lower yield spreads and volatility, which stems from the fact that the trading mechanisms and sukuk are embedded in the religious sanction against uncertainty (or *Gharar*). At the same time, sukuk holders, most of whom are fund managers, typically have long positions in their portfolios, and the likelihood of them switching instruments regularly as a result of the absence of viable alternatives is low. The demand for sukuk may become inelastic due to this motivation (non-substitutability), thus exaggerating their points of difference compared to bonds, and there is a potential for this to be reflected in spreads. Given the structural differences compared to bonds, global shocks may also elicit differing responses from sukuk. Hence, investigating the impact of global macroeconomic news – primarily that relating to the EU, the US, or economic policy uncertainty (EPU) – on sukuk spreads in comparison to conventional bond spreads is worthwhile.

Due to their promise as an indicator of economic vitality in the future, researchers have become interested in sukuk spreads, and technical dimensions of sukuk have been analysed by addressing the differences between corporate sukuk government sukuk yields. A range of research projects have documented notable results in terms of sukuk spreads, including in the GCC sukuk market (Rahman & Omar, 2015; Naifar & Mseddi, 2013) and sukuk market in Malaysia (Rahman, 2008; Saad, Haniff, & Ali, 2018a, b). As a case in point, the study undertaken by Naifar and Mseddi (2013) focused on the United Arab Emirates (UAE), and an analysis was presented with the interaction between sukuk yield spreads, stock market conditions, and macroeconomic variables. The researchers reported on a positive response in sukuk yield spreads to the stock market, reflecting a proportional relationship between stock index return and sukuk yield. Saad, Haniff, and Ali (2018b) examined the disparity in yield spread between sukuk and conventional bonds. The researchers

concluded that, compared to sukuk in long-term issuances, conventional bond yields have a greater spread, whereas mid-term issuances displayed differing behaviour.

The first of the three essays in this thesis contributes to the available literature on this topic by examining the impact of financial factors, US and EU macroeconomic announcements, and the EPU indices of various countries (e.g., Malaysia, Turkey, GCC member states, Indonesia, and Singapore) on sukuk and conventional spreads. The results of this initial phase of the thesis provide confirmatory evidence for the theory that these factors significantly influence sukuk spreads in comparison to conventional bond spreads. By using the matched-level of firm data for those issuing both conventional bonds and sukuk simultaneously, it was noted that matched firms displayed a greater level of sensitivity to maturity across every financial factor. Nevertheless, US, EU macroeconomic announcements and EPU had a more substantial influence on sukuk spreads compared to conventional bond spreads. In view of this, the conclusion was drawn but the sukuk market shows sufficient interest in the release of news in terms of economic conditions.

1.3. Essay Two: Sukuk and Shariah-Compliant Equity Market Spillovers

In the context of Islamic financial markets, Shariah-compliant sukuks and equities constitute the primary asset classes for investment portfolios. It is therefore essential for researchers to determine whether Shariah-compliant sukuks and equities behave in the same way compared to conventional bonds and equities with respect to co-evolution. Nevertheless, in the current state of research in Islamic finance, consensus has yet to be established. At the same time, given the differences between Islamic finance and conventional finance, it is possible to segment Islamic markets from their conventional counterparts, which stems from the fact that no fundamental risk factors are shared across the two. In this case, the spillovers that occurred between Islamic Equity and sukuk markets may differ from country to country due to the varying patterns time variability in the relationships between these markets over business cycles (Aloui et al. 2015a; Aloui et al. 2015b and Aloui et al. 2018). Hence, the purpose of this second essay is to examine the underlying factors in the interrelationship between sukuk and Shariah-compliant equities.

The interplay between equity and sukuk in Islamic financial markets has been the subject of significant interest among portfolio managers, hedge funds, investors, and policymakers. This has especially been the case following the emergence of macroeconomic shocks that have had global and regional effects. Multiple studies have examined interactive relationships between sukuk and Islamic equities. One of the main bodies of literature examines co-movements and interactions between sukuk and Shariah-compliant equities (Aloui et al. 2015a; Aloui et al. 2015b; Aloui et al. 2018; Godlewski et al. 2013; Mensi et al. 2020; Naifar, 2016; Naifar et al. 2016), while the other main body of literature has focused on quantifying the level of co-integration among sukuks and Islamic equity in Islamic countries (Marashdeh, 2005; Majid et al. 2007). Distinct from these studies, Akhtar et al. (2016) and Sclip et al. (2016) exhaustively investigated the volatility connections between conventional and Islamic bonds, equities, and money markets.

The present essay is distinct from prior studies due to the fact that it examines the factors that underlie the interrelationship between Shariah-compliant equities and sukuk. Extending the exhaustive cross-country market capitalisation-weighted sukuk indices listed in 13 developing and developed countries, this essay explored sukuk and Islamic equity spillovers between January 2013 and April 2020. In order to achieve this, the Diebold & Yilmaz (2012) methodology was used to evaluate the dynamic connection between Shariah-compliant equities and sukuk. The results suggest that Islamic equity and sukuk returns have a range of structural breaks. Therefore, a regime-switching pattern may characterise the dependence between the markets. In view of this, it is essential for Islamic funds in Islamic financial capital markets, as well as retail investors, to understand the benefits of portfolio diversification when they establish their strategies. This result also highlights the heterogeneity of investors, who – as well as differing in other areas – differ in terms of the time horizons according to which they plan their investments. The unique contribution of the present study the literature relates to its deep analysis of spillovers. Using empirical data, the research identifies the primary factors that account for the differences in spillovers across markets. To the best of the

researcher's knowledge, this essay is the first publication in the literature that evaluates the determinants of spillovers of conventional bonds, sukuk, and Islamic equity markets.

The research objectives for the present paper for the following: firstly, to gain insight into spillover dynamics between the sukuk and Islamic equity markets; and secondly, to determine whether known liquidity and profitability positions influence the extent of spillovers between the sukuk and Islamic equity markets. The results indicate increasing interactions in sukuk and Islamic equity return spillovers, but the spillover extends across the markets varied substantially. Upon more extensive empirical investigation, it became clear that the profitability and liquidity positions of the firms in the Islamic equity indices crucial considerations in accounting for the direction and magnitude of spillovers. Taken together, the analysis is indicative of the significance of profitability and liquidity connections in accounting for the strength of return spillovers for Islamic securities. Importantly, therefore, this essay offers practical information that policymakers can use to synchronise effective regulations that attenuate the effects of shock spillovers. Consequently, it is possible for investors to focus on firm-level financial characteristics, to gain insight into their sensitivity to spillovers, and – in accordance with this – to design and establish execute volatility trading strategies.

1.4. Essay Three: Spillovers to sectoral equity returns: Do liquidity and financial positions matter?

A key view expressed by certain researchers suggests that financial market integration eases access to foreign capital, but also that it elevates the degree to which different areas of the global system are vulnerable to financial downturns. Therefore, when financial market integration increases, the possibility exists that it may lower the available opportunities to diversify portfolios (Balli et al., 2013a; Narayan et al., 2014). In view of this, the purpose of the third essay contained in this thesis was to contribute to the limited body of existing understanding by examining the factors that affect sectoral equity market integration. In particular, the essay was interested in quantifying the extent to which liquidity and financial positions influence cross-sectoral equity market integrations.

A range of determinants of international stock market integration have been discussed in the literature. Several studies have identified the trade connection of countries as being the most critical factor that determines the mutual interdependence of stock markets (Chen & Zhang, 1997; Wälti, 2011; Bracker et al., 1999; Pretorius, 2002; Guesmi, 2011). One study noted that the trade balance can be used to forecast the dynamic relationship in Asian stock markets, and it found that the interest rate differential can explain stock market integration in developed markets (Moore & Wang 2014). Contrastingly, Gupta & Guidi (2012) found that bilateral trade has no influence on stock market integration between countries as the trade relationships are increasing in the international community. Numerous studies have assessed stock market integration between various international and regional markets (e.g., Longin & Solnik, 1995; Dumas et al., 2003; Cai et al., 2009; Yang et al., 2009; Syllignakis & Kouretas 2011; Mobarek et al., 2016; Alotaibi & Mishra, 2017; Balli et al., 2015a; Balli et al.. 2015b; Lee & Cho, 2017). As a case in point, Balli et al. (2015b) noted that security investments, market capitalisation, shared language, and bilateral trade were key factors that explain shocks in emerging markets in the GCC member states, the Latin American countries, Africa, Central Europe, Eastern Europe, and Asia.

Based on the abovementioned literature, it is reasonable to conclude that studies on the factors that determine stock market integration have comprehensively analysed aggregate equity markets. Based on an analysis of sectoral stock market integration, a range of research projects have noted that sectoral equity indices perform in a different way in relation to global and local shocks, as compared to aggregate equity markets. As a case in point, Kraus (2001) and Brooks & Del Negro (2004) demonstrated that not every sector in every equity market reacts in a similar way to local and global shocks. In addition, Balli & Balli (2011) found that sectoral diversification is more favourable impaired international diversification in the European economic area. Comparable findings were reported in the case of the GCC member states. Balli et al. (2013a) and Balli et al. (2013b) found that the level of integration of sectoral equity markets was dissimilar compared to national equity markets. Nevertheless, each of these studies focused on the idea that sectoral equity market integration is

distinctive and, moreover, distinct from national counterparts, and no prior researchers sought to account for the driving factors underlying this integration.

The impact of financial and liquidity positions on the level of integration between cross-sectoral stock markets was examined in this essay. Given the valuation and returns of every type of security is significantly influenced by market liquidity, it has a positive long-term influence and returns (see Datar, Naik, & Radcliffe, 1998; Avramov, Chordia, & Goyal, 2006; Chen, Ibbotson, & Hu, 2010; Balli et al., 2019), while financial positions significantly influence the stock market. In view of this, it is crucial for investors in the international sphere to have an adequate understanding of the driving factors behind stock market integration between sectoral equity markets in different regions and countries.

A key contribution of this essay is that the responsivity sectoral stock markets to internal shocks is higher compared to external shocks. The findings of the essay similarly emphasised the significant role of financial and liquidity connections in accounting for the strength of pair-wise spillovers. To be precise, debt, interest expenses, and market capitalisation perform the critical function in offering a definition of the cross-sector return spillovers, while other factors – including total assets and profit – had a negligible role in accounting for shock spillovers to these markets. It is relevant to emphasise that this finding has great significance portfolio holders who are interested in diversifying their equity portfolio risk in various markets.

1.5. Research Outputs from the Thesis

Essay one

The first essay contained in this thesis is published in *Applied Economics*:

- Balli, F., Billah, M., Balli, H. O., & Gregory-Allen, R. (2020). Economic uncertainties, macroeconomic announcements and sukuk spreads. *Applied Economics, 1-22*.

To this date, the essay has been presented at the following forums:

- Syed Mabruk Billah, Faruk Balli, Hatice Ozer-Balli, and Russell Gregory-Allen, "Economic Uncertainties, Macroeconomic Announcements, and Sukuk Spreads" 23rd Annual New Zealand Finance Colloquium, Lincoln, New Zealand, 13-15 February 2018.

Essay two

The second essay included in this thesis is under review at The *Journal of Financial Research*.

Essay three

The third essay included in this thesis is under review at The *Applied Economics*. To date, this essay has been presented at the following forums:

- Syed Mabruk Billah, Faruk Balli,, Hatice Ozer Balli and Anne de Bruin, "Spillovers on the sectors return: Do the liquidity and financial positions make any difference?" IIUM International Conference on Business Management, Malaysia, 10-11 July 2019.

1.6. The sequence of the Thesis

The structure of the thesis is organised in the following way: firstly, Chapter 2 introduces the first essay, which assesses the influence of global shocks on sukuk and conventional bond markets; secondly, Chapter 3 introduces the second essay, which focuses on the interconnection between sukuk and Shariah equities, and examines the factors underlying the relationship between these markets; thirdly, Chapter 4 introduces the third essay, which is concerned with the influence of financial and liquidity positions on the integration between sectoral equity markets in different nations and regions; and fourthly, the main research findings and their implications are discussed in Chapter 5, in combination with potential avenues for further research.

CHAPTER TWO: Economic uncertainties, macroeconomic announcements and sukuk spreads

2.1. Introduction

For the past ten years, Islamic asset-based debt securities have increasingly received attention in both the literature and among practitioners. Islamic securities can be used not only to generate government finance via sovereign issues but also as a way to fund organizations via corporate issues. In the context of Islamic financial markets, sukuk are the fundamental form of Islamic financial securities. These instruments differ in concrete ways from conventional bonds in view of the fact that the repayment of the latter occurs with interest, while the repayment of the former occurs with partial ownership in an asset (sukuk al ijara) or business (sukuk al musharaka).

The differences between sukuks and conventional bonds have made sukuk appealing to an increasing number of Islamic investors who view it as a socially responsible way to invest. Despite the historical observation that investors based in the Islamic countries of Southeast Asia and the Middle East have been the primary users of sukuk, this trend has been changing in recent years. Almost all sukuk issuances are associated with GCC members (49%) or Malaysia (46%), with other countries accounting for the remaining 5% (Ogino 2018). However, even among non-Muslim investors seeking to establish a diversified portfolio, sukuk is gaining attention. One of the central principles of sukuk ownership is that the investor periodically receives a fixed income profit, thus contributing to cash flow stability (Abdel-Khaleq & Richardson, 2007). Notably, in 2017, the value of Islamic bonds in non-Islamic countries outside the Middle East and Southeast Asia amounted to approximately US$2.25bn, a steady increase from the 2016 and 2015 figures of US$2bn and US$1bn, respectively (IIFM 2018). However, despite this growth trend, challenges including the absence of sukuk standardization have prevented widespread adoption in the rest of the world. For example,

interpretations of Shariah law vary from jurisdiction to jurisdiction, and therefore the structuring of Islamic financial instruments varies significantly between countries and regions.

There is a big strand of literature concentrating Sukuk, Islamic investment returns, and conventional bond returns. The stability of Islamic bonds in comparison to conventional bonds is a regular point that is made in the literature, as well as the higher average yield to maturity (Fathurahman and Fitriati 2013; Bacha and Mirakhor 2013; Ahmed et al., 2015; Kamso 2013; Hanifa et al., 2014; Ahmed et al., 2014; Bacha et al., 2015; Ramasamy et al., 2011). Nevertheless, a significant correlation has been identified between sukuks and conventional bonds with respect to their yields (Mosaid and Boutti 2014; Naifar 2016; Maurer 2010; Alam 2009; Miller et al., 2007). Besides a significant cause-and-effect relationship between two asset types exists (Ahmed et al. 2012; Naifar et al., 2017). Additionally, prominent dependence has been noted in the literature between sukuk and Islamic stocks (Aloui et al., 2015a; Aloui et al., 2015b), and sukuk yields are strongly dependent on the stock market (Naifar et al., 2016; Sclip et al. 2016). Regardless of the equity-based nature of sukuk-shares features in common with stocks-, or the debt-based nature of sukuk-shares features in common with convertible bonds, the anticipated market reaction ought not to be comparable to bonds. Noteworthy, Hassan et al. (2018) offer findings to suggest that sukuk behave differently when compared to bonds in the context of various economic settings.

Both conventional bonds and sukuks issued by the same nation are incredibly similar apart from religious tenets-based structure of the latter. Although standardization is missing, the fixed-income profit sukuk offers is attractive. Theoretically, risk-averse investors tend to choose bonds over stocks, viable fixed income opportunities are hard to identify. Thus, to determine the price of a bond the yield spread indicator has emerged as a powerful and accessible tool. A variety of factors can influence the widening or narrowing of yield spreads, including supply and demand, credit risk, and the state of the economy. The difference this paper purports to make in the literature is to distinguish between sukuk and conventional bond spreads, other factors must thus be examined. Bond pricing

theories, which entail the functionality of liquidity, default risk, and maturity, are helpful. There is some liquidity risk in the sukuk market due to their different structure and the limited nature of sukuk assets. Moreover, sukuk investments have a lower turnover ratio compared to conventional bonds.

For the reasons cited above, even a single long-term or permanent shock is capable of causing a significant deviation in spreads. The default risk perception is thus quite different within the sukuk and bonds markets. Sukuk help facilitate the sharing of the risk of default between borrower and lender, whereas the risk of not paying the loan back belongs only to the borrower in conventional bond markets. In economic downturns, sukuk borrowers may become less frustrated than conventional bond borrowers, and this may affect sukuk spreads (yield spreads). Concerning maturity, long-term sukuk may offer a better investment due to low yield spreads and less volatility, owing to the religious prohibition on uncertainty (gharar) built into their trading mechanisms. Additionally, sukuk holders, who are mostly fund managers, tend to hold their assets for the long term and are unlikely to switch instruments often due to the lack of adequate alternatives. This motivation may lead to inelastic demand for sukuks (non-substitutability) and exaggerate their differences from bonds, which may then be reflected in spreads. Because of their structural differences from bonds, sukuks may also react differently to global shocks. Therefore, it will be valuable to examine how global macroeconomic announcements – mainly the US or European Union, and economic policy uncertainty (EPU) affect sukuk spreads compared to conventional bond spreads.

A strand of literature has studied sukuk spreads, such as in the GCC sukuk market (Rahman and Omar 2015; Naifar and Mseddi 2013) as well as the Malaysian sukuk market (Rahman 2008; Saad et al., 2018a, b). For example, Naifar and Mseddi (2013), in the case of United Arab Emirates (UAE), they find a positive reaction of the sukuk yield spread to the stock market, thereby indicating that the sukuk yield increases with the stock index return. Saad et al., (2018b) assessed the difference in yield spread between conventional bonds and sukuks. This study inferred that in comparison to

sukuk in long-term issuances, the yields of conventional bonds demonstrated a more extensive spread, while the medium-term issuances showed different behaviour.

After examining existing studies addressing sukuk spreads, this paper supplements the work done in this field by comparatively examining the available data. To our knowledge, there has been no research investigating both domestic and global factors. In particular, novel to the literature, this study contributes by investigating the effects of US, EU macroeconomic announcements and the EPU indices of countries such as the GCC, Indonesia, Singapore, Malaysia, and Turkey on both conventional bond and sukuk spreads. The research results validate the theory that US, EU macroeconomic announcements and EPU have significant effects on sukuk spreads in the GCC, Indonesia, Malaysia, Singapore, and Turkey. By employing the international factors of liquidity, maturity, and default risk, especially for the GCC, Turkey, and Indonesia, we observe that sukuk spreads react significantly to more of these factors than do conventional bond spreads. In the second part of the analysis, as part of a comparison between sukuks and conventional bonds, matched firm-level data were employed in which both types of bonds are issued in the same market. The results showed that both sukuks and conventional bonds are significantly affected by default and maturity where liquidity has effect only on conventional bond spreads. However, US, EU macroeconomic announcements and economic policy uncertainty have more significant impacts on sukuk spreads than on conventional bond spreads.

The remainder of the paper is structured as follows: Part 2.2 elaborates on sukuk and conventional bonds. Part 2.3 reviews the literature for conventional bond and sukuk spreads. Part 2.4 depicts the Islamic and conventional bond market data and US macroeconomic announcements. Part 2.5 provides a detailed description of the sukuk spread model and the empirical findings are discussed in Part 2.6. Part 2.7 concludes the analysis.

2.2. Sukuk structure vs conventional bonds

Islamic finance refers to financing activities that adhere to Shariah law. The phrase thus refers to a rapidly expanding aspect of the global banking sector as Islamic corporate governance takes on greater importance worldwide. Investment in businesses that offer goods and services recognized as opposing Islamic principles (for example, the sale of pork products or alcohol) is inherently prohibited. However, multiple traditional financial instruments such as conventional bonds, options, and derivatives are also forbidden by Shariah law. Two essential investment vehicles that are often used to replace these are Islamic equities and sukuk.

The first vehicle, Islamic equity investments can be defined as investments in the share capital of companies that are obedient to Shariah law. Islamic investors become part of the company and are accountable for its internal restructuring. Before investing in any company, the investor must therefore determine whether the company is involved in Shariah-noncompliant activities.

Because lending with interest is forbidden by Shariah law, there can be no conventional bonds in Islamic finance markets. However, the second replacement vehicle, known as a sukuk, serves a similar function. It represents an undivided ownership interest within a tangible underlying asset that is proportionate to the investor's investment value. The purpose of the investor's certificate is to substantiate his or her entitlement to a proportional share of the funds (i.e. revenues or cash flow) produced as a consequence of the tangible underlying asset.

Therefore, sukuk constitutes a share in financial transactions, and its value reflects the current market value of the asset at the maturity date. More concisely, a sukuk investment involves the allocation of funds towards a project's assets. The motivation for providing funds is to increase the initial investment. A predetermined ratio is returned to the investor as a percentage of the generated profit. When investors purchase sukuk, the issuer provides them with a certificate of ownership. Sukuk attests to the investor's right to be provided with a pro rata share of the profits produced by the initial investment, at regular intervals, and following maturity, to have the entire principal amount

returned to them. Notably, however, this represents only a single approach that can be taken to achieve this objective; as is the case for almost all Islamic financial instruments, a range of approaches is available (e.g. profit payments arriving at regular intervals using profit-sharing or rental from the asset).

Despite documented differences between sukuk and conventional bonds, both provide means to achieve a similar goal: to raise capital for the issuing company. Also, both can be converted into cash by sale on the secondary market. Sukuk investments have maturity dates, with the holder receiving regular income over the specified period and a final payment upon maturity (Zakaria, Isa, & Abidin, 2012). As with conventional bonds, the market prices sukuk, with each issuance determining both coupon and issuance price. Based on processing flow in terms of how sukuk and conventional bonds operate, both instruments also have similar processes and traceability patterns and, based on the strength of their backing, both instruments can be ranked by banking institutions.

There are, however, crucial points of distinction between conventional bonds and sukuk. The first is that the financing of any assets, projects, firms, and joint ventures that comply with local laws can be facilitated using bonds, while in the case of sukuk, any underlying tangible asset must not contradict Shariah tenets. Additionally, investors who own bonds are usually insulated from the expenses associated with an asset, project, firm, or joint venture, meaning that the degree to which the underlying asset performs effectively is not a determinant of the returns. In contrast, investors who hold sukuk are not insulated from these expenses; the implication is that incurring more significant expenses can negatively affect the overall return. In addition, the fair value of conventional bonds is based on the creditworthiness of the issuer and the prevailing interest rates, which is part of their nature as debts. The fair value of sukuk, however, is based on the current market value of the underlying assets (Jamaldeen 2012).

As an additional distinction, sukuk is a relatively immature financial instrument, initially designed as a Shariah-compliant alternative to conventional bonds; however, debate has arisen

regarding the nature of the instrument. Some contend that sukuk is indeed equity rather than a bond. A few factors distinguish sukuk and equity, however. Sukuk can be structured on a debt-based model, such as lease-based (sukuk al-ijarah), where it is used in a manner that provides for regular payments throughout the life of a financing arrangement. Sukuk also has a maturity and face value paid at the end of a given term, while equities do not mature. Although equity represents general ownership for an unlimited period, sukuk represents partial ownership of a specific asset or project in a company for a limited time.

2.3. Literature review

A remarkable number of scholars have attempted to test differences in risk and return of sukuk compared to conventional bonds. According to some of them, there are no significant differences between the two types, as they present a similar structure (Ariff and Safari 2012; Alam et al., 2013; Ahmed et al., 2014; Zakaria et al., 2013; Ulus 2013; Bhuyan 2015; Nazlioglu, Hammoudeh, and Gupta 2015). On the other hand, Mirakhor and Iqbal (2007) claim that the prohibition of excessive uncertainty, short selling, arbitrage and pure speculation in sukuk should reduce overall riskiness of these products compared to conventional ones. Balcilar, Cerci, and Demirer (2016) offer a similar view, by showing that sukuk experienced a negative correlation with stock markets during the global financial crisis (2007–2009). Naifar et al., (2016) investigated the dependence structure between major local sukuk yields in the case of Malaysia, Saudi Arabia, and the United Arab Emirates and various stock market conditions as represented by national, regional, and global stock market returns. They find asymmetric dependence between the local sukuk returns and the global and regional stock markets' volatility for the UAE and Malaysian sukuk markets. Maghyereh and Awartani (2016) study the returns and volatility spillovers of sukuk and global bonds with equities 30th for the period September 2005 to the 24th of February 2014. They find different transmission mechanisms of sukuk compared to conventional bonds. Sukuk market are the higher transmission of information from equities, and the weaker transmission of information from the sukuk market to other markets. Nasir and Farooq (2017) pointed out that Sukuk are less risky and more stable than conventional bonds and

this could positively affect investors' decision to invest in the former. Based on the above assumptions, we raise the following hypothesis: Finally, Hassan et al. (2018) show that Sukuk returns are much less volatile than US and EU investment grade bonds.

The literature addressing the influence of financial factors on bond markets is still developing, and in terms of the connections between conventional and sukuk spreads, recent macroeconomic announcements by the US federal government have attracted the attention of researchers globally. Day-to-day changes in financial markets are frequently linked to macroeconomic news; several studies have shown that bond and foreign exchange prices are inextricably linked to news about inflation, output, housing, and economic sentiment (Balduzzi, Elton, and Green 2001; Andersen et al. 2007; Faust et al. 2007). Notably, while few research studies focus on the influence of macroeconomic statements in various financial markets, these works have addressed the relationship between economic data and corporate bond spreads. Barragan (2017), for example, found that the publication of negative macroeconomic information typically has a negative impact on spreads, and vice versa.

The economic policy uncertainty index developed by Baker, Bloom, and Davsi (2016) captures three core components: i. newspaper coverage to fiscal and monetary policies, ii. expirations of federal tax code provisions, iii. disagreement among economic forecasters on future government expenditures and inflation. Recently, several studies documented that the impact of EPU on the bond market and found EPU is a relevant factor which causes bond yields to increase (Wisniewski and Lambe 2015). Similarly, Leippold and Matthys (2015) examine the EPU has a crucial impact on conventional bond markets. For example, the bond yield decreases, and the bond yield volatility increases as EPU gets higher. In addition, EPU impacts conventional bonds by inducing higher volatility and causing lower returns, thus affecting conventional bond spreads (Wang, Sun, and Li 2017). When policy uncertainty peaks, bond prices display instability because of greater uncertainty regarding financial transactions, thus lowering bond yields, elevating the demand for bonds, and subsequently leading to falling conventional bond spreads.

Therefore, bond liquidity has been identified as a critical financial factor in volatility. According to Chen, Lesmond, and Wei (2007), liquidity's impact on yield spreads accounts for up to 50% of the variation observed in the appropriate levels. They also highlighted that illiquidity is a reason to widen the yield spread and it can be solved to improve liquidity. Favero, Pagano, and Von Thadden (2005) sought to account for the factors contributing to conventional bond spreads in euro bond markets. Their examination of various financial factors showed that modifications to bond liquidity correlate significantly with bond yield spreads by setting higher ask prices compared to bid price. Bond liquidity is modified by attaching a more current asset to the bond to act as a security of default, which increases bond liquidity because this asset makes the bond more marketable.

Default risk is another financial factor that can contribute to determining conventional bond yield spreads. Issues that cause default risk to change over time include wider fluctuations in the economy and a firm's financial circumstances. Based on theoretical frameworks for the valuation of high-risk corporate securities, the risk of default is a crucial aspect of the overall yield spread. Nevertheless, scholars such as Balli (2009) have emphasized that default risk cannot cause yield spreads independently because it fails to account for discrepancies in bond yields, particularly in the Euro area. This stems from the fact that high default risk premium markets have the potential to lower bond yield rates. Several other scholars confirm that default risk does not cause yield spread because only the bond issued is affected by the default risk where the yield of the benchmark is not affected, especially in relation to non-default factors (Jones, Mason, and Rosenfeld 1984; Delianedis and Geske 2001; Huang and Huang 2012; Tsuji 2005; Liu et al. 2009).

Compared to the literature addressing conventional bond spreads, the examination of sukuk spreads is a novel research interest that pertains to the technical dimensions of sukuk, primarily relying on analyses of the disparities between corporate sukuk and government sukuk yields. In recent years, several findings have been reported with respect to the current movement in sukuk spreads in both the Gulf Countries (GCC) sukuk market (Naifar and Mseddi 2013; Rahman and Omar 2015) and the Malaysian sukuk market (Rahman 2008; Saad et al., 2018a, 2018b). Rahman and Omar

conducted a study based on cointegration in 2015 to investigate spreads of USD-denominated corporate sukuk, as issued by corporations within the GCC, against movements of the US capital market. Utilizing daily data from 2007 to 2011, the study examined the relationship between the US treasury, equity market, and sukuk spreads. Sukuk spread relationships with movements in the US treasury and stock markets vary because of the nature of sukuk, in terms of its structure, sources of income, and position in Islamic fund portfolios. Saad et al., (2018a) examined the relationship between institutional ownership and long-term sukuk yield spreads. They found that long-term sukuk yield spreads had a significant relationship with institutional ownership, which means default risk will be lower among issuers with active control and monitoring by institutional ownership. Saad et al. undertook another study (2018b) and found that higher default risk can create larger spreads for conventional bonds than sukuk in terms of long tenure. Naifar and Mseddi (2013) also investigated sukuk spreads within the GCC. They calculated these spreads using an index yield from eleven sukuk originated in the UAE from October 2009 to July 2011. The results of this study showed that the slope of the yield curve and changes in the stock market were the primary influences on variances in sukuk spreads.

2.4. Data Description

This paper uses a dataset which specifies variables about sukuk and conventional bond spreads and includes macroeconomic announcements made within the context of the US, European Union indicators and global economic policy uncertainty. We selected a dataset specific to a weekly pattern, from 1 January 2013 to 31 December 2018. This period was deliberately chosen to demonstrate global shock impact on the integration of sukuk and bond markets as the dependent variable for this research; the weekly sukuk spread for each company was obtained from Bloomberg. The study empirically evaluated data from the following regions: GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE), Asia (Indonesia, Malaysia, and Singapore) and Europe (Turkey). From those regions, the research evaluated 276 (sukuk) and 268 (conventional bond) companies. The number of companies from each country contributing to the compilation of the sukuk and bond spreads is presented in Table

2.1. To check the robustness of the study, we further construct a new dataset by matching firm-level data on sukuk and conventional bonds for 31 listed companies in the same country set over the period from 1 January 2013 to 31 November 2018[3].

The use of bid-asking spreads has been incorporated for an accurate depiction of the liquidity premia impact on each sukuk spread. Typically, the supply and demand for a particular asset in financial markets are reflected through the bid-ask spread. The variable is therefore identified as:

$$Liq_{i,t} = \frac{Bid_{i,t} - Ask_{i,t}}{Ask_{i,t}} \quad (1)$$

where, $Bid_{i,t}$ refers to the bid weekly price for the given sukuk spread yield i at time t. $Ask_{i,t}$ refers to the weekly asking price for the same sukuk in financial markets. The sukuk market's liquidity is measured by the spread. The spread and market liquidity are inversely proportionate to each other, with the lesser spread indicating higher market liquidity. In addition, the maturity variable, another financial factor, may potentially impact the sukuk spread which has been recorded from Bloomberg.

Default risk, $Def_{i,t}$, refers to the uncertainty surrounding a company's ability to service its debts and obligations. In this paper we have identified default risk, obtained from Bloomberg, in order to capture the fundamental types of risk. Correspondingly, for depicting levels of economic uncertainty, the paper has considered weekly data from Bloomberg's economic policy uncertainty (EPU) Index. The study observed that it is essential to accommodate common shock factors in assessing financial integration of the Islamic and conventional bond markets. Specifically, US macroeconomic announcements were used as a substitute for the common shocks affecting sukuk and bond spreads.

[3] The number corporates that have issued sukuk as well as conventional bonds is very small. The matched data has been collected from GCC, Indonesia, Malaysia, Singapore and Turkey. Due to these restrictions, we have limited our study, while we only have 31 listed firms who issue sukuk and bond at the same time in same markets and date range is from 1st January 2013 to 31st December 2018.

Table 2 1. Composition of the Sukuk and Conventional Bond Index

	Country	Sukuk Firms	Conventional Bond Firms
GCC Countries	Bahrain	5	5
	Kuwait	8	-
	Oman	3	3
	Qatar	-	7
	Saudi Arabia	12	3
	United Arab Emirates (UAE)	35	16
Asian Countries	Indonesia	17	84
	Malaysia	179	80
	Singapore	5	47
European Countries	Turkey	12	23

Note: We used the weekly spread of Sukuk and Conventional bond data available on the Bloomberg database, covering the period from January 1st 2013 to December 31st 2017.

The US macroeconomic announcements and EU indicators are obtained from the Bloomberg world economic calendar. We also obtain the macroeconomic forecast survey data from Bloomberg news. These surveys typically represent a market consensus on the expected values for specific announcements with a clearly defined calendar and timing of news releases. We use this survey data to infer the surprise element of each macroeconomic announcement in a similar fashion to Andersen et al., (2007) as outlined in methodology section. In order to achieve an appropriate macro economy representation, the paper reviewed eleven different macroeconomic announcements rather than the conventional maximum of two or three and also eight EU indicators. These announcements include: perceived state of the economy by Consumer Confidence (CC); inflation by the Consumer Price Index (CPI); the direction of monetary policy by announcements from the Federal Reserve Board , the Federal Open Market Committee (FOMC); a nation's total economic activity by Gross Domestic Product (GDP); the situation in the real estate market by Housing Starts (HS) housing price index; activities combining factors of production to produce material goods intended for the market by Industrial Production (IND); an individual's total earnings from wages, investment enterprises, and other ventures by Personal Income (PI); Payroll release (PR); inflation by Producer Price Index (PPI) producer confidence index; the consumption by Retail Sales (RS); financial balance by the Trade Balance EU (TB); and employment by the civilian Unemployment Rate (UNR). Additionally, EU indicators include, Consumer Price Index (CPI); Gross Domestic Product (GDP); Housing Price

Index (HPI); Industrial Production (IND); Payroll release (PR); Producer Price Index (PPI); Retail Sales (RS) and Trade Balance (TB).

These variables are presented in detail in Table 2.2 and 2.3. For bond returns, and particularly for the most influential returns, these announcements are considered the most essential macroeconomic announcements (Balduzzi et al., 2001).

Table 2.2. US Announcement Releases

Variable	Abbreviations	Units
Consumer Confidence	CC	% Level
Consumer Price Index	CPI	% Change
Federal Open Market Committee	FOMC	% Level
Gross Domestic Product	GDP	% Change
Housing Starts	HS	Million
Industrial Production	IND	% Change
Payroll Release	PR	% Change
Personal Income	PI	% Change
Producer Price Index	PPI	% Level
Retail Sales	RS	% Change
Trade Balance	TB	Billion
Unemployment Rate	UNR	% Level

Note: This table shows the US macroeconomic announcements, their abbreviations, and the reported units of the variables.

Table 2.3. EU Announcement Releases

Variable	Abbreviations	Units
Consumer Price Index	CPI	% Change
Gross Domestic Product	GDP	% Change
Housing Price Index	HPI	Million
Industrial Production	IND	% Change
Payroll Release	PR	% Change
Producer Consumer Index	PPI	% Level
Retail Sales	RS	% Change
Trade Balance	TB	Billion

Note: This table shows the EU macroeconomic announcements, their abbreviations, and the reported units of the variables.

The summary statistics for conventional bond and sukuk spreads and related financial factors are presented in Table 2.4. As the statistics suggest, the spreads of sukuk securities and bond pairs are quite different. For example, the means of Indonesia and Malaysia's sukuk spreads are lower than those of their conventional bonds, while the means of the GCC, Singapore, and Turkey's sukuk spreads are higher than those of their conventional spreads. The mean default risk for companies that issue sukuk is lower for almost all countries than for conventional bonds, except in Turkey. This is due to the risk-sharing feature of sukuk, which causes a decrease in the overall risk of a project. The

mean liquidity variable for sukuk and conventional bonds is negative in both cases, indicating that both markets are limited within the sample countries. The mean for maturity of issues is, on average, a little larger for conventional bonds than for sukuk, though sukuk in Indonesia, Malaysia, and Turkey have shorted mean maturity times than conventional bonds, while the maturities for sukuk in the GCC and Singapore are higher. The shorter maturity of sukuk in the former cases could suggest that they pay lower total returns in terms of both current yield and capital gains. Overall financial factors may also be different for conventional bonds and Sukuk due to their different structures. Table 2.5 offers descriptive statistics for the global shocks extracted, showing that the average economic policy uncertainty shock is smaller than the average macroeconomic announcement shock. In terms of macroeconomic shocks, Consumer Confidence (CC) has higher levels of positive average shock than other macroeconomic shock types. The lowest average shocks related to macroeconomic announcements come from Housing Starts (HS), which produce negative shocks. Regarding European Union shocks, among eight EU macroeconomic shocks, Industrial Production (IND) is the most significant average positive shock than other announcements while the lowest average shock is Trade Balance (TB), and it produces a negative shock.

2.5. Methodology

In this study, we apply Feasible Generalized Least Squares estimation technique in order to capture the heteroscedasticity across panels. Historical weekly data on spread, liquidity, maturity and default risk are utilized in Eq. (2) as benchmark model to uncover possible factors affecting each firm's sukuk and conventional bond spreads:

$$\mathrm{Spread}_{i,t} = \beta_0 + \beta_1 \mathrm{Liq}_{i,t} + \beta_2 \mathrm{Mat}_{i,t} + \beta_3 \mathrm{Def}_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $\mathrm{Spread}_{i,t}$ is the dependent variable either reflecting to sukuk spread (the difference between each sukuk firm i's return and the corresponding US dollar treasury return at an issue date for each bond issue) or to conventional bond spread (difference between each conventional bond firm i's return and the corresponding US dollar treasury return at an issue date for each bond issue) of each

firm i at time t. Financial factors for the local risk factors for Eq. (2) are measured by the liquidity differential variable ($\mathrm{Liq}_{i,t}$); simply the liquidity-bid asking spread defined above- difference between sukuk (or bond) i and benchmark asset at time t. Maturity variable ($\mathrm{Mat}_{i,t}$) refers the residual maturity differences between sukuk (or bond) i and benchmark sukuk. Lastly, default Risk ($\mathrm{Def}_{i,t}$) corresponds the default risk difference between sukuk (or bond) and benchmark asset. spreads (sukuk and conventional bond) and financial factors are accessed through the Bloomberg database. Finally, $\varepsilon_{i,t}$ is the error term, which is assumed to be independent and normally distributed with a zero mean.

Table 2.4 Descriptive statistics for Financial factors and Spreads

	Conventional Bond				**Sukuk**			
	Spread	Default	Liquidity	Maturity	Spread	Default	Liquidity	Maturity
	GCC				GCC			
Mean	0.012	0.022	-0.018	0.037	0.019	0.022	-1.096	0.045
Maximum	0.086	0.214	0.000	0.175	0.088	0.214	0.150	0.168
Minimum	-0.029	0.001	-0.545	0.000	-0.006	0.001	-15.750	0.000
Std. Dev.	0.017	0.020	0.067	0.027	0.013	0.021	1.261	0.029
	Indonesia				Indonesia			
Mean	0.068	0.038	-0.024	0.099	0.065	0.026	-0.972	0.075
Maximum	0.124	0.389	0.042	1.503	0.142	0.152	0.000	0.402
Minimum	0.002	0.001	-0.907	0.012	0.028	0.001	-3.582	0.001
Std. Dev.	0.021	0.043	0.106	0.097	0.019	0.027	0.551	0.024
	Malaysia				Malaysia			
Mean	0.028	0.030	-0.007	0.049	0.025	0.023	-0.562	0.040
Maximum	0.389	0.537	0.007	0.967	0.544	0.537	1.719	0.695
Minimum	-0.031	0.001	-0.486	0.010	-0.031	0.001	-2.000	-0.075
Std. Dev.	0.030	0.051	0.023	0.030	0.010	0.032	0.231	0.019
	Singapore				Singapore			
Mean	0.018	0.022	-0.008	0.040	0.027	0.021	-0.083	0.042
Maximum	0.549	0.385	0.000	0.917	0.073	0.101	0.000	0.084
Minimum	-0.024	0.000	-0.088	0.001	-0.003	0.002	-2.711	0.001
Std. Dev.	0.036	0.030	0.008	0.034	0.015	0.024	0.282	0.019
	Turkey				Turkey			
Mean	0.032	0.029	-0.002	0.060	0.041	0.037	-0.606	0.041
Maximum	0.179	0.216	0.747	0.143	0.287	0.140	0.433	3.907
Minimum	-0.013	0.002	-0.060	0.011	-0.004	0.002	-3.550	0.002
Std. Dev.	0.028	0.028	0.057	0.025	0.029	0.033	0.565	0.197

Note: Descriptive statistics for the examined Financial Factors (Default, Liquidity, and Maturity) and Spreads (Bonds and Sukuk) are based on weekly data for the period January 01, 2013 to December 31, 2018.

Table 2.5 Descriptive statistics for Global Shocks

		Mean	Maximum	Minimum	Std. Dev.
Global Economic Policy	Economic Policy Uncertainty	-0.108	77.125	-78.082	21.149
Macroeconomic announcements	Consumer Confidence	0.180	10.920	-13.065	2.600
	Consumer Price Index	-0.003	0.200	-0.200	0.043
	FOMC	0.051	1.500	0.000	0.215
	GDP Price Index	-0.002	0.500	-0.900	0.122
	Housing Starts	-0.341	12.623	-15.942	3.331
	Industrial Production	-0.010	0.600	-1.000	0.155
	Payroll Release	0.020	4.740	-2.290	0.460
	Personal Income	-0.002	1.800	-1.200	0.150
	Producer Price Index	-0.005	0.400	-0.600	0.121
	Retail sales	-0.010	0.600	-0.900	0.150
	Trade Balance	-0.029	18.872	-27.193	3.805
	Unemployment Rate	-0.008	0.100	-0.300	0.059
EU Indicators	Consumer Price Index	-0.044	1.880	-4.600	0.442
	GDP Price Index	-0.063	2.700	-6.360	0.744
	Housing Price Index	-0.041	3.300	-4.600	0.558
	Industrial Production	0.036	21.950	-16.267	2.454
	Payroll release	0.001	2.300	-1.220	0.156
	Producer Consumer Index	0.009	8.490	-1.900	0.612
	Retail sales	-0.061	4.450	-8.100	1.104
	Trade Balance	-0.767	78.308	-90.845	12.932

Note: Descriptive statistics are recorded for Economic Policy Uncertainty (EPU) and US macroeconomic announcements for the period of 1st January 2013 to 31st December 2018. All the mean, maximum, minimum and standard deviation values are multiplied with 100 for better printing.

Following Baker et al. (2016), we also investigate the effects of a global economic policy uncertainty shock on sukuk and conventional bond spreads. Moreover, we examine the surprise news announcements, which are inferred using the macroeconomic forecast survey data from Bloomberg news. As only the surprise news announcements considered, the macroeconomic announcement data is normalised and defined by utilizing the difference between Expected and Actual release data following Andersen et al., (2007). To capture the effect of global economic policy, US and EU macroeconomic announcement effects on sukuk spread (or conventional bond spread alternatively) along with benchmark model, we extended Eq. (2) as follows:

$$\mathrm{Spread}_{i,t} = \beta_0 + \beta_1 \mathrm{Liq}_{i,t} + \beta_2 \mathrm{Mat}_{i,t} + \beta_3 \mathrm{Def}_{i,t} + \beta_4 \mathrm{EPU}_{i,t} + \beta_5 \mathrm{EPU}_{i,t-1} + US\mathrm{MA}_{i,t}\theta_1 \quad (3)$$

$$+ USMA_{i,t-1}\theta_2 + EU\mathrm{MA}_{i,t}\theta_3 + EUMA_{i,t-1}\theta_4 + \varepsilon_{i,t}$$

where $\mathrm{Spread}_{i,t}$ is the dependent variable reflecting to sukuk spread (or conventional bond spread alternatively) of each firm i at time t. β_0 is the intercept. β_1, β_2, …, β_5 coefficients denote the

slopes for relevant variables while θ_1,θ_2,θ_3 and θ_4 are vectors of slope coefficients for macroeconomic announcements. $\mathrm{EPU}_{i,t}$ represents the global economic policy uncertainty. $US\mathrm{MA}_{i,t}$[CC, CPI, FOMC, GDP, HS, IND, PI, PR, PPI, RS, TB, UNR] and $EU\mathrm{MA}_{i,t}$ [CPI, GDP, HPI, IND, PR, PCI, RS, TB], is a matrix for the set of all specific twelve (US) and eight (EU) macroeconomic announcements for each firm i at time t. The spread of each firm is assumed to be a function of current and past information (with a lag of one period[4]) for EPU and macroeconomic announcements. Theoretically, we might expect to include a lag for two reasons. First, the high frequency of daily data might cause delays in the announcement information to be recognised by the market. Second, due to the time difference between the geographic areas, it might take longer for the news to spill over. After examining the effect of EPU, US and EU announcements on either sukuk or conventional bonds through checking for different lags, we found that General to Specific (GS) methodology suggests strongly including the first lags for each variable. It is found that the EPU index, US and EU announcement effect tends to be strongest on the first day following the announcement. In estimating the model, we have used Panel data OLS with heteroskedasticity and autocorrelation corrected standard errors(HAC) proposed by Newey-West, to remedy heteroskedasticity and autocorrelation problems.

2.6. Empirical findings

This paper examines the impact of three financial factors (liquidity, maturity, and default risk differentials), global economic policy uncertainty, US and EU macroeconomic announcements on both sukuk and conventional bond spreads. To do this, it is important to divide the empirical findings into two different subcategories: (i) the effects of the financial factors (liquidity, maturity and default risk), EPU and US macroeconomic announcements on sukuk and conventional bond spreads and (ii)

[4]In the model, we employed various number of lags for variables EPU, USMA and EUMA to find the best model; however, by using the general to specific model—known as GS model—we ended up that the lag one of the EPU and macroeconomic announcements are mostly strongly significant, thus, we decided to use the lag one of the EPU and macroeconomic announcements.

how financial factors, EPU and US macroeconomic announcements can influence matched samples of sukuk and conventional bonds issued by the same company.

2.6.1 Effect of EPU and US Macroeconomic Announcements

Equations (2) and (3) can be estimated for both sukuk and conventional bond spreads to first capture the impact of liquidity, maturity and default risk factors and then incorporate the effects of the EPU index US and EU macroeconomic announcements. Tables 2.6–2.10 record the results for the Gulf Co-operation Countries (GCC) as a unit, each Asian country of interest (Indonesia, Malaysia, and Singapore), and Turkey. In each table, columns (1) and (2) refer to conventional bond spreads, while columns (3) and (4) refer to sukuk spreads.

Table 2.6 shows estimated results for the GCC as a whole, as the sukuk samples for each country in this set are quite limited. Financial factors liquidity differential has a significant effect on conventional bond spreads while the liquidity and maturity differentials are the significant factors impacting the sukuk spreads, which is consistent with the findings of Saeed and Izzeldin (2016). Besides, CC, CPI, IND, PR, and TB for US macroeconomic announcements are significant in explaining the conventional bond spreads, while all twelve announcements except for FOMC, GDP, and PPI have significant impacts explaining sukuk spreads. In terms of EU announcements, all of them impacting significantly on sukuk spreads except for CPI and PCI, while only three announcements (GDP, PR and PCI) have a significant impact on conventional bond spreads. We also test whether US and EU macroeconomic announcements have a long-lasting effect by using single period lags after the announcements. Lags of the following FOMC, IND, PR, PPI, and RS for US announcements have a significant impact on conventional bond spreads, while all announcements have a substantial effect on sukuk spreads, except for lagged CPI. Regarding the EU, all eight announcements except for IND impact sukuk spreads significantly, while only three announcements (CPI, PR, and PCI) have a significant effect on conventional bond spreads. Interestingly, among GCC countries, both the current and lag for EPU have a highly significant impact on sukuk spreads, unlike conventional bond spreads. All these findings suggest that economic policy uncertainties US and EU

macroeconomic announcements are highly influential in affecting sukuk spreads within the GCC region, but not conventional bond spreads.

Table 2.7 shows the estimated results for Indonesia. An initial glance suggests that only maturity differential has a significant impact on sukuk spreads, while Indonesia's conventional bond spreads are more sensitive to default risk and maturity differentials. Other than FOMC, PR, PPI, and RS announcements all have significant effects on sukuk spreads, while only CPI, PR, and PI announcements have a substantial impact on conventional bond spreads. Concerning the EU announcements, except RS, all seven EU announcements significantly impact sukuk spreads, while only two (PR and PCI) announcements have a significant impact on conventional bond spreads. In terms of a period lag, US announcements for CPI and PI only have a considerable effect on conventional spreads, and all except CC, CPI, HS, TB, and UNR have a significant impact on sukuk spreads. Except for IND, all EU announcements have an effect on sukuk spreads significantly, while CPI is the only announcement that effects conventional bond spreads. Besides, sukuk spreads are more sensitive to global economic policy uncertainty than conventional bond spreads.

Table 2 6. Effect of US macroeconomic announcements and Economic Policy Uncertainty on Conventional or Sukuk market in Gulf Cooperation Council (GCC) countries

		Conventional Bond		Sukuk	
		(1)	(2)	(3)	(4)
Financial Factors	$Default_t$	-4.12 (-1.08)	0.44 (0.53)	-5.75 (-1.11)	-5.48 (-1.23)
	$Liquidity_t$	15.38***(3.08)	15.04***(16.08)	3.99**(2.26)	3.90**(2.17)
	$Maturity_t$	31.61 (1.49)	38.86***(12.60)	99.63***(37.45)	99.84***(42.20)
Global Economic Policy	EPU_t		-0.38 (-1.37)		-0.71***(-13.54)
	EPU_{t-1}		-0.13 (-0.40)		-0.55***(-12.90)
US Macroeconomic Announcements	CC_t		-14.95***(-2.64)		-8.29***(-13.30)
	CC_{t-1}		5.07 (0.81)		-1.39***(-3.15)
	CPI_t		661.75**(1.96)		523.89***(6.29)
	CPI_{t-1}		349.93 (1.29)		88.91 (1.19)
	$FOMC_t$		-54.02 (-0.85)		41.05 (1.05)
	$FOMC_{t-1}$		-225.81***(-3.80)		-123.84***(-3.58)
	GDP_t		192.89 (1.23)		15.14 (0.77)
	GDP_{t-1}		46.48 (0.38)		52.55***(4.54)
	Housing $Starts_t$		-4.71 (-0.95)		-4.27***(-7.67)
	Housing $Starts_{t-1}$		5.03 (1.31)		10.99***(7.64)
	Industrial $Production_t$		288.35**(2.27)		254.36***(9.38)
	Industrial $Production_{t-1}$		-145.09*(-1.74)		-202.69***(-8.95)
	Payroll $Release_t$		-42.06**(-2.42)		-32.02***(-8.94)
	Payroll $Release_{t-1}$		78.01***(3.17)		85.83***(39.61)
	Personal $Income_t$		-46.83 (-0.53)		-151.49***(-16.39)
	Personal $Income_{t-1}$		269.71***(3.83)		264.61***(29.75)
	PPI_t		-2.73 (-0.01)		21.03 (1.16)
	PPI_{t-1}		365.45**(2.18)		345.12***(9.42)
	Retail $Sales_t$		-20.83 (-0.23)		12.39 (0.72)
	Retail $Sales_{t-1}$		218.52**(2.36)		224.57***(21.80)
	$Trade\_Balance_t$		-6.20**(-2.47)		-4.53***(-25.03)
	$Trade\_Balance_t$		5.19 (1.13)		-2.01**(-2.49)
	Unemployment $Rate_t$		-258.17		-119.37***(-2.59)
	Unemployment $Rate_{t-1}$		-404.48 (-1.11)		197.68***(2.69)
EU indicators	CPI_t		-14.02 (-0.13)		-1.58 (-0.06)
	CPI_{t-1}		281.96***(3.29)		103.90***(14.04)
	GDP_t		98.21**(2.29)		56.15***(9.40)
	GDP_{t-1}		44.20 (1.54)		-9.64 (-0.93)
	Housing Price $Index_t$		-51.92 (-1.16)		-47.87***(-5.05)
	Housing Price $Index_{t-1}$		25.78 (0.79)		25.03***(6.30)
	Industrial $Production_t$		-3.49 (-0.65)		-1.73 (-0.73)
	Industrial $Production_{t-1}$		7.43 (0.95)		-2.67 (-1.59)
	Payroll $Release_t$		1503.47***(3.44)		416.03**(2.32)
	Payroll $Release_{t-1}$		1741.68**(2.07)		327.70***(12.40)
	PCI_t		55.04**(2.48)		3.01 (1.21)
	PCI_{t-1}		-55.62**(-2.11)		-53.26***(-16.41)
	Retail $Sales_t$		-7.31 (-0.59)		-11.38***(-3.97)
	Retail $Sales_{t-1}$		12.01 (1.11)		3.47***(2.88)
	$Trade\_Balance_t$		0.14 (0.11)		-1.57***(-8.82)
	$Trade\_Balance_t$		0.56 (0.52)		0.50***(4.45)
	R^2(%)	20.47	46.45	95.08	96.74
	Obs.	2083	2081	4436	4430

Note: The model is as follows:

$\text{Spread}_{i,t} = \beta_0 + \beta_1 \text{Liq}_{i,t} + \beta_2 \text{Mat}_{i,t} + \beta_3 \text{Def}_{i,t} + \beta_4 \text{EPU}_{i,t} + \beta_5 \text{EPU}_{i,t-1} + US\text{MA}_{i,t}\theta_1 + USMA_{i,t-1}\theta_2 + EU\text{MA}_{i,t}\theta_3 + EUMA_{i,t-1}\theta_4 + \varepsilon_{i,t}$ where $\text{Spread}_{i,t}$ is the spread of Sukuk or Conventional bonds in Gulf Cooperation Council. $\text{Liq}_{i,t}$, $\text{Mat}_{i,t}$ &$\text{Def}_{i,t}$ are Liquidity, Maturity and Default risk. $\text{EPU}_{i,t}$ represents Economic policy uncertainty. $US\text{MA}_{i,t}$[CC, CPI, FOMC, GDP, HS, IND, PI, PR, PPI, RS, TB, UNR] and $EU\text{MA}_{i,t}$ [CPI, GDP, HPI, IND, PR, PCI, RS, TB], is a matrix for the set of all specific twelve (US) and eight (EU) macroeconomic announcements for each firm i at time t. Those include Consumer Confidence, Consumer Price Index, Federal Open Market Committee, Gross Domestic Product, Housing Starts, Industrial Production, Personal Income, Producer Price Index, Retail Sales, Trade Balance and Unemployment Rate). : *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are printed in parenthesis. Each coefficient is multiplied by 100.

Table 2.7. Effect of US macroeconomic announcements and Economic Policy Uncertainty on Conventional or Sukuk market in Indonesia

		Conventional Bond		Sukuk	
		(1)	(2)	(3)	(4)
Financial Factors	$Default_t$	8.35**(2.38)	8.14***(10.63)	19.48*(1.68)	17.00 (1.63)
	$Liquidity_t$	0.06 (0.08)	-0.19*(-1.85)	-2.67 (-0.21)	-1.36 (-0.11)
	$Maturity_t$	8.00 (1.42)	11.02***(6.00)	1.20***(3.20)	1.12***(2.92)
Global Economic Policy	EPU_t		-0.35 (-0.93)		-0.40***(-10.44)
	EPU_{t-1}		-0.27 (-0.75)		-0.58***(-8.04)
US Macroeconomic Announcements	CC_t		-10.41 (-1.64)		-7.86***(-6.16)
	CC_{t-1}		-1.86 (-0.33)		-0.58 (-0.68)
	CPI_t		768.20**(2.46)		490.99***(8.48)
	CPI_{t-1}		497.80*(1.93)		34.50 (1.07)
	$FOMC_t$		-58.05 (-1.43)		19.23 (1.54)
	$FOMC_{t-1}$		-194.49		-103.03***(-4.92)
	GDP_t		-32.72 (-0.29)		-71.02*(-1.76)
	GDP_{t-1}		77.44 (0.58)		59.37***(3.68)
	$Housing\ Starts_t$		-7.60 (-1.50)		-7.87***(-8.25)
	$Housing\ Starts_{t-1}$		-0.74 (-0.23)		0.07 (0.09)
	$Industrial\ Production_t$		157.27 (1.43)		263.00***(7.86)
	$Industrial\ Production_{t-1}$		-85.00 (-1.15)		-113.56***(-4.38)
	$Payroll\ Release_t$		-36.29**(-2.00)		-7.55 (-1.35)
	$Payroll\ Release_{t-1}$		65.53 (1.39)		82.81***(7.28)
	$Personal\ Income_t$		-158.83**(-2.19)		-208.02***(-10.32)
	$Personal\ Income_{t-1}$		222.30***(2.71)		246.47***(14.60)
	PPI_t		-118.06 (-0.69)		-23.39 (-1.05)
	PPI_{t-1}		114.36 (0.76)		204.62***(2.66)
	$Retail\ Sales_t$		-90.42 (-0.94)		-0.66 (-0.01)
	$Retail\ Sales_{t-1}$		83.16 (0.80)		140.28***(13.22)
	$Trade\_Balance_t$		-3.96 (-1.33)		-4.46***(-5.16)
	$Trade\_Balance_t$		3.10 (0.69)		-0.13 (-0.30)
	$Unemployment\ Rate_t$		-265.15 (-1.15)		-279.27***(-5.82)
	$Unemployment\ Rate_{t-1}$		-425.04 (-1.22)		16.05 (0.42)
EU indicators	CPI_t		19.26 (0.27)		14.92***(4.42)
	CPI_{t-1}		144.20**(2.29)		68.25***(4.50)
	GDP_t		49.35 (1.36)		54.67***(3.99)
	GDP_{t-1}		44.81 (1.41)		38.02***(6.02)
	$Housing\ Price\ Index_t$		-50.08 (-0.99)		-53.11***(-5.58)
	$Housing\ Price\ Index_{t-1}$		-12.37 (-0.39)		-6.44 (-1.35)
	$Industrial\ Production_t$		-2.94 (-0.67)		2.98 (1.06)
	$Industrial\ Production_{t-1}$		8.69 (1.34)		8.12***(2.87)
	$Payroll\ Release_t$		1156.08**(2.56)		115.65***(2.89)
	$Payroll\ Release_{t-1}$		1434.12 (1.37)		160.58***(2.92)
	PCI_t		46.99***(2.72)		27.60***(6.09)
	PCI_{t-1}		-42.93 (-1.58)		-47.88*** (-18.01)
	$Retail\ Sales_t$		-1.00 (-0.12)		-1.28 (-0.51)
	$Retail\ Sales_{t-1}$		11.76 (1.45)		3.21*(1.84)
	$Trade\_Balance_t$		-0.78 (-0.70)		-0.90***(-5.32)
	$Trade\_Balance_t$		0.42 (0.42)		0.58***(3.01)
	R^2(%)	5.27	31.03	13.33	53.08
	Obs.	9489	9189	1519	1514

Note: The model is as follows:
$\mathrm{Spread}_{i,t} = \beta_0 + \beta_1 \mathrm{Liq}_{i,t} + \beta_2 \mathrm{Mat}_{i,t} + \beta_3 \mathrm{Def}_{i,t} + \beta_4 \mathrm{EPU}_{i,t} + \beta_5 \mathrm{EPU}_{i,t-1} + US\mathrm{MA}_{i,t}\theta_1 + USMA_{i,t-1}\theta_2 + EU\mathrm{MA}_{i,t}\theta_3 + EUMA_{i,t-1}\theta_4 + \varepsilon_{i,t}$ where $\mathrm{Spread}_{i,t}$ is the spread of Sukuk or Conventional bonds in Indonesia. $\mathrm{Liq}_{i,t}$, $\mathrm{Mat}_{i,t}$ &$\mathrm{Def}_{i,t}$ are Liquidity, Maturity and Default risk. $\mathrm{EPU}_{i,t}$ represents Economic policy uncertainty. $US\mathrm{MA}_{i,t}$[CC, CPI, FOMC, GDP, HS, IND, PI, PR, PPI, RS, TB, UNR] and $EU\mathrm{MA}_{i,t}$ [CPI, GDP, HPI, IND, PR, PCI, RS, TB], is a matrix for the set of all specific twelve (US) and eight (EU) macroeconomic announcements for each firm i at time t. Those include Consumer Confidence, Consumer Price Index, Federal Open Market Committee, Gross Domestic Product, Housing Starts, Industrial Production, Personal Income, Producer Price Index, Retail Sales, Trade Balance and Unemployment Rate). : *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are printed in parenthesis. Each coefficient is multiplied by 100.

Table 2.8 outlines the results of Malaysia. All of the financial factors affect sukuk spreads, where only one factor (maturity) is significant for conventional bond spreads. Here, both conventional and sukuk spreads are seen to be more sensitive to all US macroeconomic announcements. Regarding EU announcements, sukuk spreads are highly significant to all announcements, while all EU announcements affect conventional spreads except IND, RS, and TB. Overall, eight of the EU macroeconomic announcement types are highly significant for sukuk spreads, and five out of the eight are highly substantial for bond spreads. Lag following each US announcement, including FOMC, IND, PR, PI, RS, and UNR, has a significant effect on both conventional and sukuk spreads. However, lagged CPI, GDP, HS, and PPI are the only announcements that affect sukuk spreads significantly. In terms of EU, all lagged announcements impact significantly to sukuk spreads, while except HPI announcement, conventional spreads are sensitive to all EU. Interestingly, conventional and sukuk markets are vulnerable to EPU in Malaysia. Overall, the result shows that returns of the sukuk are affected by US and EU macroeconomic announcements significantly than conventional bond spreads in Malaysia.

Table 2.9 summarizes the results for Singapore. In this case, all the financial factors (default risk, liquidity, and maturity differentials) are impacting on sukuk spreads, while default and maturity differentials are the only financial factor that has implications to conventional bond spreads. US macroeconomic announcements, other than UNR, all eleven impact sukuk spreads, while only two (CPI and HS) affect conventional bond spreads. Among eight EU announcements except for HPI, RS, and TB have a significant impact on sukuk spreads, while the only GDP has a substantial effect on conventional bond spreads. In terms of lagged announcements, all of the US macroeconomic news affect sukuk spreads, whereas, only FOMC, PI, and RS, announcements have a significant impact on conventional bond spreads. EU announcements have a similar result as US news, except for RS all seven announcements have a substantial effect on sukuk spreads while GDP is the only significant news for conventional bond spreads. Interestingly, Singapore's sukuk spreads are more sensitive to global economic policy uncertainty compared to conventional bond spreads.

Table 2.10 records the estimated results for Turkey. Conventional bond spreads here are more sensitive to financial factors (default, liquidity, and maturity differentials) while liquidity and maturity differentials have a significant effect on sukuk spreads. In terms of US and EU macroeconomic announcements, it can be seen substantial different results between conventional and sukuk spreads in Turkey. US announcements have a significant effect on conventional bond spreads, and these are only CC, CPI, GDP, PR, and TB. The US macroeconomic announcements that have a substantial impact on sukuk spreads are CC, CPI, HS, IND, PI, RS, TB, and UNR. Besides, EU indicators have a considerable effect on sukuk spreads, for example, CPI, GDP, HPI, IND, PR, and PCI, while only three indicators (GDP, PR, and PCI) have a significant impact on conventional bond spreads. Also, most of the lagged US announcements have a significant effect on sukuk spreads, with the exception of FOMC, GDP, HS, and TB. However, conventional spreads are more sensitive to lagged FOMC, PR, PI, and RS. These findings are consistent with Bollerslev, Cai, and Song (2000), who mentioned that RS announcements have a significant impact on the conventional bond market. EU announcements have similar results as US news. For instance, all lagged EU have a significant effect on sukuk spreads except RS, while CPI and GDP have impact on conventional bond spreads. Economic policy uncertainty has a highly significant impact on sukuk spreads, much more so than on conventional bond spreads.

Overall, several interesting trends can be observed across the different regions, however. In terms of financial factors, the liquidity and maturity differential variables affect sukuk spreads for every country except for Indonesia, while default risk affects only on Indonesia, Malaysia and Singapore. However, most of the financial factors do not have a highly significant impact on conventional bond spreads anywhere except in the GCC, Indonesia and Malaysia. These findings support the idea that financial factors play a comparatively greater role in determining sukuk markets than conventional markets.

With regard to US and EU macroeconomic announcements, most countries' sukuk spreads are impacted significantly by US and EU macroeconomic announcements, suggesting that such

announcements play a more important role in influencing sukuk markets. Overall, except for FOMC, all other eleven announcements (current or lagged levels) affect most of the examined countries' Sukuk spreads. In contrast, except for FOMC, GDP, HS, PPI, and UNR, all other seven US announcements (current or lagged levels) affect most of the examined countries' conventional bond spreads. While PI (lagged) is the only common US announcement which impacts both sukuk and bonds spreads significantly for all sample countries. Interestingly, all eight EU indicators (current and lagged) have significantly impact on sukuk spreads with the exception of RS. However, there are only two EU announcements (PR and PCI) affect most of the countries' conventional spreads. Generally, the results show that current or lagged US and EU announcements have significant impacts on sukuk spreads for most countries, while conventional bonds are less frequently affected, implying that sukuk spreads are sensitive to more US and EU macroeconomic announcements than conventional bond spreads. However, the empirical evidence contradicts Chen et al. (2017), who suggested that conventional and sukuk are not very different from each other. There are several factors that may account for the relationship between EU and US data releases, sukuk markets, and conventional bonds. In particular, since the US is considered the world's most powerful economy that drives world growth, it plays a fundamental role in the economies of all countries (including every sample country). At the same time, the greater level of integration and globalization associated with business cycles has contributed to inter-economy interdependence. Hence, participants in markets are likely to draw conclusions about the sukuk market based on EU and US announcements.

One of the key strengths of this current study is the investigation into the effect of economic policy uncertainty on conventional bond and sukuk spreads for particular countries. Remarkably, for all of the countries examined, the EPU (current or lagged), has a highly significant impact on sukuk spreads compared to conventional bond spreads. This empirical evidence is consistent with Naifar and Hammoudeh (2016), who showed that generally, EPU has a significant impact on the sukuk market.

Table 2.8. Effect of US macroeconomic announcements and Economic Policy Uncertainty on Conventional or Sukuk market in Malaysia

		Conventional Bond		Sukuk	
		(1)	(2)	(3)	(4)
Financial Factors	$Default_t$	-0.39 (-0.83)	-0.46 (-1.00)	1.91**(2.45)	1.37**(2.37)
	$Liquidity_t$	-0.38 (-0.97)	0.00 (-0.01)	2.54***(10.50)	1.88***(8.65)
	$Maturity_t$	70.23***(110.93)	69.97***(113.26)	88.32***(8.16)	92.04***(11.97)
Global Economic Policy	EPU_t		-0.39***(-4.74)		-0.46***(-23.42)
	EPU_{t-1}		-0.41***(-4.51)		-0.35***(-18.18)
US Macroeconomic Announcements	CC_t		-4.62***(-3.77)		-4.03***(-7.20)
	CC_{t-1}		-1.18 (-0.97)		0.00 (0.02)
	CPI_t		278.27***(3.73)		615.49***(36.62)
	CPI_{t-1}		43.42 (0.58)		215.61***(15.22)
	$FOMC_t$		45.22***(3.42)		-35.95***(-5.70)
	$FOMC_{t-1}$		-62.21***(-4.67)		-129.64***(-18.05)
	GDP_t		-103.75***(-3.66)		-50.29***(-5.28)
	GDP_{t-1}		20.27 (0.73)		35.44***(8.48)
	Housing $Starts_t$		-3.50***(-3.41)		-3.30***(-20.70)
	Housing $Starts_{t-1}$		0.57 (0.56)		4.42***(12.35)
	Industrial $Production_t$		154.78***(7.07)		104.32***(11.35)
	Industrial $Production_{t-1}$		-56.21***(-2.63)		-75.07***(-14.72)
	Payroll $Release_t$		-11.88**(-1.99)		-29.67***(-22.27)
	Payroll $Release_{t-1}$		71.70***(12.87)		55.59***(33.49)
	Personal $Income_t$		-120.21***(-5.83)		-131.48***(-33.04)
	Personal $Income_{t-1}$		231.88***(11.69)		251.85***(50.04)
	PPI_t		-60.04**(-2.09)		0.14 (0.02)
	PPI_{t-1}		41.26 (1.46)		151.59***(13.74)
	Retail $Sales_t$		41.20*(1.80)		29.00***(3.35)
	Retail $Sales_{t-1}$		161.82***(7.38)		179.80***(33.62)
	$Trade\_Balance_t$		-3.55***(-4.28)		-4.61***(-16.22)
	$Trade\_Balance_t$		0.09 (0.10)		-0.33 (-0.53)
	Unemployment $Rate_t$		-201.52***(-3.40)		-130.56***(-6.04)
	Unemployment $Rate_{t-1}$		-296.77***(-4.72)		-132.59***(-7.08)
EU indicators	CPI_t		-25.93*(-1.92)		-8.90**(-1.96)
	CPI_{t-1}		29.27**(2.12)		152.33***(14.92)
	GDP_t		45.34***(5.87)		55.36***(8.30)
	GDP_{t-1}		40.45***(5.48)		7.53***(2.61)
	Housing Price $Index_t$		-25.43***(-2.80)		-37.13***(-12.14)
	Housing Price $Index_{t-1}$		3.17 (0.37)		12.22***(4.11)
	Industrial $Production_t$		-1.70 (-1.30)		-1.49***(-3.81)
	Industrial $Production_{t-1}$		4.05***(3.10)		5.16***(15.52)
	Payroll $Release_t$		147.13***(3.15)		736.37***(13.51)
	Payroll $Release_{t-1}$		155.52***(3.45)		700.90***(10.61)
	PCI_t		44.07***(5.59)		20.76***(15.81)
	PCI_{t-1}		-21.24***(-2.72)		-53.04***(-18.85)
	Retail $Sales_t$		3.17 (1.14)		-3.71***(-5.63)
	Retail $Sales_{t-1}$		9.74***(3.53)		7.85***(10.78)
	$Trade\_Balance_t$		-0.11 (-0.42)		-1.48***(-20.15)
	$Trade\_Balance_t$		0.69***(2.63)		0.44***(4.15)
	R^2(%)	48.00	51.00	74.89	84.97
	Obs.	13520	13460	19127	1905

Note: The model is as follows:
$\text{Spread}_{i,t} = \beta_0 + \beta_1 \text{Liq}_{i,t} + \beta_2 \text{Mat}_{i,t} + \beta_3 \text{Def}_{i,t} + \beta_4 \text{EPU}_{i,t} + \beta_5 \text{EPU}_{i,t-1} + US\text{MA}_{i,t}\theta_1 + USMA_{i,t-1}\theta_2 + EU\text{MA}_{i,t}\theta_3 + EUMA_{i,t-1}\theta_4 + \varepsilon_{i,t}$ where $\text{Spread}_{i,t}$ is the spread of Sukuk or Conventional bonds in Malaysia. $\text{Liq}_{i,t}$, $\text{Mat}_{i,t}$ &$\text{Def}_{i,t}$ are Liquidity, Maturity and Default risk. $\text{EPU}_{i,t}$ represents Economic policy uncertainty. $US\text{MA}_{i,t}$[CC, CPI, FOMC, GDP, HS, IND, PI, PR, PPI, RS, TB, UNR] and $EU\text{MA}_{i,t}$ [CPI, GDP, HPI, IND, PR, PCI, RS, TB], is a matrix for the set of all specific twelve (US) and eight (EU) macroeconomic announcements for each firm i at time t. Those include Consumer Confidence, Consumer Price Index, Federal Open Market Committee, Gross Domestic Product, Housing Starts, Industrial Production, Personal Income, Producer Price Index, Retail Sales, Trade Balance and Unemployment Rate). : *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are printed in parenthesis. Each coefficient is multiplied by 100.

Table 2.9. Effect of US macroeconomic announcements and Economic Policy Uncertainty on Conventional or Sukuk market in Singapore

		Conventional Bond		Sukuk	
		(1)	(2)	(3)	(4)
Financial Factors	$Default_t$	3.32***(6.55)	2.90***(6.31)	18.14***(3.95)	11.80***(12.90)
	$Liquidity_t$	0.14 (0.53)	-0.16 (-0.76)	-3.38***(-7.39)	-0.91***(-6.04)
	$Maturity_t$	25.25***(6.06)	24.29***(6.17)	99.92***(596.00)	100.03***(6778.11)
Global Economic Policy	EPU_t		-0.33 (-0.91)		-0.35***(-11.30)
	EPU_{t-1}		-0.38 (-1.09)		-0.41***(-16.10)
US Macroeconomic Announcements	CC_t		-3.10 (-0.70)		-1.15***(-4.86)
	CC_{t-1}		-1.11 (-0.29)		0.49***(3.21)
	CPI_t		287.14*(1.79)		134.60***(17.26)
	CPI_{t-1}		133.40 (0.77)		59.28***(4.83)
	$FOMC_t$		0.30 (0.01)		-0.61(-0.09)
	$FOMC_{t-1}$		-93.47**(-2.45)		-45.61***(-7.38)
	GDP_t		-82.65 (-1.28)		-82.64***(-17.56)
	GDP_{t-1}		14.45 (0.17)		-35.62***(-13.47)
	Housing $Starts_t$		-3.74*(-1.80)		-1.78***(-6.14)
	Housing $Starts_{t-1}$		-0.25 (-0.12)		-1.48***(-5.97)
	Industrial $Production_t$		125.32 (1.44)		54.60***(20.96)
	Industrial $Production_{t-1}$		-44.85 (-0.88)		-37.33***(-5.95)
	Payroll $Release_t$		-12.66 (-0.99)		-11.19***(-7.64)
	Payroll $Release_{t-1}$		64.23 (1.57)		14.09***(5.47)
	Personal $Income_t$		-110.65 (-1.41)		-46.77***(-4.78)
	Personal $Income_{t-1}$		206.87**(2.21)		151.21***(36.05)
	PPI_t		-67.13 (-0.70)		-56.20***(-5.11)
	PPI_{t-1}		9.56 (0.16)		33.09***(6.28)
	Retail $Sales_t$		34.98 (0.69)		17.54***(4.38)
	Retail $Sales_{t-1}$		123.57**(2.56)		42.69***(17.39)
	$Trade\_Balance_t$		-2.80 (-1.15)		-3.21***(-8.63)
	$Trade\_Balance_t$		-0.35 (-0.15)		-1.15***(-6.90)
	Unemployment $Rate_t$		-121.77 (-0.82)		1.72 (0.06)
	Unemployment $Rate_{t-1}$		-205.98 (-0.86)		-77.31***(-5.51)
EU indicators	CPI_t		-6.71 (-0.34)		-8.37**(-2.17)
	CPI_{t-1}		37.12 (1.52)		19.75***(8.32)
	GDP_t		30.02**(2.54)		37.80***(15.29)
	GDP_{t-1}		31.10***(3.82)		24.80***(11.29)
	Housing Price $Index_t$		-22.90 (-1.16)		-0.71 (-0.73)
	Housing Price $Index_{t-1}$		-0.01 (0.01)		7.98***(10.02)
	Industrial $Production_t$		-0.40 (-0.22)		-0.68***(-14.58)
	Industrial $Production_{t-1}$		3.21 (0.94)		3.25***(19.90)
	Payroll $Release_t$		82.40 (1.43)		243.08***(14.84)
	Payroll $Release_{t-1}$		70.27 (0.95)		250.97***(29.62)
	PCI_t		32.19 (1.53)		34.02***(21.86)
	PCI_{t-1}		-19.91 (-1.03)		-13.27***(-7.14)
	Retail $Sales_t$		2.36 (0.44)		-0.37 (-1.43)
	Retail $Sales_{t-1}$		7.44 (1.56)		1.80 (1.48)
	$Trade\_Balance_t$		-0.34 (-0.46)		-0.11 (-2.03)
	$Trade\_Balance_t$		0.36 (0.56)		0.26***(5.02)
	R^2(%)	6.00	17.28	99.75	99.97
	Obs.	9493	9441	894	888

Note: The model is as follows:

$$\mathrm{Spread}_{i,t} = \beta_0 + \beta_1 \mathrm{Liq}_{i,t} + \beta_2 \mathrm{Mat}_{i,t} + \beta_3 \mathrm{Def}_{i,t} + \beta_4 \mathrm{EPU}_{i,t} + \beta_5 \mathrm{EPU}_{i,t-1} + US\mathrm{MA}_{i,t}\theta_1 + USMA_{i,t-1}\theta_2 + EU\mathrm{MA}_{i,t}\theta_3 + EUMA_{i,t-1}\theta_4 + \varepsilon_{i,t}$$

where $\mathrm{Spread}_{i,t}$ is the spread of Sukuk or Conventional bonds in Singapore. $\mathrm{Liq}_{i,t}$, $\mathrm{Mat}_{i,t}$ &$\mathrm{Def}_{i,t}$ are Liquidity, Maturity and Default risk. $\mathrm{EPU}_{i,t}$ represents Economic policy uncertainty. $US\mathrm{MA}_{i,t}$[CC, CPI, FOMC, GDP, HS, IND, PI, PR, PPI, RS, TB, UNR] and $EU\mathrm{MA}_{i,t}$ [CPI, GDP, HPI, IND, PR, PCI, RS, TB], is a matrix for the set of all specific twelve (US) and eight (EU) macroeconomic announcements for each firm i at time t. Those include Consumer Confidence, Consumer Price Index, Federal Open Market Committee, Gross Domestic Product, Housing Starts, Industrial Production, Personal Income, Producer Price Index, Retail Sales, Trade Balance and Unemployment Rate). : *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are printed in parenthesis. Each coefficient is multiplied by 100.

Table 2.10. Effect of US macroeconomic announcements and Economic Policy Uncertainty on Conventional or Sukuk market in Turkey

		Conventional Bond		Sukuk	
		(1)	(2)	(3)	(4)
Financial Factors	$Default_t$	9.02***(3.57)	4.55***(2.67)	8.35 (1.39)	4.58 (1.41)
	$Liquidity_t$	-4.78***(-4.97)	-3.87***(-4.31)	-0.35***(-6.94)	-0.40***(-7.96)
	$Maturity_t$	100.32***(23.97)	96.85***(24.97)	100.84***(518.06)	100.30***(799.13)
Global Economic Policy	EPU_t		-0.44 (-1.42)		-0.45***(-14.09)
	EPU_{t-1}		-0.31 (-0.87)		-0.70***(-8.07)
US Macroeconomic Announcements	CC_t		-11.31*(-1.84)		-2.20**(-2.04)
	CC_{t-1}		0.20 (0.03)		1.29 (1.59)
	CPI_t		621.02**(2.13)		735.22***(12.05)
	CPI_{t-1}		338.03 (1.19)		149.26***(4.28)
	$FOMC_t$		6.47 (0.13)		-28.66 (-0.79)
	$FOMC_{t-1}$		-139.40***(-2.79)		-158.76
	GDP_t		-11.62 (-0.09)		-157.38
	GDP_{t-1}		61.88 (0.46)		26.50 (0.75)
	Housing $Starts_t$		-4.75 (-0.98)		-4.30***(-3.30)
	Housing $Starts_{t-1}$		3.40 (0.89)		0.61 (0.43)
	Industrial $Production_t$		209.71 (1.64)		165.72***(9.22)
	Industrial $Production_{t-1}$		-79.68 (-0.91)		-102.75***(-5.55)
	Payroll $Release_t$		-34.62*(-1.85)		-9.92 (-1.27)
	Payroll $Release_{t-1}$		68.90*(1.71)		86.56***(12.78)
	Personal $Income_t$		-100.35 (-1.12)		-144.27***(-10.71)
	Personal $Income_{t-1}$		283.53***(3.19)		225.49***(11.59)
	PPI_t		-39.49 (-0.22)		30.65 (0.89)
	PPI_{t-1}		194.97 (1.39)		206.02***(3.80)
	Retail $Sales_t$		21.79 (0.26)		66.28***(4.57)
	Retail $Sales_{t-1}$		211.75**(2.50)		216.34***(9.27)
	$Trade\_Balance_t$		-5.83*(-1.74)		-5.09***(-7.79)
	$Trade\_Balance_t$		2.93 (0.65)		-0.22 (-0.41)
	Unemployment $Rate_t$		-240.17 (-0.90)		-316.46***(-5.73)
	Unemployment $Rate_{t-1}$		-441.15 (-1.12)		-418.61***(-5.24)
EU indicators	CPI_t		1.31 (0.01)		-50.85***(-2.84)
	CPI_{t-1}		156.67*(1.91)		105.73***(3.56)
	GDP_t		83.98**(2.03)		83.27***(9.34)
	GDP_{t-1}		58.57*(1.70)		49.47***(13.31)
	Housing Price $Index_t$		-40.16 (-0.73)		-55.36***(-6.07)
	Housing Price $Index_{t-1}$		12.51 (0.33)		20.95***(3.10)
	Industrial $Production_t$		-5.08 (-1.04)		1.95*(1.88)
	Industrial $Production_{t-1}$		5.92 (0.84)		9.56***(9.23)
	Payroll $Release_t$		1370.82***(4.32)		903.92***(7.35)
	Payroll $Release_{t-1}$		1345.55 (1.56)		793.74***(9.57)
	PCI_t		57.93**(2.35)		34.29***(3.90)
	PCI_{t-1}		-37.99 (-1.30)		-22.66***(-2.70)
	Retail $Sales_t$		-3.60 (-0.36)		-0.29 (-0.07)
	Retail $Sales_{t-1}$		10.66 (1.22)		1.78 (0.95)
	$Trade\_Balance_t$		-0.01 (-0.01)		-0.01 (-0.03)
	$Trade\_Balance_t$		1.02 (0.82)		1.86***(7.77)
	R^2(%)	77.60	62.05	99.75	99.89
	Obs.	2281	2281	1402	1399

Note: The model is as follows:

$\text{Spread}_{i,t} = \beta_0 + \beta_1 \text{Liq}_{i,t} + \beta_2 \text{Mat}_{i,t} + \beta_3 \text{Def}_{i,t} + \beta_4 \text{EPU}_{i,t} + \beta_5 \text{EPU}_{i,t-1} + US\text{MA}_{i,t}\theta_1 + USMA_{i,t-1}\theta_2 + EU\text{MA}_{i,t}\theta_3 + EUMA_{i,t-1}\theta_4 + \varepsilon_{i,t}$ where $\text{Spread}_{i,t}$ is the spread of Sukuk or Conventional bonds in Turkey. $\text{Liq}_{i,t}$, $\text{Mat}_{i,t}$ &$\text{Def}_{i,t}$ are Liquidity, Maturity and Default risk. $\text{EPU}_{i,t}$ represents Economic policy uncertainty. $US\text{MA}_{i,t}$[CC, CPI, FOMC, GDP, HS, IND, PI, PR, PPI, RS, TB, UNR] and $EU\text{MA}_{i,t}$ [CPI, GDP, HPI, IND, PR, PCI, RS, TB], is a matrix for the set of all specific twelve (US) and eight (EU) macroeconomic announcements for each firm i at time t. Those include Consumer Confidence, Consumer Price Index, Federal Open Market Committee, Gross Domestic Product, Housing Starts, Industrial Production, Personal Income, Producer Price Index, Retail Sales, Trade Balance and Unemployment Rate). : *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are printed in parenthesis. Each coefficient is multiplied by 100.

2.6.2 Impact of EPU and US macroeconomic announcements on sukuk and bonds, matched sample of GCC, Indonesia, Malaysia, Singapore and Turkey

Table 2.11 shows the estimated results for companies who issue sukuk and conventional bonds in the same markets. This analysis enables us to directly compare how sukuk and conventional bonds belonging to same issuers respond to the main determinants; i.e. liquidity, maturity and default risk differentials, EPU, US and EU macroeconomic announcements.

Companies issuing sukuk and conventional bonds are more sensitive to maturity differences, while conventional bonds are more sensitive to all financial factors for all matched samples. Regarding EPU, the US, and EU macroeconomic announcements, we have observed stronger differences between sukuk and bond spreads for companies that issue both. Overall, for all companies, sukuk spreads are affected more significantly by all eleven types of US announcements, except for CPI, compared to bond spreads within the matched samples. Only five US macroeconomic announcements had a significant effect on conventional bonds spreads, suggesting that they have been affected less by US macroeconomic announcements than the sukuk spreads. EU indicators have similar results as the US, all six EU announcements except CPI and PCI have a substantial impact on sukuk spreads while the only PR has a significant effect on conventional bond spreads within the matched sample. In terms of lagged announcements, eight US macroeconomic news including CCF, FOMC, PR, PI, PPI, RS, TB, and UNR significantly impacted the matched sukuk spreads, while seven types of US macroeconomic news significantly affect bond spreads. None of the EU announcements affect conventional bond spreads except IND, PCI, and TB; however, apart from PCI, all of the EU announcements have a significant impact on sukuk spreads issued by the same companies.

The EPU index was also introduced to ascertain how the same issuers of sukuk and bond firms would respond to it. The estimated coefficient for EPU has different impacts on sukuk, and bond spreads for the same companies. Current EPU has a significant effect on sukuk spreads, whereas the matched bond spreads do not have a significant coefficient. Remarkably, lagged EPU is more highly significant for sukuk spreads than for conventional bonds from the same issuer, indicating that the impact of EPU on sukuk spreads is significantly higher than on bond spreads within matched samples. Overall, Table 11A suggests that there is a significant causal relationship between sukuk returns and US and EU macroeconomic news and EPU factors for the company issues both sukuk and conventional bonds.

2.7. Conclusion

Aside from the religion-based structure of sukuk, any given country's conventional bonds and sukuk are strictly comparable. As a result, changes in returns from systematic risk make the most difference to yield spreads between sukuk and conventional bonds. Moreover, financial factors (default risk, liquidity, and maturity) are the main determinants that affect both types' yield spreads. It is interesting, however, to examine the effect of global shocks on these yield spreads as well. This paper analysed the effects of US macroeconomic news and EPU on the yield spread of conventional bonds and sukuk in 10 countries, including six belonging to the GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE), three Asian countries (Malaysia, Indonesia, and Singapore), and Turkey using weekly data for the period 1 January 2013 to 31 December 2018.

The results can be summarized as follows: Most US macroeconomic news has more significant effects on sukuk spreads in all sample countries than on conventional spreads, which can be explained by sukuk spreads being influenced by global shocks. Moreover, the findings

also show that economic policy uncertainty (EPU) has a greater impact on sukuk spreads than on conventional spreads. Overall, this indicates that US macroeconomic announcements (acting as a proxy for common shocks) may create disturbances in sukuk spreads and that this effect is more significant than US macroeconomic announcement impacts on bond markets. There are possible reasons for the stronger influence that US and EU announcements have on the sukuk markets than conventional bonds. First, the United States can be perceived as the engine of global growth, which therefore explains its importance for the global financial markets, including all sample countries. Second, it may also be argued that business cycles have become more integrated and globalization therefore has led to a higher degree of interdependence between economies. Thus, market participants may therefore draw inferences about the sukuk market from the US and EU data releases.

To investigate whether global shocks impact sukuk spreads differently than conventional spreads in the same markets, a matched sample of 31 listed firms who issued sukuk and bonds at the same time was constructed. The analysis showed that individual announcements tended to matter more significantly for sukuk as compared with conventional spreads because of the structural differences between sukuk and bonds. Sukuk markets are more sensitive to EPU than are bond markets, which may also suggest that EPU plays a more significant role in sukuk than in conventional bonds within the matched sample.

These results point to significant differences between conventional bond and sukuk spreads based on an examination of the impact of global shocks. The findings confirm the vital role played by US macroeconomic news and EPU in determining the differences between conventional and sukuk spreads. This paper also improves understanding of how the sukuk market works, what affects the spreads of sukuk, and whether these are impacted differently

by global shocks than are conventional bonds. We also hope that this study will inform investors and encourage the development of a healthier and more efficient sukuk market.

Table 2.11. Effect of US macroeconomic announcements and Economic Policy Uncertainty on the same issuer of Conventional Bond and Sukuk spreads in GCC, Indonesia, Malaysia, Singapore and Turkey

		Conventional Bond		Sukuk	
		(1)	(2)	(3)	(4)
Financial Factors	$Default_t$	6.24***(5.62)	5.78***(5.40)	3.11*(1.67)	3.16* (1.76)
	$Liquidity_t$	-11.07***(-9.86)	-10.78***(-10.0)	-3.14 (-1.56)	-3.08 (-1.55)
	$Maturity_t$	91.24***(99.08)	91.38***(103.32)	99.81***(50.82)	100.07***(52.27)
Global Economic Policy	EPU_t		-0.08 (-1.23)		-0.05***(-4.79)
	EPU_{t-1}		-0.13*(-1.70)		-0.10***(-4.14)
US Macroeconomic Announcements	CC_t		0.50 (0.51)		0.27*(1.84)
	CC_{t-1}		-0.91 (-0.92)		-0.88***(-9.53)
	CPI_t		-60.34 (-1.01)		-19.15 (-1.47)
	CPI_{t-1}		71.53 (1.20)		32.92 (1.49)
	$FOMC_t$		4.46 (0.40)		-22.49***(-3.52)
	$FOMC_{t-1}$		-68.85***(-6.15)		-33.31***(-5.35)
	GDP_t		-8.28 (-0.37)		-18.92***(-4.86)
	GDP_{t-1}		15.04 (0.68)		1.01 (0.22)
	Housing $Starts_t$		-1.99**(-2.47)		-1.01***(-9.15)
	Housing $Starts_{t-1}$		0.36 (0.45)		-0.23 (-1.45)
	Industrial $Production_t$		94.33***(5.43)		31.06*** (20.18)
	Industrial $Production_{t-1}$		-30.33* (-1.79)		0.61 (0.37)
	Payroll $Release_t$		-6.21 (-1.26)		2.39***(2.67)
	Payroll $Release_{t-1}$		83.95***(18.24)		30.39***(14.56)
	Personal $Income_t$		-52.60*** (-3.19)		-22.73***(-5.11)
	Personal $Income_{t-1}$		-59.50*** (-3.71)		-8.70**(-2.46)
	PPI_t		-26.75 (-1.19)		-15.46***(-5.14)
	PPI_{t-1}		-23.41 (-1.06)		-23.00***(-7.85)
	Retail $Sales_t$		-44.70** (-2.47)		-8.95***(-3.93)
	Retail $Sales_{t-1}$		31.73* (1.84)		22.00***(9.96)
	Trade_$Balance_t$		0.60 (0.91)		0.08 (1.17)
	Trade_$Balance_t$		1.40** (2.02)		0.57***(3.79)
	Unemployment $Rate_t$		-91.94** (-1.95)		41.78***(17.03)
	Unemployment $Rate_{t-1}$		-105.12**(-2.15)		54.66***(6.48)
EU indicators	CPI_t		6.44 (0.70)		-3.33 (-1.40)
	CPI_{t-1}		9.15 (0.96)		3.95**(2.43)
	GDP_t		-0.91 (-0.17)		-3.77***(-3.31)
	GDP_{t-1}		-1.84 (-0.35)		-4.29***(-5.07)
	Housing Price $Index_t$		-4.35 (-0.64)		-2.72***(-6.90)
	Housing Price $Index_{t-1}$		-8.72 (-1.37)		-5.56***(-7.89)
	Industrial $Production_t$		1.52 (1.49)		0.81***(5.87)
	Industrial $Production_{t-1}$		4.37*** (4.24)		1.03***(6.02)
	Payroll $Release_t$		79.95*** (2.69)		20.56***(4.31)
	Payroll $Release_{t-1}$		40.63 (1.42)		19.70***(4.38)
	PCI_t		-0.88 (-0.13)		2.17 (0.83)
	PCI_{t-1}		-10.79* (-1.65)		3.59 (1.32)
	Retail $Sales_t$		-2.57 (-1.14)		-2.37***(-8.84)
	Retail $Sales_{t-1}$		-0.05 (-0.02)		1.02***(3.18)
	Trade_$Balance_t$		-0.22 (-1.09)		-0.37***(-10.56
	Trade_$Balance_t$		-0.45* (-2.16)		-0.29***(-10.31)
	R^2(%)	70.41	73.34	96.58	96.51
	Obs.	4374	4344	4359	4329

Note: The model is as follows:

$\text{Spread}_{i,t} = \beta_0 + \beta_1 \text{Liq}_{i,t} + \beta_2 \text{Mat}_{i,t} + \beta_3 \text{Def}_{i,t} + \beta_4 \text{EPU}_{i,t} + \beta_5 \text{EPU}_{i,t-1} + US\text{MA}_{i,t}\theta_1 + USMA_{i,t-1}\theta_2 + EU\text{MA}_{i,t}\theta_3 + EUMA_{i,t-1}\theta_4 + \varepsilon_{i,t}$

where $\text{Spread}_{i,t}$ is the spread of Sukuk or Conventional bonds in Matched sample. $\text{Liq}_{i,t}$, $\text{Mat}_{i,t}$ &$\text{Def}_{i,t}$ are Liquidity, Maturity and Default risk. $\text{EPU}_{i,t}$ represents Economic policy uncertainty. $US\text{MA}_{i,t}$[CC, CPI, FOMC, GDP, HS, IND, PI, PR, PPI, RS, TB, UNR] and $EU\text{MA}_{i,t}$ [CPI, GDP, HPI, IND, PR, PCI, RS, TB], is a matrix for the set of all specific twelve (US) and eight (EU) macroeconomic announcements for each firm i at time t. Those include Consumer Confidence, Consumer Price Index, Federal Open Market Committee, Gross Domestic Product, Housing Starts, Industrial Production, Personal Income, Producer Price Index, Retail Sales, Trade Balance and Unemployment Rate). : *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are printed in parenthesis. Each coefficient is multiplied by 100.

CHAPTER THREE: Sukuk and Shariah-Compliant Equity Market Spillovers

3.1. Introduction

Over the last 10 years, growing investments in infrastructure, the halal sector, and Shariah-compliant financial instruments have resulted in a significant expansion of the global Islamic financial market. The most sizeable sector in the Islamic financial market is Islamic banking, which accounts for 71% of the industry's assets (amounting to USD 2.1 trillion). Although the primary factor that has contributed to the growth of the sector is commercial banking, Islamic banking is still prominent. In 2019, 520 Islamic banks were operated, including 207 Islamic banking windows. A substantial proportion of the overall banking assets of the Gulf Cooperation Council (GCC) is also accounted for by Shariah-compliant assets, and in the Middle East and North African (MENA) region, 14% of total banking assets are Islamic. The market share for Islamic banking in the GCC surpassed 25%, which reflects the systemic importance of Islamic banks in the GCC states (S&P Global Ratings, 2020).

For investment portfolios in Islamic financial markets, two primary asset classes are the following: firstly, Shariah-compliant equities; and secondly, sukuks (Islamic bonds). It is essential for researchers to address the question of whether the assets in these classes behave in a similar way to traditional bonds and equities in terms of co-evolution. Nevertheless, scholars in the area of Islamic finance have not yet established consensus on this issue. It is important for Islamic portfolio managers to understand the dynamic connection and the transmission of information that exists between the two Islamic markets, which stems from the way they offer valuable implications in terms of generating reasonable hedging strategies and informational efficiency. This can also illuminate the way in which Islamic assets co-react to

novel information, as well as the degree to which they are persistent to innovations over time. It is also notable that, policymakers, from the standpoint of financial stability, view the co-movement between the two Islamic markets as a fundamental concern.

Sukuks, which are a prominent Islamic financial instrument, offer a different way to finance debt when considered against commercial banking (Nasir & Farooq, 2017; Reboredo & Naifar, 2017). It is notable that almost every issuance of sukuk is linked to the GCC member states (49%) or Malaysia (46%), with the remaining 5% accounted for by other countries (Balli et al. 2020). Nevertheless, sukuk is becoming increasingly popular as a way to promote portfolio diversification even in non-Islamic investors. In 2019, sukuk valuation in non-Islamic countries (i.e., countries outside Southeast Asia and the Middle East) was around USD 38,476 million, which represented a significant rise from the 2017 figure of USD 37,648 million and the 2018 figure of USD 32,988 million (IIFM, 2020). Towards the middle of 2014, the UK emerged as the only Western country at that point the host assets of this kind. The UK attracted over 10 times the size of the new issue (exceeding USD 3 billion), followed by Luxembourg and Hong Kong (Edwards, 2014).

In Shariah law, it is permitted for an individual to invest in equities if the firm in question is compliant with Shariah requirements. It is interesting to note that a range of Shariah-compliant investment and financing structures, including Shariah-compliant securities and sukuk, have been devised to offer different financing options compared to traditional financing. In recent years, the rise of financial instruments of this kind has been hailed as one of the most momentous developments in Islamic capital markets. Notable industry stakeholder organisations estimated the total worth of the industry, over its banking, Islamic insurance, and capital market sectors, to be USD 2.19 trillion in 2018, which represented 13.6% asset growth

(in USD), and which turned back the previous two years of asset growth stagnation (i.e., USD 2.1 trillion in 2018 compared to USD 1.89 trillion in 2017) (S&P Global Ratings, 2020).

The interaction between sukuk and equity in Islamic financial markets has been a topic of special interest among portfolio managers, policymakers, hedge funds, and investors. This has been especially the case in recent years following the emergence of regional and global extreme events and macroeconomic shocks. A range of researchers have examined the connections between Islamic equities and sukuk. Summarise these studies, and explore the co-movements/interactions between sukuk and Shariah-Compliant equities (Aloui et al. 2015a; Aloui et al. 2015b; Aloui et al. 2018; Godlewski et al. 2013; Mensi et al. 2020; Naifar, 2016; Naifar et al. 2016), quantifying the degree of co-integration among Islamic countries sukuks and Islamic equity (Marashdeh, 2005; Majid et al. 2007). Dissimilar to prior studies, Akhtar et al. (2016) and Sclip et al. (2016), analysed volatility connections between Islamic and conventional equities, money markets, and bonds. Importantly, since there are significant differences between conventional finance and Islamic finance, it is possible that Islamic markets will be segmented from their conventional counterparts because they do not share identical fundamental risk factors. Spillovers between Islamic equity markets and sukuk may be marked by changing patterns of time variations in the relationships between these markets over business cycles (Aloui et al. 2015a; Aloui et al. 2015b and Aloui et al. 2018). Additionally, Kim & Kang (2012) argued that unidirectional volatility spillover from the Islamic equity market entered the sukuk market in the years of the financial crisis, which suggests that the sukuk market is strongly influenced by the equity market, whereas the opposite is not the case.

The present paper is distinct compared to the existing literature because it examines the underlying factors in the interrelationship between Shariah-compliant equities and sukuk. The following are the present paper's objectives: firstly, to investigate spillover dynamics between

sukuk and Islamic equity markets; and secondly, to determine whether known liquidity and profitability positions influence the extent of spillovers between sukuk and Islamic equity markets. Empirical investigation into the antecedents of return spillovers is not extensive and is also important to determine whether spillovers occur in response to higher market integration. Given that the liquidity of the market significantly influences the valuation and returns of every security type, it also has a positive long-term impact on returns (see Datar et al. 1998; Avramov et al. 2006; Chen et al. 2010; Balli et al. 2019), whereas profitability and liquidity positions (total sales, total assets, net profit margin, earnings before interest and tax, return on equity, net debt, price-earnings ratio, an interest charge coverage) significantly influence financial markets. Therefore, the impact of favourable liquidity and profitability positions of indices on spillovers is an issue that can be understood through empirical inquiry. Hence, in this research, the panel data model is used, consistent with studies such as Balli, Hajhoj, Basher, & Ghassan, (2015), Balli, Uddin, Mudassar, & Yoon, (2017) and Balli et al. (2019). In this way, the analysis does not simply investigate spillovers between sukuk and Islamic equity markets; at the same time, it illuminates the antecedents of these spillovers. To remove firm-level disparities across sukuks and Islamic equities, firm-level sukuk and Islamic equity returns were obtained from 38 firms, which issue both types of financial instruments simultaneously.

Increasing interactions in sukuk and Islamic equity return spillovers were observed, but the spillover extent was different depending on the market. In terms of the time-variant spillovers for sukuk and Islamic equity markets, the structures of spillovers between these markets were identified as different. More in-depth empirical analysis revealed that profitability and liquidity positions in the firms in Islamic equity indices played a critical role in accounting for the direction and magnitude of spillovers. Another mode of analysis was

applied to verify the results were due to profitability positions specifically. In theory, it is suitable to explain sukuk and Islamic equity markets, which are influenced by identical firm-level effects, and so this study thoroughly examined firms issuing sukuk and Islamic equities across the same periods. Drawing on data obtained from 13 countries, both developed and developing, the study used 38 matched firm-level data on sukuk and Islamic equities from the same markets. The results indicate that profitability and liquidity positions significantly influence Islamic financial market spillovers. Taken together, the results show the importance of profitability and liquidity connections in explaining the strength of return spillovers of Islamic securities. To be more precise, the panel data model in this research offers valuable insights for policymakers who are attempting to synchronise reasonable regulations to lessen the effect of shock spillovers. Hence, it is possible for investors to address the firm-level financial characteristics to determine the degree to which they are sensitive to spillovers, after which volatility trading strategies can be designed.

In what remains of this paper, Section 2 offers a literature review, Section 3 illustrates the dataset and the study's methodology, Section 4 presents and discusses the results, and Section 5 presents a summary with concluding remarks.

3.2. Literature review

3.2.1. The relation between conventional securities

The various ways in which markets are connected are critical to consider in investor asset allocation. This is because these interrelationships are fundamental to any determination of risk. Making an estimate of the relationship structure, and applying this estimate to devise effective portfolios, is an important pivot point for risk managers and portfolio managers. Moreover, authorities in the domain of monetary policy leverage asset price information to establish more accurate expectations about conditions in the business cycle and matters such

as inflation. Hence, knowledge of the co-movements between bonds and equities may be vital in these settings.

Empirical researchers have long been interested in examining the relationship between comparable conventional assets (e.g., equities and bonds). Several prior studies have examined the connection between developed markets (Engle et al., 1990; Bae & Karolyi, 1994). Most previous studies identified strong relationships between these markets, primarily in the context of financial episodes marked by instability. Prior researchers have also examined the relationship between developed and developing markets (Lean & Ghosh, 2010; Singh et al., 2010; Syllignakis & Kouretas, 2011; Li & Giles, 2015). In most cases, these researchers have found an increasing relation between the two types of markets. Comparable results have been identified between developing equity markets (Chin & Isa, 2011; Korkmaz et al., 2012; Duncan & Kabundi, 2013; Jouini & Harrathi, 2014). Another group of researchers has also documented in increasing or high relation between bond markets (Iben & Litterman, 1994; Solnik et al., 1996; Hunter & Simon, 2005; Cappiello et al., 2006; Kim et al., 2006; Ciner, 2007).

In addition to the relationships that may exist between comparable asset types, co-movement between conventional securities of different types has also been assessed. At present, the only studies published in the literature on this topic have focused on the connection between bonds and equity indexes. The majority of these research groups have demonstrated that the connection between high-quality fixed income (government bond, investment-grade bond (I.G. bond - BIG)) and equity indexes is essentially null in periods of normal financial activity, whereas during periods of financial turbulence (e.g., crises and macroeconomic shocks), high-quality bonds and equities tend to move apart (Gulko, 2002; Stivers & Sun, 2002; Connolly et al., 2005; Cappiello et al., 2006; Andersson et al., 2008; Briere et al., 2008;

Aslanidis and Christiansen, 2010; Baele et al., 2010; Tuysuz, 2013). These relationships can be accounted for by referencing the "flight to quality" effect.

3.2.2. Empirical studies of Islamic financial markets

Given the rising importance of Islamic finance, a growing number of researchers have sought to explore the connection between Islamic equity indices. Nevertheless, the results reported in the existing literature do not offer any conclusive insights. For example, certain researchers have documented no relationship between Islamic securities (Karim et al., 2010; Majdoub & Mansour, 2014; Saiti et al., 2014). In Karim et al. (2010), the researchers examined the impact of the global financial crisis on co-movements and integration in Islamic stock markets. Cointegration techniques were applied to the analysis period, which ranged from 15 February 2006 to 31 December 2008, and this period was separated into the following: firstly, the pre-crisis phase (15 February 2006 to 25 July 2007); and secondly, the crisis phase (26 July 2007 to 31 December 2008). The data attested to the lack of cointegration in the Islamic stock markets across both periods. Hence, it was concluded that the 2007 sub-prime mortgage crisis had no influence on the long-term co-movements between the Islamic stock markets. Contrastingly, several research projects have reported on a relationship between Islamic assets in the context of crisis periods (Kassim, 2013; Abdullah et al., 2016). As a case in point, Kassim (2013) examined the level of integration among 7 Islamic equity markets, and the period of analysis spanned both crisis and non-crisis periods. Based on the results, integration was a feature during crisis periods but not during pre-crisis periods.

Another issue that has been examined in the literature is the relationship between Islamic equity indices and conventional equity indices. Results from this body of literature are inconsistent, and they appear to be strongly influenced by economic conditions and the state of financial markets (Dania & Malhotra, 2013; Dewandaru et al., 2014; Hammoudeh et al., 2014;

Rizvi & Arshad, 2014). As a case in point, Rizvi and Arshad (2014) analysed the connection between 4 conventional global indices and 5 Islamic indices. The researchers reported on the comparable patterns exhibited by Islamic markets and conventional markets during periods of economic growth, but the global financial crisis period was marked by negative trends in both indices.

The interplay between equity and sukuk in Islamic financial markets has been investigated by many policymakers, investors, portfolio managers, and hedge funds, principally following the emergence of extreme events (whether regional or global). In the study undertaken by Aloui et al. (2015a), the researchers evaluated co-movements between sukuk and Shariah equities in the GCC states, and a strong dependence was observed between them. The researchers also demonstrated that Islamic assets do not appear to behave differently when considered in relation to conventional bond and equity counterparts, and the total levels of portfolio diversification varied across time and frequencies. In a later paper, Aloui et al. (2015b) examined the global factors responsible for co-movement, and it was revealed that credit event information and oil prices were positively related between 2008 and 2013. Drawing on a wavelet method, Rizvi, Arshad, & Alam (2015) investigated co-movements between Islamic and conventional equities. The results are consistent with the hypothesis of fundamental contagion, and they indicate that the prominent global financial shocks experienced by Asian countries had a negligible exposure effect on Islamic markets. Hence, it is reasonable to perceive Islamic equities, based on these empirical results, as hedges against turbulent market conditions.

In Naifar et al. (2016), the researchers examined the dependence structure between substantial local sukuk yields in the Saudi Arabian, UAE, and Malaysian cases, as well as in a range of equity market conditions as represented by national, regional, and global equity market

returns. Asymmetric dependence was identified between local sukuk returns and volatility in the regional and global equity markets for the Malaysians and UAE sukuk markets. A comparable set of results was published by Balcilar et al., (2016), which demonstrated that sukuks were negatively correlated with equity markets during the global economic upheaval of 2007 to 2009. Another study undertaken by Sclip et al. (2016) examined volatility spillovers between sukuk and conventional equities. In their research, a multivariate GARCH-DCC specification with a Student-t density distribution was undertaken, and the results revealed a strong correlation between sukuk yields and the US and the European equity market returns. Additionally, it was not possible for the researchers to verify the existence of the well-documented "flight-to-quality" phenomena in Islamic financial markets. In accordance with this, the relationship between the two Shariah-compliant was shown to vary over time, also increased during crisis periods. In Shahzad et al. (2019), the researchers investigated the dependence and portfolio management, suggesting the major Islamic DJIA indices with the sukuk index. The researchers drew the conclusion that the Islamic bond index could be included as a possible hedge asset in benchmark equity portfolios. Lastly, the study of Nasreen et al. (2020) analysed the connectedness between sukuk-compliant and Shariah-compliant equity indices in the financial markets of the GCC, which relied on wavelet analysis and value-at-risk (VaR).

As outlined previously, sukuk and Shariah equities are dissimilar when compared to conventional bonds and equities. Nevertheless, in the existing literature on Islamic finance, researchers have not paid sufficient attention to the determinants of co-movement between Shariah equities and sukuk in different markets. Hence, the present study is different from prior studies in a collection of key ways. The first difference is that this study quantifies the spillovers from sukuk on other countries' Islamic/conventional bond markets (or vice vera), leveraging

the methodology proposed by Diebold & Yilmaz (2012) to extract a range of shops influencing sukuk/bond and Islamic equity markets. Existing empirical results indicate a high level of dispersal in the connectedness of the Islamic equity markets and sukuk, whereas connectedness between conventional bonds and Islamic equity are marked by greater robustness. In addition, to identify disparities in the levels of integration among these markets, the present study draws on panel data regression to examine the relevance of liquidity factors and profitability positions of equity markets in accounting for the spillover extent, originating from sukuk markets or originating from other Islamic equities/bonds. Lastly, to gain insight into the determinants of these markets, this study uses matched firm-level data for the same issue of sukuk and Islamic equities within the same countries.

3.3. Data Description

Obtained from Bloomberg Professional Service, the dataset used in this research comprises weekly returns from 13 countries sukuk indices of 6 GCC countries, viz., Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates; Turkey from Western Asia; Hong Kong, Indonesia, Malaysia, and Singapore from Southeast Asia; Pakistan from South Asia; and the United Kingdom for the period 1 January 2013 to 30 April 2020. The rationale for choosing this period was to examine the influence of global shocks on sukuk market integration. The use of a broad sample of countries also enabled the researchers to examine intra- and inter-regional spillover effects. Data only for the liquid sukuk, which has regular weekly data, were used, the reason being that these are fully negotiable and, moreover, that it is possible to trade then in the secondary markets. Data availability is a key consideration that informed country selection. Hence, the researchers established country sukuk indices for such instruments, adopting the Bloomberg methodology used by Hassan et al. (2018) and criteria

for minimising selection bias. The criteria needed by Bloomberg indices informed the choice of sukuk instruments: firstly, maturity of a minimum of 12 months; secondly, outstanding amount surpassing USD 200 million; and thirdly, a minimum of one rating availability from S&P, RAM, MARC, or Moody's.

For the purpose of limiting currency effects, the decision was made to focus exclusively on USD-denominated sukuk, which represents a majority within this market. From those countries, 153 sukuks and the number of sukuks in each country were evaluation, which contributed to the compilation of the sukuk given in Table 3.1. The time variation of sukuk aggregate returns are given in Figure 1 for every country.

Islamic equity indices for the same markets over an identical period were also included in the dataset. These consist of weekly closing prices, USD-denominated, and they served to maintain uniformity and avoid the currency risk effect. The dataset also contained weekly returns from the 13 countries' government 10-year bonds, which were extracted from Bloomberg. The purpose of these data was to serve as a representation of returns in the conventional bond market. Calculation of weekly returns took place for sukuk, Islamic equity indices, and conventional bonds using the equation $r_t = \ln(P_t) - \ln(P_{t-1})$, where r_t and P_t represent weekly returns and prices, respectively, at the business week t. Weekly data were used for the purpose of avoiding spurious spillover effects, which arise as a consequence of non-synchronous trading hours.[5] Moreover, from the standpoint of policymakers who are

[5] Burns, Engle, & Mezrich (1998), demonstrate the aggregation to weekly returns can bypass the issues arising from non-synchronous trading hours. Our data, therefore, were screened on related problems. At the outset, we examined whether it is possible to predict current returns in one market based on lagged returns in markets closing later the same day, but – for all country-sector combinations – this was not accepted. Following this, despite finding that relationships based on monthly returns are typically higher than those grounded in weekly returns, it was not possible to link this to the problem of non-synchronous trading hours. The disparity between the two relationships is relatively small for relationships involving Japan, which ought to be most severely

interested in the issue of financial stability, correlations at a high frequency have greater relevance compared to correlations holding over long horizons.[6] To avoid a potential impact on the days of the week, we use the Wednesday through Wednesday return. As trading volumes vary widely across markets, the last price of the week may come from a day on which only one contract was traded. In this case, the price will likely be tougher than the day's last price observation, which has significant trade. To mitigate this effect, we use average weekly prices, weighted by trading volume, to calculate weekly returns.[7] DataStream was used as the source for the data for all the series (Thomson Reuters).

Table 3.1. Composition of the Sukuk Index

	Country	**Sukuk**
GCC Countries	Bahrain	4
	Kuwait	5
	Oman	4
	Qatar	7
	Saudi Arabia	5
	United Arab Emirates (UAE)	16
Asian Countries	Hong Kong	5
	Indonesia	35
	Malaysia	47
	Pakistan	5
	Singapore	5
European Countries	Turkey	12
	United Kingdom (UK)	3

Note: We used the weekly return of Sukuk data available on the Bloomberg database, for the period from 01 January 2013 to 30 April 2020. To construct country sukuk indices we use the same methodology of Bloomberg Index.

influenced by this issue, while the largest disparities were for relationships between the UK and Germany, where the issue is not severe.

[6] Monthly correlations show the same trending behaviour compared to weekly correlations. Drawing on monthly returns between 1960 and 1990, Longin and Solnik (1995) identified the correlations between the US stock market and several other stock markets had risen.

[7] We also use the last price of the week (i.e. Wednesday) for the estimated weekly return. Any missing data on Wednesday are replaced with the closing prices of the last trading day. The results show no remarkable correlation.

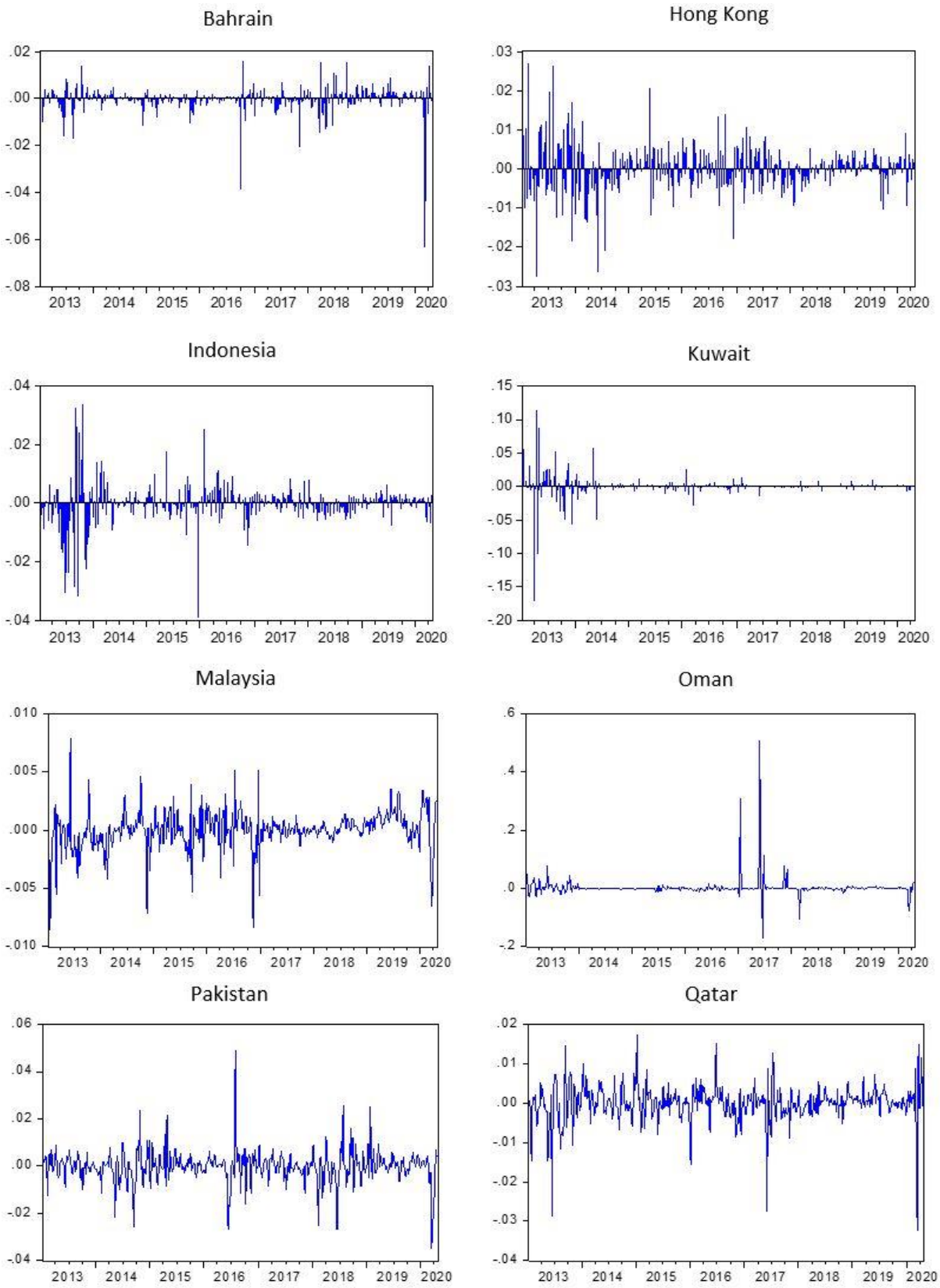
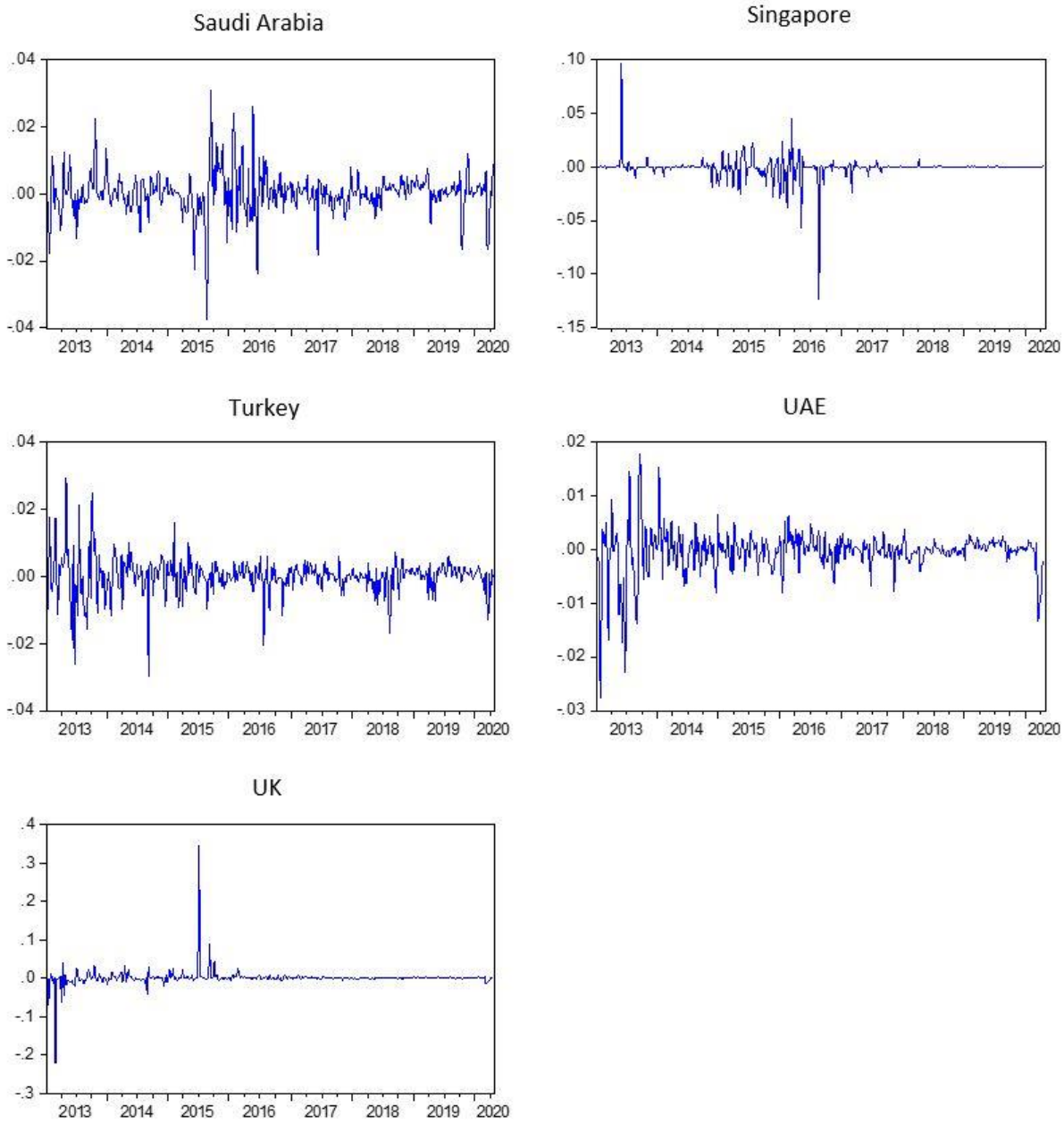


Figure 1. Time varying returns of Sukuk indices for each country



Additionally, the dataset used for this research, variables measuring the profitability and liquidity positions of the equity indices were included. The following variables were included in the panel data analysis: firstly, the Islamic equity market capitalisation ratio (MCAP RATIO), which is measured as the market value of the equity divided by the overall market value worldwide; secondly, the Islamic equity market value (MV), which is measured as the product of the share price and the number of shares outstanding by year's end; thirdly, total assets, which denotes the overall assets owned by equity markets; fourthly, total sales,

which denotes the overall number of sold Islamic equities units; fifthly, earnings before interest and tax (EBIT), which serves to indicate the profitability of the firm; sixthly, profit margin, which is a profitability ratio for the Islamic equity markets; seventhly, debt, which is possible to represent as a metric that reflects the debt situation of various equities; eighthly, price earnings ratio, which is the ratio of a firm's share (equity) price to its earnings per share; ninthly, return on equity (ROE), which reflects a firm's profitability relative to its equity; and finally, return on total assets (ROA), which reflects a firm's profitability in relation to its total assets. The last of these variables can be calculated by dividing EBIT by total assets. The dataset contains yearly data from 2013 to 2020, denominated in USD, and obtained from the Bloomberg database.

To determine whether the profitability and liquidity position of firms influenced sukuk and Islamic equity in a different way in the same markets, a matched sample consisting of 38 listed firms was established, where each firm had issued sukuk and Islamic equities simultaneously over the period from 1 January 2013 to 30 April 2020. A relatively small number of corporates were found to have issued sukuk and Islamic equities. Matched data were obtained from the GCC states, Indonesia, Hong Kong, Malaysia, Singapore, Pakistan, the UK, and Turkey. As a result of these limitations, the study itself is limited, where only 38 listed firms were included that had issued sukuk and Islamic equities at the same time in the same markets. Table 3.2 provides an overview of the matched sample. In terms of profitability and liquidity positions, the researchers also matched with specific firms that are issuing both Islamic securities to assess the effect of firm-level financial characteristics on these markets. As before, these data were obtained from the Bloomberg database.

The data in Tables 3.3 and 3.4 show descriptive statistics for the sovereign sukuk, Islamic equity, and conventional bond indices that were extracted. In Table 3.3, it is clear that the average returns of all sukuk indices exceed the average returns of Islamic equity indices, the only exceptions being in Hong Kong, Pakistan, the UAE, Qatar, and Bahrain. Contrastingly, in Table 3.4, the average returns of conventional bonds clearly exceed the average returns of Islamic equity in the season sukuk. In addition, for the purpose of examining firms that issue both Islamic equity and sukuk, the descriptive statistics in Table 3.5 were compiled. As the table shows, the average returns of matched sukuk firms for each country exceeded the matched Islamic equity firms, the sole exception being Saudi Arabia. This reflects the fact that, from the standpoint of returns, matched sukuk and Islamic equity firms are not significantly different with the results of Table 3 for the same period.

In accordance with Sclip et al. (2016), sukuk indices displayed a lower level of volatility compared to Islamic equity indices. Additionally, as shown in Table 3.5, matched sukuk firms' returns were more volatile compared to national sukuk indices. This is consistent with expectations in view of the fact that the latter shows a portfolio marked by higher diversification. In addition, regarding volatilities, matched sukuk and Islamic equity firms showed higher volatility compared to country sukuk and Islamic equity indices. As shown in Tables 3.3 and 3.4, except Oman, Pakistan, and UK for sukuk, Bahrain and Oman for Islamic equity indices while Indonesia, Malaysia, and UAE for conventional bonds have negative skewness, which means that the distribution's left tail is not as short as the right tail. Nevertheless, every matched-level firm was associated with positive skewness, which means that the distribution's right tail was not as short as the left tail. Every price change was associated with a high value of kurtosis, which is suggestive of the fact that certain indices

contained outlier values. Indeed, as the data show in Tables 3.3, 3.4, and 3.5, the Jarque-Bera test rejected the null hypothesis of normality for all series.

Table 3.2. Composition of the Sukuk and Islamic equity firms

	Country	**Matched-level firms**
GCC Countries	Bahrain	2
	Kuwait	2
	Oman	-
	Qatar	2
	Saudi Arabia	3
	United Arab Emirates (UAE)	3
Asian Countries	Hong Kong	1
	Indonesia	5
	Malaysia	13
	Pakistan	2
	Singapore	1
European Countries	Turkey	3
	United Kingdom (UK)	1

Note: We used the weekly return of Sukuk and Islamic equity data available on the Bloomberg database, covering the period from January 01 2013 to April 30 2020.

Table 3.3. Summary statistics weekly returns (Sukuk and Islamic Equity Indices)

SUKUK INDICES	**Mean**	**Std. Dev.**	**Skewness**	**Kurtosis**	**J-B**
BAHRAIN	-0.044%	0.601%	-4.817	45.585	3.0E+04***
HONG KONG	-0.006%	0.602%	-0.076	7.551	3.3E+02***
INDONESIA	-0.027%	0.678%	-0.536	12.837	1.6E+03***
KUWAIT	0.015%	1.577%	-2.585	53.267	4.0E+04***
MALAYSIA	0.002%	0.173%	-0.828	8.475	5.2E+02***
OMAN	0.197%	3.462%	9.894	141.049	3.1E+05***
PAKISTAN	-0.015%	0.702%	0.188	13.241	1.7E+03***
QATAR	-0.004%	0.491%	-1.636	13.710	2.0E+03***
SAUDI ARABIA	0.012%	0.658%	-0.381	9.359	6.5E+02***
SINGAPORE	-0.073%	1.085%	-2.337	65.768	6.3E+04***
TURKEY	-0.001%	0.569%	-0.254	9.642	7.0E+02***
UAE	-0.043%	0.419%	-1.535	13.347	1.8E+03***
UK	0.075%	2.355%	6.140	146.187	3.3E+05***
ISLAMIC EQUITY INDICES					
BAHRAIN	0.098%	1.350%	11.585	190.562	5.7E+05***
HONG KONG	0.029%	2.370%	-0.715	5.143	1.1E+02***
INDONESIA	-0.118%	3.432%	-1.448	15.331	2.5E+03***
KUWAIT	-0.051%	1.985%	-2.787	32.498	1.4E+04***
MALAYSIA	-0.141%	2.073%	-1.175	11.983	1.4E+03***
OMAN	-0.129%	1.569%	0.213	18.884	4.0E+03***
PAKISTAN	0.048%	2.345%	-0.525	5.566	1.2E+02***
QATAR	-0.036%	2.521%	-0.257	5.626	1.1E+02***
SAUDI ARABIA	0.002%	2.812%	-0.280	8.527	4.9E+02***
SINGAPORE	-0.105%	1.984%	-2.017	18.441	4.0E+03***
TURKEY	-0.229%	4.428%	-0.841	6.591	2.5E+02***
UAE	0.070%	2.750%	-1.718	20.421	5.0E+03***
UK	-0.082%	2.571%	-2.056	17.958	3.8E+03***

Note: Std. Dev. refers to standard deviation. J-B is the Jarque-Bera test for normality. The results for the examined thirteen different countries (Bahrain, Hong Kong, Indonesia, Kuwait, Malaysia, Oman, Pakistan, Qatar, Saudi Arabia, Singapore, Turkey, UAE & UK) are based on weekly data for the whole sample period (January 01, 2013 to April 30, 2020), with superscripts symbolizing *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 3.4. Summary statistics weekly returns (Conventional Bonds)

CONVENTIONAL BONDS	Mean	Std. Dev.	Skewness	Kurtosis	J-B
BAHRAIN	2.081%	1.005%	0.557	2.015	3.5E+01***
HONG KONG	4.115%	1.447%	0.501	1.650	4.4E+01***
INDONESIA	7.263%	1.145%	-0.452	2.155	2.4E+01***
KUWAIT	2.770%	0.979%	0.480	1.504	5.0E+01***
MALAYSIA	3.902%	0.258%	-0.708	2.315	3.9E+01***
OMAN	1.017%	0.663%	0.440	1.391	5.3E+01***
PAKISTAN	1.932%	0.575%	0.551	1.850	4.0E+01***
QATAR	4.019%	1.708%	0.634	2.878	2.5E+01***
SAUDI ARABIA	0.790%	0.607%	0.449	1.797	3.5E+01***
SINGAPORE	2.449%	0.649%	0.493	2.144	2.7E+01***
TURKEY	2.446%	0.651%	0.503	2.163	2.7E+01***
UAE	3.332%	0.619%	-0.871	3.048	4.8E+01***
UK	2.538%	0.630%	0.378	2.054	2.3E+01***

Note: Std. Dev. refers to standard deviation. J-B is the Jarque-Bera test for normality. The results for the examined thirteen different countries (Bahrain, Hong Kong, Indonesia, Kuwait, Malaysia, Oman, Pakistan, Qatar, Saudi Arabia, Singapore, Turkey, UAE & UK) are based on weekly data for the whole sample period (January 01, 2013 to April 30, 2020), with superscripts symbolizing *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

In Tables 3.6 and 3.7, collective statistics for specific financial variables for the panel data analysis are given. In particular, Table 3.6 offers an overview of Islamic equity markets, whereas Table 3.7 shows the matched sample. Relevant variables are averaged from the period 2013 to 2020. As the tables show, the market capitalisation ratio of matched Islamic equities displayed the highest standard deviation compared to Islamic equities (0.047 compared to 0.003). Nevertheless, the market value of matched Islamic equities did not surpass the Islamic equity indices regarding standard deviation. This suggests that the market capitalisation ratios and market values of Islamic equity markets differ. In Tables 3.6 and 3.7, the data sample evidently varies between these markets. As a case in point, the size indicators, as proxied by total sales and total assets for Islamic equities, were 45.40 million and 11.80 million, while matched Islamic equities were 7.63 million and 4.31 million, respectively. The tables clearly show that the minimum and maximum values for EBIT, ROA, and ROE varied significantly between the markets. Nevertheless, the ROA average was comparable across markets, which suggests that both matched and Islamic equity markets efficiently leverage their assets to

produce earnings. The tables also indicate that the average sample of matched Islamic equity markets are quite profitable compared to Islamic equity indices, with profit margins amounting to around 20.959 and 13.888. Nevertheless, compared to the mean of the debt for Islamic equity, which amounted to 16.8 million, the value was smaller for the matched sample (1.03 million).

Table 3.5. Summary statistics weekly returns (Matched sample)

SUKUK FIRMS	**Mean**	**Std. Dev.**	**Skewness**	**Kurtosis**	**J-B**
BAHRAIN	0.023%	3.039%	0.289	11.072	1.1E+03***
HONG KONG	-0.058%	3.118%	0.358	7.396	3.2E+02***
INDONESIA	-0.025%	2.140%	0.211	4.992	6.8E+01***
KUWAIT	-0.060%	3.110%	0.170	7.927	4.0E+02***
MALAYSIA	-0.056%	2.532%	1.496	18.423	4.0E+03***
OMAN	-	-	-	-	-
PAKISTAN	-0.018%	2.286%	0.769	8.011	4.5E+02***
QATAR	-0.059%	3.059%	0.359	7.191	3.0E+02***
SAUDI ARABIA	-0.018%	2.051%	0.213	4.780	5.5E+01***
SINGAPORE	-0.107%	5.173%	1.071	10.971	1.1E+03***
TURKEY	0.082%	4.922%	1.640	25.443	8.4E+03***
UAE	0.002%	2.814%	0.910	10.324	9.3E+02***
UK	-0.018%	2.766%	10.850	162.281	4.2E+05***
ISLAMIC EQUITY FIRMS					
BAHRAIN	-0.163%	4.327%	0.500	6.939	2.7E+02***
HONG KONG	-0.083%	3.363%	0.357	6.056	1.6E+02***
INDONESIA	0.075%	2.529%	-0.661	7.395	3.4E+02***
KUWAIT	-0.257%	4.207%	-0.382	5.386	1.0E+02***
MALAYSIA	-0.182%	3.343%	-2.501	21.950	6.3E+03***
OMAN	-	-	-	-	-
PAKISTAN	-0.066%	2.303%	-0.328	6.651	2.3E+02***
QATAR	-0.063%	3.867%	-0.465	8.947	5.9E+02***
SAUDI ARABIA	0.062%	3.128%	-0.732	8.996	6.2E+02***
SINGAPORE	-0.198%	4.175%	-1.472	20.874	5.4E+03***
TURKEY	-0.116%	1.989%	-0.300	5.602	1.2E+02***
UAE	-0.051%	2.932%	-0.704	6.382	2.2E+02***
UK	-0.128%	4.633%	-1.059	13.665	1.9E+03***

Note: Std. Dev. refers to standard deviation. J-B is the Jarque-Bera test for normality. The results for the examined thirteen different countries (Bahrain, Hong Kong, Indonesia, Kuwait, Malaysia, Oman, Pakistan, Qatar, Saudi Arabia, Singapore, Turkey, UAE & UK) are based on weekly data for the whole sample period (January 01, 2013 to April 30, 2020), with superscripts symbolizing *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 3.6. Descriptive statistics for liquidity and profitability positions

	Mean	Std. Dev	Maximum	Minimum
Market capitalization ratio	0.001	0.003	0.022	0.000
Market value	3280000	11600000	53900000	6001
Debt	16800000	649000000	4400000000	1751491
EBIT	27100000	960000000	4700000000	411664
Profit margin (%)	13.888	5.231	31.760	3.950
Price earnings ratio (%)	11.384	3.134	17.780	3.310
ROE (%)	19.147	6.637	39.130	9.930
ROA (%)	5.343	13.387	122.167	0.795
Total assets	454000000	160000000	7930000000	24095710
Total sales	118000000	413000000	1950000000	3992569

Note: Descriptive statistics are recorded for Liquidity position and Profitability position for the period January 01, 2013 to April 30, 2020. Std. Dev. refers to standard deviation.

Table 3.7. Descriptive statistics for liquidity and profitability positions of matched sample

	Mean	Std. Dev	Maximum	Minimum
Market capitalization ratio	0.011	0.047	0.355	0.000
Market Value	13943804	66078939	488000000	298
Debt	1027400	3895484	26032344	200000
EBIT	141617	489474	3507000	40000
Profit margin (%)	20.959	23.833	268.284	0.111
Price earning ratio (%)	22.538	32.613	335.938	0.837
ROE (%)	15.600	38.132	655.215	0.181
ROA (%)	5.535	11.751	78.556	0.025
Total assets	7631473	29621010	206000000	7100000

Note: Descriptive statistics are recorded for Liquidity position and Profitability position for the period January 01, 2013 to April 30, 2020. Std. Dev. refers to standard deviation.

3.4. Empirical model

The empirical model used in this research encompasses two steps: firstly, an application of the Diebold and Yilmaz DY spillover index, which assists in the determination of pairwise returns; and secondly, development of a panel data equation of gravity model, which assists in studying the incentive of such spillovers

This paper's method is grounded in the multivariate time-series approach of Diebold and Yilmaz (2012). For the purpose of explicitly accounting for the interdependent relationships identified in financial markets, the simple measure of connectedness was devised. The DY methodology provides a novel viewpoint on variability modelling, principally because it provides lower computational overhead and assistance in reflecting cyclic and mundane motions across our considered interest variables. A vector autoregressive model (VAR) lies at the heart of the DY methodology, as well as a variance decomposition framework[8]. Diebold and Yilmaz (2009) are structured in a VAR framework, which – from the perspective of Cholesky's factorisation – is sensitive to the alignment of several variables. Hence, Diebold and Yilmaz (2012) suggested that the general VAR framework of Koop et al. (1996) and Pesar and Shin (1998) should be used, where forecast error variance decompositions are invariant to variable ordering, and where the possibility of assessing directional volatility spillovers is included in an explicit way.

The following stages were used for the implementation of the DY methodology: firstly, an estimate was made of the VAR model for the sample variables; secondly, the forecast-error-variance-decomposition (FEVD) was calculated; and finally, the static and dynamic total and pairwise spillovers are determined from the generalised FEVD. In the remaining sections, a definition of the DY methodology is offered.

3.4.1. Spillover index

The approach devised by Diebold and Yilmaz's (2012) was used as a preliminary step towards determining spillover effects, which involves extracting spillover indices representative of the return volatility spillover effects of the sukuk, conventional bonds, and

[8] See generic papers for further details on Diebold and Yilmaz (2009, 2012) methodology.

Islamic equity indices. The basis for the index is the FEVD in generalised VAR by Koop, Pesaran and Potter (1996) and Pesaran and Shin (1998). As opposed to Cholesky's factorisation, this configuration leverages variance decomposition, which leads to no change in variable ordering. As a result, the researchers identified the share of the forecast error variance in sukuk, conventional bonds, and Islamic equity markets x_i (for $i = 1, 2, \dots, N$) that can be attributed to shocks in other sukuk, conventional bonds, and Islamic equity markets from the x_j (for $j = 1, 2, \dots, N$), where $i \neq j$. Hence, from the standpoint of a general VAR, the H-step-ahead forecast error variance decomposition can be expressed in the following way:

$$\theta_{ij}^{g}(\mathrm{H}) = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H-1} \left(e_i' A_h \Sigma e_j\right)^2}{\sum_{h=0}^{H-1} \left(e_i' A_h \Sigma A_h' e_i\right)} \tag{1}$$

where Σ denotes the variance matrix for the VAR's error term, σ_{ii} represents the standard deviation of the error term for the ith equation, and e_i refers to the selection vector, with 1 for the ith element and 0 otherwise. Since the generalised VAR permits correlated shocks, it is possible that the sum of the features for each contribution in the variance decomposition may not be 1. In turn, consistent with Diebold & Yilmaz (2012), the normalisation of every forecast error variance decomposition can occur using the row sum as follows:

$$\tilde{\theta}_{ij}^{g}(H) = \frac{\theta_{ij}^{g}(H)}{\sum_{j=1}^{N} \theta_{ij}^{g}(H)} \tag{2}$$

3.4.2. Total spillover index

The normalisation of variance contributions, namely by the construction $\sum_{j=1}^{N} \tilde{\theta}_{ij}^{g}(H) = 1$ and $\sum_{i,j=1}^{N} \tilde{\theta}_{ij}^{g}(H) = N$, enabled the researchers to identify the degree of interdependence on a range of spillover measures. In a similar way, the total spillover index captures the average contribution of spillovers from the shocks across different countries to the

total forecast error variance within sukuk, conventional bonds, and Islamic equity markets. This can be expressed as follows:

$$S^{g}(H) = \frac{\sum_{i,j=1, i\neq j}^{N} \widetilde{\theta}_{ij}^{g}(H)}{\sum_{i,j=1}^{N} \widetilde{\theta}_{ij}^{g}(H)} \times 100 = \left(\frac{\sum_{i,j=1, i\neq j}^{N} \widetilde{\theta}_{ij}^{g}(H)}{\mathrm{N}} \right) \times 100 \quad (3)$$

3.4.3. Directional spillovers

The purpose of this spillover measure is to reflect the shocks received from all vectors j by vector i. In the context of the present analysis, directional spillover is defined in terms of spillovers from sukuk, conventional bonds, and Islamic equity market i to all other markets.

$$S_{i\cdot}^{g}(H) = \frac{\sum_{j=1, j\neq i}^{N} \widetilde{\theta}_{ij}^{g}(H)}{\sum_{j=1}^{N} \widetilde{\theta}_{ij}^{g}(H)} \times 100 = \left(\frac{\sum_{j=1, j\neq i}^{N} \widetilde{\theta}_{ij}^{g}(H)}{\mathrm{N}} \right) \times 100 \quad (4)$$

The second set of directional spillovers (i.e., shocks by market i to all other sukuk, conventional bonds, and Islamic equity markets) can be measured in a similar way, as shown below:

$$S_{\cdot i}^{g}(H) = \frac{\sum_{j=1, j\neq i}^{N} \widetilde{\theta}_{ji}^{g}(H)}{\sum_{j=1}^{N} \widetilde{\theta}_{ji}^{g}(H)} \times 100 = \left(\frac{\sum_{j=1, j\neq i}^{N} \widetilde{\theta}_{ji}^{g}(H)}{\mathrm{N}} \right) \times 100 \quad (5)$$

3.4.4. Net spillovers

It is possible to calculate net spillovers based on directional spillovers, where net spillovers reflect the difference between the volatility shops transmitted to and the volatility shops transmitted from every other market. The equation for net spillovers is given as follows.

$$S_{i}^{g}(H) = S_{\cdot i}^{g}(H) - S_{i\cdot}^{g}(H) \quad (6)$$

3.4.5. Net pair-wise spillovers

Pairwise indices are noteworthy measures, where the net pairwise spillover index reflects the difference between the volatility spillover from i to j and the volatility spillover from j to i, as below

$$S_{ij}^{g}(H) = \left(\frac{\tilde{\theta}_{ji}^{g}(H)}{\sum_{i,k=1}^{N} \tilde{\theta}_{ik}^{g}(H)} - \frac{\tilde{\theta}_{ij}^{g}(H)}{\sum_{j,k=1}^{N} \tilde{\theta}_{jk}^{g}(H)} \right) \times 100 = \left(\frac{\tilde{\theta}_{ji}^{g}(H) - \tilde{\theta}_{ij}^{g}(H)}{\mathrm{N}} \right) \times 100 \quad (7)$$

3.4.6. Panel data regression analysis

After applying net pairwise spillovers to identify the magnitude of shocks, the second layer of analysis was undertaken to identify the antecedents of spillovers. The hypothesis was formed that several variables would influence the impact of shocks on conventional bonds, sukuk, and Islamic equity markets, including ($MCAP\ RATIO$), market value (MV), return on equity (ROE), net debt ($Debt/Total\ Asset$), profit margin ($Profit$), Logarithm of total sales (Log($Total\ Sales$)), price-earnings ratio (PER) and return on total assets (ROA). Additionally, consistent with recently published studies such as Balli et al. (2015b), Balli et al. (2017) and Balli et al. (2019), a panel data regression equation was specified for conventional bonds, sukuk, and Islamic equity markets. In this case, the panel data regression equation was based on the standard gravity model, but it was adapted to encompass variables relating to profitability and liquidity indicators:

$$\begin{aligned} Log\ (S_{ij}^{g}(H)) = {} & \alpha_0 + \alpha_1 MCAP\ RATIO_{,ij} + \alpha_2 MV_{,ij} + \alpha_3 ROE_{i,j} \\ & + \alpha_4 Debt/Total\ Asset_{i,j} + \alpha_5 Profit_{i,j} + \alpha_6 Log(Total\ Sales_{i,j}) \\ & + \alpha_7 PER_{i,j} + \alpha_8 ROA_{i,j} + \varepsilon_i \end{aligned} \quad (8)$$

where the dependent variable, $Log\ (S_{ij}^{g}(H))$, is formed in six ways. First, it refers to the logarithm spillover of sukuk i over other Islamic equities (Table 8.1) at country j; second, the logarithm spillovers of Islamic equities j on sukuk i (Table 8.2); third, the logarithm conventional bond spillovers i on Islamic equities at country j (Table 8.3); fourth, the logarithm Islamic equity spillovers j on conventional bonds at country i (Table 8.4); fifth, the logarithm

matched sukuk spillovers *i* on matched Islamic equities at country *j* (Table 8.5); and sixth, the logarithm matched Islamic equity spillovers *j* on matched sukuk at country *i* (Table 8.6).

3.5. Empirical Analysis

The purpose of this section is to present the results obtained from the estimation of the return spillovers from sukuk to Islamic equity markets, and vice versa. The Diebold and Yilmaz (2012) spillover method, which relies on variance decompositions obtained from second-order VARs, was utilised. The variance decompositions allow a division of the forecast error variances for every variable into elements that can be attributed to the various system shocks. That is to say, given a pair of variables x1 and x2, the variance decompositions enable an insight to be gained about the question of what fraction of the one-step-ahead error variance in forecasting x1 is due to shocks to x1, and what fraction arises from shocks to x2. In addition, it can illuminate the question of what fraction of the one-step-ahead error variance in forecasting x2 is attributable to shocks to x1, and what fraction is attributable to shocks to x2 (Diebold & Yilmaz, 2011). As previously noted, consistent with Diebold & Yilmaz (2012), VAR identification was achieved using the generalised VAR framework of Koop, Pesaran and Potter (1996) and Pesaran and Shin (1998), which generates variance decompositions invariant to ordering. In turn, a panel data analysis was undertaken to determine whether the spillovers from sukuk to Islamic equities, and vice versa, could be accounted for based on profitability and liquidity positions. To verify the robustness test, conventional bonds and Islamic equities were included in order to assess the effect on spillovers of profitability positions. Lastly, to gain an accurate sense of the impact of financial characteristics on Islamic financial markets, 38 matched firms were used that issue both Islamic equities and sukuk simultaneously in identical markets.

3.5.1. Dynamic Spillover

The continuous evolution and dynamic variability of financial markets over time is well-documented. Therefore, the connections between markets also change with time, and both structural and cyclical changes are observable. Average summary measures cannot reflect these movements. Furthermore, since this study aims to examine dynamic spillovers from sukuk to Islamic equity markets (and vice versa), return spillovers were estimated using 52-week rolling samples. Additionally, these samples were used to examine the nature and extent of spillover variation over time, leveraging the associated time-series plot of the spillover indices. Figure 2 illustrates the spillover plot for sukuk to Islamic equity returns, whereas Figure 3 shows that of Islamic equity to sukuk returns[9].

Figures 2 and 3 show 52-week estimates from 1 January 2013 to 30 April 2020, and various trajectory refers to total return spillovers index of sukuk to Islamic equity markets as well as Islamic equity to sukuk markets for each country. Several of the country indices in Figure 2 show comparable patterns, which suggests that the return of spillovers for every country's index does not track accurately with those of other countries. Furthermore, the magnitude of return spillovers for several countries, including Hong Kong, Kuwait, Malaysia, and Bahrain, exceeded that of other countries, the only exception being the year of 2016. Taken together, the indices resemble different drifts, which suggests that spillovers from sukuk to Islamic equities are different in the countries for this period of analysis. Additionally, the return spillovers for Hong Kong, Turkey, Oman, and Saudi Arabia ranged from 2.0% to 3.0%, while the values for other countries ranged from 2.6% to 4.0%. A gradual increase or decrease was

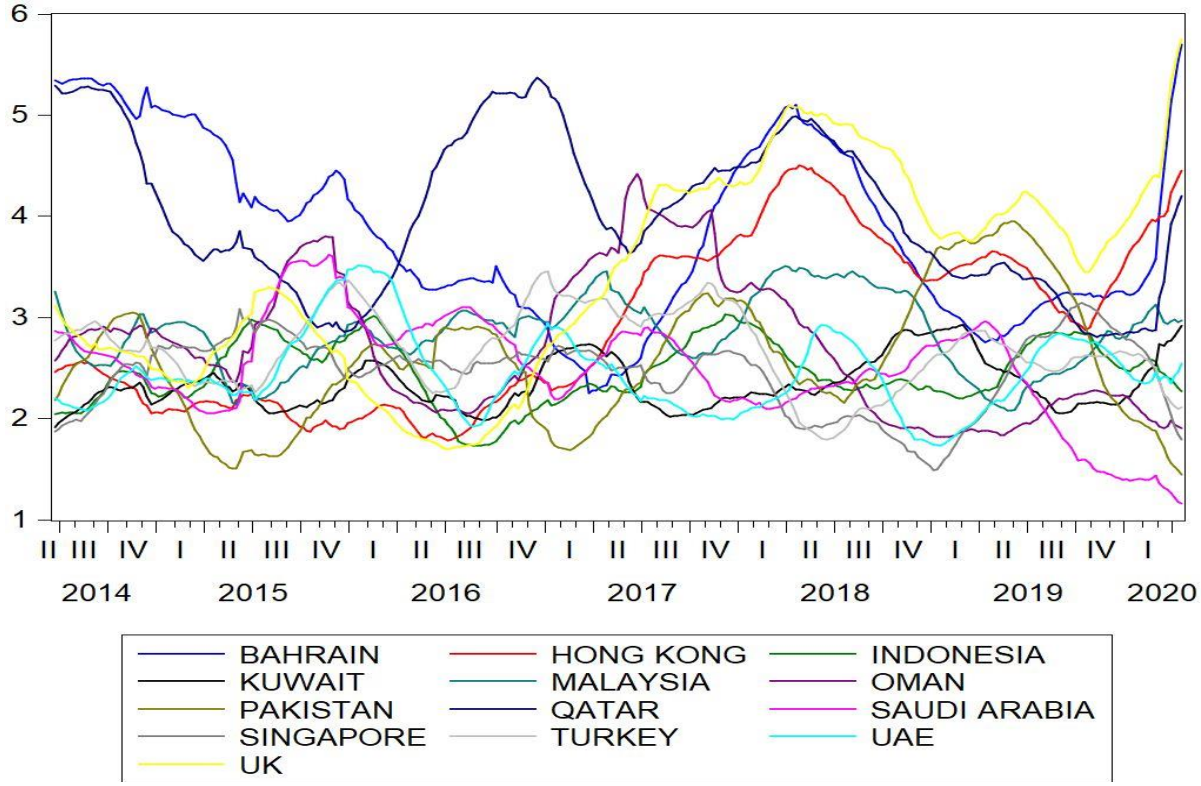
[9] This study used 52-week (i.e., one-year) rolling window samples, consistent with the methodology proposed by Diebold and Yilmaz (2012) (see Section 4).

observed in the return spillovers for Turkey, Saudi Arabia, Bahrain, and Hong Kong, whereas sudden rises and falls were associated with the other spillovers.

Several distinct phases are noticeable in Figures 2 and 3. At the outset, a gradual decline occurs until mid-2014, which can reasonably be attributed to the slow recovery after the global financial crisis[10] (Shahzad et al., 2017) and the following European sovereign debt crisis. Asset prices fell, capital flows slowed down, and trade levels declined, and the crisis is implicated in each trend. In turn, an uptrend was maintained until late-2016, which can be related to growing uncertainty surrounding the Syrian civil war (e.g., the rise of ISIS), geopolitical conflicts centred in the Middle East, and the UK's decision to withdraw from the European Union. This period reflects an intensification of spillover during episodes of stress. Noteworthily, Turkey, Indonesia, and the UK displayed lower volatility compared to other countries, which accounts for the better diversification benefits of these markets in the crisis period. Hence, the index fell and continually declined until July 2017, the sample period's end. After 2018, return spillovers ranged from 2% to 5.5% and proceeded through 3 cycles until the sample period's end. The results show that sukuk and Islamic equity returns were marked by a series of structural breaks over the sample period, as shown in Figures 2 and 3. Therefore, a regime-switching pattern may characterise the dependence between the markets. In view of this, it is important for Islamic funds and retail investors operating in Islamic financial capital markets to appreciate the advantages of diversification in portfolio design. At the same time, the result reflects the heterogeneity of investors, each of whom will make an investment decision based on their own time horizon.

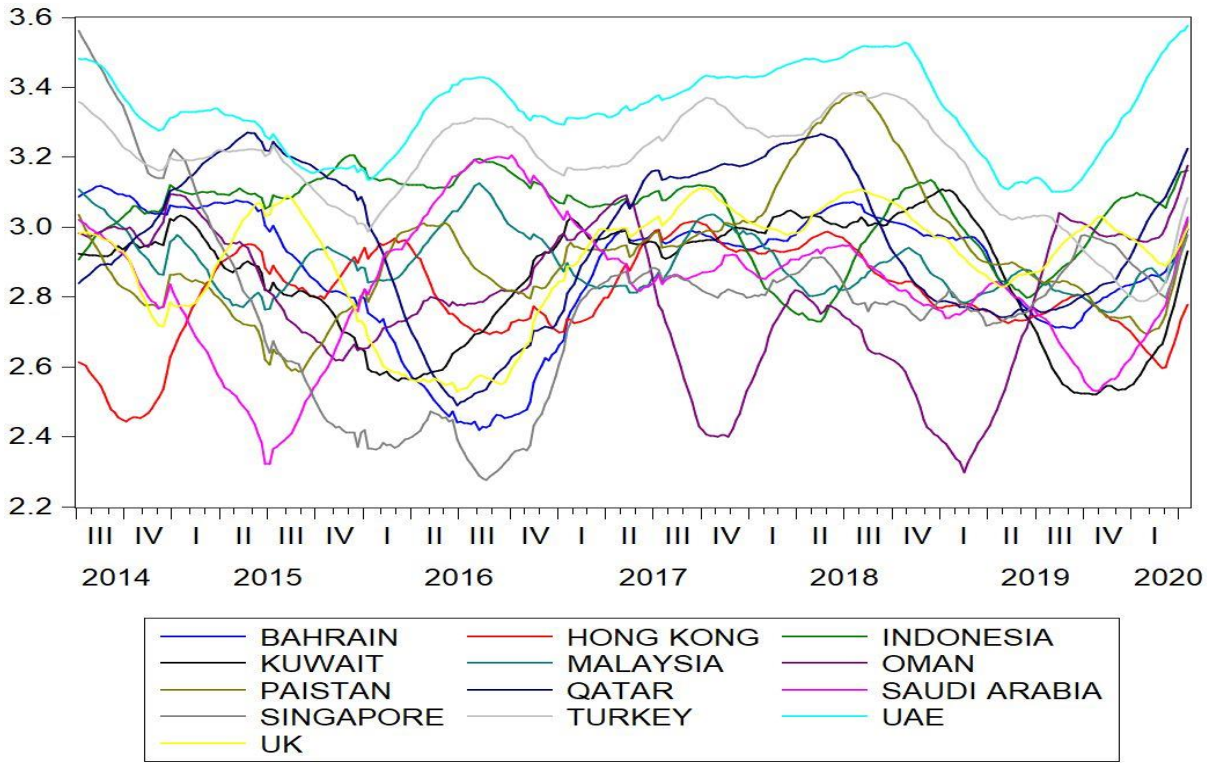
[10] Henceforth, GFC, i.e. started in late 2007, continued over 2008 and bottomed in early 2009 (Kashyap & Zingales, 2010).

Figure 2. The dynamics of the total return spillover from Sukuk to Islamic Equity markets



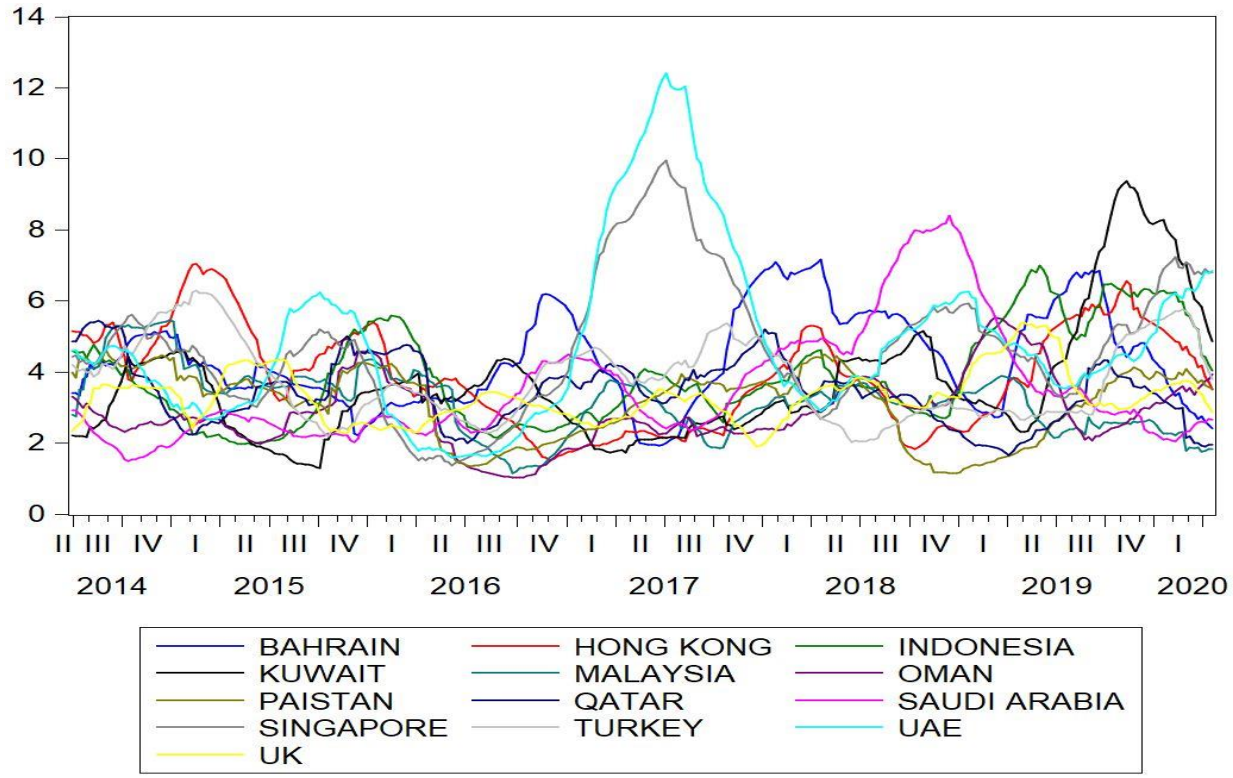
Notes: Dynamic total return spillovers are calculated from the forecast error variance decompositions on 10-step-ahead forecasts; total spillover indices are estimated using 52-week rolling windows; the sample period is from 01.01.2013 to 30.04.2020. Each trajectory refers to total return spillover index of sukuk to Islamic equity.

Figure 3. The dynamics of the total return spillover from Islamic Equity to Sukuk markets



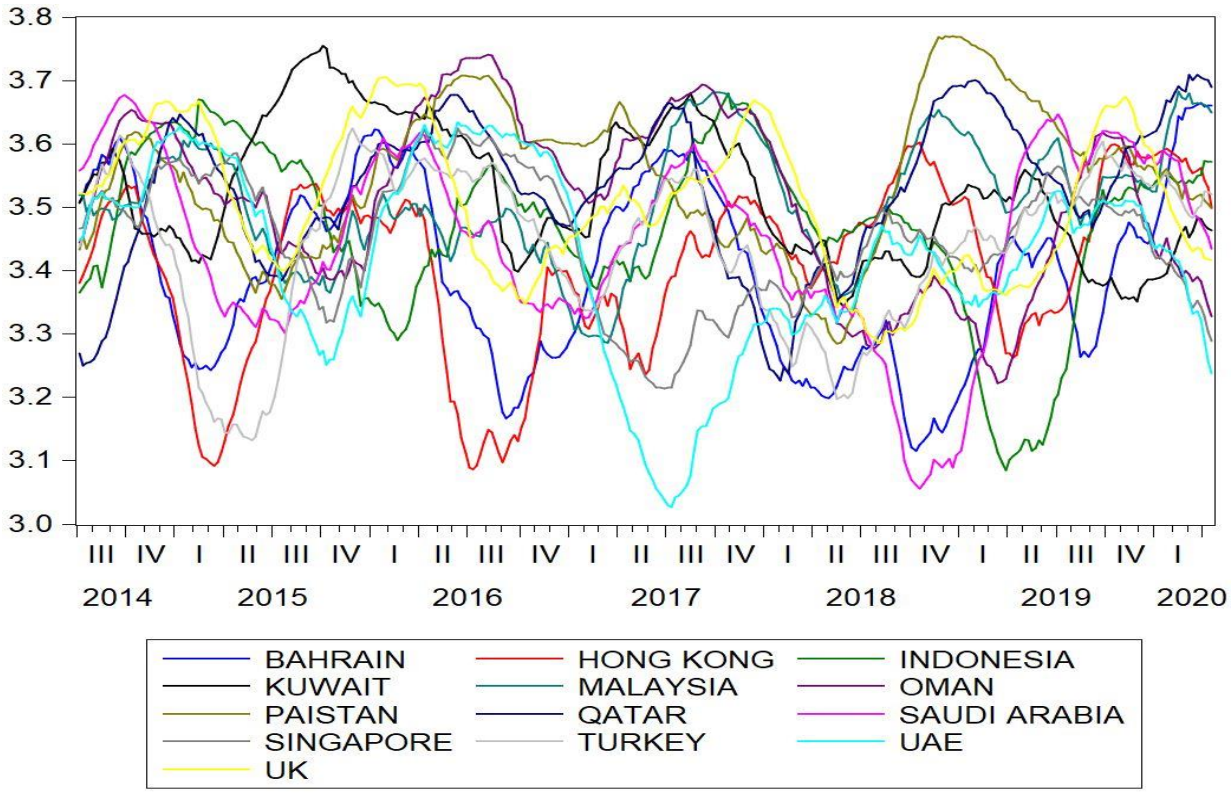
Notes: Dynamic total return spillovers are calculated from the forecast error variance decompositions on 10-step-ahead forecasts; total spillover indices are estimated using 52-week rolling windows; the sample period is from 01.01.2013 to 30.04.2020. Each trajectory refers to total return spillover index of Islamic equity to sukuk.

Figure 4. The dynamics of the total return spillover from Conventional Bond to Islamic Equit



Notes: Dynamic total return spillovers are calculated from the forecast error variance decompositions on 10-step-ahead forecasts; total spillover indices are estimated using 52-week rolling windows; the sample period is from 01.01.2013 to 30.04.2020. Each trajectory refers to total return spillover index of Conventional Bond to Islamic Equity.

Figure 5. The dynamics of the total return spillover from Islamic Equity to Conventional Bond



Notes: Dynamic total return spillovers are calculated from the forecast error variance decompositions on 10-step-ahead forecasts; total spillover indices are estimated using 52-week rolling windows; the sample period is from 01.01.2013 to 30.04.2020. Each trajectory refers to total return spillover index of Islamic Equity to Conventional

To establish the robustness of the result, we illuminate the dynamic interactions between Islamic equity and conventional bonds, this study generated time-varying spillover plots for returns (Figure 4). Evidently, return spillovers were higher than the sukuk to Islamic equity market spillovers, where the former ranged from 1.5% to 12% and the latter ranged from 1% to 5%. Therefore, it is clear that the degree of interconnectedness between Islamic equity markets and conventional bonds is greater compared to the interconnectedness between Islamic equity markets and sukuk. Figure 4 also shows return spillover plots with comparable and favourable patterns through the sample, while the return spillovers for sukuk to Islamic equity markets were marked by more incremental trends, as well as sudden inclines and declines.

Figure 5 shows the return spillover plots for the interactions with Islamic equity to conventional bonds. The figure indicates that return spillover patterns ranged from 3.1% to 3.7%, whereas Figure 3 shows that return spillovers ranged from 2.2% to 3.6%. This shows that the level of integration between Islamic equity and conventional bond markets was markedly higher compared to Islamic equity and sukuk markets. The return spillover pattern shown in Figure 5 is somewhat distinct to those considered earlier, primarily because opposite patterns were identified between early-2014 to early-2015, as well as early-2016 to late-2017, in the return spillovers with sukuk to Islamic equity and Islamic equity to sukuk markets. This suggests that uncertainty-related events, including Middle Eastern geopolitical conflicts, Brexit, and the Syrian civil war, did not have as severe an impact on Islamic financial market returns compared to conventional bond markets.

In summary, trends in total return spillover are indicative of significant variability in Islamic financial markets as opposed to conventional markets. This result may have implications for portfolio structure portfolio management. Consistent with Aloui et al. (2015a),

Aloui et al. (2015b), and Aloui et al. (2018), the findings also indicate that sukuk to Islamic equities are dispersed in comparison to bonds to Islamic equities in different countries. Nevertheless, evidence was offered showing that crisis events intensify the total return spillovers across the markets. To be more specific, return spillovers reached their highest point in the turbulent periods from 2014 to 2017 (the Russian and Brazilian crisis), during 2015 (Chinese equity market crash), and from 2009 to 2019 (European sovereign debt crisis). The results also show that the time-varying return spillovers may be influenced by other significant economic events, including unstable oil prices (2014 to 2015) and the commodity crisis (second half of 2014). Events such as this increase the spillovers between conventional bonds to Islamic equity markets but not for all Islamic markets, thus lowering the number of opportunities for diversification by moving from conventional bonds to Islamic equity markets.

3.5.2. Determinants of spillovers

Until now, the previous literature has performed analysis of sukuk and Islamic equity market spillovers with different models to different countries. However, the extent of the spillovers is unusual, or more specifically, why some markets have more spillovers to certain markets, is not appropriately investigated. Novel to the literature, we go one step further and quantify the determinants of spillovers between sukuk and Islamic equity markets of 13 countries. Tables 3.8 & 3.9 present our main findings based on the panel data estimations of Equation (8), where are the two dependent variables (i) logarithm of sukuk to Islamic equity spillovers, (ii) logarithm of Islamic equity to sukuk spillovers. Empirically, we test if the spillovers are affected by market capitalisation ratio, market value, return on equity, profit margin, net debt, total sales, price-earnings ratio and return on total assets at the equity markets. We load each variable separately to test their explanatory capacity on the dependent variable

before considering them collectively. This yields in a total of nine models. We have calculated the heteroskedasticity and autocorrelation corrected standard errors (HAC) in the estimations.

Table 3.8. Spillovers from Sukuk to Islamic Equity Indices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MCAP RATIO	-4.48***								-3.67***
	(-7.02)								(-5.99)
MV		-0.02***							-0.03***
		(-5.05)							(-3.38)
ROE			-0.002						-0.01*
			(-1.39)						(-1.88)
PROFIT MARGIN				0.001					0.001
				(0.15)					(1.14)
DEBT/TOTAL ASSET					0.44***				0.36*
					(3.13)				(1.85)
LOG(TOTAL SALES)						-0.004*			0.01*
						(-1.67)			(1.83)
PRICE EARNINGS RATIO							-0.003		-0.01***
							(-1.57)		(-3.63)
ROA								0.01***	0.01*
								(2.61)	(1.83)
R^2(%)	6.00	11.0	2.00	1.00	7.00	4.00	3.00	2.00	32.0
N	104	104	104	104	104	104	104	104	104

Note: The dependent variable: Logarithm spillovers from Sukuk to Islamic Equity Indices. MCAP RATIO (market capitalization ratio) is calculated as market value of the equity divided by total world's market value. MV (market value) of the Islamic equity refers to the value of a company that is traded on the national equity market, calculated by multiplying the total number of shares by the present share price. We use MV as MV/10^9 to get a better representation in analysis. ROE (return on equity) is a measure of the profitability of a business in relation to the equity. PROFIT MARGIN refers to the profitability ratio of the Islamic equity markets. DEBT/ASSET that defines the total amount of debt relative to assets. LOG(TOTAL SALES) refers to the total number of units sold by companies. PRICE EARNINGS RATIO is the ratio of a company's share (equity) price to the company's earnings per share. ROA (return on total assets) refers to the ability of the firm's assets to generate net income. *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are in parenthesis.

Table 3.8 presents the results of the regression analysis for the dependent variable of sukuk to Islamic equity spillovers. Looking at the columns from 1 to 8, we find that most of the variables are statistically significant. The key result of table 3.8 (columns 1 & 9) is that the market capitalization and market value variables are statistically significant and have a negative impact on spillovers from sukuk to Islamic equity. It means that the impact of a shock from others weakens with the growth of the Islamic equity market. Column 5 shows that the debt variable statistically significant with a sizeable effect and positively influences the extent of return spillovers. This aligns with Nictoi & Pochea, (2019), who also find that debt is significant in explaining the spillovers effect. Therefore, there can be no doubt that increasing

debt might be primarily the key indicator of the magnitude of spillovers in Islamic financial markets.

Table 3.9. Spillovers of Islamic Equity indices to Sukuk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MCAP RATIO	6.16**								3.83***
	(2.09)								(3.28)
MV		-0.001							-0.01
		(-0.22)							(-0.74)
ROE			0.004*						0.01***
			(1.90)						(2.84)
PROFIT MARGIN				-0.001					0.001
				(-0.20)					(0.69)
DEBT/TOTAL ASSET					0.22				0.96***
					(1.11)				(4.38)
LOG(TOTAL SALES)						0.01***			0.01***
						(3.78)			(3.22)
PRICE EARNINGS RATIO							0.01**		0.01**
							(2.00)		(2.27)
ROA								0.01*	0.01**
								(1.83)	(2.16)
R^2(%)	5.00	0.10	4.00	0.10	2.00	11.0	5.00	1.00	37.0
N	104	104	104	104	104	104	104	104	104

Note The dependent variable: Logarithm spillovers of Islamic Equity indices to Sukuk. MCAP RATIO (market capitalization ratio) is calculated as market value of the equity divided by total world's market value. MV (market value) of the Islamic equity refers to the value of a company that is traded on the national equity market, calculated by multiplying the total number of shares by the present share price. We use MV as MV/10^9 to get a better representation in analysis. ROE (return on equity) is a measure of the profitability of a business in relation to the equity. PROFIT MARGIN refers to the profitability ratio of the Islamic equity markets. DEBT/ASSET that defines the total amount of debt relative to assets. LOG(TOTAL SALES) refers to the total number of units sold by companies. PRICE EARNINGS RATIO is the ratio of a company's share (equity) price to the company's earnings per share. ROA (return on total assets) refers to the ability of the firm's assets to generate net income. *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are in parenthesis.

Regarding columns 6 and 8, the return spillovers of sukuks to Islamic equity markets are negatively affected by total sales and positively by return on total assets (ROA), explaining the vital role in sukuks to Islamic equity spillovers. It implies that the higher the total sales and ROA between sukuk and Islamic equity markets, the greater/lower will be the magnitude of shocks to Islamic equity markets. According to the column 9, we have employed all these variables and tested their effect jointly. Except for profit margin variable, the rest of the variables are statistically significant (and R2 increases sharply), emphasising the important role of these variables in explaining the magnitude of the sukuks to Islamic equity spillovers. Interestingly, the coefficient of price-earnings ratio of column 9 is negative and significant,

indicating 1% increase in price-earnings ratio would generate a lower intensity of shocks by 1% in sukuk to Islamic equity markets. Therefore, it suggests that sukuk and Islamic equity markets can be explained through a firm-level of financial characteristics.

Previously we capture the impact of financial characteristics on sukuk to Islamic equity spillovers; however, we twist the dependent variable as spillovers from Islamic equity to sukuk returns and results are depicted in table 3.9. Interestingly, we observe similar results as we perceived from the previous (table 3.8) regression. First and foremost, our variable of interest is the measure capturing the market capitalization ratio in Islamic financial markets. Market capitalization ratio comes out to be positively significant in all columns, implying that the higher the market capital for Islamic financial markets, the greater will be the magnitude of equity market shocks to sukuk markets. The gravity impact prevails with a positive coefficient. In the column 9, we show that return on equity is proposed as determinants of spillover of sukuk and Islamic equity markets, and the results indicated that ROE is positively and significantly correlated with the extent of sukuk and Islamic equity spillovers. Particularly, spillovers of Islamic equity to sukuk increases by 1% while ROE increases by 1%. Moreover, the coefficients of the total sales, price-earnings ratio, and return on total assets are also positive and significant in table 3.9, indicating the importance of the attractiveness and market power characteristics of the indices on the Islamic equity to sukuk spillovers. As the equity markets become bigger (total sales and total assets increase) and more attractive, the P/E ratio increases; these all lead to higher market capitalization ratio, therefore lead to more spillovers from equity markets to sukuks.

In sum, the statistically significant coefficients alongside high R-squared values indicate the importance of market capitalization ratio, market value, return on equity, net debt,

total sales, price-earnings ratio and return on total assets to explain the directions of spillovers in sukuk and Islamic equity markets.

Table 3.10. Spillovers from Conventional Bond to Islamic Equity Indices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MCAP RATIO	8.00								4.79
	(0.67)								(0.47)
MV		0.02***							-0.01
		(2.64)							(-0.24)
ROE			0.001						-0.01
			(0.28)						(-1.23)
PROFIT MARGIN				-0.01**					-0.01**
				(-2.40)					(-2.08)
DEBT/TOTAL ASSET					-0.04				1.18
					(-0.09)				(1.10)
LOG(TOTAL SALES)						0.01*			0.04*
						(1.74)			(1.95)
PRICE EARNINGS RATIO							0.002		-0.01
							(0.21)		(-0.64)
ROA								0.25***	0.26***
								(2.59)	(3.53)
R2(%)	3.00	1.00	0.10	3.00	0.01	2.00	0.01	1.00	7.00
N	104	104	104	104	104	104	104	104	104

Note: The dependent variable: Logarithm spillovers from Conventional Bond to Islamic Equity Indices. MCAP RATIO (market capitalization ratio) is calculated as market value of the equity divided by total world's market value. MV (market value) of the Islamic equity refers to the value of a company that is traded on the national equity market, calculated by multiplying the total number of shares by the present share price. We use MV as MV/10^9 to get a better representation in analysis. ROE (return on equity) is a measure of the profitability of a business in relation to the equity. PROFIT MARGIN refers to the profitability ratio of the Islamic equity markets. DEBT/ASSET that defines the total amount of debt relative to assets. LOG(TOTAL SALES) refers to the total number of units sold by companies. PRICE EARNINGS RATIO is the ratio of a company's share (equity) price to the company's earnings per share. ROA (return on total asstes) refers to the ability of the firm's assets to generate net income. *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are in parenthesis.

We have re-performed the spillover analysis for the different markets to check the relationship between Islamic and conventional financial markets. In particular, we performed Equation (8) for conventional bonds (instead of sukuks) to Islamic equity or Islamic equity to conventional bond spillovers to examine how the conventional bond markets will behave with financial characteristics and posted estimations at tables 3.10 & 3.11. We observed in column 2 that for conventional bonds to Islamic equity spillovers (3.10), market value is positive and significant. We also showed in column 9, the estimated coefficients are not statistically significant except for profit margin, ROA and total sales, while R^2 in the models is lower compared to tables 3.8 and 3.9. In particular, market capitalization ratio, market value, return

on equity, debt, and the price-earnings ratio at the bond markets are insignificant. However, we also have a negative and significant profit margin, indicating that profitability might be necessary consideration.

Table 3.11. Spillovers of Islamic Equity indices to Conventional Bond

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MCAP RATIO	-7.19								-13.31
	(-0.65)								(-1.10)
MV		0.04							0.04
		(1.42)							(0.94)
ROE			0.002						-0.0002
			(0.35)						(-0.02)
PROFIT MARGIN				-0.01*					-0.01*
				(-1.79)					(-1.83)
DEBT/TOTAL ASSET					0.27				1.03
					(0.35)				(0.94)
LOG(TOTAL SALES)						0.01			0.003
						(0.96)			(0.20)
PRICE EARNINGS RATIO							0.01		0.01
							(1.01)		(0.81)
ROA								0.16	0.15
								(0.71)	(0.63)
R2(%)	1.00	2.00	0.10	3.00	0.10	1.00	1.00	1.00	8.00
N	104	104	104	104	104	104	104	104	104

Note: The dependent variable: Logarithm spillovers of Islamic Equity indices to Conventional Bond. MCAP RATIO (market capitalization ratio) is calculated as market value of the equity divided by total world's market value. MV (market value) of the Islamic equity refers to the value of a company that is traded on the national equity market, calculated by multiplying the total number of shares by the present share price. We use MV as MV/10^9 to get a better representation in analysis. ROE (return on equity) is a measure of the profitability of a business in relation to the equity. PROFIT MARGIN refers to the profitability ratio of the Islamic equity markets. DEBT/ASSET that defines the total amount of debt relative to assets. LOG(TOTAL SALES) refers to the total number of units sold by companies. PRICE EARNINGS RATIO is the ratio of a company's share (equity) price to the company's earnings per share. ROA (return on total asstes) refers to the ability of the firm's assets to generate net income. *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are in parenthesis.

Regarding table 3.11 (Islamic equity to conventional bond spillovers), except for the profit margin variable, all of the liquidity and profitability variables do not have a significant impact on spillovers of Islamic equity to conventional bonds. It implies, spillovers would decrease 1% if profit margin increase by 1%. Therefore, the results show that the profitability and liquidity positions of the firms in Islamic equity markets cannot explain spillovers between sukuks and conventional bond markets better. Overall, our findings indicate that profitability and liquidity positions play a predominant role in explaining the return spillovers between the sukuk and Islamic equity markets. Furthermore, to check the robustness test we include

conventional bonds instead of sukuk with Islamic equity markets and we found these factors such as market capitalization ratio, market value, ROE, profit margin, debt, total sales, price earnings ratio, and ROA have limited role in explaining shock spillovers to these markets. We contribute to the literature by finding that profitability and liquidity positions of the firms in Islamic equity markets are relatively important determinants of Islamic financial market spillovers.

3.5.3. Impact of financial and liquidity positions on sukuk and Islamic equities of matched sample of thirteen countries

Tables 3.12 and 3.13 show the estimated results for companies who issue sukuk and Islamic equities in the same markets in the same period. This analysis enables us to explain how sukuk and Islamic equities belonging to same issuers respond to the financial and liquidity positions; i.e., market capitalisation ratio, market value, return on equity, profit margin, net debt, total sales, price-earnings ratio and return on total assets at the equity markets.

Table 3.12 shows the estimation results for the matched sukuk to Islamic equity spillovers. As expected, we may observe most of the variables are having a significant impact either individually or collectively on these markets. As established earlier, market capitalization ratio and market value appear to be the leading determinant of spillovers to Islamic financial markets (Columns 1 & 2). The market capitalization ratio is negative and significant at the 5 percent level, suggesting that higher capital flows lead to the lower intensity of shocks on matched sukuk to Islamic equity markets. Regarding profitability positions (Column 3 to 8), except for profit margin, all five variables (ROE, Total sales, Debt, Price-earnings ratio, and ROA) are highly significant, and it indicates the importance of firms' level of financial characteristics on matched sukuk to Islamic equity spillovers. Notably, debt, total

sales, and the price-earnings ratio are positive and significant, and signifying that higher these variables would cause higher spillovers from matched sukuk to Islamic equity markets. When we consider these variables collectively (Column 9), the findings show that market capitalization ratio, ROE and ROA negatively and debt positively affect the spillovers of matched sukuk to Islamic equity markets. Thus, liquidity and profitability variables play an important role to explain these spillovers.

Table 3.13 estimates the determinants of spillovers of matched Islamic equity to sukuk markets. We observe similar results in table 3.13 as table 3.12; market value (Column 1& 9) has a negative and significant coefficient meaning that higher market value of Islamic financial markets would correspond to a lower magnitude of shocks to matched Islamic equity to sukuk return spillovers. Nevertheless, the price-earnings ratio was negatively and statistically significantly linked. It indicates that the spillovers of Islamic equity to sukuk will be lower (0.1%) as the price-earnings ratio increases by 1%. Similar to table 3.12, return on equity and debt have significant coefficients in estimating the Equation (8) (Column 9).

Overall, our findings indicate that the return spillovers of sukuk and Islamic equity markets may be explained predominantly by liquidity and profitability positions. In contrast, return spillovers of conventional bond and Islamic equity markets have limited impact by firms' level of financial factors. We contribute to the literature by finding that sukuk and Islamic equity markets are quite disperse than conventional bond markets, and their spillovers may be explained by the firms' level of financial characteristics rather than conventional bond markets. Moreover, we implied matched sample for sukuk, and Islamic equities and findings show that there is a significant causal relationship between sukuk to Islamic equity (or vice versa) and liquidity and profitability positions for the company issues both sukuk and Islamic

equities. The Islamic financial markets are indeed immature and have been affected by global financial markets. We have quantified the extent of the integration with spillovers and have seen that return spillovers are tied to financial linkages. This finding is quite essential for the portfolio holders who want to diversify their portfolio risk in various markets. In order to diversify the Islamic equity portfolio efficiently, it would be an excellent option to include sukuk from Islamic financial markets that do not have strong linkages with Islamic equity markets.

Table 3.12. Spillovers from Sukuk to Islamic Equity (Matched Sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MCAP RATIO	-0.22**								-0.23**
	(-2.45)								(-2.24)
MV		0.27**							0.17
		(2.36)							(0.76)
ROE			-0.001*						-0.001**
			(-1.72)						(-2.47)
PROFIT MARGIN				-0.001					0.001
				(-1.41)					(0.98)
DEBT/TOTAL ASSET					0.088*				0.10**
					(1.95)				(2.20)
LOG(TOTAL SALES)						0.011***			0.01
						(2.89)			(0.67)
PRICE EARNINGS RATIO							0.001**		0.0001
							(1.96)		(0.06)
ROA								-0.01***	-0.004***
								(-7.17)	(-5.06)
R2(%)	0.20	0.30	2.00	1.00	1.00	1.00	1.00	1.00	3.00
N	304	304	304	304	304	304	304	304	304

Note: The dependent variable: Logarithm spillovers from Sukuk to Islamic Equity (Matched Sample). MCAP RATIO (market capitalization ratio) is calculated as market value of the equity divided by total world's market value. MV (market value) of the Islamic equity refers to the value of a company that is traded on the national equity market, calculated by multiplying the total number of shares by the present share price. We use MV as MV/10^9 to get a better representation in analysis. ROE (return on equity) is a measure of the profitability of a business in relation to the equity. PROFIT MARGIN refers to the profitability ratio of the Islamic equity markets. DEBT/ASSET that defines the total amount of debt relative to assets. LOG(TOTAL SALES) refers to the total number of units sold by companies. PRICE EARNINGS RATIO is the ratio of a company's share (equity) price to the company's earnings per share. ROA (return on total assets) refers to the ability of the firm's assets to generate net income. *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are in parenthesis..

Table 3.13.Spillovers of Islamic Equity indices to Sukuk (Matched Sample)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MCAP RATIO	-0.078								0.012
	(-0.67)								(0.04)
MV		-0.48***							-0.71***
		(-3.26)							(-4.67)
ROE			0.001***						0.001**
			(2.78)						(2.13)
PROFIT MARGIN				-0.0003					-0.001*
				(-0.84)					(-1.86)
DEBT/TOTAL ASSET					-0.042				-0.081*
					(-0.80)				(-1.68)
LOG(TOTAL SALES)						-0.002			0.01*
						(-0.48)			(1.86)
PRICE EARNINGS RATIO							-0.001**		-0.001**
							(-2.10)		(-2.52)
ROA								0.002**	0.001
								(2.53)	(0.63)
R2(%)	0.02	3.00	1.00	0.10	2.00	0.10	1.00	1.00	8.00
N	304	304	304	304	304	304	304	304	304

Note: The dependent variable: Logarithm spillovers of Islamic Equity indices to Sukuk (Matched Sample). MCAP RATIO (market capitalization ratio) is calculated as market value of the equity divided by total world's market value. MV (market value) of the Islamic equity refers to the value of a company that is traded on the national equity market, calculated by multiplying the total number of shares by the present share price. We use MV as MV/10^9 to get a better representation in analysis. ROE (return on equity) is a measure of the profitability of a business in relation to the equity. PROFIT MARGIN refers to the profitability ratio of the Islamic equity markets. DEBT/ASSET that defines the total amount of debt relative to assets. LOG(TOTAL SALES) refers to the total number of units sold by companies. PRICE EARNINGS RATIO is the ratio of a company's share (equity) price to the company's earnings per share. ROA (return on total asstes) refers to the ability of the firm's assets to generate net income. *, ** and *** show that the relevant coefficient is significant at the 10%, 5% and 1% level respectively. T-statistics are in parenthesis.

3.6. Conclusion

Despite the possibility of cross-country disparities in the level of financial integration, evidence suggests that sukuk markets are integrated with Islamic equity markets to a significant degree. This research quantified the degree of integration between these markets using a sample of 13 sukuk and Islamic equity issuance countries. The results indicate the heterogeneous extent of the return spillovers originating from sukuk to Islamic equity, and vice versa, in Islamic financial markets. These disparities were accounted for by leveraging profitability and liquidity factors, including the market capitalisation ratio, return on equity, profit margin, market value, total sales, debt, price-earnings ratio, and return on total asset factors. The degree to which the results are robust was examined by including the conventional bond markets with

Islamic equity markets, where the panel data regression showed that liquidity and financial positions do not significantly affect these markets across timescale.

A matched sample consisting of 38 listed firms that issued Islamic equities and sukuk simultaneously was established in order to examine the relationship between financial variables and sukuk and Islamic equity markets in the same markets. Profitability and liquidity positions appeared to have greater significance for Islamic financial markets due to structural differences, which may also indicate that financial and liquidity factors are more significant and Islamic financial markets, at least in the matched sample.

These results have significant implications for forecasting sukuk and Islamic equity returns based on profitability and liquidity considerations, and so they have valuably advanced current understandings of the relationships between the major Islamic financial markets. This study offered useful insights for Islamic investors and international portfolio managers. Understanding the directions of spillovers, especially for investors interested in portfolio diversification by leveraging Islamic financial assets, is pivotal. Thus, this study's demonstration that liquidity and profitability strongly influence spillovers, suggests limited room in which diversification can be achieved. Fortunately, however, it is possible for investors to centre on the financial issues, to learn about their sensitivity to spillovers, and – in accordance with this – to implement volatility trading strategies. It is vital for Shariah policymakers and researchers to recognise the criticality of liquidity in Islamic capital markets as a strategy for minimising susceptibility to macroeconomic shock. This study also found that, compared to conventional counterparts, the nature of spillovers in Islamic equity markets with firm-level financial characteristics are dissimilar. Altogether, the results show financial

connections between sukuk and Islamic equity markets are key factors in accounting for the spillover of the shocks.

CHAPTER FOUR: Spillovers to sectoral equity returns: Do liquidity and financial positions matter?

4.1. Introduction

The level of integration in financial markets strongly influences strategic approaches to portfolio management, as well as financial system stability, so it is clearly a significant issue. In markets that are integrated, capital flows can move freely towards the areas that will generate the highest returns. Furthermore, integration promotes more convenient access to foreign capital, but it also undermines every world region's resistance to economic recession. Hence, an inverse relationship may exist between financial market integration and portfolio diversification (see Odier & Solnik, 1993; Longin & Solnik, 1995; Olienyk et al., 2000; Glezakos et al., 2007; Berger et al., 2011; Arouri & Rault, 2012; Balli et al., 2013a; Narayan et al., 2014; Balcilar et al., 2015). Additionally, financial market integration is likely to prompt investors to consider broader investment opportunities, primarily to derive benefits from efficient capital allocation and a diversified international portfolio (Chien, Lee, Hu, & Hu, 2015), but this typically declines as cross-market financial integration increases (Billio et al. 2017). It is critical for international investors to understand the variables that influence the interdependence of global stock markets. Equally, it is necessary for policymakers to possess this knowledge, principally because, from their perspective, contagion means irrational capital flows, and especially capital outflows when capital is urgently required (Pretorius, 2002). The purpose of the present study is to analyse the effect of various factors on cross-sectoral stock market integration, taking the standpoint of different countries and regions.

While several studies have sought to examine the evolution of stock market integration in various markets, relatively few researchers have assessed the factors that drive this process (Büttner & Hayo, 2011). Both financial and economic factors are frequently cited in the literature as elements that determine stock market integration. Consistent with the perspective of Bekaert and Harvey (1995, 2000), many researchers consider local, regional, and global factors as broad groups that drive market integration. In the study conducted by Guesmi (2011), regional trade openness and market development were identified as factors that accounted for the time-varying level of Latin American, South East Asian, and South East European integration in stock markets. In contrast, local factors, including inflation and market volatility, were found to perform a pivotal function in stock market integration in the Middle Eastern region. Moore and Wang (2014) reported that trade balance is a key predictor of the dynamic relationship in Asian stock markets, while the interest rate differential accounts for the level of stock market integration in developed markets. It was also noted that financial development had a negligible effect on the relationship. Büttner and Hayo (2011) have evaluated the level of interest rate risk and exchange rate risk in European stock market integration over time.

Inflation, monetary policy, fluctuations in the business cycle, and other macroeconomic elements have been identified as factors influencing the level of international stock market integration (e.g., Longin & Solnik, 1995; Dumas et al., 2003; Cai et al., 2009; Yang et al., 2009; Syllignakis & Kouretas 2011; Lee & Cho, 2017). In the study conducted by Lehkonen (2015), the researchers focused on the long-term determinants of integration, and the following were identified as relevant: firstly, financial liberalisation; secondly, the institutional environment; and finally, global financial uncertainty. Mobarek et al. (2016) also indicate that economic and financial factors (e.g., inflation rates, GDP growth rates, and different market sizes) and behavioural factors (e.g., regional or cultural similarities) can explain cross-country integration

in the equity markets. A significant and positive correlation was observed by Alotaibi and Mishra (2017) between the integration index of the Gulf Cooperation Council (GCC) stock markets and trade openness, turnover, financial market development, and oil revenue. In addition, a significant and negative correlation was observed between the integration index and global financial crisis. Balli et al. (2015a) reported that security investments, bilateral trade, market capitalisation, and a common language are factors that can account for shocks in emerging Asian, GCC, Eastern and Central European, African, and Latin American markets. Focusing on the emerging markets of the Asia and MENA region, Balli et al. (2015b) also found that portfolio investment, trade volume and distance are the key factors that inform spillover effects. In a similar way, the importance of common bilateral, economic, and financial variables in terms of structure for the directions of spillover effects over time has been observed in Islamic markets (Balli et al., 2019).

From the literature briefly discussed above, it can be concluded that research on determinants of stock market integration mainly studied aggregate equity markets. To the best of our knowledge, there are no studies on the determinants of sectoral stock market integration. However, several studies have confirmed that sectoral equity indices perform differently against local and global shocks compared to aggregate equity markets. For instance, Kraus (2001) and Brooks and Del Negro (2004) demonstrated that, depending on the sector in the equity market, the response to global and local shocks is likely to differ. Moerman (2008) noted that the benefits associated with sectoral diversification are significantly greater when compared to the gains from diversification over countries. Furthermore, sectoral diversification appears to be a more effective option when compared to national diversification across the European area (Balli & Balli, 2011). Consistent results have been reported in the GCC, particularly in terms of the different levels of integration that exist between sectoral equity

markets and national equity markets (Balli et al., 2013a; Balli et al., 2013b). However, while all these studies explore the fact that sectoral equity market integration is unique and different from national counterparts, none of them attempt to explain the drivers of this integration. Therefore, this study attempts to contribute to the thin body of knowledge by exploring the factors that influence cross-sectoral stock market integration in a comprehensive manner.

This study contributes to the literature on stock market integration in two ways. First, we quantify the sectoral equity spillovers from major countries and regions into the sectoral equity markets of other countries and regions using the methodology proposed by Diebold and Yilmaz (2012) to extract a variety of shocks affecting those markets. Indeed, the connectedness of the sectoral equity markets is quite dispersed. Second, to capture the differences in the integration among sectoral equity markets, we use a cross-section regression technique to investigate the relevance of liquidity factors and financial positions (total assets, net profit, net profit margin, net debt and interest expense coverage) of each sector in explaining the extent of the spillovers originating from global or regional markets or from other sectors.

We find increasing interactions in national and regional sectoral equity return spillovers, while the extent of spillovers varies widely across the markets. Regarding the magnitude of spillovers for national sectoral markets, we emphasise the role of consumer goods, financials, and industrials as significant contributors to return spillover effects. Considering the magnitude of spillovers for regional sectors, returns of consumer service and industrials explain the higher amount of forecast-error-variance decompositions (FEVDs) of returns of other sectors. Also important for both national and regional sectoral markets are basic materials, financials, industrials, and oil & gas, followed by technology, which are affected by the US return spillovers among 10 sector returns. However, an interesting observation is that

every national and regional sectoral return is a significant contributor to their sectoral indices. In general, the empirical data indicate that national and regional sectoral returns are more responsive to internal shocks than external shocks. The cross-section analysis discloses that liquidity and other financial linkages are critical to consider when explaining the magnitude and direction of the spillover effects. In particular, market capitalisation of the sectors, interest expense coverage, and leverage positions are utilised in defining the determinants of the cross-sector return spillovers, regional sectors to sectors, and the US sectors to sectoral markets. Similarly, profit margin of the sectors has descriptive (lower side) power in explaining the magnitude of the spillovers to these markets. For the management of equity portfolios in which an aim of the portfolio holder is to diversify their risk across various markets, this finding might be particularly important.

4.2. Literature Review

4.2.1. Empirical studies of stock market integration

Stock market integration continues to be an interesting topic in finance, particularly in portfolio management. Several scholars have tried to describe stock market integration. Emiris (2001) finds that the stock market is integrated when price is just a common risk factor. Meanwhile, Bekaert and Harvey (1995) explain that the stock market is integrated when some similarities are found in the risk return and it also found in Robiyanto (2018). Deliberate stock market integration plays an important role in both the international and national economies (Suryanta, 2011). Stock market integration can offer opportunities for lower fund prices, better capital allocation and also better portfolio diversification (Boyle, 2009). Stock market integration has also been driven by the easing of capital flows in several countries (Park and Lee, 2011).

In the many studies on this topic, researchers have examined global stock market integration, particularly in developing and developed markets. In developing markets, the literature indicates that financial market integration increases international risk sharing (Balli & Balli, 2011; Balli et al., 2013a; Balli, Balli, & Luu, 2014; Chen, Chen, & Lee, 2014; Guidi & Ugur, 2014; Kenourgios, Samitas, & Paltalidis, 2011; Labidi, Rahman, Hedström, Uddin, & Bekiros, 2018; Mobarek et al., 2016; Srianantha kumar and Narayan 2015). When developing markets that are geographically, politically, or economically proximate to one another become integrated (Alotaibi & Mishra, 2017), regional and global factors can increase the level of market co-movement (Chen, 2018). Additionally, studies indicate that interdependent relationships exist between many of the world's stock markets, and that the transmission of volatility from one to another is an issue worthy of study (Arshanapalli & Doukas, 1993; Sheng & Tu, 2000; Izquierdo & Lafuente, 2004; Mun 2005; Mun & Brooks 2012; Bekaert, Harvey, & Lundblad, 2005; and Dutt and Mihov 2013).

For several decades, published studies have assessed the level of stock market integration and its implications. In Bekaert and Harvey (1995), Bekaert, Erb, Harvey, and Viskanta (1997), Bekaert and Harvey (2000), Bekaert et al., (2005), Carrieri et al., (2007), Johnson and Soenen, (2002), Moneta and Rüffer, (2009), Komatsubara et al., (2017), Badshah et al., (2018), Labidi et al., (2018), and Hedström et al., (2019), the researchers evaluated the implications of increasing integration with global markets in terms of volatility, local returns, and cross-country correlations, and various emerging markets were included in the study (Latin America, Eastern and Central Europe, and Asia). For example, Hedström et al., (2019) mentioned, market integration leads to spillover and reduces the possibility of risk mitigation through diversification.

Conversely, other studies have adopted a restricted focus that addresses certain regions. For example, some researchers analysed the level of stock market integration in European markets, both globally and regionally (Scheicher, 2001; Yang et al., 2003; Yang, Hsiao, Li, & Wang, 2006; Lafuente and Ordóñez, 2009; Rua, 2010; Balli & Balli, 2011; Balli et al., 2013b; Vilpišauskas 2013; Schimmelfennig 2014, 2015; Bekiros et al., 2015; Niemann and Ioannou 2015; Verdun 2015; Billio et al., 2017; Lindman et al., 2020), while others sought to explore regional connections among equity markets in Latin America (Chen, Firth, & Rui, 2002; Abugri, 2008; Susmel, 2001; Diamandis, 2009; Eyraud et al., 2017; Fund, 2019). According to Lindman et al., (2020), financial market integration increased during times of economic and financial turmoil in European markets. Other researchers examined the stock markets of the Middle East (Neaime, 2002; Neaime, 2006; Neaime, 2012; Floros, 2008; and Balli et al., 2013a; Panda et al., 2019) and Asia (Ng, 2000; Tay & Zhu, 2000; Worthington & Higgs, 2004; Caporale, Cipollini, & Spagnolo, 2005; Caporale, Pittis, & Spagnolo, 2006; Engle, Gallo, & Velucchi, 2008; Yilmaz, 2010; and Balli et al. 2014; Boubakri & Guillaumin, 2015; Chien et al., 2015; Kim et al., 2015; Li & Giles 2015; Kang and Yoon, 2016; Kang et al., 2019; Ahmed and Huo, 2019). For example, Kang et al. (2019) have successfully captured the targeted spillovers effect between ASEAN and global stocks, and Kang and Yoon (2019) introduced dynamic spillovers between Chinese stocks and future commodity markets.

4.2.2. Determinants of stock market integration

Although interdependence between stock markets is well-documented in the literature, relatively few studies have addressed the question of why integration exists at all. Almost all of the available studies that contend with this question focus on the decomposition of stock returns into industry and country effects, and only a small number evaluate alternative economic variables that could underpin stock market co-movements. In the past twenty years,

the determinants of stock market integration have been explored more systematically. For example, Erb, Harvey, and Viskanta (1994), Leachman and Francis (1995) and Bracker et al., (1999) noted that the business cycle, exchange rate policy, bilateral import dependence, market size differential, time trend and geographic proximity influenced the correlation between stock market returns in the G7 states between 1970 and 1993, and they also found that the strength of the correlation increased during periods of economic downturn. Meanwhile, Morana (2008) highlighted the importance of both financial and economic integration. In their investigation of an inverse correlation between financial market linkages and geographic distance, Lucey and Zhang (2010) revealed that country-pairs display greater linkages if their cultural distance is smaller. Finally, Wälti (2011) analysed 15 developed markets between 1975 and 2006, revealing that monetary integration reinforces stock market integration, while the study conducted by Guesmi and Nguyen (2014) drew a link between stock market integration and trade openness, as well as stock market development.

In terms of developed and emerging markets, several studies have attempted to identify factors that influence stock market integration. For example, trading relationship, exchange rate risk, bilateral trade, industrial production, market crisis, exchange rate and financial liberalisation influenced the co-movement of stock market returns (Pretorius, 2002; Johnson & Soenen, 2003; Lin & Cheng, 2008; Büttner & Hayo, 2011; and Beine & Candelon 2011). Furthermore, the study undertaken by Lehkonen (2015) drew attention to the importance of financial openness, global financial uncertainty and institutional environment in affecting the level of stock market integration. It is noteworthy that the degree to which these determinants affect stock market integration varies in developed and developing markets. Balli et al. (2015b) examined the volatility and return spillover effects from developed markets and other developing Asian and MENA states, revealing that bilateral trade, a common language, market

capitalisation, and security investments played a key role as determinants of shock spillover effects to emerging markets. Additionally, Mobarek et al. (2016), Alotaibi and Mishra (2017), and Nguyen, Nguyen and Schinckus (2019) indicated that liquidity, trade openness, market size, GDP growth rate, inflation rate, and good institutional environment were identified as positive influencers in terms of stock market integration in GCC states. Recently, cross-sectional analysis has been used in the literature to examine the macroeconomic factors that underlie the directions of spillover effects in Islamic markets (Balli et al., 2019). The results attest to the importance of common bilateral, economic and financial structural variables.

Despite the existence of a significant number of studies that have been conducted on interdependent equity markets in various world regions, relatively few researchers have sought to identify the drivers of this interdependence. In particular, the issue is underexplored in the case of cross-sectoral stock markets. Although many factors that influence the level of integration in stock markets across developed and developing countries have been identified, these factors may not be the same as those that promote integration in cross-sectoral stock markets. This is because equities from sectoral markets differ considerably in terms of their characteristics when compared to regional and national markets (see Baca, Garbe, & Weiss, 2000; Cavaglia, Brightman, & Aked, 2000; Hauser & Vermeersch, 2002; Berben & Jansen, 2005; Meric, Ratner, & Meric, 2008; Moerman, 2008; Balli & Balli, 2011; Balli et al., 2013a; and Balli et al., 2014). This study will evaluate the influence of liquidity and financial position on the extent of integration between cross-sectoral stock markets. Market liquidity has a substantial impact on the valuation and returns of all types of securities, having a positive long-run impact on returns (see Datar et al., 1998; Avramov et al., 2006; Chen et al., 2010; Balli, Balli, Basher, Karimova, & Wang, 2019), while financial positions (total assets, net profit, net profit margin, net debt, return on equity and interest charge coverage) have a significant impact

on the stock market. Therefore, it is imperative for international investors to understand the factors that drive stock market integration between sectoral equity markets in different countries/regions.

4.3. Data Description

The current data set of this study consists of 19 sector indices, including the Islamic stock market, regional sectors (n=8) and national sectors (n=10). The regional sectors are Asia, Australasia, emerging markets (EM)[11], the Economic and Monetary Union (EMU)[12], the European Union (EU), the Gulf Cooperation Council (GCC), Latin America (LA), and Pacific. The national sectors are Australia, China, France, Germany, India, Japan, Netherlands, South Korea, the United Kingdom, and the United States. In each case, the data span 13 years, and – to avoid the currency risk effect while preserving uniformity – they consist of weekly closing prices (in USD). Notably, the research timeframe ranges from 1 January 2007 to 4 April 2019, which incorporates various periods of instability and crisis (e.g., oil price increases from 2007 to early 2008, food price increases between 2007 and 2008, and the global financial crisis of 2007–2008), as well as the gradual recovery of global stock markets.

Sectoral indices include the Dow Jones Basic Materials Index, the Dow Jones Consumer Services Index, the Dow Jones Consumer Goods Index, the Dow Jones Energy

[11] The Morgan Stanley Capital International Emerging Market Index (MSCI Index) contains the following countries: Brazil, Chile, China, Colombia, the Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Qatar, Peru, the Philippines, Poland, Russia, South Africa, South Korea, Taiwan, Thailand, Turkey, and the United Arab Emirates. The purpose of the index is to track the market capitalisation of each company listed on the stock markets of the included countries.

[12] Established in 1992, the EU's economic and monetary union (EMU) has played a significant role in driving forward economic integration. The main concerns of the EMU include coordination of fiscal and economic policies, a common currency (i.e., the euro), and a common monetary policy. Although each of the member states in the EU participates in the economic union, certain states increased their level of integration by adopting the euro. Collectively, these countries comprise the euro area.

Index, the Dow Jones Financials Index, the Dow Jones Health Care Index, the Dow Jones Industrials Index, the Dow Jones Technology Index, the Dow Jones Telecommunications Index, and the Dow Jones Utilities Index. The formula $r_t = \ln(P_t) - \ln(P_t - 1)$ is used to calculate weekly returns, where r_t represents weekly return at week t and P_t represents price at the business week t. Weekly data were used to sidestep spurious spillover effects arising from non-overlapping trading hours.[13] Additionally, from the standpoint of a policymaker interested in financial stability, high-frequency correlations were considered to have greater relevance when compared to correlations over extended periods of time.[14] To avoid a potential impact on the days of the week, we use the Wednesday through Wednesday return. As trading volumes vary widely across markets, the last price of the week may come from a day on which only one contract was traded. In this case, the price will likely be tougher than the day's last price observation, which has significant trade. To mitigate this effect, we use average weekly prices, weighted by trading volume, to calculate weekly returns.[15] The data for all the series were obtained from DataStream (Thomson Reuters).

[13] In Burns, Engle, & Mezrich (1998), it was noted that aggregation to weekly returns plays a key role in sidestepping the issues arising from non-overlapping trading hours. This study's data have been screened to identify possible problems in this area. Initially, the question of whether it is possible to predict returns in one market based on lagged returns in markets closing later in the day was examined. This was rejected for every combination of countries and sectors. Additionally, despite the fact that the relationships based on monthly returns tended to be stronger than those based on weekly returns, this cannot be accounted for by referencing the non-overlapping trading hours issue. The disparity between the two correlations is relatively small for correlations involving Japan, which can be expected to be the most significantly affected by the issue. Conversely, the largest differences pertained to the correlations between the UK and Germany, where the issue is not significantly affecting the countries.

[14] Monthly correlations present the same trending behaviour associated with weekly correlations. Based on the monthly returns observed between 1960 and 1990, Longin and Solnik (1995) reported that correlations between the US stock market and several other stock markets had become stronger.

[15] We also use the last price of the week (i.e. Wednesday) for the estimated weekly return. Any missing data on Wednesday are replaced with the closing prices of the last trading day. The results show no remarkable correlation.

Additionally the data includes the variables that measure liquidity and financial position sector indices in the previous data set. The list of variables considered in the cross-section analysis includes: (i) the sectoral market capitalization ratio ($MCAP_{Sector}$), which measures as each sector's market value of the equity divided by the each regions/nations market value; (ii) the regional market capitalization ratio ($MCAP_{Region}$), which measures as each sector's market value of the equity divided by the total world's market value; (iii) total assets, which refers to the total amount of assets owned by sectoral equity markets; (iv) net profit, which represents the number of sales dollars remaining after all expenses have been deducted from the sectoral market's total revenue; (v) net debt, which can be expressed as a metric that indicates the overall debt situation of different sectors; (vi) net profit margin, which refers to the profitability ratio of the sectoral markets; and (vii) interest expense coverage, which indicates a sectoral market's profit from its operations to meet its interest obligations. This data set contains yearly data from 2007 to 2019 in US dollars, which is also extracted from DataStream (Thomson Reuters). However, the market value of equity is being collected weekly to match the 10 sectoral indices.

Tables 4.1 and 4.2 provide the descriptive statistics of the weekly returns for region/country sectors and display the results of the standard deviation. As shown in Table 4.1, the highest average of the weekly returns based on regional sector equity indices is 0.24% and 0.19% for telecommunication and health care respectively, in the Australasia region, and the lowest is 0.001% for industrials, in the EU and GCC region. Surprisingly, the Islamic market has average weekly returns that are positive for all sectors (except for the financial index), while the Australasia region has negative returns for all sectors (except for the telecommunication and health care index) over the sample period. Furthermore, the average return for the Pacific region is higher than all other regions' sectoral indices except for basic

materials, financials and utilities indices. In terms of country sectoral weekly return (Table 4.2), the highest average return is 0.33% and 0.31% for the health care and technology sector indices respectively, corresponding to South Korea and China. The lowest weekly average return is 0.002% for Australia's aggregate index. Additionally, India's average weekly sectoral returns are all positive except for telecommunication, while most of Australia's sectoral returns are negative except for basic materials, health care, industrials and technology indices. Furthermore, the aggregate indices for each country have positive returns except for the Japanese stock market.

Table 4. 1. Summary statistics weekly returns (Regional)

SECTOR	ISLAMIC	ASIA	AUSTRALASIA	EM	EMU	EU	GCC	LA	PACIFIC
	MEAN								
AGGREGATE INDEX	0.086	-0.040	-0.019	0.008	-0.025	-0.040	-0.022	-0.018	0.022
BASIC MATERIALS	0.043	-0.006	-0.017	-0.038	-0.059	-0.006	-0.091	-0.056	-0.034
CONSUMER GOODS	0.071	0.086	-0.006	-0.044	0.100	0.086	0.006	0.047	0.046
CONSUMER SERVICES	0.102	-0.034	-0.037	0.053	0.074	-0.034	0.023	0.008	0.046
FINANCIALS	-0.020	-0.161	-0.050	-0.127	0.020	-0.161	-0.009	0.026	-0.012
HEALTH & CARE	0.101	0.062	0.191	0.081	0.129	0.062	0.118	0.070	0.107
INDUSTRIALS	0.055	-0.002	-0.006	-0.021	-0.024	-0.002	0.004	-0.065	0.017
OIL & GAS	0.076	-0.052	-0.031	-0.027	-0.040	-0.052	0.164	-0.037	0.009
TECHNOLOGY	0.129	0.024	-0.069	0.115	0.126	0.024	-	-0.134	0.032
TELECOMMUNICATION	0.087	-0.094	0.242	-0.067	-0.075	-0.094	-0.057	0.027	0.118
UTILITIES	0.035	-0.115	-0.019	-0.082	-0.077	-0.115	-0.050	-0.037	-0.016
	STANDARD DEVIATION								
AGGREGATE INDEX	0.722	3.026	3.521	2.868	2.740	3.026	2.259	3.438	2.389
BASIC MATERIALS	0.760	4.255	5.077	3.710	3.987	4.255	3.242	4.508	3.415
CONSUMER GOODS	0.722	2.569	3.019	3.195	2.684	2.569	3.183	3.351	2.293
CONSUMER SERVICES	0.740	2.729	3.234	2.826	3.241	2.729	1.922	3.158	2.001
FINANCIALS	1.901	4.306	3.764	4.344	3.377	4.306	2.328	3.943	2.849
HEALTH & CARE	0.921	2.365	2.957	2.119	2.561	2.365	3.127	3.948	1.992
INDUSTRIALS	0.653	3.560	3.401	3.063	3.295	3.560	3.148	3.422	2.718
OIL & GAS	0.925	3.662	4.549	3.618	3.994	3.662	5.579	5.029	3.499
TECHNOLOGY	1.438	3.437	3.217	3.107	3.235	3.437	-	3.530	2.079
TELECOMMUNICATION	0.792	2.777	4.395	2.271	2.510	2.777	2.641	4.000	2.895
UTILITIES	0.747	3.048	2.903	2.515	2.697	3.048	3.350	2.970	1.800

Note: Descriptive statistics for the examined Islamic equity market and eight different regions (Asia, Australasia, Emerging markets, Economic and monetary union, Europe union, Gulf corporation council, Latin America and Pacific) are based on weekly data for the period January 01, 2007 to April 04, 2019.

In the second section of Tables 4.1 and 4.2, the standard deviation of the returns is given as a measure of volatility. In line with expectations, every country and region's returns on sectoral indices displayed a greater level of volatility than the return on the corresponding aggregate index. This is reasonable because the latter reflects a portfolio with more diversification. At the regional level, sectoral volatility was diverse. In every market, technology stocks were volatile, and this is unsurprising to note given the significant returns. Additionally, volatility in utilities stocks and telecommunications stocks was low. As for basic materials and financials, the standard deviation and mean for the respective market indices appear to be inconsistent, particularly given that they were associated with the highest risk and the lowest return. However, consumer goods, consumer services, and health care stocks were less volatile compared to aggregate indices, but returns were high. At the same time, each country's aggregate indices are less volatile than sectoral indices. For example, on the one hand, consumer goods, consumer services, health care, technology, and industrials equities had high volatility and high returns, which is acceptable with regard to the risk-return trade-off theory. On the other hand, basic materials, financials, oil & gas, and telecommunication stocks were highly volatile, but showed less return compared to other sectors, while utilities were stable.

Table 4.3 provides an overview of statistics relating to the financial and liquidity variables for the cross-section analysis. As observed from Table 4.3, market capitalisation ratio of sectors has the largest standard deviation of approximately 0.09 compared to regional sectors (0.04). This implies that sectoral markets differ to some extent in terms of their market capitalisation. Looking forward, Table 4.3 indicates that the data sample is varied with respect to sectoral size, as proxied by the total assets. As a matter of fact, the average of total assets was 28.6 billion, as the maximum and minimum value was between 150 billion and 8 billion. Moreover, it can be noted from the table that the average sample sectors are fairly profitable, with a profit of about 564 million. Additionally, the mean of the debt and interest expense coverage are much higher (3.29 billion and 8.99) and they vary between 21.7 billion and -20.6 billion (debt), 99.18 and -1.23 (interest expense).

Table 4. 2. Summary statistics weekly returns (Country)

SECTOR	AUS	CHINA	FR	GER	IND	JAP	NL	SOUTH KOREA	UK	US
	MEAN									
AGGREGATE INDEX	0.002	0.038	0.016	0.020	0.137	-0.009	0.003	0.048	0.024	0.106
BASIC MATERIALS	0.007	-0.094	0.071	0.066	0.046	-0.055	-0.091	0.032	0.013	-0.007
CONSUMER GOODS	-0.008	0.151	0.145	0.054	0.280	0.010	0.108	0.169	0.129	-0.046
CONSUMER SERVICES	-0.011	0.030	-0.005	-0.038	0.046	0.063	0.138	-0.078	0.032	0.108
FINANCIALS	-0.026	0.061	-0.080	-0.044	0.157	-0.118	-0.130	-0.055	-0.072	-0.061
HEALTH & CARE	0.208	0.137	0.050	0.120	0.231	0.068	-0.005	0.334	0.089	0.118
INDUSTRIALS	0.011	-0.033	0.068	0.025	0.158	0.025	0.003	-0.105	0.079	0.053
OIL & GAS	-0.006	-0.061	-0.036	-0.344	0.125	-0.093	-0.096	0.025	0.028	-0.029
TECHNOLOGY	0.190	0.315	0.059	0.152	0.209	-0.028	0.227	0.238	0.244	0.162
TELECOMMUNICATION	-0.050	-0.002	-0.048	0.003	-0.097	0.082	-0.117	-0.001	-0.030	-0.024
UTILITIES	-0.019	-0.058	-0.199	-0.180	0.032	-0.121	-0.170	-0.041	-0.023	-0.020
	STANDARD DEVIATION									
AGGREGATE INDEX	2.246	4.062	2.611	2.623	3.007	2.821	2.745	2.710	2.357	2.573
BASIC MATERIALS	3.808	5.522	3.077	2.980	4.273	3.581	4.778	3.992	5.210	3.757
CONSUMER GOODS	2.357	4.387	2.589	4.069	2.451	3.094	2.421	2.888	2.024	3.459
CONSUMER SERVICES	2.180	6.312	2.581	2.747	4.107	2.291	2.171	3.213	2.266	2.706
FINANCIALS	2.653	4.108	4.035	2.974	4.196	3.729	3.762	3.467	3.424	3.676
HEALTH & CARE	2.359	4.912	2.723	2.144	2.758	2.466	5.457	5.234	2.486	2.144
INDUSTRIALS	2.337	4.974	2.855	3.091	3.589	3.358	3.411	3.691	2.433	2.952
OIL & GAS	3.418	4.467	3.338	5.197	3.560	3.866	5.174	4.434	3.248	3.499
TECHNOLOGY	3.830	5.653	3.147	3.022	3.315	3.218	3.725	3.476	3.147	2.825
TELECOMMUNICATION	2.652	4.454	3.199	2.948	4.062	2.923	3.920	2.915	2.773	2.328
UTILITIES	2.280	5.001	3.423	3.172	3.653	3.359	13.524	3.849	2.177	2.202

Note: Descriptive statistics for the examined ten different countries (Australia, China, France, Germany, India, Japan, Netherlands, South Korea, United kingdom and United states) are based on weekly data for the period January 01, 2007 to April 04, 2019.

Table 4.3. Descriptive statistics for liquidity and financial positions

	Mean	Std. Dev	Maximum	Minimum
Sectoral market capitalization ratio	0.10	0.09	0.72	0.00
Regional market capitalization ratio	0.02	0.04	0.27	0.00
Debt	3290000000	17900000000	217000000000	-20600000000
Interest coverage (%)	8.99	9.63	99.18	-1.23
Profit	564000000	2440000000	25600000000	57531
Profit margin (%)	7.69	4.36	30.13	0.93
Total assets	28600000000	15200000000	1500000000000	8000000000

Note: Descriptive statistics are recorded for Liquidity position and Financial position for the period January 01, 2007 to April 04, 2019. Std. Dev. refers to standard deviation.

4.4. Empirical Model

Our empirical approach consists of two steps. First, we apply the Diebold and Yilmaz DY spillover index to determine the pairwise returns. Second, we develop a cross-sectional equation of gravity model to study the incentive of such spillovers.

The multivariate time-series approach proposed by Diebold and Yilmaz (2012) is the cornerstone of the present paper's method. To account explicitly for the interdependence observed in financial markets, we established a straightforward measure of connectedness. The DY methodology offers a new perspective on variability modelling because it offers less computational effort and assistance in capturing cyclic and mundane motions across our considered interest variables. The DY methodology is based on a vector autoregressive model (VAR) and a variance decomposition framework [16]. Diebold and Yilmaz (2009) are structured in a VAR framework, which according to Cholesky's factorization is sensitive to the alignment of a number of variables. Therefore, Diebold and Yilmaz (2012) proposed to use a general VAR framework by Koop et al. (1996) and Pesar and Shin (1998), where forecast error variance decompositions are invariant to the ordering of variables, and where the possibility of measuring directional volatility spillovers is explicitly included.

The model involves three steps. The first step is the estimation of the VAR model for the sample variables. The second step is the calculation of the forecast-error-variance-decomposition (FEVD), and the third step is the calculation of the static and dynamic total and pairwise spillovers from generalised FEVD. We briefly define the DY method in the following manner:

[16] More insights into Diebold and Yilmaz (2009, 2012) methodology can consult generic papers.

4.4.1. Spillover index

The first approach used to assess spillover effects was Diebold and Yilmaz's (2012) methodology. This enabled us to extract the spillover indices that reflected the return volatility spillover effects of the US, as well as each market index on the equity sectors (basic materials, consumer goods, consumer services, financials, health care, industrials, oil & gas, technology, telecommunications, and utilities). The index is based on the FEVD in generalised VAR by Koop, Pesaran and Potter (1996) and Pesaran and Shin (1998). In contrast to Cholesky's Factorisation, this arrangement uses variance decomposition, which does not change the order of the variables. Therefore, we identify the portion of the forecast error variance in regional/national sectoral equity markets x_i (for $i = 1, 2, \dots, N$) that may be due to shocks in other regional/national sectoral equity markets from the x_j (for $j = 1, 2, \dots, N$), where $i \neq j$. Hence, from a general VAR perspective, the H-step-ahead forecast error variance decomposition is specified as:

$$\theta_{ij}^{g}(\mathrm{H}) = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H-1} \left(e_i' A_h \Sigma e_j\right)^2}{\sum_{h=0}^{H-1} \left(e_i' A_h \Sigma A_h' e_i\right)} \quad (1)$$

where Σ denotes the variance matrix for the VAR's error term, σ_{ii} represents the standard deviation of the error term for the ith equation, and e_i is the selection vector. The value of the selection vector is 1 for the ith element and 0 otherwise. Given that the generalised VAR permits correlated shocks, it is possible that the elements of every contribution of the variance decomposition may not be 1. Then, consistent with Diebold & Yilmaz (2012), every forecast error variance decomposition can be normalised using the following equation:

$$\tilde{\theta}_{ij}^{g}(H) = \frac{\theta_{ij}^{g}(H)}{\sum_{j=1}^{N} \theta_{ij}^{g}(H)} \tag{2}$$

4.4.2. Total spillover index

By construction, it is clear that $\sum_{j=1}^{N} \tilde{\theta}_{ij}^{g}(H) = 1$ and $\sum_{i,j=1}^{N} \tilde{\theta}_{ij}^{g}(H) = N$. With this normalisation of the variance contributions, the matter of capturing the degree of interdependence in terms of various spillover measures becomes more straightforward. The total spillover index assesses the average contribution of spillovers from the shocks across different countries and regions within sectoral equity markets to the total forecast error variance:

$$S^{g}(H) = \frac{\sum_{i,j=1, i\neq j}^{N} \tilde{\theta}_{ij}^{g}(H)}{\sum_{i,j=1}^{N} \tilde{\theta}_{ij}^{g}(H)} \times 100 = \left(\frac{\sum_{i,j=1, i\neq j}^{N} \tilde{\theta}_{ij}^{g}(H)}{\mathrm{N}} \right) \times 100 \tag{3}$$

4.4.3. Directional spillovers

Directional spillovers measure the spillover that reflects the shocks received by i from all other j, where i and j are vectors. In a similar way, we define directional spillovers as those arising from a sectoral market i to all other sectoral markets.

$$S_{i\cdot}^{g}(H) = \frac{\sum_{j=1, j\neq i}^{N} \tilde{\theta}_{ij}^{g}(H)}{\sum_{j=1}^{N} \tilde{\theta}_{ij}^{g}(H)} \times 100 = \left(\frac{\sum_{j=1, j\neq i}^{N} \tilde{\theta}_{ij}^{g}(H)}{\mathrm{N}} \right) \times 100 \tag{4}$$

The second directional spillover, which refers to a shock by sectoral market i to all other sectoral markets, is measured in the following way:

$$S_{\cdot i}^{g}(H) = \frac{\sum_{j=1, j\neq i}^{N} \tilde{\theta}_{ji}^{g}(H)}{\sum_{j=1}^{N} \tilde{\theta}_{ji}^{g}(H)} \times 100 = \left(\frac{\sum_{j=1, j\neq i}^{N} \tilde{\theta}_{ji}^{g}(H)}{\mathrm{N}} \right) \times 100 \tag{5}$$

4.4.4. Net spillovers

It is straightforward to obtain net spillovers using directional spillovers. Specifically, one has only to take the difference between the volatility stocks transmitted to and those transmitted from all other markets.

$$S_i^g(H) = S_{\cdot i}^g(H) - S_{i\cdot}^g(H) \tag{6}$$

4.4.5. Net pairwise spillovers

Pairwise indices should be considered, and the net pairwise spillover index refers to the difference between the volatility spillover from i to j and the volatility spillover from j to i.

$$S_{ij}^g(H) = \left(\frac{\tilde{\theta}_{ji}^{\,g}(H)}{\sum_{i,k=1}^{N} \tilde{\theta}_{ik}^{\,g}(H)} - \frac{\tilde{\theta}_{ij}^{\,g}(H)}{\sum_{j,k=1}^{N} \tilde{\theta}_{jk}^{\,g}(H)} \right) \times 100 = \left(\frac{\tilde{\theta}_{ji}^{\,g}(H) - \tilde{\theta}_{ij}^{\,g}(H)}{\mathrm{N}} \right) \times 100 \tag{7}$$

4.4.6. Cross-section analysis

After identifying the magnitude of a shock using net pairwise spillovers, the determinants of spillovers were explored in another round of analysis. A hypothesis was advanced that the effects of shocks on sectoral markets were linked to sectoral market capitalisation ratio ($MCAP_{Sector}$), market capitalisation ratio of regional sectors ($MCAP_{Region}$), net debt ($Debt/Total\ Asset$), net profit ($Log(Profit/Total\ Asset)$), net profit margin ($NET\ PROFIT\ MARGIN$), interest expense coverage ($INTEREST\ COVER$), and total assets ($Log\ (Total\ ASSET)$) along with standard gravity factors (Aviat & Coeurdacier, 2007; Portes & Rey, 2005). Additionally, consistent with Balli et al. (2015b), Balli et al. (2017), and Balli et al. (2019), a cross-sectional regression equation was specified for the sectoral equity markets.

This equation is based on the standard gravity model, but is extended to include several variables for liquidity and financial indicators.

$$S_{ij}^{g}(H) = \alpha_0 + \alpha_1 MCAP_{Sector,ij} + \alpha_2 MCAP_{Region,ij} + \alpha_3 Debt/Asset_{i,j} \quad (8)$$
$$+ \alpha_4 Log\ (Profit/Total\ Asset)_{i,j}$$
$$+ \alpha_5 NET\ PROFIT\ MARGIN_{i,J} + \alpha_6 INTEREST\ COVER_{i,J}$$
$$+ \alpha_7 Log\ (TOTAL\ ASSET)_{i,j} + \varepsilon_i$$

Here, the dependent variable, $S_{ij}^{g}(H)$ is created in three ways: firstly, it refers to the net spillover of sector i over other sectors (Table 4.4) at country (region) j; secondly, the spillovers of aggregate region (country) j on sector i (Table 4.5); and finally, the US equity spillovers on each sector i at country (region) j (Table 4.6). To perform cross-sectional regression, we obtain pairwise spillovers from the spillovers index table of regional/sectoral equity markets (Tables 4.7 to 4.25) by cross-section before combining them with explanatory variables.

4.5. Empirical Analysis

Having used the previous sections to detail this study's methods and database, the focal point of this section is the study's results. The DY approach helps us to capture the development of the spillover index over time. Therefore, we start with the static pairwise return spillovers and build on them with a dynamic analysis among country/region sectoral equity markets. As observed from Tables A1.1 to A1.19 in the appendix, the empirical results for returns showed strong/weak interdependence between the US and national and regional sector markets. It implies that sectors' net spillovers, US spillovers to each sector, or regional impact on each sector (magnitudes) is different across countries and regions. Therefore, we turn our attention to a cross-section analysis to check the impact of liquidity and financial linkages on spillovers.

4.5.1. Return spillovers of national and regional sectoral markets

Tables A1.1 to A1.19 in the appendix present the spillover effect of how specific (US, region, national) sectors in countries/regions transmit and receive spillovers or, in other words, how the shocks to one sector impact other sectors in different countries/regions. The highest values lie on a diagonal and represent the extent to which the own return spillover of a specific sector affects its own subsequent return spillover. Additionally, an important observation is that shocks to each country (region)'s index transfer to their sector indices to a larger extent than shocks to each sectors' spillover to their aggregate index.

Regarding directional spillover effects in national sectoral markets (see appendix Tables A1.1 to A1.10), the US is the largest average contributor of return spillovers to other sector markets in the Netherlands (71.27%), followed by the UK (70.73%) and Germany (68.04%), while receiving 71.99%, 74.68% and 76.78% from the other sectors on average. Interestingly, the US market has the lowest contribution is average of 34.67% to the sectoral returns of the India while US receives 49.74% from different sectors of India (in net terms -15.07%) relative to other countries. It implies that there are enough hedging and portfolio diversification opportunities in Indian sectors if we combine sectoral indices of the US market.

In terms of aggregate index, all of the sectoral returns of each country are affected by their own aggregate index relative to the US market. For example, Australia, India, and South Korea are the largest contributors to their own sectors, on average by 135.65%, 132.03%, and 134.61%, respectively, while the US contributes only 54.29%, 34.67%, and 40.58%, respectively. Therefore, it may be concluded that there is high spillovers transfer from aggregate index to those countries own sectoral markets, while the US market transfers comparatively lower spills to each country's sectoral market.

In sum, the static return spillovers primarily explain the average of the intensity of interdependence between the US, aggregate, and sectoral indices. Among each country sector, almost all the consumer goods, financials, and industrials are the net contributors, while the health care, telecommunication, technology, and utilities are the net recipients from other sectoral returns spillovers. Regarding the global shocks, there are common sectors (basic materials, financial, industrial, oil & gas, and technology) among 10 sector returns that are affected by US market returns for each country. However, an interesting and intuitive observation is that each country's index is a significant contributor to its own sectoral indices. Therefore, it suggests that returns of sectors are influenced by the returns of own aggregate indices rather than the US index. Moreover, we find almost analogous directions of spillovers for each country's return, but the magnitudes of return spillovers are scattered among 10 countries. The lowest total spillover index is for South Korea (62.82%), followed by the Netherlands (64.42%) and Australia (69.27%). This implies that South Korea and the Netherlands have better diversification opportunities than other countries' sectoral markets. From an economic point of view, these varying degrees of interdependence characterise the strength of the liquidity and financial positions.

Regarding regional sectoral markets (see Tables A1.11 to A1.19 in the appendix), the results indicate that, in the sample regions, the size of return spillovers across the sample sectors was greatest in the EMU and the EU (86.09%), followed by the EM (85.53%), Pacific (83.79%), and Australasia (83.64%). This suggests that the levels of information transmission are higher in these regional indices when compared to the GCC (59.45%) and Islamic markets (69.57%). Hence, the GCC and Islamic sectoral market is associated with greater benefits in terms of diversification than other regional sectors. This result is consistent with Balli et al. (2013a), who reported that portfolios diversified with a combination of sector indices yielded

more favourable results in the GCC market. Additionally, Balcilar et al. (2015) reported that Islamic sectors typically exert a significant influence in strategic approaches to global diversification.

Among 10 sectors in different regions, returns of consumer service and industrial explain the highest number of FEVDs of returns of other sectors. In terms of global shock, the results indicate that every sectoral index in a different region was linked to elevated levels of return spillover within their own regional market when compared to the US market. As a case in point, the US is the net receiver of return spillover shock from 10 regional sectors. In a similar way, between the US and specific regions, US sectoral indices are the receiver of spillover shock from different regions. This indicates that every regional index, relative to the US, plays a key role in influencing the stock market returns of 10 regional sectors. This is because, the United States can be perceived as the engine of global growth, which therefore explains its importance for the global financial markets. Thus, market participants may therefore draw inferences about the sectoral markets from the US equity market.

Stated concisely, the sizes of return spillovers from each regional sector are greater than the sizes of the return spillovers from each nation's sectoral markets. From the standpoint of an efficient market framework, the US sectors can be considered the most efficient, followed by Germany, France, and Japan, while the EMU, EU, EM, Pacific, and Australasia sectors were the most efficient from a regional standpoint. For investors, the results further suggest that, when these national and regional indices are included in a portfolio, opportunities for hedging and diversification are reduced. Kenourgios and Dimitriou (2015) reported consistent results, noting that, at the outset of the global financial crisis, the energy, utilities, and basic materials sectors were the most strongly affected, while Baur (2012) reported that the most strongly

affected were oil & gas and basic materials. Overall, Tables A1.1 to A1.19 in the appendix demonstrate considerable regional and national differences in terms of shock intensity. Hence, the purpose of this study quantifies the determinants of these differences, specifically by assessing liquidity and financial positions.

4.5.2. Rolling-sample analysis

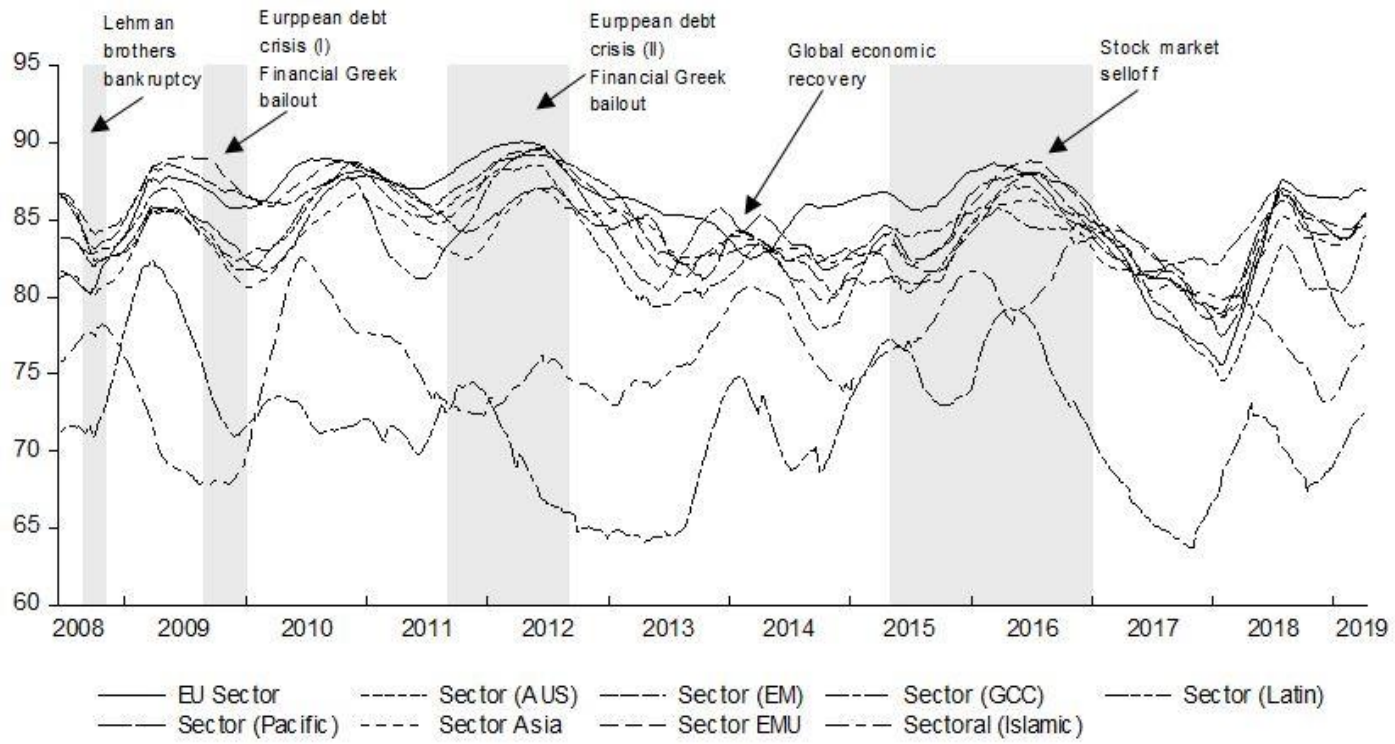
The literature indicates that it is possible for the transmission of return spillovers to change at any point, and that, as a result, connections between sectoral equity markets may decrease or increase based on uncertainty. To be more specific, the static spillover indices (see appendix Tables A1.1 to A1.19) may overlook the movements in volatility and price that are often linked to financial and economic events (e.g. the 2007–2009 GFC and 2009–2012 European sovereign debt crisis (ESDC). As previously noted, the research timeframe encompasses a series of notable events, each of which may have affected the intensity or direction of the dependence across sectoral equity markets. In view of this, the study addressed time-varying volatility spillovers among the sectoral equity markets in countries and regions.

Figure. 6 and 7 illustrate the time-varying return spillovers for countries'/regions' sectoral indices using a rolling-window method[17]. Figure 6 exhibits regional sectors, whereas Figure 7 exhibits national sectoral indices from January 2007 to April 2019. The return spillovers for regional and national indices show similar cyclical movements and magnitudes over the sample period. However, the magnitude of regional return spillovers is higher than national return spillovers throughout the sample, with the exception of 2017. Looking at Figure 6, starting from a level of around 64 in 2007, the magnitude of regional return spillovers

[17] We use 52-week (one-year) rolling window samples, following the methodology of Diebold and Yilmaz (2012). The methodology is explained briefly in the econometric modelling framework later in section 4.

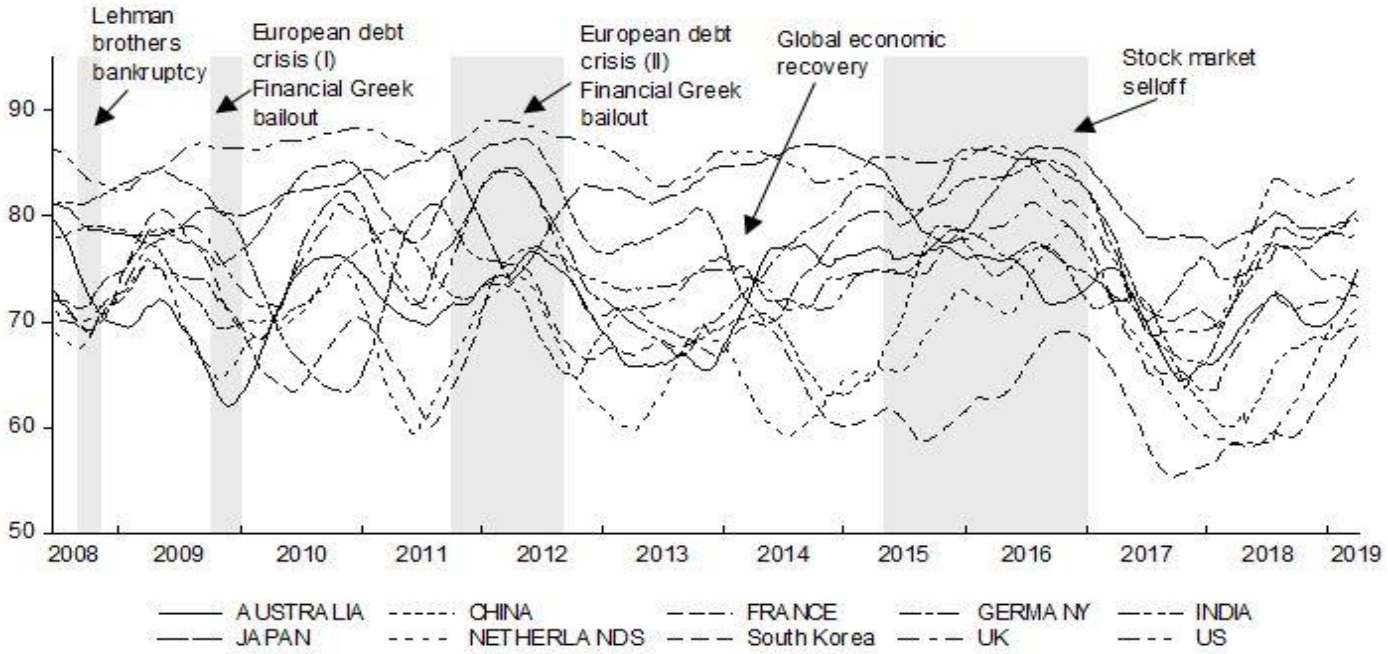
increases to reach around 87 (out of 100) by the end of 2008 during the US financial crisis of 2007–2008. However, sectoral market for countries' (Figure 7) total volatility fluctuates around 83 (out of 100). Over this period, the elevated number of total volatility spillovers, paired with the existence of multiple spikes, suggests that crises occurred. It is worth noting that one of the spikes can be localised for both sectoral markets in September 2008, which is the month in which Lehman Brothers collapsed. However, the GCC and Islamic sectoral markets and a few countries (Australia, India, the Netherlands and the UK) are less volatile than other regions/national sectors, which could explain why these markets had better diversification benefits during the financial crisis. In 2009, the total volatility spillover steadily decreased to reach a level below 85 in regional sectors and 80 in national sectors. Surprisingly, the volatility spillovers of the GCC and Islamic markets reached below 70, while the Netherlands, South Korea and the UK appeared below 65. This is in line with the US Federal Reserve's response to the global financial crisis, particularly the introduction of schemes intended to promote institutional liquidity within financial firms and enhanced conditions in the financial markets. Furthermore, the spread of the crisis throughout the Eurozone pushed total spillovers for the GCC and Islamic sectoral markets to 75, where other regional sectors reached between 84 and 91, during the phase of the ESDC (2011–2012). Additionally, total volatility spillovers for all countries' sectors were 82 to 89. In contrast, a decrease in volatility spillovers was identified between 2013 and 2014 for various regions and countries, which could indicate global economic recovery. Total volatility spillovers began to rise from mid-2015, and this lasted until the third quarter of 2016, i.e. throughout the 2015–2016 stock market selloff. In turn, it fluctuated around 88 (regional) and 83 (national) until the end of the research timeframe.

Figure 6. The dynamics of the total return spillover indices for regional sectoral markets



Notes: Dynamic total return spillovers are calculated from the forecast error variance decompositions on 10-step-ahead forecasts; total spillover indices are estimated using 52-week rolling windows; the sample period is from 01.01.2008 to 04.04.2019. Shading denotes the global financial crisis (11/23/2007–05/22/2009) and two European debt crises (11/05/2009–04/22/2010, 05/02/2011–05/30/2012).

Figure 7. The dynamics of the total return spillover indices for national sectoral markets



Notes: Dynamic total return spillovers are calculated from the forecast error variance decompositions on 10-step-ahead forecasts; total spillover indices are estimated using 52-week rolling windows; the sample period is from 01.01.2008 to 04.04.2019. Shading denotes the global financial crisis (11/23/2007–05/22/2009) and two European debt crises (11/05/2009–04/22/2010, 05/02/2011–05/30/2012).

In summary, the trends in terms of total return spillovers indicate that the sectoral markets of the included countries and regions are substantially different. One implication of this finding relates to the portfolio management strategies adopted by individual investors. Nevertheless, the results indicate that the crises that occurred during the research timeframe intensified the total return spillovers across the markets. Specifically, the return spillovers reached their highest point during 2008–2009 and 2010–2012, both of which were turbulent periods (i.e., corresponding to the global financial crisis and the European sovereign debt crisis). Additionally, it is reasonable to conclude that the time-varying return spillovers may be informed by other economic events (e.g., elevated oil prices in summer 2008 and January 2014, the 2003 Gulf War, and the commodity crisis of 2007–2008). These shocks heightened the level of spillover between the sectoral markets, but not for all regional/sectoral markets, thus lowering the availability of opportunities relating to investment diversification. It also shows that uncertainty is less likely to affect all regional/sectoral equity markets. In other words, our findings suggest that there are sectors that are immune to external shocks during times of volatility. These sectors can be tools to diversify risk in times of crisis and achieving the benefits of diversification. So far, the results of Figures 6 and 7 correspond to Tables A1.1 to A1.19. Given that pairwise and rolling spillovers are very different from each other, in the next section we will look at the predecessors of these differences and examine their liquidity and financial characteristics.

4.5.3. Robustness tests

To investigate the sensitivity of our findings, we use alternative Hstep- ahead forecast error-variance decompositions, and alternative m-week rolling home windows. Fig. A1-A2 in appendix, reviews the robustness test for 31- and 75-week rolling window estimates with 10- , 5- , and 2-week forecast horizons, respectively. In all subgraphs, the spillover indices appear

to have similar patterns, indicating that the whole spillover plot isn't always sensitive to the selection of widow length or forecast horizon. Similar alternative values also are adopted as robustness tests by way of several previous studies (Diebold and Yilmaz, 2009, 2012, Diebold and Yilmaz, 2014; Chau and Deesomsak, 2014; Antonakakis and Kizys, 2015; Kang et al,. 2017).

4.5.4. Cross-section analysis of sectoral spillovers

The hypothesis was established that the liquidity and financial positions of sectoral markets in specific countries and regions can explain spillover magnitude. Thus, Tables 4.4, 4.5, and 4.6 present the results from the cross-sectional regressions of Eq. (8) for the determinants of pairwise return and volatility spillovers, respectively. To assess the impact of the sign and loading of the control variables on the dependent variables, control variables were included separately in the regression estimation. As such, eight models were included, with the last model holding the results for the complete model. A cross-section estimation was undertaken with 10 countries and nine regions, and heteroskedasticity and autocorrelation corrected standard errors (HAC) were computed.

Table 4.4 gives the aggregate estimation with net spillover of sector over other sectors at country (region) level. Determinants are given in regressions separately, followed by estimates for the complete model in the final column. Most variables were statistically significant at the 1% or 5% levels (see Columns 1-7), indicating their strong explanatory power. For example, in Column 1, a higher level of sectoral market capitalisation ratio in the country/region relative to other sectors is positively associated with the magnitude of the net sectoral return spillovers on other sectors. In Columns 3 and 4, the return spillovers of sectors are negatively affected by debt volume and positively by interest expense coverage. The

coefficients indicate that for those sectors, having more debt, their net spillover impact on other sectors in their region (country) decreases. This finding partially aligns with Nictoi and Pochea (2019), who also find that debt position is significant in explaining the spillovers effect. Lastly, we have observed a significant impact of interest expense coverage on net spillovers. Interest coverage simply measures how well the profit covers the interest expense; a general proxy for the liquidity position of the sector and a better position of the sector would transmit higher spillovers to other sectors. In Columns 5 and 6, profit and total assets were proposed as determinants of net spillover of sectors, and the results indicated that both were positively and significantly correlated with the extent of sectoral spillovers. In Column 8, for the regional market capitalization ratio, the relationship was not statistically significant when estimated with other variables, but it was significant at the 5% level in individual testing. This suggests that higher regional market capitalisation ratio in a country or region is associated with a greater magnitude of shocks to other sectors. Moreover, profit margin was significant and negative, explained the vital role of the sectoral markets.

Table 4.5 shows the estimation results for the dependent variable: spillovers of aggregate region (country) on other sectors. We find comparatively different results in Table 4.5 compared to Table 4.4, as expected. As established earlier, market capitalisation ratios appear to be the leading determinant of spillovers to sectoral indices. The coefficient is negative and significant at the 1% level, suggesting that higher market capitalisation ratio of sectors i relative to the country/region lead to a lower extent of the regional aggregate shocks to that particular sector. In other words, as the sector is bigger in the country, it is affected less by regional shocks. This result is similar to the findings of Bracker et al. (1999), Mobarek et al. (2016) and Niţoi and Pochea (2019), who mentioned that market size differentials are negatively associated with pairwise co-movements of equity markets. In Columns 3 and 6, debt

and total assets have significant coefficients, implying that regional spillover gets stronger as net debt of that sector is higher. Looking over Column 7, profit margin is negative and significant, implying as sectors profitability gets better, the spillovers of regional aggregate to sectors decreases. In column 8, we have employed all these variables and tested the effect jointly. Except for debt and profit margin variables, the rest of the variables are statistically significant (and R^2 increases sharply), emphasising the important role of these variables in explaining the magnitude of the regional spillovers in each sector's returns. Interestingly, the interest expense coverage has a positive coefficient, indicating that as the sector is better in a liquidity position (like higher profits to pay interest expense), the magnitude of the regional spillovers increases.

Table 4.4. Net spillovers of Sector to other sectors in the regions

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
$MCAP_{sector}$	0.91***							0.92***
	(0.02)							(0.21)
$MCAP_{region}$		1.07**						0.45
		(0.47)						(0.36)
DEBT/ASSET			-0.02***					-0.35*
			(0.001)					(0.20)
INTEREST COVER				0.35**				-0.76***
				(0.14)				(0.19)
LOG(PROFIT/ASSET)					0.02*			0.07***
					(0.02)			(0.03)
LOG(TOTAL ASSET)						0.03***		0.02
						(0.01)		(0.01)
NET PROFIT MARGIN							0.01	-0.01*
							(0.01)	(0.01)
R^2	0.13	0.11	0.06	0.02	0.02	0.11	0.11	0.23
N	179	179	179	179	179	179	179	179

Note: The dependent variable: return net spillovers of sector *i* to other sectors in country(region) *j*. MCAPsector, which measures as each sector's market value of the equity divided by the each regions/nations market value. MCAPregion, which measures as each sector's market value of the equity divided by the total world's market value. DEBT/ASSET that defines the total amount of debt relative to assets. INTEREST_COVER a measure of the ability of a company's profits to make the interest payments on its debt. We use INTEREST COVER as INTEREST COVER /100 to get a better representation in analysis. LOG(PROFIT/ASSET) that provides how much profit a company is able to generate from its assets. LOG(TOTAL ASSET) is the firm size which is defined as the natural logarithm of total assets. NET PROFIT MARGIN, which refers to the profitability ratio of the sectoral markets. HAC Standard errors are in parenthesis.

Table 4.5. Net spillovers from Regional aggregates to each sector

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$MCAP_{sector}$	-0.12***							-0.11***
	(0.02)							(0.02)
$MCAP_{region}$		-0.12***						-0.07***
		(0.04)						(0.02)
DEBT/ASSET			0.33***					0.02
			(0.01)					(0.02)
INTEREST COVER				-0.004				0.04*
				(0.02)				(0.02)
LOG(PROFIT/ASSET)					-0.06			-0.01**
					(0.07)			(0.003)
LOG(TOTAL ASSET)						-0.003***		-0.002*
						(0.001)		(0.001)
NET PROFIT MARGIN							-0.001*	-0.001
							(0.001)	(0.001)
R^2	0.17	0.02	0.09	0.03	0.003	0.08	0.04	0.28
N	179	179	179	179	179	179	179	179

Note: The dependent variable: return net spillovers of regional aggregate i to each sector in country(region) j. $MCAP_{sector}$, which measures as each sector's market value of the equity divided by the each regions/nations market value. $MCAP_{region,}$ which measures as each sector's market value of the equity divided by the total world's market value. DEBT/ASSET that defines the total amount of debt relative to assets. INTEREST COVER a measure of the ability of a company's profits to make the interest payments on its debt. We use INTEREST COVER as INTEREST COVER /100 to get a better representation in analysis. LOG(PROFIT/ASSET) that provides how much profit a company is able to generate from its assets. LOG(TOTAL ASSET) is the firm size which is defined as the natural logarithm of total assets. NET PROFIT MARGIN, which refers to the profitability ratio of the sectoral markets. HAC Standard errors are in parenthesis.

Table 4.6 estimates the determinants of spillovers of the US aggregate equity index on sectoral equities. Consistent with previous results, an inversely proportional relationship was observed between the size of the regional sector market in the country/region and the extent of US return spillovers from another sectoral equity market. Consequently, shocks from others are likely to undermine growth in the US sectoral equity market. Additionally, debt was significant and negative in both column 3 and 8, meaning that high debt in national and regional sectoral markets would correspond to a low magnitude of shocks to US return spillovers. Nevertheless, interest coverage (Column 4) were linked in a statistically significant negative way. It is still intuitive, because as the sector becomes better able to cover its interest expense with profit, it will be less affected by the US stock markets. Column 8 revealed that the size of a country or region's sectoral markets has a significant impact on US spillovers. For sectors, the correlation coefficient was positive, while it was negative for regions. Hence, sectoral size is likely to increase US equity spillovers.

Table 4.6. Net spillovers from US aggregates to each sector

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MCAP $_{sector}$	0.03*							0.06***
	(0.01)							(0.02)
MCAP $_{region}$		-0.09**						-0.08***
		(0.04)						(0.03)
DEBT/ASSET			-0.002***					-0.02**
			(0.001)					(0.01)
INTEREST COVER				-0.03**				0.03
				(0.01)				(0.02)
LOG(PROFIT/ASSET)					-0.0001			0.001
					(0.0003)			(0.003)
LOG(TOTAL ASSET)						-0.01		-0.001
						(0.001)		(0.001)
NET PROFIT MARGIN							-0.001	-0.002***
							(0.001)	(0.0003)
R^2	0.02	0.02	0.04	0.02	0.012	0.02	0.01	0.16
N	179	179	179	179	179	179	179	179

Note: The dependent variable: return net spillovers of US aggregate *i* to each sector in country(region) *j*. MCAPsector, which measures as each sector's market value of the equity divided by the each regions/nations market value. MCAPregion, which measures as each sector's market value of the equity divided by the total world's market value. DEBT/ASSET that defines the total amount of debt relative to assets. INTEREST COVER a measure of the ability of a company's profits to make the interest payments on its debt. We use INTEREST COVER as INTEREST COVER /100 to get a better representation in analysis. LOG(PROFIT/ASSET) that provides how much profit a company is able to generate from its assets. LOG(TOTAL ASSET) is the firm size which is defined as the natural logarithm of total assets. NET PROFIT MARGIN, which refers to the profitability ratio of the sectoral markets. HAC Standard errors are in parenthesis.

Overall, our findings indicate that the market capitalisation ratio of the sectors, together with debt positions and the magnitude of interest expense coverages of firms, plays a predominant role in explaining the return spillovers from sectors to sectors, regional equity indices to sectors, and US aggregates to sectors, while the other factors such as profit margins and total asset volumes have a limited role in explaining shock spillovers to these markets. This study's key contribution stems from its identification of liquidity and financial factors as determinants of the extent of spillovers to sectoral equity markets. We quantified the level of integration with spillovers, and it is clear that return spillovers are connected to liquidity and financial variables. Hence, it indicates limited scope for diversification as it discourages investors from owning the securities of those sectors. On the bright side, investors can focus on major market movements, study their vulnerability to spills, and apply volatility trading

strategies accordingly. An important lesson for policymakers is to understand the importance of a more liquid sectoral equity markets to minimize exposure to external shocks. For investors seeking to diversify their equity portfolio risk by holding positions in several markets, this finding is especially relevant. To diversify a stock portfolio efficiently, the inclusion of equities from sectoral markets that lack strong connections to national equity markets is a reasonable suggestion.

4.6. Conclusion

This study examined the development of sectoral equity markets in several countries and regions, and it investigated pairwise, total, and net return spillovers in 19 major sectoral indices. It is important to note that, unlike in previous studies, this study examined the origins and drivers of spillovers with market integration.

With the generalised perspective of the spillover index, increasing interactions were observed in return spillovers, while the extent of spillovers was asymmetric across the selected sectoral markets. Specifically, the results indicated that the extent of return spillovers originating from various sectors was heterogeneous across each of the sectoral indices. Interestingly, the magnitudes of return spillovers for each regional sector are higher than the return spillovers of each nation's sectoral markets. We explain these differences using liquidity factors (market value of equity) and financial positions such as total assets, net profit, net profit margin, net debt, and interest charge coverage factors. Notable determinants of spillovers included market capitalisation, debt, and interest factors, which indicates little room for diversification. Overall, we indicate that the liquidity and financial linkages between different sectoral indices of regions and countries are important factors in explaining the spillover of the

shocks. It is clear that transmission of the market shocks from one market to another utilises the liquidity and financial positions.

Based on our findings, results confirm the heterogeneity of sectoral spillover returns and this has implications for portfolio managers who seek to diversify risks. In other words, portfolio managers can monitor the sensitivity of fundamental market movements to spillovers, and guide their investment decisions based on their analysis. In addition, differences in integration between countries/regions indicate that these sectors are not as globally connected as we expected and that national/regional sectoral impacts continue to play a role. Therefore, selecting portfolios between national/regional sectors rather than within regions/countries will be more efficient. However, international investors and portfolio managers are concerned about diversification during difficult times, especially during times of crisis where it is most needed. Our findings suggest that some sectors are more integrated in times of crisis. Therefore, investors and portfolio managers should avoid selecting individual securities from these sectors.

Significantly, this study's findings have implications for the projection of sectoral equity return spillovers in terms of liquidity and financial integration, which means they are relevant for current understandings of the interaction of sectoral equity markets. Useful insights are given for faith-based investors and cross-border portfolio managers, and strong motivations exist to understand the directions of spillovers, especially for investors who aim to achieve portfolio diversification across sectoral equity markets.

CHAPTER FIVE: Conclusion

When Islamic finance is considered against the backdrop of financial globalisation, it appears as a viable strategic option that can be used to safeguard against economic downturns, as well as to promote reliance on socially responsible values in everyday financial and economic transactions. In the 1970s, Islamic finance arose as a resilient, high-achieving, and viable industry, principally due to the fact that, through innovation in financial activity, the tenets of Islamic economics were adapted along the lines of both economic and non-economic environmental changes to super contemporary times. The rise of Islamic finance, grounded in the asset base of the GCC member states, particularly their oil-derived wealth, gave way to the establishment of Islamic financial institutions throughout the 1970s. Combined with the growth in "petrodollars", the rise of Islamic economics was also driven by the quest for a genuine Islamic identity, paired with the desire for reform. In the post-1960., This laid the groundwork for the future development of Islamic finance.

In international financial markets, the development of Islamic securities markets has taken place, and these markets have become increasingly popular over the years. The emergence of Islamic equity and bond indices, which were established in order to monitor the performance of publicly-traded, Shariah-compliant companies, has captured the interest of investors. Rigorous screenings are one of the elements that Islamic indices are subjected to for business activities, financial ratios, and dividend purification. The screening of stocks takes place in order to filter the firms that participate in activities that violate the tenets of Shariah law. The application of financial ratios also takes place for the purpose of limiting the firms' interest-based income and interest-bearing receivables and securities. In the event that an

Islamic equity fund assigns a portion of its portfolio to short-term securities or cash, is necessary for them to be non-interest-bearing.

Institutional developments and product innovation have constituted some of the most critical advancements in the practice of Islamic finance. A key element of the developments in the creation and sustenance of Islamic capital markets has been reflected in the sukuk, or Islamic bond, market, which have emerged as critical financing instruments in the Islamic financial system, especially for the funding of projects. Consequently, sukuk demand has arisen as a different option compared to conventional debt products. Furthermore, the growth of sukuk markets has improved the degree to which Islamic finance is diverse, specifically by moving financial activity in the opposite direction from bank-based Islamic finance.

Numerous studies have been conducted to analyse the reasons why weak linkages exist between Islamic and conventional financial markets, and also to assess subsequent implications for the dynamics of financial markets (Ajmi et al., 2014; Aloui et al., 2015a, 2015b; Aloui et al., 2018; Majdoub & Mansour, 2014; Mansour et al., 2015; Pezzuto, 2012; Rizvi et al., 2015). As a case in point, the study undertaken by Rizvi et al. (2015) demonstrated that, in most of the recessions that have occurred since 1996, the cause can be traced to excessive connections between the US and Asia Pacific. The researchers also noted that the real sector grounded Islamic markets are associated with a lower level of exposure to crises. This verifies a common result reported elsewhere in the literature that Islamic financial markets can serve as a buffer with respect to economic downturns.

The thesis drew the conclusion that global shocks, including macroeconomic news relating to the US and the EU, financial factors, and EPU, perform a critical function in accounting for sukuk markets relative to conventional bonds. The thesis also examined the connections between conventional and Islamic financial markets, and investigated the

determinants of these markets. The research results indicate that the magnitudes and directions of spillovers are relatively dispersed across various countries and Islamic equity markets. The results also indicated that the liquidity and profitability positions of Islamic equity markets had a strong influence on spillover magnitude. At the same time, this thesis examined sectoral markets in various countries and regions. It demonstrated that spillovers in global and regional markets on sector equity indices were dispersed to a significant degree across various markets. It also demonstrated that sector positions are highly influential by the liquidity and financial positions in accounting for spillover extent. In particular, the thesis discovered that global and regional spillovers to specific sector equity markets increased to a substantial extent when the sector is associated with greater debt and lower interest expense coverage.

5.1. Essay One: Economic uncertainties, macroeconomic announcements and sukuk spreads

The structure that underlies sukuk, as well as the provision of sukuk, is distinct in comparison to conventional bonds, which stems from the fact that sukuk are consistent with Shariah tenets. This is still the case despite the fact that sukuk must comply with a strict and robust ethical filter prior to the approval of issuance, where the process is regulated by rigorous legal and structuring requirements. Controversies in recent years that have surrounded the question of whether certain sukuks are compliant with Shariah tenets indicate that the structuring of sukuk occurs based on the standard rules pertaining to asset securitisation. This highlights the issue of whether novel financial instruments of this kind differ in any way from conventional bonds in terms of their spreads. Several papers published in the literature have drawn attention to high-quality empirical data indicating that conventional bonds and sukuk yields (YTM) differ in spite of their comparable tenures in Malaysia (Safari, 2011; Safari et al., 2013; Safari et al., 2013; Safari and Ariff, 2014). Moreover, Saad et al., (2018a, 2019)

revealed that conventional bond yields are associated with a greater spread compared to sukuk in long-term issuances. Noteworthily, the converse result was found in the case of medium-term issuances. Nevertheless, it is relevant to emphasise that none of these studies identified the determinants of spreads in these markets. Hence, this essay sought to examine whether financial factors (i.e., liquidity, maturity, and default risk) and global shocks (macroeconomic news relevant to the US and the EU, as well as EPU) had different impacts on yield spreads in conventional bonds and sukuk.

In the initial part of the essay, the results derived from the ordinary least squares analysis indicated that global shocks and financial factors had a greater impact, marked by higher significance, on sukuk spreads in every sample country compared to conventional spreads. This indicates that liquidity, default risk, and maturity, as well as macroeconomic news (i.e., pertaining to the US and the EU) and EPU, may disturb sukuk spreads, and that the effect has greater significance than financial factors and global shocks impact on bond markets. This result suggests that sukuk spreads are different from conventional bond spreads. There are a range of ways to explain the connection between EU and US announcements, conventional bonds, and sukuk markets. Specifically, given that the US is regarded as the planet's main economic powerhouse that underpins global growth, it performs a critical function in every country's economy (including in each of the countries included in this study's sample). Simultaneously, inter-economy interdependence has increased in response to growing integration and globalisation, which is itself linked to business cycles. Therefore, market participants have a high likelihood of forming conclusions about the sukuk market on the basis of macroeconomic news pertaining to the US and the EU.

The second section of the essay sought to undertake comparison by using 31 matched-level firms that issued both conventional bonds and sukuk at the same time in identical markets.

The results matched the initial element of the empirical analysis, verifying the result that financial factors and global shocks account to a significant extent for sukuk spreads as opposed to conventional bond spreads. Thus, this paper contributes to an enhanced knowledge of the way in which the sukuk market operates, the factors that influence sukuk spreads, and the question of whether these factors are influenced in a different way by global shocks compared to conventional bonds. Furthermore, this study attempts to inform investors and prompt the advancement of a more sustainable and efficient sukuk market.

As data availability increases in the coming years, it will be possible to conduct further research initiatives by incorporating multiple combinations of sukuk structures and conventional bond structures. At the same time, it will be possible for future research initiatives to examine choices in terms of depth security in a multi-sectoral way.

5.2. Essay Two: Sukuk and Shariah-Compliant Equity Market Spillovers

In the second essay, the researcher sought to quantify sukuk spillovers on other countries' Islamic equity markets, or vice versa, and the methodology outlined by Diebold & Yilmaz (2012) was used to extract a range of shocks influencing sukuk and Islamic equity markets between January 2013 and April 2020. The results demonstrated that the extent of return spillovers arising from sukuk to Islamic equity, as well as from Islamic equity to sukuk, was heterogeneous across the Islamic financial markets. Noteworthily, consistent results were reported in Aloui et al. (2015a), Aloui et al. (2015b), and Aloui et al. (2018). The essay accounted for these disparities based on profitability and liquidity factors, including market value, market capitalisation ratio, profit margin, return on equity, price-earnings ratio, debt, total sales, and return on total asset factors. The profitability positions and liquidity factors (i.e., return on equity, return on total assets, price-earnings ratio, and debt) were identified as the main ways to account for the extent of spillovers between the sample countries. For the purpose

of evaluating the degree to which the results were robust, the researcher incorporated conventional bond markets with Islamic equity markets. As a result, the panel data regression indicated that liquidity in financial positions had no significant impact on these markets across the timescale.

For the purpose of examining the relationship between sukuk and Islamic equity markets in the same markets, and – in particular – to determine how financial factors moderated this relationship, a matched sample consisting of 38 listed firms that issued Islamic equities and sukuk at the same time was established. From the analysis, it was clear that profitability and liquidity positions typically had greater import and significance for Islamic financial markets compared to conventional counterparts. This was attributable to the structural disparities that were identified between the markets, which could also imply that financial and liquidity factors have greater significance in Islamic financial markets in the matched sample.

The results of this research project are valuable for forecasting sukuk and Islamic equity returns based on profitability and liquidity connections. As such, the results are crucial in allowing a clear knowledge of the interaction between the major Islamic financial markets to be established. The results also provide worthwhile insights for professional investors who are informed by their faith, as well as international portfolio managers. Learning about spillover directions has significant practical implications, especially for investors who aim to achieve portfolio diversification across Islamic equity markets and sukuk markets. However, profitability and liquidity connections are strong on spillovers, which reflects little room for diversification.

It is positive to point out that investors have the option of focusing on financial characteristics, learning the sensitivity spillovers, and – in accordance with this – applying volatility trading strategies. A critical issue that Shariah researchers and Shariah policymakers

must recognise relates to the value of greater liquidity in Islamic capital markets, principally as a way to mitigate susceptibility to external shocks. The fact that the nature of spillovers in Islamic equity markets with respect to firm-level financial characteristics is dissimilar compared to conventional counterparts is also relevant to consider. Taken together, the results of the second essay given in this thesis suggest that financial connections between Islamic equity markets and sukuk markets are fundamental in accounting for the spillover of the shocks.

Several avenues for further study are implied by this research. As a case in point, limitations regarding the availability of data in this research meant that, in terms of the firms that were considered, only 38 matched firms that issued both sukuk and Islamic equities were included. Thus, future researchers would benefit from considering a higher number of matched firms and major volatility shocks. It would also be worthwhile for future research projects to consider the US implied volatility risk (VIX), as well as necessary commodities (oil and gold) (OVX and GVX) volatility index. This would offer a more nuanced and deeper understanding of the interaction of both markets with volatility shocks.

5.3. Essay Three: Spillovers to sectoral equity returns: Do liquidity and financial positions matter?

Following the global economic downturn that occurred between 2008 and 2009, the situation facing global markets was transformed. Owing to global market integration, benefits in terms of diversification have lessened. Furthermore, financial shocks that occur in specific regions or countries have been transmitted more rapidly to other countries' and regions' markets, which stems from integration between the emerging and developed markets. Diversification of investments only among the emerging and developed countries is regarded as a risky approach. Investor interest in sectoral equity markets has also risen in response to growing global market integration. Prior literature has established consensus that sectoral

equity indices perform in a different way in response to global and local shocks in comparison to aggregate equity markets (Kraus, 2001; Brooks & Del Negro, 2004; Moerman, 2008; Balli & Balli, 2011; Balli et al., 2013a; Balli et al., 2013b). As a case in point, the study undertaken by Moerman (2008) revealed that the benefits arising from sectoral diversification far outweigh those associated with diversification over countries. In summary, empirical data that supports the influence of global and local shocks on aggregate equity markets has greater strength compared to the sectoral equity markets, and the level of dispersal is high. Hence, the purpose of this third essay was to augment the currently limited understanding by examining the influences of cross-sectoral stock market integration.

The third study focused on the real development sectoral equity markets in various countries and regions, and examined pair-wise, total, and return spillovers in 19 major sectoral indices. It is equally important to know that, dissimilar to most of the prior studies in this area, this study focused on the origins and, furthermore, the drivers of spillovers in relation to market integration.

Adopting the generalised standpoint of the spillover index, this essay demonstrated growing interactions in return spillovers, whereas the spillover extent was asymmetric across the chosen sectoral markets. To be more precise, the results demonstrated that the extent of return spillovers arising from varying sectors was heterogeneous across the sectoral indices of 10 countries and 8 regions. It is interesting to note that the return spillover magnitudes for every regional sector exceeded those of the country sectoral markets. Following this, the study sought to account for these disparities based on liquidity factors (market value of equity) and financial positions, including net profit, total assets, net profit margin, interest charge coverage factors, and net debt. The results demonstrated that market capitalisation, interest factors, and debt factors, as well as other determinants, could explain the extent of spillovers between the

selected sectoral indices. The key implication of this is that there is little room in which diversification can take place. Taken together, this result indicates that the financial and liquidity connections that exist between varying sectoral indices of countries and regions play a pivotal role in accounting for the spillover of the shocks. It is evident that when these market shocks are transferred between market, financial and liquidity positions are used.

It is positive to know that investors have the option of centring on underlying market trends, and also gaining insight into the degree to which they are sensitive to spillovers. To project sectoral equity return spillovers with respect to financial liquidity connections, these results are critical, and thus they can stimulate knowledge among investors relating to sectoral equity markets' interactions. This essay offers directly applicable findings that religiously-informed investors and international portfolio managers can leverage. Learning about the directions of spillovers is valuable, especially for investors who are interested in achieving portfolio diversification across sectoral equity markets.

Limitations in terms of the availability of data influenced this study, particularly given that it was not possible for the researcher to include Islamic sectoral equity markets for each region and country, thus enabling the illumination of the factors that determined Islamic sectoral market spillovers. Given the fact that the time period chosen for the analysis (January 2007 to April 2019) contained both windows of stability and windows of instability, the influence of financial positions and liquidity positions on Islamic sectoral equity markets in each region or country may vary. It has been documented that certain securities' returns co-evolve during non-crisis periods and diverge during economic downturns. Additionally, Rizvi et al., (2015) reported that Islamic equities might be viewed as hedge assets during periods marked by market volatility. In view of this, the fruitful future avenue for research could

involve identifying the main determinants of Islamic sectoral equity markets across different nations and regions, both during periods of stability and instability.

References

Abdel-Khaleq, A. H., & Richardson, C. F. (2007). New Horizons for Islamic Securities: Emerging Trends in Sukuk Offerings. *Chicago Journal of International Law*, *7*(2), 409–425.

Abdullah, A. M., Saiti, B., & Masih, M. (2016). The impact of crude oil price on Islamic stock indices of South East Asian countries: Evidence from MGARCH-DCC and wavelet approaches. *Borsa Istanbul Review*, *16*(4), 219-232.

Abugri, B. A. (2008). Empirical relationship between macroeconomic volatility and stock returns: Evidence from Latin American markets. *International Review of Financial Analysis*, *17*(2), 396–410.

Ahmed, A. D., & Huo, R. (2019). Impacts of China's crash on Asia-Pacific financial integration: Volatility interdependence, information transmission and market co-movement. *Economic Modelling*, *79*, 28-46.

Ahmad, N., Dauda, S. N. M., & Kefelia, Z. (2012). Economic Forces and the Sukuk Market. *Procedia-Social and Behavioral Sciences*, *65*, 127-133.

Ahmed, E. R., Islam, M. A., & Alabdullah, T. T. Y. (2014). Islamic sukuk: Pricing mechanism and rating. *Journal of Asian Scientific Research*, *4*(11), 640.

Ahmed, E. R., Islam, M. A., & Ariffin, K. H. K. (2015). An empirical analysis on legitimacy of sukuk: an insight of Malaysian sukuk. *Asian Social Science*, *11*(13), 84.

Akhtar, S., Akhtar, F., Jahromi, M., & John, K. (2017). Impact of interest rate surprises on Islamic and conventional stocks and bonds. *Journal of International Money and Finance*, *79*, 218–231.

Akhtar, S. M., Akhtar, F., Jahromi, M., & John, K. (2016). Intensity of volatility linkages in Islamic and conventional markets. *Available at SSRN 2906546*.

Alam, M. S. (2009). Islamic finance: An alternative to the conventional financial system. *Korea Review of International Studies*, *12*, 37–53.

Alam, N., Hassan, M. K., & Haque, M. A. (2013). Are Islamic bonds different from conventional bonds? International evidence from capital market tests. *Borsa Istanbul Review*, *13*(3), 22–29.

Alotaibi, A. R., & Mishra, A. V. (2017). Time varying international financial integration for GCC stock markets. *The Quarterly Review of Economics and Finance*, *63*, 66–78.

Aloui, C., Hammoudeh, S., & Hamida, H. Ben. (2015a). Co-movement between sharia stocks and sukuk in the GCC markets: A time-frequency analysis. *Journal of International Financial Markets, Institutions and Money*, *34*, 69–79.

Aloui, C., Hammoudeh, S., & Hamida, H. Ben. (2015b). Price discovery and regime shift behavior in the relationship between sharia stocks and sukuk: A two-state Markov switching analysis. *Pacific-Basin Finance Journal*, *34*, 121–135.

Aloui, C., Jammazi, R., & Hamida, H. Ben. (2018). Multivariate co-movement between Islamic stock and bond markets among the GCC: a wavelet-based view. *Computational Economics*, *52*(2), 603–626.

Amrani, M. B., Hamza, F., & others. (2017). Sukuk: Literature Review. *Journal of Social and Administrative Sciences*, *4*(1), 124–131.

Andersen, T. G., Bollerslev, T., Diebold, F. X., & Vega, C. (2007). Real-time price discovery in global stock, bond and foreign exchange markets. *Journal of International Economics*, *73*(2), 251–277.

Andersson, M., Krylova, E., & Vähämaa, S. (2008). Why does the correlation between stock and bond returns vary over time?. *Applied Financial Economics*, *18*(2), 139-151.

Antonakakis, N., & Kizys, R. (2015). Dynamic spillovers between commodity and currency markets. *International Review of Financial Analysis*, *41*, 303-319.

Ariff, M., Chazi, A., Safari, M., & Zarei, A. (2017). Significant difference in the yields of Sukuk bonds versus conventional bonds. *Journal of Emerging Market Finance*, *16*(2), 115–135.

Ariff, M., & Safari, M. (2012). Are Sukuk Securities the Same as Conventional Bonds? AfroEurasian Studies 1 (1), 101-125.

Arouri, M. E., Ben Ameur, H., Jawadi, N., Jawadi, F., & Louhichi, W. (2013). Are Islamic finance innovations enough for investors to escape from a financial downturn? Further evidence from portfolio simulations. *Applied Economics*, *45*(24), 3412–3420.

Arouri, M. E. H., & Rault, C. (2012). Oil prices and stock markets in GCC countries: empirical evidence from panel analysis. *International Journal of Finance & Economics*, *17*(3), 242–253.

Arshanapalli, B., & Doukas, J. (1993). International stock market linkages: Evidence from the pre-and post-October 1987 period. *Journal of Banking & Finance*, *17*(1), 193–208.

Aslanidis, N., & Christiansen, C. (2012). Smooth transition patterns in the realized stock–bond correlation. *Journal of Empirical Finance*, *19*(4), 454-464.

Avramov, D., Chordia, T., & Goyal, A. (2006). Liquidity and autocorrelations in individual stock returns. *The Journal of Finance*, *61*(5), 2365–2394.

Azmat, S., Skully, M., & Brown, K. (2014). Issuer's choice of Islamic bond type. *Pacific-Basin Finance Journal*, *28*, 122–135.

Azmat, S., Skully, M., & Brown, K. (2017). The (little) difference that makes all the difference between Islamic and conventional bonds. *Pacific-Basin Finance Journal*, *42*, 46–59.

Baca, S. P., Garbe, B. L., & Weiss, R. A. (2000). The rise of sector effects in major equity markets. *Financial Analysts Journal*, *56*(5), 34–40.

Saiti, B., Bacha, O. I., & Masih, A. M. M. (2013). Estimation of Dynamic Conditional Correlations of Shariah-Compliant Stock Indices through the Application of Multivariate GARCH Approach. *Australian Journal of Basic and Applied Sciences*, *7*(7), 259-267.

Bacha, O. I., & Mirakhor, A. (2019). *Islamic capital markets: A comparative approach*. Singapore: John Wiley & Sons Singapore Pte. Ltd.

Bacha, O. I., Mirakhor, A., & Askari, H. (2015). Risk Sharing in Corporate and Public Finance: The Contribution of Islamic Finance. *PSL Quarterly Review*, *68*(274), 187-213.

Badshah, I., Bekiros, S., Lucey, B. M., & Uddin, G. S. (2018). Asymmetric linkages among the fear index and emerging market volatility indices. *Emerging Markets Review*, *37*, 17-

31.
Bae, K. H., & Karolyi, G. A. (1994). Good news, bad news and international spillovers of stock return volatility between Japan and the US. *Pacific-Basin Finance Journal*, *2*(4), 405-438.
Baele, L., Bekaert, G., & Inghelbrecht, K. (2010). The determinants of stock and bond return comovements. *The Review of Financial Studies*, *23*(6), 2374-2428.
Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The quarterly journal of economics*, *131*(4), 1593-1636.
Balcilar, M., Demirer, R., & Hammoudeh, S. (2015). Regional and global spillovers and diversification opportunities in the GCC equity sectors. *Emerging Markets Review*, *24*, 160–187.
Balcilar, M., Cerci, G., & Demirer, R. (2016). Is there a role for Islamic bonds in global diversification strategies?. *Managerial Finance*, *42*(7), 656-679.
Balduzzi, P., Elton, E. J., & Green, T. C. (2001). Economic news and bond prices: Evidence from the US Treasury market. *Journal of Financial and Quantitative Analysis*, *36*(4), 523–543.
Balli, F. (2009). Spillover effects on government bond yields in euro zone. Does full financial integration exist in European government bond markets? *Journal of Economics and Finance*, *33*(4), 331–363. https://doi.org/10.1007/s12197-008-9029-3
Balli, F., & Balli, H. O. (2011). Sectoral equity returns in the Euro region: Is there any room for reducing portfolio risk? *Journal of Economics and Business*, *63*(2), 89–106.
Balli, F., Balli, H. O., Basher, S. A., Karimova, A., & Wang, A. (2019). Determinants of sector of holders international equity holdings. *International Review of Economics & Finance*, *63*, 329–338.
Balli, F., Balli, H. O., Louis, R. J., & Vo, T. K. (2015a). The transmission of market shocks and bilateral linkages: Evidence from emerging economies. *International Review of Financial Analysis*, *42*, 349–357.
Balli, F., Balli, H. O., & Luu, M. N. (2014). Diversification across ASEAN-wide sectoral and national equity returns. *Economic Modelling*, *41*, 398–407.
Balli, F., Basher, S. A., & Louis, R. J. (2013a). Sectoral equity returns and portfolio diversification opportunities across the GCC region. *Journal of International Financial Markets, Institutions and Money*, *25*, 33–48.
Balli, F., Billah, M., Balli, H. O., & Gregory-Allen, R. (2020). Economic uncertainties, macroeconomic announcements and sukuk spreads. *Applied Economics*, 1–22.
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*, https://doi.org/10.1016/j.najef.2019.101040
Balli, F., Hajhoj, H. R., Basher, S. A., & Ghassan, H. B. (2015b). An analysis of returns and volatility spillovers and their determinants in emerging Asian and Middle Eastern countries. *International Review of Economics & Finance*, *39*, 311–325.
Balli, F., Uddin, G. S., Mudassar, H., & Yoon, S.-M. (2017). Cross-country determinants of economic policy uncertainty spillovers. *Economics Letters*, *156*, 179–183.

Balli, H. O., Balli, F., & Louis, R. J. (2013b). Time-varying spillover effects on sectoral equity Returns. *International Review of Finance, 13*(1), 67–91.

Barragan, F. (2017). The Impact of Macroeconomic Announcements on Corporate Bond Spreads, (6), 1–37.

Beine, M., & Candelon, B. (2011). Liberalisation and stock market co-movement between emerging economies. *Quantitative Finance, 11*(2), 299–312.

Bekaert, G, Harvey, C. R., & Lundblad, R. (2005). Does Financial Development Spur Growth. *Journal of Financial Economics*, *77*, 3–55.

Bekaert, Geert, Erb, C. B., Harvey, C. R., & Viskanta, T. E. (1997). What matters for emerging equity market investments. *Emerging Markets Quarterly*, *1*(2), 17–46.

Bekaert, Geert, & Harvey, C. R. (1995). Time-varying world market integration. *The Journal of Finance*, *50*(2), 403–444.

Bekaert, Geert, & Harvey, C. R. (2000). Foreign speculators and emerging equity markets. *The Journal of Finance*, *55*(2), 565–613.

Bekaert, Geert, Harvey, C. R., & Lumsdaine, R. L. (2002). The dynamics of emerging market equity flows. *Journal of International Money and Finance*, *21*(3), 295–350.

Bekiros, S., Nguyen, D. K., Uddin, G. S., & Sjö, B. (2015). Business cycle (de) synchronization in the aftermath of the global financial crisis: implications for the Euro area. *Studies in Nonlinear Dynamics & Econometrics, 19*(5), 609-624.

Berben, R.-P., & Jansen, W. J. (2005). Comovement in international equity markets: A sectoral view. *Journal of International Money and Finance*, *24*(5), 832–857.

Berger, D., Pukthuanthong, K., & Yang, J. J. (2011). International diversification with frontier markets. *Journal of Financial Economics*, *101*(1), 227–242.

Billio, M., Donadelli, M., Paradiso, A., & Riedel, M. (2017). Which market integration measure? *Journal of Banking & Finance, 76*, 150–174.

Bollerslev, T., Cai, J., & Song, F. M. (2000). Intraday periodicity, long memory volatility, and macroeconomic announcement effects in the US Treasury bond market. *Journal of Empirical Finance, 7*(1), 37–55.

Boubakri, S., & Guillaumin, C. (2015). Regional integration of the East Asian stock markets: An empirical assessment. *Journal of International Money and Finance, 57,* 136-160.

Bracker, K., Docking, D. S., & Koch, P. D. (1999). Economic determinants of evolution in international stock market integration. *Journal of Empirical Finance*, *6*(1), 1–27.

Bresser-Pereira, L. C. (2010). The global financial crisis and a new capitalism? *Journal of Post Keynesian Economics*, *32*(4), 499–534.

Briere, M., Signori, O., & Topeglo, K. (2008). Bond MarketConundrum: New Factors to Explain Long-term Interest Rates. *Banque & Marches*, (92), 51-68.

Brooks, R., & Del Negro, M. (2004). The rise in comovement across national stock markets: market integration or IT bubble? *Journal of Empirical Finance*, *11*(5), 659–680.

Brunn, S., Devriendt, L., Boulton, A., Derudder, B., & Witlox, F. (2016). Assessing the impacts of the global financial crisis on major and minor cities in South and Southeast Asia: A hyperlink analysis. In *Spatial diversity and dynamics in resources and urban*

development (pp. 135-155). Springer, Dordrecht.

Burns, P., Engle, R. F., & Mezrich, J. J. (1998). Correlations and Volatilities of Asynchronous Data. *The Journal of Derivatives*, *5*(4), 7-18.

Büttner, D., & Hayo, B. (2011). Determinants of European stock market integration. *Economic Systems*, *35*(4), 574–585.

Cai, Y., Chou, R. Y., & Li, D. (2009). Explaining international stock correlations with CPI fluctuations and market volatility. *Journal of Banking & Finance*, *33*(11), 2026–2035.

Cakir, S., & Raei, F. (2007). Sukuk vs. Eurobonds: Is There a Difference in Value-at-Risk?

Caporale, G. M., Cipollini, A., & Spagnolo, N. (2005). Testing for contagion: a conditional correlation analysis. *Journal of Empirical Finance*, *12*(3), 476–489.

Caporale, G. M., Pittis, N., & Spagnolo, N. (2006). Volatility transmission and financial crises. *Journal of Economics and Finance*, *30*(3), 376–390.

Cappiello, L., Engle, R. F., & Sheppard, K. (2006). Asymmetric dynamics in the correlations of global equity and bond returns. *Journal of Financial econometrics*, *4*(4), 537-572.

Carrieri, F., Errunza, V., & Hogan, K. (2007). Characterizing world market integration through time. *Journal of Financial and Quantitative Analysis*, *42*(4), 915–940.

Cavaglia, S., Brightman, C., & Aked, M. (2000). The increasing importance of industry factors. *Financial Analysts Journal*, *56*(5), 41–54.

Chau, F., & Deesomsak, R. (2014). Does linkage fuel the fire? The transmission of financial stress across the markets. *International Review of Financial Analysis, 36*, 57-70.

Chen, G., Firth, M., & Rui, O. M. (2002). Stock market linkages: evidence from Latin America. *Journal of Banking & Finance*, *26*(6), 1113–1141.

Chen, L., Lesmond, D. A., & Wei, J. (2007). Corporate yield spreads and bond liquidity. *The Journal of Finance*, *62*(1), 119–149.

Chen, M.-P., Chen, P.-F., & Lee, C.-C. (2014). Frontier stock market integration and the global financial crisis. *The North American Journal of Economics and Finance*, *29*, 84–103.

Chen, M., Cherian, J., Shao, Y., & Subrahmanyam, M. G. (2017). *Are Islamic Bonds a Good Deal? Evidence from the Malaysian Sovereign Bond Market*. Retrieved from https://bschool.nus.edu.sg/Portals/0/images/CAMRI/Research Papers/MYBondPaper_20170930_Latex_Final.pdf

Chen, N., & Zhang, F. (1997). Correlations, trades and stock returns of the Pacific-Basin markets. *Pacific-Basin Finance Journal*, *5*(5), 559–577.

Chen, P. (2018). Understanding international stock market comovements: A comparison of developed and emerging markets. *International Review of Economics & Finance, 56*, 451–464.

Chen, Zhiwu; Ibbotson, Roger G and Hu, Wendy (2010) "Liquidity As An Investment Style," Yale SOM Working Paper, *Available at SSRN: http://ssrn.com/abstract=1675108*

Chin, W and Z Isa (2011). Bivariate value-at-risk in the emerging malaysian sectoral markets, *Journal of Interdisciplinary Mathematics*, 14(1), 67–94.

Chien, M.-S., Lee, C.-C., Hu, T.-C., & Hu, H.-T. (2015). Dynamic Asian stock market convergence: Evidence from dynamic cointegration analysis among China and ASEAN-

5. *Economic Modelling*, *51*, 84–98.
Chung, P. J., & Liu, D. J. (1994). Common stochastic trends in Pacific Rim stock markets. *Quarterly Review of Economics and Finance*, *34*(3), 241–260.
Connolly, R., Stivers, C., & Sun, L. (2005). Stock market uncertainty and the stock-bond return relation. *Journal of Financial and Quantitative Analysis*, 161-194.
Dania, A., & Malhotra, D. K. (2013). An Empirical Examination of the Dynamic Linkages ofFaith-Based Socially Responsible Investing. *The Journal of Wealth Management*, *16*(1), 65–79.
Datar, V. T., Naik, N. Y., & Radcliffe, R. (1998). Liquidity and stock returns: An alternative test. *Journal of Financial Markets*, *1*(2), 203–219.
Delianedis, G., & Geske, R. (2001). The components of corporate credit spreads: Default, recovery, tax, jumps, liquidity, and market factors, Working paper, UCLA.
Dewandaru, G, S Rizvi, R Masih, M Masih and S Alhabshi (2014). Stock market comovements: Islamic versus conventional equity indices with multi-timescales analysis, *Economic Systems*, 38(4), 553–571.
Diamandis, P. F. (2009). International stock market linkages: Evidence from Latin America. *Global Finance Journal*, *20*(1), 13–30.
Diebold, F. X., & Yilmaz, K. (2009). Measuring financial asset return and volatility spillovers, with application to global equity markets. *The Economic Journal*, *119*(534), 158–171.
Diebold, F. X., & Yilmaz, K. (2012). Better to give than to receive: Predictive directional measurement of volatility spillovers. *International Journal of Forecasting*, *28*(1), 57–66.
Diebold, F. X., & Yilmaz, K. (2014). On the network topology of variance decompositions: Measuring the connectedness of financial firms. *Journal of Econometrics*, *182*(1), 119–134.
Dumas, B., Harvey, C. R., & Ruiz, P. (2003). Are correlations of stock returns justified by subsequent changes in national outputs? *Journal of International Money and Finance*, *22*(6), 777–811.
Duncan, A. S., & Kabundi, A. (2013). Domestic and foreign sources of volatility spillover to South African asset classes. *Economic Modelling*, *31*, 566-573.
Edwards, B. (2014). *U.K. Becomes First Western Government to Sell Islamic Bonds*. Retrieved from https://www.wsj.com/articles/u-k-poised-to-become-first-western-nation-to-sell-islamic-bonds-1403689251
Alaoui, A. O., Dewandaru, G., Rosly, S. A., & Masih, M. (2015). Linkages and co-movement between international stock market returns: Case of Dow Jones Islamic Dubai Financial Market index. *Journal of International Financial Markets, Institutions and Money*, *36*, 53–70.
Mosaid, F., & Boutti, R. (2014). Sukuk and bond performance in Malaysia. *International Journal of Economics and Finance*, *6*(2), 226–234.
Engle, R., Ito, T., & Lin, W. L. (1990). Meteor Showers or Heat Waves? Heteroskedastic Intra-daily Volatility in the Foreign Exchange Market. *Econometrica*, *58*(3), 525-42.
Engle, R. F., Gallo, G. M., & Velucchi, M. (2008). *A MEM-based Analysis of Volatility*

Spillovers in East Asian Financial Markets (No. wp2008_09). Universita'degli Studi di Firenze, Dipartimento di Statistica, Informatica, Applicazioni" G. Parenti".

Erb, C. B., Harvey, C. R., & Viskanta, T. E. (1994). Forecasting international equity correlations. *Financial Analysts Journal*, *50*(6), 32–45.

Eyraud, L., Singh, D., & Sutton, B. Benefits of Global and Regional Financial Integration in Latin America. *Journal Issue,* 2017, 1

Fathurahman, H., & Fitriati, R. (2013). Comparative analysis of return on sukuk and conventional bonds. *American Journal of Economics*, *3*(3), 159–163.

Faust, J., Rogers, J. H., Wang, S.-Y. B., & Wright, J. H. (2007). The high-frequency response of exchange rates and interest rates to macroeconomic announcements. *Journal of Monetary Economics*, *54*(4), 1051–1068.

Fauzi, F., Foo, D., & Basyith, A. (2017). Islamic bond announcement: Is there any effect on returns? *Global Business Review*, *18*(2), 327–347.

Favero, C. A., Pagano, M., & Von Thadden, E. L. (2005). *Valuation, Liquidity and Risk in Government Bond Markets*. Retrieved from http://www.igier.unibocconi.it/en/papers/index.htm

Fitoussi, J. P., & Stiglitz, J. (2009). *The Ways Out of the Crisis and the Builbing of a More Cohesive World* (No. 2009-17). Observatoire Francais des Conjonctures Economiques (OFCE).

Floros, C. (2008). Modelling volatility using GARCH models: evidence from Egypt and Israel. *Middle Eastern Finance and Economics*, (2), 31–41.

Foster, J. B., & Magdoff, F. (2009). *The great financial crisis: Causes and consequences*. NYU Press.

Fund, A. (2019). Regional Integration in Latin America. *Gen,* 74(75), 77-78.

Ghosh, A., Saidi, R., & Johnson, K. H. (1999). Who moves the Asia-Pacific stock markets—US or Japan? Empirical evidence based on the theory of Cointegration. *Financial Review*, *34*(1), 159–169.

Glezakos, M., Merika, A., & Kaligosfiris, H. (2007). Interdependence of major world stock exchanges: How is the Athens stock exchange affected. *International Research Journal of Finance and Economics*, *7*(1), 24–39.

Godlewski, C. J., Turk-Ariss, R., & Weill, L. (2013). Sukuk vs. conventional bonds: A stock market perspective. *Journal of Comparative Economics*, *41*(3), 745–761. https://doi.org/10.1016/j.jce.2013.02.006

Grosse, R. (2017). The global financial crisis—Market misconduct and regulation from a behavioral view. *Research in International Business and Finance*, *41*, 387–398.

Guesmi, K., & Nguyen, D. K. (2014). Time-varying regional integration of stock markets in Southeast Europe. *Applied Economics*, *46*(11), 1279–1290.

Guesmi, K., & others. (2011). What drives the regional integration of emerging stock markets? *Economics Bulletin, AccessEcon*, *31*(3), 2603–2619.

Guidi, F., & Ugur, M. (2014). An analysis of South-Eastern European stock markets: Evidence on cointegration and portfolio diversification benefits. *Journal of International Financial*

Markets, Institutions and Money, *30*, 119–136.

Gulko, L. (2002). Decoupling. *The Journal of Portfolio Management*, *28*(3), 59-66.

Gupta, R., & Guidi, F. (2012). Cointegration relationship and time varying co-movements among Indian and Asian developed stock markets. *International Review of Financial Analysis*, 21, 10-22.

Hammoudeh, S, W Mensi, J Reboredo and D Nguyen (2014). Dynamic dependence of the global islamic equity index with global conventional equity market indices and risk factors, *Pacific-Basin Finance Journal*, 30, 189–206.

Hanifa, M. H., Masih, M., & Bacha, O. (2014). *Testing Sukuk And Conventional Bond Offers Based On Corporate Financing Theories Using Partial Adjustment Models: Evidence From Malaysian Listed Firms* (No. 56953). University Library of Munich, Germany.

Haque, M. M., Chowdhury, M. A. F., Buriev, A. A., Bacha, O. I., & Masih, M. (2018). Who drives whom-sukuk or bond? A new evidence from granger causality and wavelet approach. *Review of Financial Economics*, *36*(2), 117-132.

Hassan, M. K., Paltrinieri, A., Dreassi, A., Miani, S., & Sclip, A. (2018). The determinants of co-movement dynamics between sukuk and conventional bonds. *The Quarterly Review of Economics and Finance*, *68*, 73–84.

Hauser, T., & Vermeersch, D. (2002). Is country diversification still better than sector diversification? *Financial Markets and Portfolio Management*, *16*(2), 234.

Hedström, A., Zelander, N., Junttila, J., & Uddin, G. S. (2020). Emerging Market Contagion Under Geopolitical Uncertainty. *Emerging Markets Finance and Trade*, *56*(6), 1377-1401.

Hooi Lean, H., & Ghosh, B. N. (2010). Economic integration in Asia: quo vadis Malaysia?. *International Economic Journal*, *24*(2), 237-248.

Huang, J.-Z., & Huang, M. (2012). How much of the corporate-treasury yield spread is due to credit risk? *The Review of Asset Pricing Studies*, *2*(2), 153–202.

Hunter, D. M., & Simon, D. P. (2005). A conditional assessment of the relationships between the major world bond markets. *European Financial Management*, *11*(4), 463-482.

Iben, T., & Litterman, R. B. (1994). Have the benefits of international diversification diminished?. *The Journal of Fixed Income*, *4*(2), 27-34.

IFSB. (2019). *Islamic Financial Services Industry Stability Report*. Retrieved from https://www.ifsb.org/download.php?id=5231&lang=English&pg=/index.php

IIFM. (2018). *Sukuk report: A comprehensive study of the global sukuk market (7th edition)*. Retrieved from https://www.iifm.net/wp-content/uploads/2019/08/IIFM-Sukuk-Report-7th-Edition_0.pdf

IIFM. (2020). *Sukuk report: A comprehensive study of the global sukuk market (9th edition)*. Retrieved from https://www.iifm.net/wp-content/uploads/2020/07/IIFM-Sukuk-Report-9th-Edition.pdf

Jackson, K. (2018). *Asian contagion: the causes and consequences of a financial crisis*. Routledge.

Jamaldeen, F. (2012). How Sukuk (Islamic bonds) differ from conventional bonds. *Islamic*

Finance for Dummies, (pp. 207–228). Hoboken: Wiley.

Johnson, R., & Soenen, L. (2002). Asian economic integration and stock market comovement. *Journal of Financial Research, 25*(1), 141-157.

Johnson, R., & Soenen, L. (2003). Economic integration and stock market comovement in the Americas. *Journal of Multinational Financial Management*, *13*(1), 85–100.

Jones, E. P., Mason, S. P., & Rosenfeld, E. (1984). Contingent claims analysis of corporate capital structures: An empirical investigation. *The Journal of Finance, 39*(3), 611–625.

Jouini, E., Pastré, O., & others. (2009). *La Finance Islamique-Une solution à la crise?*

Jouini, J., & Harrathi, N. (2014). Revisiting the shock and volatility transmissions among GCC stock and oil markets: A further investigation. *Economic Modelling, 38*, 486-494.

Kamso, N. (2013). *Investing in islamic funds: A practitioner's perspective* (Vol. 874). John Wiley & Sons.

Kang, S. H., & Yoon, S. M. (2016). Dynamic spillovers between Shanghai and London nonferrous metal futures markets. *Finance Research Letters, 19*, 181-188.

Kang, S. H., McIver, R., & Yoon, S. M. (2017). Dynamic spillover effects among crude oil, precious metal, and agricultural commodity futures markets. *Energy Economics, 62*, 19-32.

Kang, S. H., Uddin, G. S., Troster, V., & Yoon, S. M. (2019). Directional spillover effects between ASEAN and world stock markets. *Journal of Multinational Financial Management, 52*, 100592.

Kang, S. H., & Yoon, S. M. (2019). Financial crises and dynamic spillovers among Chinese stock and commodity futures markets. *Physica A: Statistical Mechanics and its Applications, 531*, 121776.

Karim, B. A., Kassim, N. A. M., & Arip, M. A. (2010). The subprime crisis and Islamic stock markets integration. *International Journal of Islamic and Middle Eastern Finance and Management*, *3*(4), 363-371.

Kashyap, A. K., & Zingales, L. (2010). The 2007-8 financial crisis: Lessons from corporate finance. *Journal of financial economics*, *97*(3), 303-305.

Kassim, S. H. (2013). The Global Financial Crisis and The Integration of Islamic Stock Markets in Developed and Developing Countries. *Asian Academy of Management Journal of Accounting and Finance (AAMJAF), 9*(2), 75-94.

Kenourgios, D., & Dimitriou, D. (2015). Contagion of the Global Financial Crisis and the real economy: A regional analysis. *Economic Modelling*, *44*, 283–293.

Kenourgios, D., & Padhi, P. (2012). Emerging markets and financial crises: regional, global or isolated shocks? *Journal of Multinational Financial Management*, *22*(1–2), 24–38.

Kenourgios, D., Samitas, A., & Paltalidis, N. (2011). Financial crises and stock market contagion in a multivariate time-varying asymmetric framework. *Journal of International Financial Markets, Institutions and Money*, *21*(1), 92–106.

Kim, S. J., Lucey, B. M., & Wu, E. (2006). Dynamics of bond market integration between established and accession European Union countries. *Journal of International Financial Markets, Institutions and Money*, *16*(1), 41-56.

Kim, H. B., & Kang, S. H. (2012). Volatility transmission between the sharia stock and sukuk GII markets in Malaysia. *한국금융공학회 학술발표논문집*, *2012*(1), 1-17.

Kim, B. H., Kim, H., & Lee, B. S. (2015). Spillover effects of the US financial crisis on financial markets in emerging Asian countries. *International Review of Economics & Finance, 39*, 192-210.

Klein, P.-O., Turk, R., & Weill, L. (2017). Religiosity vs. well-being effects on investor behavior. *Journal of Economic Behavior & Organization*, *138*, 50–62.

Klein, P.-O., & Weill, L. (2016). Why do companies issue sukuk? *Review of Financial Economics*, *31*, 26–33.

Koop, G., Pesaran, M. H., & Potter, S. M. (1996). Impulse response analysis in nonlinear multivariate models. *Journal of Econometrics*, *74*(1), 119–147.

Komatsubara, T., Okimoto, T., & Tatsumi, K. I. (2017). Dynamics of integration in East Asian equity markets. *Journal of the Japanese and International Economies, 45*, 37-50.

Korkmaz, T, E Cevik and E Atukeren (2012). Return and volatility spillovers among civetsstock markets, *Emerging Markets Review*, 13, 230–252.

Kraus, M. T. (2001). *The Impact of the EMUon the Structure of European Equity Returns: An Empirical Analysis of the First 21 Months* (No. 1-84). International Monetary Fund.

Labidi, C., Rahman, M. L., Hedström, A., Uddin, G. S., & Bekiros, S. (2018). Quantile dependence between developed and emerging stock markets aftermath of the global financial crisis. *International Review of Financial Analysis*, *59*, 179–211.

Leachman, L. L., & Francis, B. (1995). Long-run relations among the G-5 and G-7 equity markets: Evidence on the Plaza and Louvre Accords. *Journal of Macroeconomics*, *17*(4), 551–577.

Lee, H., & Cho, S. M. (2017). What drives dynamic comovements of stock markets in the Pacific Basin region?: A quantile regression approach. *International Review of Economics & Finance*, *51*, 314–327.

Lehkonen, H. (2015). Stock market integration and the global financial crisis. *Review of Finance*, *19*(5), 2039–2094.

Leippold, M., & Matthys, F. (2015). Economic policy uncertainty and the yield curve. *Available at SSRN 2669500*.

Li, Y., & Giles, D. E. (2015). Modelling volatility spillover effects between developed stock markets and Asian emerging stock markets. *International Journal of Finance & Economics*, *20*(2), 155-177.

Lin, C.-M., & Cheng, W.-H. (2008). Economic determinants of comovement across international stock markets: the example of Taiwan and its key trading partners. *Applied Economics*, *40*(9), 1187–1205.

Lindman, S., Tuvhag, T., Jayasekera, R., Uddin, G. S., & Troster, V. (2020). Market Impact on financial market integration: Cross-quantilogram analysis of the global impact of the euro. *Journal of Empirical Finance, 56*, 42-73.

Liu, S., Shi, J., Wang, J., & Wu, C. (2009). The determinants of corporate bond yields. *The Quarterly Review of Economics and Finance*, *49*(1), 85–109.

Longin, F., & Solnik, B. (1995). Is the international correlation of equity returns constant: 1960-1990? *Journal of International Money and Finance*, *14*(1), 3–27.

Lucey, B. M., & Zhang, Q. (2010). Does cultural distance matter in international stock market comovement? Evidence from emerging economies around the world. *Emerging Markets Review*, *11*(1), 62–78.

Maghyereh, A. I., & Awartani, B. (2016). Dynamic transmissions between Sukuk and bond markets. *Research in International Business and Finance*, *38*, 246–261.

Majid, M., Yusof, R. M., & Razal, A. N. (2007). Dynamic financial linkages among selected OIC countries. *Journal of Economic Cooperation Among Islamic Countries*, *28*(2), 25–56.

Marashdeh, H. (2005). *Stock Market Integration in the MENA Region: An Application of the ARDL Bounds Testing Approach*. School of Economics, University of Wollongong, NSW, Australia.

Masih, A. M. M., & Masih, R. (2002). Propagative causal price transmission among international stock markets: evidence from the pre-and postglobalization period. *Global Finance Journal*, *13*(1), 63-91.

Maurer, B. (2010). Form versus substance: AAOIFI projects and Islamic fundamentals in the case of sukuk. *Journal of Islamic Accounting and Business Research*, *1*(1), 32-41.

Mensi, W., Rehman, M. U., Maitra, D., Al-Yahyaee, K. H., & Sensoy, A. (2020). Does bitcoin co-move and share risk with Sukuk and world and regional Islamic stock markets? Evidence using a time-frequency approach. *Research in International Business and Finance*,. https://doi.org/10.1016/j.ribaf.2020.101230.

Meric, I., Ratner, M., & Meric, G. (2008). Co-movements of sector index returns in the world's major stock markets in bull and bear markets: Portfolio diversification implications. *International Review of Financial Analysis*, *17*(1), 156–177.

Miller, N., Challoner, J., & Aziza, J. A. (2007). UK welcomes the sukuk. *International Financial Law Review*, *26*(5), 24-25. Retrieved from www.scopus.com

Mirakhor, A., & Iqbal, Z. (2007). Qard hasan microfinance. *New Horizon*, *164*(2), 18–20.

Mobarek, A., Muradoglu, G., Mollah, S., & Hou, A. J. (2016). Determinants of time varying co-movements among international stock markets during crisis and non-crisis periods. *Journal of Financial Stability*, *24*, 1–11.

Moerman, G. A. (2008). Diversification in euro area stock markets: Country versus industry. *Journal of International Money and Finance*, *27*(7), 1122–1134.

Mohamed, H. H., Masih, M., & Bacha, O. I. (2015). Why do issuers issue Sukuk or conventional bond? Evidence from Malaysian listed firms using partial adjustment models. *Pacific-Basin Finance Journal*, *34*, 233–252.

Moneta, F., & Rüffer, R. (2009). Business cycle synchronisation in East Asia. *Journal of Asian Economics*, *20*(1), 1-12.

Moore, T., & Wang, P. (2014). Dynamic linkage between real exchange rates and stock prices: Evidence from developed and emerging Asian markets. *International Review of Economics & Finance*, *29*, 1–11.

Morana, C. (2008). International stock markets comovements: the role of economic and financial integration. *Empirical Economics*, *35*(2), 333–359.

Nagano, M. (2016). Who issues Sukuk and when?: An analysis of the determinants of Islamic bond issuance. *Review of Financial Economics*, *31*, 45-55.

Nagano, M. (2017). Sukuk issuance and information asymmetry: Why do firms issue sukuk? *Pacific Basin Finance Journal*, *42*, 142–157. https://doi.org/10.1016/j.pacfin.2016.12.005

Naifar, N. (2016). Modeling dependence structure between stock market volatility and sukuk yields: A nonlinear study in the case of Saudi Arabia. *Borsa Istanbul Review*, *16*(3), 157–166.

Naifar, N., & Hammoudeh, S. (2016a). Do global financial distress and uncertainties impact GCC and global sukuk return dynamics? *Pacific Basin Finance Journal*, *39*, 57–69. https://doi.org/10.1016/j.pacfin.2016.05.016

Naifar, N., & Hammoudeh, S. (2016b). Do global financial distress and uncertainties impact GCC and global sukuk return dynamics? *Pacific-Basin Finance Journal*, *39*, 57–69.

Naifar, N., Hammoudeh, S., & others. (2016). Dependence structure between sukuk (Islamic bonds) and stock market conditions: An empirical analysis with Archimedean copulas. *Journal of International Financial Markets, Institutions and Money*, *44*, 148–165.

Naifar, N., Mroua, M., & Bahloul, S. (2017). Do regional and global uncertainty factors affect differently the conventional bonds and sukuk? New evidence. *Pacific-Basin Finance Journal*, *41*, 65–74.

Naifar, N., & Mseddi, S. (2013). Sukuk spreads determinants and pricing model methodology. *Afro-Asian Journal of Finance and Accounting*, *3*(3), 241-257.

Najeeb, S. F., Bacha, O., & Masih, M. (2017). Does a held-to-maturity strategy impede effective portfolio diversification for Islamic bond (sukuk) portfolios? A multi-scale continuous wavelet correlation analysis. *Emerging Markets Finance and Trade*, *53*(10), 2377–2393.

Narayan, S., Srianantha kumar, S., & Islam, S. Z. (2014). Stock market integration of emerging Asian economies: Patterns and causes. *Economic Modelling*, *39*, 19–31.

Nasir, A., & Farooq, U. (2017). Analysis of value at risk of Sukuk and conventional bonds in Pakistan. *Journal of Islamic Accounting and Business Research*, *8*(4), 375–388.

Nasr, A. Ben, Lux, T., Ajmi, A. N., & Gupta, R. (2016). Forecasting the volatility of the Dow Jones Islamic Stock Market Index: Long memory vs. regime switching. *International Review of Economics & Finance*, *45*, 559–571.

Nasreen, S., Naqvi, S. A. A., Tiwari, A. K., Hammoudeh, S., & Shah, S. A. R. (2020). A Wavelet-Based Analysis of the Co-Movement between Sukuk Bonds and Shariah Stock Indices in the GCC Region: Implications for Risk Diversification. *Journal of Risk and Financial Management*, *13*(4), 1-22.

Nazlioglu, S., Hammoudeh, S., & Gupta, R. (2015). Volatility transmission between Islamic and conventional equity markets: Evidence from causality-in-variance test. *Applied Economics*, *47*(46), 4996–5011.

Neaime, S. (2002). Liberalization and financial integration of MENA stock markets. In *A paper*

presented at the ERF's 9th annual conference on Finance and Banking, United Arab Emirates.

Neaime, S. (2006). Volatilities in emerging MENA stock markets. *Thunderbird International Business Review*, *48*(4), 455–484.

Neaime, S. (2012). The global financial crisis, financial linkages and correlations in returns and volatilities in emerging MENA stock markets. *Emerging Markets Review*, *13*(3), 268–282.

Ng, A. (2000). Volatility spillover effects from Japan and the US to the Pacific--Basin. *Journal of International Money and Finance*, *19*(2), 207–233.

Nguyen, C. P., Nguyen, T. V. H., Schinckus, C., & others. (2019). Institutions, economic openness and stock return co-movements: An empirical investigation in emerging markets. *Finance Research Letters*, *28*(C), 137–147.

Nictoi, M., & Pochea, M. M. (2019). What drives European Union stock market co-movements? *Journal of International Money and Finance*, *97*, 57–69.

Niemann, A., & Ioannou, D. (2015). European economic integration in times of crisis: a case of neofunctionalism?. *Journal of European Public Policy*, *22*(2), 196-218.

Oakley, D. (2011). *Sukuk issuance plunges on liquidity concerns*. Retrieved from https://www.ft.com/content/6e69004e-a225-11de-9caa-00144feabdc0

Odier, P., & Solnik, B. (1993). Lessons for international asset allocation. *Financial Analysts Journal*, *49*(2), 63–77.

Ogino, Y. (2018). Developments of Sukuk (Islamic Bond) Market and Challenges of Japanese Market. *Institute for International Monetary Affairs*, pp. 1–14. Retrieved from https://www.iima.or.jp/en/docs/newsletter/2018/NL2018No_2_e.pdf

Olienyk, J. P., Schwebach, R. G., & Zumwalt, J. K. (2000). The Impact of Financial Crises on International Diversification. *Paper presented at 12th PACAP/FAM conference*, Melbourne, Australia.

Paltrinieri, A., Hassan, M. K., Bahoo, S., & Khan, A. (2019). A bibliometric review of sukuk literature. *International Review of Economics & Finance*. In press, doi: 10.1016/j.iref.2019. 04.004

Panda, A. K., Nanda, S., & Paital, R. R. (2019). An empirical analysis of stock market interdependence and volatility spillover in the stock markets of Africa and Middle East region. *African Journal of Economic and Management Studies*. *10*, 314–335. https://doi.org/10.1108/AJEMS-10-2018-0293

Pesaran, H. H., & Shin, Y. (1998). Generalized impulse response analysis in linear multivariate models. *Economics Letters*, *58*(1), 17–29.

Phylaktis, K., & Ravazzolo, F. (2005). Stock market linkages in emerging markets: implications for international portfolio diversification. *Journal of International Financial Markets, Institutions and Money*, *15*(2), 91–106.

Pollard, J., & Samers, M. (2007). Islamic banking and finance: postcolonial political economy and the decentring of economic geography. *Transactions of the Institute of British Geographers*, *32*(3), 313–330.

Pretorius, E. (2002). Economic determinants of emerging stock market interdependence. *Emerging Markets Review*, *3*(1), 84–105.

Raei, F., & Cakir, S. (2007). *Sukuk vs. Eurobonds: Is there a difference in value-at-risk?* (No. 7-237). International Monetary Fund.

Rahman, M. P. (2008). Islamic Bond Credit Spread and Its Determinants: A Case Study of Malaysia. Unpublished master dissertation, International Islamic University Malaysia, Selangor.

Rahman, M. P., & Omar, M. (2015). Factors influencing the excess returns of Sukuk: an empirical analysis on USD denominated Sukuk issued by corporations in the Gulf Cooperation Council Countries (GCC). Gerlach Press.

Ramasamy, R., & Shanmugam Munisamy, M. H. M. H. (2011). Relative risk of Islamic sukuk over government and conventional bonds. *Global Journal of Management and Business Research*, *11*(6), 1–9.

Raza, M. W., & Ashraf, D. (2019). Does the application of smart beta strategies enhance portfolio performance? The case of Islamic equity investments. *International Review of Economics & Finance*, *60*, 46–61.

Reboredo, J. C., & Naifar, N. (2017). Do Islamic bond (sukuk) prices reflect financial and policy uncertainty? A quantile regression approach. *Emerging Markets Finance and Trade*, *53*(7), 1535–1546.

Rizvi, S. A. R., & Arshad, S. (2014). An empirical study of Islamic equity as a better alternative during crisis using multivariate GARCH DCC. *Islamic Economic Studies*, *130*(1155), 1-27.

Rizvi, S. A. R., Arshad, S., & Alam, N. (2015). Crises and contagion in Asia Pacific—Islamic v/s conventional markets. *Pacific-Basin Finance Journal*, *34*, 315–326.

S&P Global Ratings. (2020). *Islamic Finacial Outlook 2020 Edition*. Retrieved from https://www.spglobal.com/_assets/documents/ratings/research/islamic_finance_2020_screen.pd

Saad, N. M., Haniff, M. N., & Ali, N. (2018a). Comparison of Yield Spreads of Sukuk and Conventional Bonds in Malaysia. *American Scientific Publishers*, *24*, 2961–2965. https://doi.org/https://doi.org/10.1166/asl.2018.11301

Saad, N. M., Haniff, M. N., & Ali, N. (2018b). Relationship of Corporate Governance and Conventional Bonds and Sukuk Yield Spreads in Malaysia. *American Scientific Publishers*, *24*, 2966–2972.

Saeed, M., & Izzeldin, M. (2016). Examining the relationship between default risk and efficiency in Islamic and conventional banks. *Journal of Economic Behavior and Organization*, *132*(October 2012), 127–154. https://doi.org/10.1016/j.jebo.2014.02.014

Safari, M., Ariff, M., & Mohamad, S. (2013). Do Debt Markets Price Sukuk and Conventional Bonds Differently?. *Journal of King Abdulaziz University Islamic Economies*, *26*(2), 113-149.

Scheicher, M. (2001). The comovements of stock markets in Hungary, Poland and the Czech Republic. *International Journal of Finance & Economics*, *6*(1), 27–39.

Schimmelfennig, F. (2014). European integration in the euro crisis: The limits of postfunctionalism. *Journal of European Integration, 36*(3), 321-337.

Schimmelfennig, F. (2015). Differentiated integration before and after the crisis. *İçinde Democratic Politics In A European Union Under Stress, edited by Olaf Cramme ve Sara B. Hobolt*, 120-134.

Sclip, A., Dreassi, A., Miani, S., & Paltrinieri, A. (2016). Dynamic correlations and volatility linkages between stocks and sukuk: Evidence from international markets. *Review of Financial Economics*, *31*, 34–44.

Shafron, E. (2019). Investor tastes: Implications for asset pricing in the public debt market. *Journal of Corporate Finance*, *55*, 6–27.

Shahzad, S. J. H., Aloui, C., Jammazi, R., & Shahbaz, M. (2019). Are Islamic bonds a good safe haven for stocks? Implications for portfolio management in a time-varying regime-switching copula framework. *Applied Economics*, *51*(3), 219–238.

Shahzad, S. J. H., Ferrer, R., Ballester, L., & Umar, Z. (2017). Risk transmission between Islamic and conventional stock markets: A return and volatility spillover analysis. *International Review of Financial Analysis*, *52*, 9–26.

Shamsuddin, A. F. M., & Kim, J. H. (2003). Integration and interdependence of stock and foreign exchange markets: an Australian perspective. *Journal of International Financial Markets, Institutions and Money*, *13*(3), 237–254.

Shiller, R. J. (2012). *The subprime solution: How today's global financial crisis happened, and what to do about it*. Princeton University Press.

Singh, P., Kumar, B., & Pandey, A. (2010). Price and volatility spillovers across North American, European and Asian stock markets. *International Review of Financial Analysis*, *19*(1), 55-64.

Solnik, B., Boucrelle, C., & Le Fur, Y. (1996). International market correlation and volatility. *Financial analysts journal*, *52*(5), 17-34.

Soros, G. (2009). *La vérité sur la crise financière*. Braille Jymico Incorporated.

Stivers, C. T., & Sun, L. (2002). *Stock market uncertainty and the relation between stock and bond returns* (No. 2002-3). Federal Reserve Bank of Atlanta.

Susmel, R. (2001). Extreme observations and diversification in Latin American emerging equity markets. *Journal of International Money and Finance*, *20*(7), 971–986.

Syllignakis, M. N., & Kouretas, G. P. (2011). Dynamic correlation analysis of financial contagion: Evidence from the Central and Eastern European markets. *International Review of Economics & Finance*, *20*(4), 717–732.

Syriopoulos, T., Makram, B., & Boubaker, A. (2015). Stock market volatility spillovers and portfolio hedging: BRICS and the financial crisis. *International Review of Financial Analysis*, *39*, 7–18.

Tabash, M. I. (2018). Islamic financial investments and economic growth evidence from emerging economy, United Arab Emirates. *International Journal of Economics and Business Research*, *15*(1), 125–139.

Tay, N. S. P., & Zhu, Z. (2000). Correlations in returns and volatilities in Pacific-Rim stock

markets. *Open Economies Review*, *11*(1), 27–47.
Tsuji, C. (2005). The credit-spread puzzle. *Journal of International Money and Finance*, *24*(7), 1073–1089.
Tuysuz, S. (2013). Conditional correlations between stock index, investment grade yield, high yield and commodities (gold and oil) during stable and crisis periods. *International Journal of Economics and Finance*, *5*(9), 28.
Ulus, S. (2013). Fixed Income Investment (Sukuk) in Islamic Finance. *Afro Eurasian Studies*, *2*(1–2), 298–305.
Verdun, A. (2015). A historical institutionalist explanation of the EU's responses to the euro area financial crisis. *Journal of European Public Policy*, *22*(2), 219-237.
Vilpišauskas, R. (2013). Eurozone crisis and European integration: functional spillover, political spillback?. *Journal of European Integration*, *35*(3), 361-373.
Wälti, S. (2011). Stock market synchronization and monetary integration. *Journal of International Money and Finance*, *30*(1), 96–110.
Wang, L. (2014). Who moves East Asian stock markets? The role of the 2007--2009 global financial crisis. *Journal of International Financial Markets, Institutions and Money*, *28*, 182–203.
Wang, J., Sun, X., & Li, J. (2017). How does economic policy uncertainty interact with sovereign bond yield? Evidence from the US. *Procedia computer science*, *122*, 154-158.
Wisniewski, T. P., & Lambe, B. J. (2015). Does economic policy uncertainty drive CDS spreads?. *International Review of Financial Analysis*, *42*, 447-458.
Worthington, A., & Higgs, H. (2004). Transmission of equity returns and volatility in Asian developed and emerging markets: a multivariate GARCH analysis. *International Journal of Finance & Economics*, *9*(1), 71–80.
Yang, J., Hsiao, C., Li, Q., & Wang, Z. (2006). The emerging market crisis and stock market linkages: further evidence. *Journal of Applied Econometrics*, *21*(6), 727–744.
Yang, J., Zhou, Y., & Wang, Z. (2009). The stock--bond correlation and macroeconomic conditions: One and a half centuries of evidence. *Journal of Banking & Finance*, *33*(4), 670–680.
Yilmaz, K. (2010). Return and volatility spillovers among the East Asian equity markets. *Journal of Asian Economics*, *21*(3), 304–313.
Zakaria, N. B., Isa, M. A. M., & Abidin, R. A. Z. (2013). Sukuk Rating, Default Risk And Earnings Response Coefficient. *Advances in Natural and Applied Sciences*, *7*(2), 131–137.
Zulkhibri, M. (2015). A synthesis of theoretical and empirical research on sukuk. *Borsa Istanbul Review*, *15*(4), 237–248.

Appendices

A 1.1. Return Spillover index of USA, Australia and Sectoral Equity Markets of Australia

	USA	Australia	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	37.60	11.73	9.71	1.69	4.72	7.65	1.94	7.91	8.65	3.57	0.71	4.12	**62.40**
Australia	6.62	16.87	10.18	4.12	10.59	12.86	4.65	11.50	9.43	4.92	2.16	6.09	**83.13**
BM	7.79	16.48	27.31	2.16	6.53	5.63	1.59	7.80	14.03	4.45	0.83	5.41	**72.69**
CG	2.22	8.82	2.80	36.24	11.47	6.21	8.18	8.50	4.32	4.44	2.61	4.20	**63.76**
CS	5.34	13.95	5.36	7.00	22.03	10.94	6.08	10.86	6.19	4.93	2.36	4.95	**77.97**
FIN	5.94	17.03	4.59	3.94	11.18	22.34	4.90	12.48	5.27	4.41	2.14	5.79	**77.66**
HC	2.30	9.94	1.97	8.16	10.01	8.02	36.22	8.31	3.44	4.53	2.96	4.14	**63.78**
IND	6.85	14.47	6.05	5.02	10.39	11.85	4.85	21.19	6.82	5.09	1.54	5.88	**78.81**
OG	6.65	14.18	13.10	3.08	6.90	5.97	2.45	8.08	25.43	5.35	1.24	7.56	**74.57**
TECH	4.39	10.13	5.74	4.19	7.84	6.57	4.41	8.41	7.32	35.48	2.89	2.63	**64.52**
TELE	1.85	7.36	1.56	4.04	5.89	5.45	4.51	4.09	2.74	4.76	55.42	2.32	**44.58**
UTL	4.33	11.54	6.25	3.78	7.32	8.20	3.75	8.98	9.57	2.32	1.30	32.66	**67.34**
TO	**54.29**	**135.65**	**67.31**	**47.18**	**92.82**	**89.35**	**47.31**	**96.92**	**77.79**	**48.78**	**20.75**	**53.08**	**Index**
NET	**-8.12**	**52.52**	**-5.38**	**-16.58**	**14.86**	**11.69**	**-16.47**	**18.11**	**3.22**	**-15.74**	**-23.84**	**-14.27**	**69.27**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.2. Return Spillover index of USA, China and Sectoral Equity Markets of China

	USA	China	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	41.40	8.68	7.62	4.00	4.47	7.51	2.88	6.11	8.29	0.04	4.76	4.24	**58.60**
China	3.72	16.32	11.62	7.53	7.18	15.73	3.41	11.77	10.91	0.89	5.33	5.59	**83.68**
BM	4.07	13.47	18.91	7.57	6.47	11.89	2.68	12.00	11.12	0.92	6.03	4.89	**81.09**
CG	2.79	11.24	9.77	24.84	7.70	9.77	3.60	10.86	8.51	1.77	4.84	4.31	**75.16**
CS	3.24	11.36	8.82	8.09	25.88	9.55	2.70	10.30	8.45	1.20	4.59	5.82	**74.12**
FIN	3.54	17.41	11.37	7.30	6.70	18.08	3.18	11.42	10.19	0.82	4.83	5.18	**81.92**
HC	3.31	8.18	5.55	5.71	4.03	6.90	39.15	8.55	8.05	1.08	3.52	5.97	**60.85**
IND	3.03	13.29	11.70	8.13	7.36	11.67	4.04	18.50	9.46	1.43	5.35	6.05	**81.50**
OG	4.32	12.84	11.31	6.62	6.29	10.84	3.97	9.87	19.18	0.50	7.24	7.02	**80.82**
TECH	1.41	4.02	3.74	5.00	2.58	3.28	1.85	5.87	2.25	64.59	3.17	2.24	**35.41**
TELE	3.29	9.51	9.26	5.66	5.08	7.82	2.58	8.37	10.95	1.15	29.15	7.18	**70.85**
UTL	2.92	9.73	7.40	4.94	6.41	8.14	4.21	9.30	10.47	0.85	7.06	28.58	**71.42**
TO	**35.64**	**119.73**	**98.15**	**70.55**	**64.26**	**103.09**	**35.09**	**104.43**	**98.63**	**10.65**	**56.71**	**58.50**	**Index**
NET	**-22.96**	**36.05**	**17.05**	**-4.61**	**-9.86**	**21.17**	**-25.75**	**22.93**	**17.81**	**-24.77**	**-14.14**	**-12.93**	**71.29**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.3. Return Spillover index of USA, France and Sectoral Equity Markets of France

	USA	France	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	22.63	9.81	7.64	8.56	8.96	6.68	3.70	9.89	6.17	8.37	2.12	5.47	**77.37**
France	5.83	12.41	8.22	9.71	10.23	9.25	5.71	10.77	7.97	8.37	4.15	7.38	**87.59**
BM	6.24	11.32	17.14	9.90	8.91	7.56	3.97	11.51	7.86	7.49	2.86	5.25	**82.86**
CG	6.17	12.09	8.91	15.42	11.11	6.61	4.93	11.09	6.82	8.12	3.43	5.30	**84.58**
CS	6.11	12.00	7.51	10.48	14.55	7.78	5.23	10.87	6.57	8.66	3.76	6.49	**85.45**
FIN	5.72	12.96	7.69	7.43	9.28	17.51	4.01	10.70	6.89	8.22	3.68	5.92	**82.49**
HC	4.78	11.05	5.62	7.72	8.63	5.61	24.24	7.45	7.11	6.71	4.15	6.95	**75.76**
IND	6.35	12.10	9.44	10.01	10.37	8.61	4.32	13.90	6.80	9.36	3.14	5.61	**86.10**
OG	5.39	11.76	8.48	8.07	8.23	7.23	5.43	8.91	18.46	5.87	4.18	7.99	**81.54**
TECH	6.95	11.45	7.43	8.96	10.14	8.00	4.71	11.46	5.43	16.96	2.41	6.10	**83.04**
TELE	2.76	9.88	4.85	6.55	7.78	6.19	5.16	6.57	6.65	4.49	29.88	9.24	**70.12**
UTL	5.05	11.70	6.02	6.75	8.77	6.68	5.69	7.95	8.56	7.06	6.09	19.68	**80.32**
TO	**61.32**	**126.10**	**81.81**	**94.14**	**102.41**	**80.20**	**52.87**	**107.15**	**76.83**	**82.71**	**39.98**	**71.71**	**Index**
NET	**-16.05**	**38.51**	**-1.05**	**9.55**	**16.95**	**-2.29**	**-22.89**	**21.06**	**-4.71**	**-0.32**	**-30.14**	**-8.62**	**81.44**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.4. Return Spillover index of USA, Germany and Sectoral Equity Markets of Germany

	USA	Germany	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	23.22	10.84	8.74	6.66	9.57	8.79	3.52	10.19	4.80	7.71	2.15	3.81	**76.78**
Germany	6.63	13.84	11.07	9.45	9.26	10.33	5.64	11.38	4.32	8.07	4.37	5.66	**86.16**
BM	6.46	13.09	16.29	6.18	8.80	9.77	6.19	12.33	4.35	7.48	3.84	5.21	**83.71**
CG	6.56	15.99	8.78	25.18	7.92	7.10	3.76	9.02	3.67	6.09	2.63	3.32	**74.82**
CS	7.53	11.95	9.58	6.04	17.73	10.49	5.45	11.78	4.92	7.60	2.52	4.40	**82.27**
FIN	6.78	12.77	10.21	5.18	10.05	17.04	4.88	11.20	4.27	7.42	4.40	5.81	**82.96**
HC	4.59	10.59	10.01	4.20	7.82	7.19	26.13	8.18	3.48	7.64	5.75	4.41	**73.87**
IND	7.15	12.84	11.76	6.03	10.31	10.23	4.90	15.53	5.27	7.89	3.30	4.79	**84.47**
OG	6.45	9.39	8.02	4.34	8.36	7.51	3.67	10.18	30.00	5.85	2.53	3.70	**70.00**
TECH	7.56	11.77	9.25	5.22	8.72	8.86	5.87	10.24	3.96	20.08	3.38	5.09	**79.92**
TELE	3.02	10.31	7.69	3.77	4.58	8.17	7.33	6.82	2.63	5.53	33.50	6.65	**66.50**
UTL	5.33	11.01	8.60	3.83	6.72	9.17	4.54	8.32	3.39	6.92	5.39	26.76	**73.24**
TO	**68.04**	**130.55**	**103.70**	**60.90**	**92.11**	**97.61**	**55.76**	**109.64**	**45.06**	**78.19**	**40.26**	**52.85**	**Index**
NET	**-8.73**	**44.39**	**19.99**	**-13.91**	**9.85**	**14.65**	**-18.11**	**25.17**	**-24.93**	**-1.73**	**-26.24**	**-20.38**	**77.89**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.5. Return Spillover index of USA, India and Sectoral Equity Markets of India

	USA	India	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	50.26	7.31	6.69	3.23	1.93	5.27	2.30	6.27	4.43	6.97	2.68	2.66	**49.74**
India	3.06	14.08	10.35	8.08	6.52	11.66	4.93	12.28	9.91	3.31	5.63	10.19	**85.92**
BM	3.50	13.90	18.89	5.53	6.24	10.40	3.54	11.70	9.16	1.96	4.49	10.69	**81.11**
CG	2.29	12.34	6.36	21.26	7.10	10.03	6.36	11.31	7.10	2.55	5.04	8.27	**78.74**
CS	2.68	11.24	8.08	7.95	23.94	10.16	4.11	10.74	6.74	1.90	4.49	7.97	**76.06**
FIN	2.84	14.04	9.36	7.89	7.11	16.86	3.98	12.63	8.43	1.78	5.31	9.75	**83.14**
HC	2.35	10.64	5.85	9.02	5.29	7.11	30.15	8.68	6.35	3.73	3.95	6.86	**69.85**
IND	3.08	13.73	9.61	8.29	7.06	11.76	4.55	15.93	8.97	1.99	5.25	9.79	**84.07**
OG	2.71	13.87	9.42	6.54	5.48	9.78	4.08	11.23	19.46	2.12	4.76	10.55	**80.54**
TECH	8.62	10.05	4.52	5.03	3.18	4.48	5.47	5.38	4.55	42.33	3.00	3.38	**57.67**
TELE	2.19	11.46	6.67	6.85	5.26	8.99	3.71	9.56	6.68	1.97	28.70	7.97	**71.30**
UTL	1.36	13.45	10.61	7.17	6.16	10.64	4.15	11.54	10.01	1.42	5.11	18.38	**81.62**
TO	**34.67**	**132.03**	**87.53**	**75.56**	**61.33**	**100.27**	**47.18**	**111.32**	**82.34**	**29.7'1**	**49.72**	**88.09**	**Index**
NET	**-15.07**	**46.11**	**6.42**	**-3.18**	**-14.73**	**17.14**	**-22.67**	**27.25**	**1.80**	**-27.96**	**-21.58**	**6.47**	**74.98**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.6. Return Spillover index of USA, Japan and Sectoral Equity Markets of Japan

	USA	Japan	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	36.25	8.00	8.41	7.23	4.33	6.14	3.41	9.47	6.23	8.06	1.86	0.62	**63.75**
Japan	4.08	12.32	10.31	11.08	8.87	9.83	7.05	11.04	5.77	10.49	5.32	3.85	**87.68**
BM	4.58	12.06	14.46	10.79	6.94	8.59	5.36	12.69	7.38	10.90	3.57	2.68	**85.54**
CG	4.14	12.60	10.48	14.00	8.06	8.81	6.35	11.40	5.24	10.96	4.57	3.39	**86.00**
CS	3.00	11.49	7.76	9.18	15.82	8.45	10.22	8.23	4.06	8.64	6.78	6.38	**84.18**
FIN	3.89	12.90	9.60	10.16	8.46	16.17	5.72	10.47	5.10	9.83	4.42	3.28	**83.83**
HC	3.10	10.70	7.10	8.42	12.01	6.67	18.43	7.83	4.36	8.44	7.44	5.50	**81.57**
IND	4.97	12.26	12.03	11.13	7.02	8.87	5.70	13.68	7.19	11.19	3.67	2.30	**86.32**
OG	4.82	10.14	11.08	8.12	5.57	6.83	5.02	11.37	21.69	9.12	3.93	2.32	**78.31**
TECH	4.77	11.97	10.65	11.01	7.58	8.55	6.29	11.51	5.96	14.05	4.71	2.93	**85.95**
TELE	3.24	9.92	5.77	7.49	9.90	6.17	9.40	6.22	4.24	7.75	22.96	6.96	**77.04**
UTL	0.87	9.04	5.37	6.91	11.70	5.89	8.64	4.84	3.10	6.02	8.72	28.90	**71.10**
TO	**41.45**	**121.07**	**98.57**	**101.50**	**90.43**	**84.80**	**73.17**	**105.06**	**58.63**	**101.39**	**54.99**	**40.22**	**Index**
NET	**-22.30**	**33.39**	**13.03**	**15.50**	**6.25**	**0.97**	**-8.40**	**18.73**	**-19.68**	**15.45**	**-22.06**	**-30.88**	**80.94**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.7. Return Spillover index of USA, Netherlands and Sectoral Equity Markets of Netherlands

	USA	Netherlands	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	28.01	12.09	9.89	5.31	5.49	9.75	1.57	11.01	6.95	8.30	1.40	0.23	**71.99**
Netherlands	8.31	16.52	12.18	9.39	8.07	12.95	2.33	12.51	6.43	8.48	2.81	0.03	**83.48**
BM	8.22	16.21	22.01	5.20	5.52	11.18	2.31	12.20	7.51	7.87	1.73	0.04	**77.99**
CG	6.87	15.50	6.43	27.20	11.71	8.17	1.77	9.51	4.30	6.47	1.98	0.10	**72.80**
CS	6.03	13.77	7.12	12.01	28.21	7.19	1.90	9.39	4.70	6.54	3.11	0.05	**71.79**
FIN	9.26	16.88	10.96	6.41	5.52	21.50	2.10	12.45	6.03	6.86	1.97	0.07	**78.50**
HC	3.68	7.49	5.09	3.45	3.60	5.33	55.07	7.00	3.56	2.92	2.78	0.03	**44.93**
IND	8.75	15.19	11.16	6.93	6.67	11.52	2.71	20.06	6.91	8.22	1.84	0.02	**79.94**
OG	8.16	11.70	10.30	4.64	5.01	8.42	2.09	10.39	30.11	7.07	2.09	0.02	**69.89**
TECH	8.51	13.65	9.59	6.21	6.25	8.38	1.50	10.95	6.31	26.77	1.83	0.04	**73.23**
TELE	3.42	9.11	4.11	3.89	5.94	4.88	2.66	4.87	3.73	3.66	53.62	0.10	**46.38**
UTL	0.04	0.07	0.30	0.22	0.18	0.38	0.30	0.00	0.02	0.42	0.21	97.86	**2.14**
TO	**71.27**	**131.67**	**87.13**	**63.66**	**63.94**	**88.14**	**21.24**	**100.28**	**56.46**	**66.81**	**21.74**	**0.73**	**Index**
NET	**-0.72**	**48.18**	**9.14**	**-9.14**	**-7.85**	**9.64**	**-23.69**	**20.34**	**-13.43**	**-6.42**	**-24.64**	**-1.41**	**64.42**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.8. Return Spillover index of USA, South Korea and Sectoral Equity Markets of South Korea

	USA	South Korea	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	44.00	9.35	9.49	3.45	5.33	5.92	0.51	7.42	6.12	5.49	0.24	2.68	**56.00**
South Korea	4.66	17.83	11.17	10.80	7.56	11.61	1.08	13.26	7.66	9.35	0.94	4.08	**82.17**
BM	5.70	15.24	24.11	7.07	6.41	8.80	0.60	13.34	9.69	5.21	0.37	3.44	**75.89**
CG	2.97	18.24	8.64	30.32	6.50	7.25	1.11	9.16	4.78	8.30	0.32	2.41	**69.68**
CS	3.84	12.49	7.77	6.28	31.16	9.56	1.27	9.63	5.93	4.31	2.38	5.37	**68.84**
FIN	4.70	15.82	8.93	5.81	7.70	24.69	0.63	11.29	5.91	6.44	2.08	6.01	**75.31**
HC	0.62	4.40	1.62	2.68	3.14	1.97	77.61	4.39	1.97	0.94	0.10	0.57	**22.39**
IND	4.91	16.56	12.31	6.79	7.05	10.26	1.28	22.22	9.73	5.81	0.47	2.61	**77.78**
OG	5.01	13.20	12.37	4.85	6.14	7.41	0.82	13.47	30.82	3.24	0.34	2.33	**69.18**
TECH	4.27	17.02	7.00	8.93	5.60	8.84	0.54	8.41	3.68	31.45	0.69	3.56	**68.55**
TELE	1.11	3.26	1.44	0.77	4.32	5.37	0.02	1.53	0.96	1.04	68.92	11.25	**31.08**
UTL	2.77	9.04	5.88	2.94	7.25	10.10	0.31	4.89	3.05	3.71	7.05	43.02	**56.98**
TO	**40.58**	**134.61**	**86.62**	**60.37**	**67.00**	**87.09**	**8.18**	**96.79**	**59.46**	**53.85**	**14.98**	**44.32**	**Index**
NET	**-15.42**	**52.44**	**10.74**	**-9.31**	**-1.84**	**11.78**	**-14.21**	**19.01**	**-9.72**	**-14.70**	**-16.10**	**-12.66**	**62.82**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.9. Return Spillover index of USA, UK and Sectoral Equity Markets of UK

	USA	UK	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	25.32	11.67	8.17	6.05	8.27	8.83	2.64	9.44	6.72	7.38	2.32	3.18	**74.68**
UK	7.51	14.60	9.18	8.10	9.66	10.70	4.11	11.47	8.75	7.11	4.42	4.40	**85.40**
BM	7.81	14.79	23.87	4.52	6.49	8.25	1.15	11.38	10.90	6.43	2.03	2.37	**76.13**
CG	5.86	11.95	4.14	21.62	9.27	5.43	7.23	9.49	6.22	6.56	4.70	7.52	**78.38**
CS	7.27	12.77	5.34	8.29	19.31	10.36	2.67	13.20	4.35	8.92	3.96	3.56	**80.69**
FIN	8.34	15.18	7.18	5.31	11.19	20.89	2.13	11.57	5.37	6.56	3.67	2.61	**79.11**
HC	4.74	9.54	1.59	11.36	4.61	3.51	33.60	6.38	5.69	4.36	6.37	8.26	**66.40**
IND	7.16	13.51	8.28	7.62	11.81	9.58	3.26	17.22	6.27	8.88	3.18	3.21	**82.78**
OG	7.09	14.12	11.09	6.64	5.29	6.33	3.82	8.68	23.63	4.90	3.07	5.35	**76.37**
TECH	7.26	11.37	6.40	7.20	10.92	7.34	3.06	12.05	4.83	23.35	3.29	2.93	**76.65**
TELE	3.45	10.24	2.69	7.54	7.07	6.00	6.69	6.37	4.51	4.88	35.16	5.40	**64.84**
UTL	4.25	9.61	3.20	11.13	5.84	3.84	7.80	5.93	7.32	3.93	5.14	32.02	**67.98**
TO	**70.73**	**134.75**	**67.26**	**83.75**	**90.41**	**80.16**	**44.58**	**105.94**	**70.96**	**69.92**	**42.15**	**48.79**	**Index**
NET	**-3.95**	**49.36**	**-8.87**	**5.37**	**9.72**	**1.05**	**-21.82**	**23.16**	**-5.41**	**-6.74**	**-22.68**	**-19.18**	**75.78**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.10. Return Spillover index of USA and Sectoral Equity Markets of USA

	USA	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	15.80	8.17	9.35	8.96	9.06	7.58	10.29	6.99	9.38	5.19	9.23	**84.20**
BM	7.05	14.38	9.91	8.56	9.31	6.80	11.95	10.88	4.60	7.34	9.23	**85.62**
CG	7.84	9.21	13.43	9.49	13.27	7.17	11.28	7.48	4.98	6.64	9.21	**86.57**
CS	7.94	8.61	10.27	14.54	9.81	8.01	11.22	7.21	4.62	6.90	10.86	**85.46**
FIN	7.87	8.96	13.75	9.40	13.92	7.21	11.33	7.42	4.80	6.31	9.02	**86.08**
HC	7.88	7.83	8.93	9.17	8.67	16.81	10.18	7.50	5.51	8.04	9.50	**83.19**
IND	7.98	10.46	10.62	9.76	10.31	7.72	12.60	8.75	4.91	7.00	9.87	**87.40**
OG	6.74	11.91	8.89	7.74	8.52	7.18	10.97	15.96	5.07	8.04	8.98	**84.04**
TECH	12.05	7.33	7.85	7.00	7.30	7.06	8.50	6.99	21.08	8.13	6.71	**78.92**
TELE	5.77	8.89	8.76	8.17	8.01	8.53	9.74	8.88	7.00	18.17	8.08	**81.83**
UTL	8.16	9.16	9.81	10.64	9.25	8.16	11.19	8.16	4.47	6.66	14.35	**85.65**
TO	**79.29**	**90.53**	**98.14**	**88.89**	**93.50**	**75.41**	**106.64**	**80.26**	**55.36**	**70.24**	**90.70**	**Index**
NET	**-76.04**	**-76.46**	**11.57**	**-74.82**	**-76.83**	**-7.78**	**19.24**	**-3.78**	**-23.56**	**-11.59**	**5.05**	**84.45**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.11. Return Spillover index of USA, Islamic Equity and Sectoral Equity Markets of Islamic

	USA	Islamic	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	93.30	1.06	0.14	0.30	0.62	0.36	0.78	0.84	0.37	0.68	0.28	1.26	**6.70**
Islamic	0.17	16.10	7.82	11.19	10.77	1.74	11.57	11.56	8.89	7.54	1.96	10.69	**83.90**
BM	0.05	12.79	22.29	9.13	8.75	2.93	7.54	11.83	8.58	6.65	3.19	6.30	**77.71**
CG	0.07	14.81	7.72	20.46	9.82	1.38	11.55	12.39	8.52	5.74	1.84	5.69	**79.54**
CS	0.14	14.36	7.22	9.89	20.90	1.22	10.65	11.36	8.34	6.16	1.80	7.97	**79.10**
FIN	0.07	7.94	6.86	4.63	4.97	37.84	4.63	11.08	4.41	4.05	9.58	3.95	**62.16**
HC	0.17	15.77	6.47	11.90	11.10	1.25	21.60	9.91	8.30	5.10	1.47	6.97	**78.40**
IND	0.16	14.16	8.90	10.77	10.22	4.00	8.88	16.65	8.58	5.87	3.98	7.82	**83.35**
OG	0.08	13.16	7.67	9.53	9.52	1.67	8.99	10.32	24.00	6.23	3.64	5.18	**76.00**
TECH	0.20	13.96	7.41	8.00	8.89	1.37	6.89	8.44	7.81	29.47	1.83	5.73	**70.53**
TELE	0.02	8.09	6.34	4.93	6.13	8.78	5.52	9.86	8.43	4.34	34.06	3.52	**65.94**
UTL	0.39	18.30	5.48	7.18	9.85	0.75	8.93	9.45	5.78	4.80	0.57	28.52	**71.48**
TO	**1.51**	**134.40**	**72.03**	**87.45**	**90.63**	**25.46**	**85.92**	**107.04**	**78.00**	**57.15**	**30.15**	**65.06**	**Index**
NET	**-5.19**	**50.51**	**-5.67**	**7.91**	**11.53**	**-36.70**	**7.52**	**23.69**	**2.00**	**-13.38**	**-35.79**	**-6.42**	**69.57**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.12. Return Spillover index of USA, Asia and Sectoral Equity Markets of Asia

	USA	Asia	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	27.16	8.44	9.48	6.69	6.00	8.22	2.84	9.11	8.64	8.42	3.86	1.13	**72.84**
Asia	5.41	12.84	9.72	9.77	9.17	10.42	4.49	11.03	8.23	9.20	6.60	3.12	**87.16**
BM	6.15	10.93	14.62	8.65	7.67	9.51	3.45	11.86	11.16	9.09	5.07	1.84	**85.38**
CG	5.40	11.31	8.82	14.86	8.80	9.03	4.91	11.45	6.82	9.56	5.42	3.61	**85.14**
CS	5.01	10.53	7.86	8.79	14.81	9.17	7.88	8.93	6.98	6.66	7.31	6.08	**85.19**
FIN	5.87	11.98	9.66	8.95	9.10	14.73	4.03	10.81	8.02	8.81	5.48	2.55	**85.27**
HC	4.19	8.06	5.55	7.63	12.45	6.44	22.99	7.26	5.23	4.93	7.73	7.54	**77.01**
IND	5.99	11.41	10.88	10.26	8.01	9.74	4.18	13.32	8.91	9.76	5.36	2.16	**86.68**
OG	6.24	10.33	12.52	7.51	7.66	8.84	3.57	10.87	16.52	8.44	5.69	1.81	**83.48**
TECH	5.79	11.42	9.92	10.25	7.11	9.55	3.40	11.67	8.20	15.95	4.99	1.75	**84.05**
TELE	4.21	10.33	7.07	7.26	10.10	7.47	6.90	8.10	7.11	6.24	19.88	5.35	**80.12**
UTL	2.22	7.50	3.85	7.46	12.74	5.32	10.09	4.99	3.42	3.42	8.25	30.75	**69.25**
TO	**56.48**	**112.22**	**95.34**	**93.23**	**98.82**	**93.71**	**55.75**	**106.07**	**82.72**	**84.54**	**65.75**	**36.94**	**Index**
NET	**-16.36**	**25.06**	**9.96**	**8.09**	**13.63**	**8.44**	**-21.26**	**19.39**	**-0.76**	**0.49**	**-14.38**	**-32.31**	**81.80**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.13. Return Spillover index of USA, Australasia and Sectoral Equity Markets of Australasia

	USA	Australasia	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	26.22	9.22	7.92	5.40	6.75	7.80	5.64	8.20	7.75	3.55	4.51	7.05	**73.78**
Australasia	5.11	11.80	9.36	7.25	10.04	10.41	7.20	10.25	9.02	5.66	5.13	8.79	**88.20**
BM	5.17	12.01	15.17	6.60	9.02	7.94	5.87	9.30	10.85	4.90	4.26	8.90	**84.83**
CG	4.23	9.99	7.07	16.29	10.18	8.44	8.04	9.39	7.59	5.65	5.35	7.76	**83.71**
CS	4.93	11.20	7.86	8.23	13.13	9.86	7.57	10.06	8.02	5.64	5.23	8.28	**86.87**
FIN	5.06	12.03	7.15	7.06	10.24	13.63	7.27	10.64	7.37	5.42	5.62	8.52	**86.37**
HC	4.40	10.17	6.43	8.23	9.62	8.89	16.67	9.16	7.09	5.63	6.04	7.67	**83.33**
IND	5.52	11.23	7.95	7.50	9.90	10.07	7.10	12.91	8.16	5.15	5.69	8.81	**87.09**
OG	5.07	11.26	10.58	6.91	8.90	7.96	6.28	9.25	14.80	5.07	4.55	9.38	**85.20**
TECH	3.71	9.95	6.68	7.15	8.91	8.23	6.94	8.25	7.16	20.48	5.07	7.48	**79.52**
TELE	4.99	9.07	5.88	6.85	8.33	8.54	7.62	9.17	6.46	5.13	20.71	7.25	**79.29**
UTL	4.93	10.79	8.52	6.94	9.17	9.05	6.67	9.89	9.23	5.26	5.07	14.49	**85.51**
TO	**53.11**	**116.92**	**85.38**	**78.12**	**101.07**	**97.19**	**76.21**	**103.56**	**88.70**	**57.05**	**56.50**	**89.89**	**Index**
NET	**-20.67**	**28.72**	**0.55**	**-5.59**	**14.20**	**10.82**	**-7.12**	**16.47**	**3.50**	**-22.46**	**-22.79**	**4.38**	**83.64**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.14. Return Spillover index of USA, Emerging Markets and Sectoral Equity Markets of Emerging

	USA	EM	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	23.17	8.55	8.03	4.75	9.02	6.64	4.21	7.44	7.20	6.91	7.77	6.32	**76.83**
EM	4.57	11.03	9.93	5.59	9.24	8.07	5.95	10.11	9.31	7.22	9.49	9.50	**88.97**
BM	4.85	11.10	12.46	5.17	8.59	7.80	5.22	10.02	9.96	6.75	8.94	9.14	**87.54**
CG	4.10	8.96	7.42	17.63	8.78	10.83	5.06	7.77	6.86	5.09	9.27	8.24	**82.37**
CS	5.16	10.48	8.68	6.18	12.52	7.89	6.00	9.44	7.99	6.86	9.78	9.01	**87.48**
FIN	4.44	10.08	8.74	8.45	8.69	13.75	4.57	8.41	9.17	5.53	9.31	8.87	**86.25**
HC	3.86	9.65	7.64	5.07	8.65	5.89	17.46	9.94	6.97	6.65	8.75	9.47	**82.54**
IND	4.68	10.95	9.73	5.32	9.09	7.36	6.58	12.00	8.11	7.61	9.31	9.26	**88.00**
OG	4.72	11.01	10.56	5.01	8.36	8.64	5.12	8.86	13.08	6.30	8.94	9.40	**86.92**
TECH	5.23	10.44	8.70	4.64	8.70	6.41	6.01	10.16	7.68	15.93	8.09	8.02	**84.07**
TELE	4.28	10.58	8.90	6.42	9.59	8.33	5.96	9.54	8.44	6.24	12.25	9.46	**87.75**
UTL	3.76	10.74	9.33	5.76	8.97	7.99	6.62	9.74	9.01	6.19	9.57	12.32	**87.68**
TO	**49.66**	**112.52**	**97.65**	**62.36**	**97.68**	**85.85**	**61.30**	**101.43**	**90.70**	**71.36**	**99.21**	**96.69**	**Index**
NET	**-27.18**	**23.55**	**10.11**	**-20.02**	**10.20**	**-0.40**	**-21.24**	**13.43**	**3.79**	**-12.71**	**11.47**	**9.00**	**85.53**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.15. Return Spillover index of USA, Economic and Monitory Union and Sectoral Equity Markets of Economic and Monitory Union

	USA	EMU	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	21.21	9.39	7.78	6.86	8.26	7.25	5.14	7.29	6.86	6.08	7.56	6.33	**78.79**
EMU	7.44	15.57	7.71	7.99	8.44	8.73	6.24	8.49	7.87	6.21	7.90	7.42	**84.43**
BM	4.98	6.23	12.66	8.93	8.29	9.70	5.27	9.93	9.92	6.62	8.66	8.81	**87.34**
CG	4.16	6.07	8.45	11.91	9.43	10.09	6.82	10.07	7.68	7.03	9.00	9.29	**88.09**
CS	4.98	6.68	8.12	9.78	12.39	9.82	6.65	9.18	7.64	6.81	9.19	8.75	**87.61**
FIN	4.25	6.41	8.87	9.76	9.13	11.49	6.43	10.13	8.40	6.75	9.00	9.37	**88.51**
HC	4.43	6.45	6.96	9.51	8.98	9.10	16.05	9.15	6.67	5.94	8.19	8.56	**83.95**
IND	4.59	6.35	9.19	9.84	8.67	10.20	6.49	11.61	7.92	7.51	8.61	9.02	**88.39**
OG	4.79	6.67	10.44	8.50	8.17	9.59	5.29	8.96	13.25	6.12	8.90	9.31	**86.75**
TECH	4.76	6.16	8.18	9.26	8.54	9.21	5.73	10.18	7.25	15.71	7.57	7.46	**84.29**
TELE	4.54	6.31	8.64	9.50	9.32	9.84	6.22	9.30	8.50	6.09	12.57	9.16	**87.43**
UTL	3.99	5.91	8.82	9.75	8.84	10.14	6.50	9.71	8.86	5.92	9.09	12.48	**87.52**
TO	**52.91**	**72.64**	**93.16**	**99.67**	**96.06**	**103.68**	**66.79**	**102.39**	**87.58**	**71.08**	**93.66**	**93.47**	**Index**
NET	**-25.87**	**-11.80**	**5.82**	**11.59**	**8.44**	**15.17**	**-17.16**	**14.00**	**0.83**	**-13.21**	**6.23**	**5.95**	**86.09**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.16. Return Spillover index of USA, Europe Union and Sectoral Equity Markets of Europe Union

	USA	EU	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	19.95	8.97	8.07	8.09	8.07	7.62	5.26	9.09	6.50	7.99	4.70	5.69	**80.05**
EU	5.25	10.85	9.03	8.95	9.37	9.39	5.88	10.03	7.86	8.02	7.41	7.97	**89.15**
BM	5.43	10.74	12.93	8.61	8.39	8.33	4.69	10.90	8.80	8.02	6.19	6.97	**87.07**
CG	5.41	10.39	8.42	12.58	9.78	7.51	6.74	9.79	7.17	7.61	7.03	7.57	**87.42**
CS	5.31	10.58	7.99	9.51	12.22	8.84	5.75	9.93	6.93	8.30	7.20	7.46	**87.78**
FIN	5.40	11.31	8.41	7.79	9.42	13.12	5.16	9.88	7.18	7.58	7.31	7.45	**86.88**
HC	5.21	9.27	6.28	9.17	8.02	6.76	17.11	7.80	6.77	7.35	8.26	7.99	**82.89**
IND	5.53	10.78	9.83	9.04	9.42	8.84	5.33	11.64	7.35	8.76	6.47	7.02	**88.36**
OG	5.00	10.24	9.68	8.02	7.98	7.81	5.56	8.93	14.08	6.93	7.19	8.58	**85.92**
TECH	5.84	10.14	8.56	8.28	9.30	7.97	5.87	10.35	6.76	13.67	6.35	6.90	**86.33**
TELE	3.71	10.08	7.04	8.25	8.71	8.20	7.16	8.17	7.44	6.85	14.89	9.49	**85.11**
UTL	4.32	10.22	7.54	8.36	8.47	7.90	6.50	8.39	8.46	7.03	8.90	13.92	**86.08**
TO	**56.40**	**112.72**	**90.86**	**94.07**	**96.92**	**89.18**	**63.89**	**103.27**	**81.21**	**84.44**	**77.00**	**83.08**	**Index**
NET	**-23.64**	**-201.87**	**3.78**	**6.65**	**9.13**	**2.30**	**-18.99**	**14.91**	**-4.72**	**-1.89**	**-8.11**	**-3.00**	**86.09**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.17. Return Spillover index of USA, GCC and Sectoral Equity Markets of GCC

	USA	GCC	BM	CG	CS	FIN	HC	IND	OG	TELE	UTL	From
USA	68.58	5.78	2.14	2.33	2.24	4.99	0.67	6.11	0.61	4.16	2.38	**31.42**
GCC	2.94	19.48	6.26	4.55	9.06	18.73	1.75	14.23	1.69	11.82	9.49	**80.52**
BM	1.68	12.73	39.62	5.18	4.51	11.02	1.02	8.39	1.67	9.53	4.63	**60.38**
CG	1.78	10.84	6.02	46.03	4.10	9.55	0.86	7.42	1.30	6.67	5.45	**53.97**
CS	2.33	14.75	3.55	3.15	30.67	13.68	1.36	10.70	1.89	7.82	10.08	**69.33**
FIN	3.07	20.45	5.90	4.33	9.16	21.47	1.50	13.80	1.78	9.50	9.04	**78.53**
HC	0.78	5.63	1.68	1.31	2.89	4.20	70.20	4.96	0.16	5.73	2.47	**29.80**
IND	3.44	17.64	5.18	3.87	8.25	15.68	2.00	24.01	1.70	8.14	10.08	**75.99**
OG	1.74	6.05	3.64	1.94	3.43	5.88	0.13	4.86	67.50	2.28	2.55	**32.50**
TELE	2.13	17.24	7.16	4.10	7.11	12.70	2.33	9.86	1.09	28.41	7.87	**71.59**
UTL	2.70	14.59	3.58	3.56	9.80	12.70	1.19	12.52	1.07	8.23	30.07	**69.93**
TO	**22.59**	**125.70**	**45.11**	**34.32**	**60.55**	**109.12**	**12.81**	**92.85**	**12.97**	**73.89**	**64.05**	**Index**
NET	**-28.72**	**-65.93**	**-15.27**	**-50.42**	**-59.53**	**30.59**	**-16.98**	**16.86**	**-19.53**	**2.30**	**-5.89**	**59.45**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.18. Return Spillover index of USA, Latin America and Sectoral Equity Markets of Latin America

	USA	LA	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	25.85	8.57	7.97	5.47	8.49	7.28	4.68	10.04	4.85	7.65	3.01	6.13	**74.15**
LA	4.04	11.93	9.41	8.05	9.39	10.77	5.78	10.04	8.68	8.50	3.84	9.58	**88.07**
BM	4.81	11.80	14.91	6.42	8.33	9.21	5.63	9.78	9.05	7.75	3.81	8.50	**85.09**
CG	3.61	11.19	7.11	16.54	9.48	9.24	6.34	9.99	6.17	8.08	3.58	8.68	**83.46**
CS	4.56	10.89	7.68	7.91	13.84	9.18	5.75	11.06	6.43	8.93	4.42	9.34	**86.16**
FIN	3.78	12.38	8.43	7.64	9.10	13.78	5.61	9.78	7.85	8.10	3.60	9.96	**86.22**
HC	4.11	9.74	7.62	7.67	8.34	8.21	20.06	9.21	6.11	6.75	3.96	8.21	**79.94**
IND	5.38	11.03	8.60	7.91	10.47	9.33	6.01	13.11	6.93	8.68	3.83	8.73	**86.89**
OG	3.42	12.10	10.11	6.20	7.71	9.49	5.02	8.77	16.62	7.56	3.95	9.05	**83.38**
TECH	4.41	10.92	7.92	7.45	9.93	9.07	5.18	10.24	6.99	15.58	3.32	9.00	**84.42**
TELE	3.30	8.54	6.78	5.77	8.44	6.95	5.17	7.67	6.26	5.74	26.12	9.26	**73.88**
UTL	3.28	11.30	8.02	7.38	9.53	10.22	5.80	9.41	7.73	8.18	4.99	14.16	**85.84**
TO	**44.70**	**118.44**	**89.65**	**77.88**	**99.20**	**98.95**	**60.96**	**105.99**	**77.05**	**85.93**	**42.30**	**96.45**	**Index**
NET	**-29.45**	**30.37**	**4.56**	**-5.58**	**13.05**	**12.73**	**-18.98**	**19.10**	**-6.33**	**1.50**	**-31.59**	**10.61**	**83.12**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

A 1.19. Return Spillover index of USA, Pacific and Sectoral Equity Markets of Pacific

	USA	Pacific	BM	CG	CS	FIN	HC	IND	OG	TECH	TELE	UTL	From
USA	26.75	8.94	9.16	6.77	5.94	7.98	2.59	8.86	8.03	4.35	8.16	2.45	**73.25**
Pacific	5.14	11.52	9.76	9.44	8.88	10.35	4.39	10.70	8.55	7.16	9.01	5.10	**88.48**
BM	5.84	11.40	13.59	8.78	7.47	9.53	3.17	11.47	10.33	6.11	8.59	3.72	**86.41**
CG	5.13	11.25	8.94	13.71	8.85	8.79	4.72	10.88	6.86	5.97	9.52	5.37	**86.29**
CS	4.61	10.67	7.72	8.95	13.81	8.64	7.14	9.12	6.74	7.28	7.82	7.49	**86.19**
FIN	5.21	12.12	9.59	8.64	8.41	13.42	3.44	10.49	8.55	6.92	8.61	4.62	**86.58**
HC	3.96	8.69	5.44	7.78	11.88	5.83	22.42	7.18	4.67	7.06	6.22	8.87	**77.58**
IND	5.52	11.52	10.59	9.84	8.16	9.63	3.93	12.42	8.69	6.23	9.32	4.14	**87.58**
OG	5.47	11.06	11.42	7.45	7.27	9.44	3.00	10.43	15.00	7.39	8.17	3.91	**85.00**
TECH	3.71	10.54	7.73	7.31	9.00	8.68	5.40	8.54	8.44	16.84	6.72	7.10	**83.16**
TELE	5.29	11.27	9.17	10.00	8.08	9.23	3.92	10.81	7.88	5.75	14.42	4.17	**85.58**
UTL	2.79	9.18	5.71	8.11	11.28	7.10	8.15	6.90	5.44	8.73	6.02	20.59	**79.41**
TO	**52.68**	**116.66**	**95.22**	**93.08**	**95.22**	**95.20**	**49.85**	**105.38**	**84.18**	**72.94**	**88.16**	**56.94**	**Index**
NET	**-20.57**	**-205.14**	**8.81**	**6.78**	**9.03**	**8.62**	**-27.72**	**17.81**	**-0.82**	**-10.23**	**2.58**	**-22.48**	**83.79**

Note: Spillover indices are calculated from variance decomposition based on 10-step-ahead forecasts. The underlying forecast error variance decomposition (FEVD) is based on upon a ten-dimension FIVAR of order 1, which is indicated by the AIC.

See Figures A1 – A2.

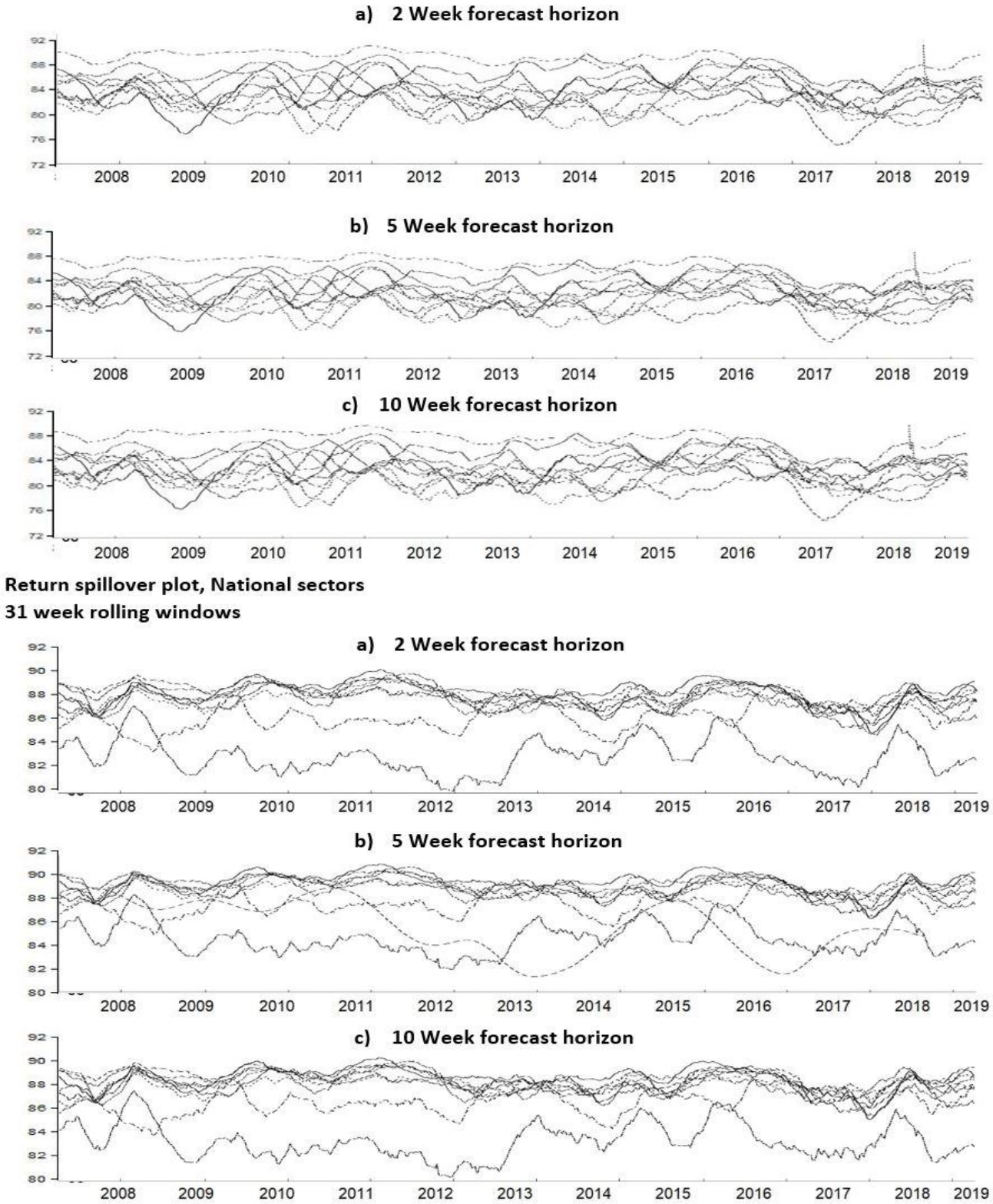
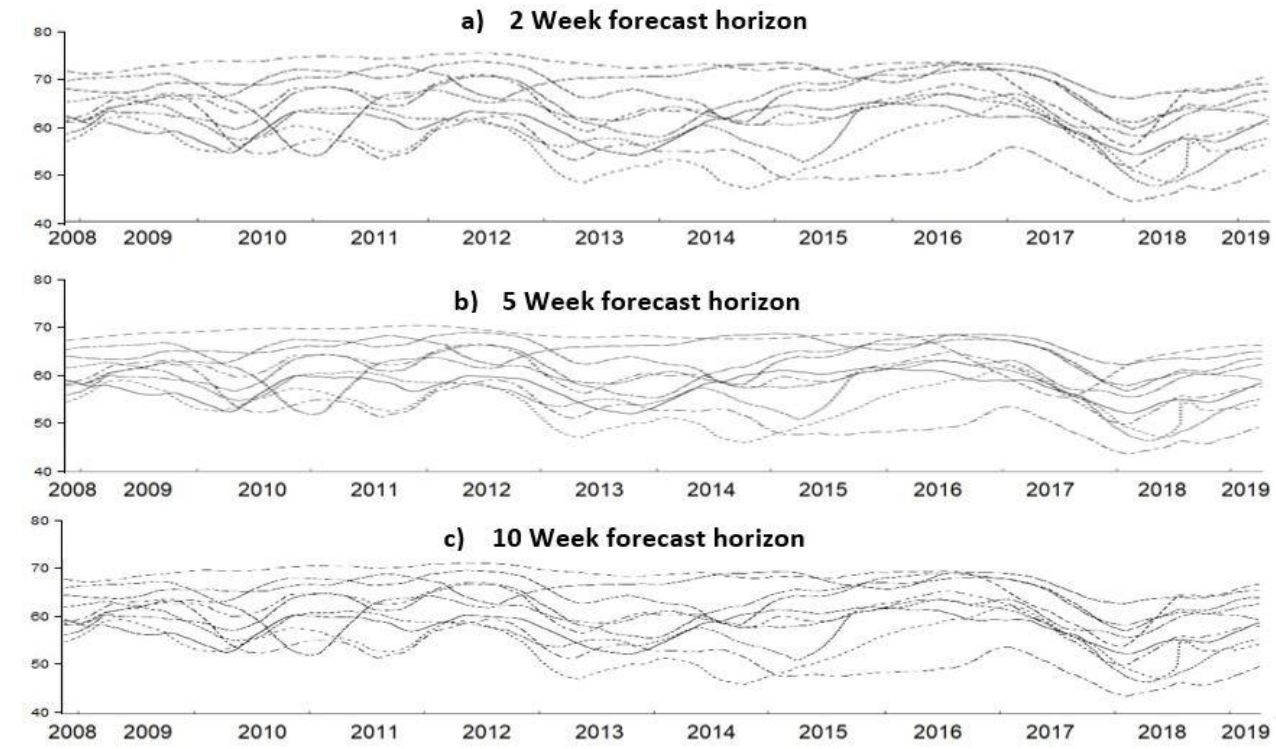
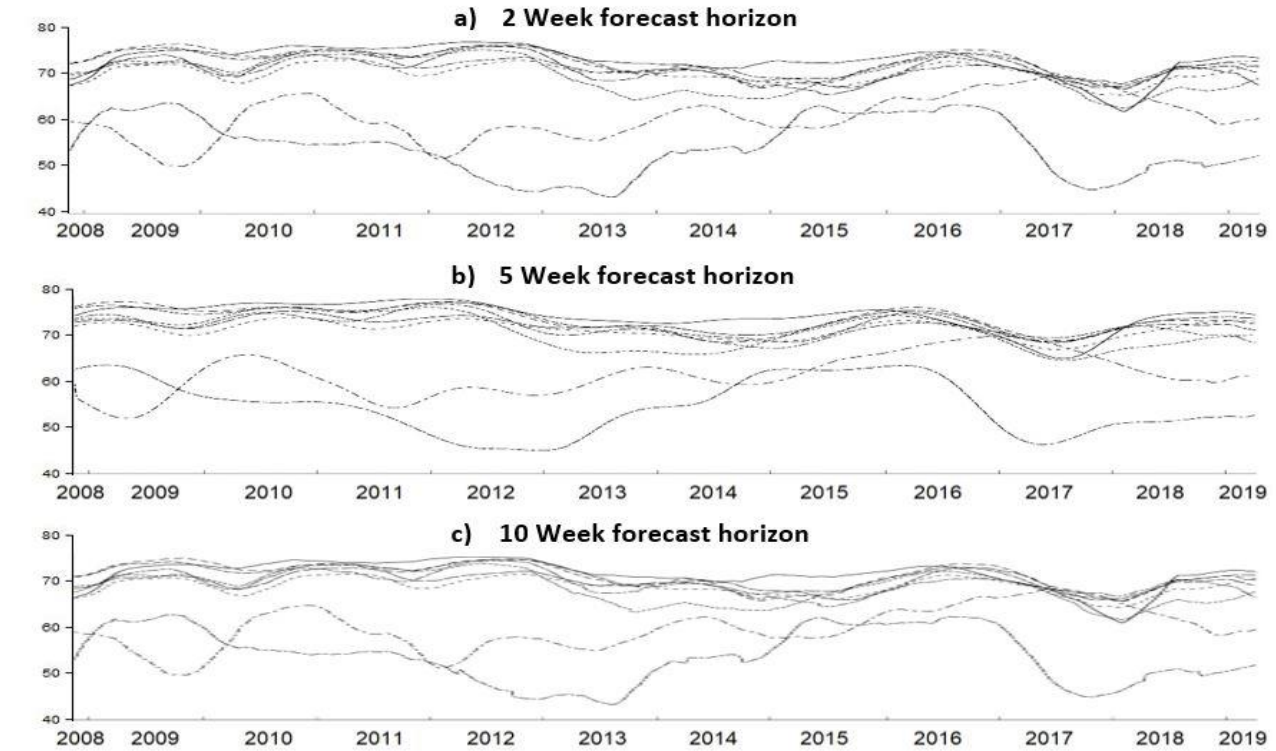


Fig. A1. Robustness of total return spillover indices for National and Regional sectors Note: The total return spillover indices are calculated by re-estimating the second-order VAR approach using 31-week rolling window estimates with 10- , 5- , and 2-week forecast horizons.



Return spillover plot, National sectors
75 week rolling windows



Return spillover plot, Regional sectors
75 week rolling windows

Fig. A2. Robustness of total return spillover indices for National and Regional sectors Note: The total return spillover indices are calculated by re-estimating the second-order VAR approach using 75-week rolling window estimates with 10- , 5- , and 2-week forecast horizons.

A3. Statement of Contribution to Doctorate with Publications (Chapter 2)

DRC 16

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

GRADUATE RESEARCH SCHOOL

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:	Syed Mabruk Billah
Name/title of Primary Supervisor:	Dr. Faruk Balli (Associate Professor)
In which chapter is the manuscript /published work:	Chapter 2

Please select one of the following three options:

(●) The manuscript/published work is published or in press

- Please provide the full reference of the Research Output:

Balli, F., Billah, M., Balli, H. O., & Gregory-Allen, R. (2020). Economic uncertainties, macroeconomic announcements and sukuk spreads. Applied Economics, 1-22.

( ) The manuscript is currently under review for publication – please indicate:

- The name of the journal:

- The percentage of the manuscript/published work that was contributed by the candidate:

- Describe the contribution that the candidate has made to the manuscript/published work:

Syed Mabruk Billah is the main author of this paper and while his supervisors have made contribution, which is reflected by co-authorship, the paper is essentially the work of Syed Mabruk Billah.

( ) It is intended that the manuscript will be published, but it has not yet been submitted to a journal

Candidate's Signature:	Syed Mabruk Billah — Digitally signed by Syed Mabruk Billah, Date: 2020.09.07 20:02:32 +12'00'
Date:	07-Sep-2020
Primary Supervisor's Signature:	FARUK BALLI — Digitally signed by FARUK BALLI, DN: c=FARUK BALLI, o=NZ, o=MASSEY UNIVERSITY, ou=SCHOOL OF ECONOMICS AND FINANCE, email=f.balli@massey.ac.nz, Date: 2020.09.07 08:26:00 +12'00'
Date:	7-Sep-2020

This form should appear at the end of each thesis chapter/section/appendix submitted as a manuscript/ publication or collected as an appendix at the end of the thesis.

A4. Statement of Contribution to Doctorate with Manuscripts (Chapter 4)

DRC 16

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UNIVERSITY OF NEW ZEALAND

GRADUATE RESEARCH SCHOOL

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:	Syed Mabruk Billah
Name/title of Primary Supervisor:	Dr. Faruk Balli (Associate Professor)
In which chapter is the manuscript /published work:	Chapter 4

Please select one of the following three options:

○ The manuscript/published work is published or in press

- Please provide the full reference of the Research Output:

◉ The manuscript is currently under review for publication – please indicate:

- The name of the journal:

Applied Economics

- The percentage of the manuscript/published work that was contributed by the candidate:

- Describe the contribution that the candidate has made to the manuscript/published work:

This paper is chapter 4 in Syed Mabruk Billah's Ph.D. Dissertation and while his supervisors have made contribution, which is reflected by co-authorship, the paper is essentially the work of Syed Mabruk Billah.

○ It is intended that the manuscript will be published, but it has not yet been submitted to a journal

Candidate's Signature:	Syed Mabruk Billah — Digitally signed by Syed Mabruk Billah, Date: 2020.09.07 19:58:22 +12'00'
Date:	07-Sep-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: 2020.09.07 08:25:40 +12'00'
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