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Long Run and Short Run Connection between Emerging Asian Markets and World Conventional and Islamic Markets

by

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I want to dedicate this thesis to my parents, respected teachers and friends for their love, support and care.

CERTIFICATE OF APPROVAL

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Abstract

This study examines the bivariate dynamics of Asian emerging markets with international conventional and Islamic markets in the background of co-integration and time varying correlation. The ARDL and DCC GARCH approaches are employed on the daily data ranging the period April 01, 2013 to July 31, 2020. The findings conclude that Asian emerging markets are correlated in short term with both international conventional and Islamic markets. However, significant long run relationship of Indian market is observed with both conventional and Islamic markets. Moreover, this study finds very little evidence of past residual shocks on conditional correlation for the pairs of markets of UK conventional markets with Chinese, Indonesian and Indian markets as well as World equity market with Pakistan. However, Chinese and Pakistani equity markets show significant effect of past residual shocks on conditional correlation. In further, the lagged dynamic conditional correlation is present for all the pairs of MSCI world market with Asian markets except for the pairs of MSCI world market with Malaysian market and US equity market with Indian market. The findings of Asian markets with Islamic markets with respect to DCC exhibit mixed results. Finally, this study is valuable for regulators in order to construct macro stabilizing policies, efficient resource allocation and risk management. This study also provides useful insights for foreign investors, traders and fund managers in preparing investing and trading objectives for portfolio constructing and portfolio diversification.

Keywords: ARDL, DCC-GARCH, Co-movement, Asian Markets

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Abbreviations

ARDL	Auto Regressive Distributed Lag
DCC	Dynamic Conditional Covariance
CUSUM	Cumulative Sum of Recursive Residuals
LBANG	Log of Bangladesh DSEX Index
LCHINA	Log of China SSE Composite Index
LMAL	Log of Malaysia KLSE Index
LPAK	Log of Pakistan KSE100 Index
LINDO	Log of Indonesia JKSE Composite Index
LINDIA	Log of India BSE Index
LWE	Log of MSCI World Market Index
LUSC	Log of USA S&P 500 Index
LUKC	Log of UK FTSE 100 Index
LWEI	Log of MSCI world Islamic Index
LUSI	Log of DJIM US Index
LUKI	Log of DJIM UK Index

Chapter 1

Introduction

A decade after the global financial crisis, financial market integration increases like economic trade and financial liberalization etc. but decreases investor diversification benefits across developed markets. Investors and fund manager have shifted their investments from developed markets to emerging markets and from emerging markets to developed markets. The main purpose of the study is to understand the volatilities and correlation between Asian emerging markets and international countries markets.

1.1 Theoretical Background

International investors are aware of the fact that international stocks have different characteristics and portfolio performance; it can be increased through diversification across different countries or investment in different industries. Investment in domestic markets and international markets are different form each other due to covariance, countries rule and regulations like taxation, Currency control and exchange rate (Gupta & Donleavy, 2009). When the stocks are integrated with each other's, the benefits of diversification are limited, the benefits of diversification increase when the stock are not correlated with each other's. Basically, this idea motivates investors to diversify investments or assets across borders, the return

receive foreign market is not perfectly correlated with the return that receive in the local market.

Increasing financial market integration around the world like economic trade, bilateral trade and financial liberalization and enormous economic crises decreases advantages of diversification over time. This situation has encouraged global investors to look for other asset classes to maintain certain levels of returns of their portfolios, such as Islamic securities. Recently, Islamic finance has seen significant growth and innovation to the point that it has become a feasible alternative to conventional finance.

There has been a considerable expansion worldwide in Islamic finance and banking over the last decade, and there is speedy growth in the Islamic Sharia compliant investments than conventional finance. Pakistan has observed 18% growth and UK observed 14% growth in Islamic finance since 2007. Outside the Islamic world, Islamic finance has speedily grown-up in the UK followed by Europe and USA. The religion identification shows that Muslims represent 23.2% of the world's population in 2010 and are expected to represent 30% of the world's total population by 2050 (Gad & Andrikopoulos, 2019).

The risk of investment can be minimized through diversification, when the portfolio of stock is less correlated with each other. Investors maximize their return by lowest possible risk they faced, and make their portfolio of diverse mix by including different assets such as equity, fixed income instruments etc. The correlations among the stocks are lower, and the risk reduction can be achieved in the portfolio. The international portfolio theory, developed by (Solnik, 1974) says that more benefits of diversification can be achieved when investors invest in stock across borders. Oloko (2017) determine that investors are eager to diversify their assets out of the country if the return of the stock is less correlated with return to local countries stocks markets; it is more beneficial because in foreign stock markets long term benefits can be achieved by the investors. Another recent study also provides similar evidence (Saiti & Noordin, 2018).

The relationship between Asian markets and international markets is significant because it explains how well these markets are connected and how easily new

information is transmitted from one market to another. If markets are linked and open to each other, fund managers and investors may use past information to estimate future returns. Due to the globalization, advantages of portfolio diversification across developed markets have been limited by a high degree of integration, and investors have thus shifted their investments in that markets which are less correlated with each other's.

As discussed earlier due to the effect of liberalization, correlation between the countries increased. The investors and portfolio managers need to identify that markets which are less correlated with each other's. Asian emerging markets and developed markets have to be considered high earning and low correlations markets with each other's. The low co-movement between developed and emerging equity markets shows that availability of quality information, investors may take best investment decision in their favor (Lingaraja, Selvam, Vasanth, & Ramkumar, 2015). Another study (Li, Sarkar, & Wang, 2003) compares the US markets with emerging countries and show that US investors invest in emerging markets because US markets stock has low correlation with emerging markets.

The co-movements are boosted by globalization and technological growth, a cross-class correlation that makes it impossible for disparate resources to be diversified. Therefore, investors and managers are more concerned with assessing the causality and co-movement between indices in order to gain the advantage of global portfolio diversity to invest Islamic stock or conventional stocks. This study explores, in this respect, the dynamics of co-movement between emerging Asian markets and international conventional as well as international Islamic markets.

The theoretical background of this study is efficient market hypothesis. The market is said to be efficient when the security prices completely reflect all the available information about the security or stock and adjust price according to that information, the theory of efficient market states that investors do not rely on all available information to forecast the security prices movement in the future. There are three forms of market efficiency including Weak form efficiency, Semi strong form efficiency and Strong form efficiency. The weak form says that on the basis of historical prices stock prices are predicted, semi strong form states that all

publicly available information is already reflected in the stock prices like financial statements, different announcements, accounting ratios, non-market information and there is no valve based on future predicted prices. The last one is strong form in which all the relevant information regarding the stock either it is privately or publicly available is quickly reflected in the stock prices (Saiti & Noordin, 2018).

As according to this theory prices of securities adjust to the arrival of new information. This new information created in one market effects the other market as well. When the information arrives in conventional markets then Islamic markets are also influenced. The information may be transmitted from International financial markets to Asian emerging markets and from Asian emerging markets to International Financial Markets.

1.2 Research Gap

When there is co-movement in stock the benefit of diversification is limited, and when there is no co-movement in stock there is strong benefits of diversification (Christoffersen, Errunza, Jacobs, & Langlois, 2012), Gupta (2013) says that, when there is correlation in the markets the benefits of diversification decreases, this results is also supported by Abbes & Trichilli (2015). Another study (Saiti & Noordin, 2018) explore time varying correlation and compares Malaysia index with Asian indices and international developed indices, conventional as well as Islamic stock indices, and this study suggests that the future study should be conducted by adding more countries, in order to know the co-movement between them. So, the investors and fund manager should get benefits from portfolio diversification. Therefore, this is the extension of earlier study. This is the value addition in our existing knowledge by adding emerging countries as base indices and compares it with the international and Islamic markets indices of developed countries. Most of the studies are on time varying correlation in volatility of Islamic markets. The best way for examine portfolio diversification are short run and long rum co-movements. So, the second extension is time varying correlation as well as short run and long rum co-movements.

1.3 Research Questions

Research questions of this study are:

Research Question 1

Is there long run relationship between Asian emerging markets and international conventional and Islamic markets?

Research Question 2

Is there short run relationship between Asian emerging markets and international conventional and Islamic markets?

Research Question 3

Is there time varying correlation in volatility between Asian emerging markets and international conventional and Islamic markets?

1.4 Objectives of the Study

Subsequent are the objectives of the study:

Research objective 1

To examine the long run relationship between Asian emerging markets and international conventional and Islamic markets.

Research objective 2

To examine the short run relationship between Asian emerging markets and international conventional and Islamic markets.

Research objective 3

To explore the time varying correlation between Asian emerging markets and international conventional and Islamic markets.

1.5 Significance of Work

This research work is for the investors of Asian emerging markets. The emerging

markets investors understand the return correlations and co-movement between Asian emerging markets and international countries markets. The equity investors and fund managers of emerging markets in making investment decision on where in the world to invest.

They will see which market is better for them to invest according to their objective. Similarly this study is also beneficial for Pakistani investors and fund managers in constructing diversified portfolios by including those international markets that are weakly correlated.

The advantages of portfolio diversification across developed markets have been limited by a high degree of integration and investors have also shifted their investments from developed to emerging markets and from emerging markets to developed markets. It is also desirable to diversify investments in the mix of developed and emerging markets.

In the perspective of Pakistan, the theoretical perspective shows that trade plays a fundamental role to link Pakistan with other countries, Interestingly, Pakistan's top trade partners include both developed and developing countries with a low degree of integration therefore, there is a good opportunity for investors and portfolio manager to invest in those markets which are less correlated with each other's.

1.6 Plan of Study

This thesis comprises of five main chapters. Chapter 1 focuses on primary idea of the relevant topic which includes Introduction, Theoretical Background, Research Gap, Research Questions, Research Objectives and Significance of the study. Chapter 2 reports the findings and outcomes of survey of topic that includes the theoretical and empirical arguments from previous study.

Chapter 3 contains the definition of the variables and various methodologies which have been employed for investigation that including Auto Regressive Distributed Lag Model (ARDL) for short run as well as long run relationship and DCC-GARCH for time varying correlation in volatility. Chapter 4 explains the outcomes

from empirical results and explains the finding. Finally chapter 5 summarizes the research outcomes and recommendations are added in this chapter that according to market conditions of each Asian countries.

Chapter 2

Literature Review

2.1 Asian Emerging Markets with International Conventional Markets

When an investment decision is made, investors chose different type of assets for diversification. And some prefer international diversification Wong, Penm, Terreil, & Lim (2004) examine the relationship between major developed countries' stock markets and emerging markets in Asia. This study uses the indices of US, UK, Japan from the developed markets and Malaysia, Thailand, Korea, Taiwan, Singapore and Hong Kong from the emerging markets. The cointegration test is employed, and three sub periods are selected Period I is from Jan 1st 1981 to Dec 31st 1986, Period II is from Jan 1st 1987 to Dec 31st 1996, and Period III is from Jan 1st 1997 to Dec 31st 2002. The finding of the study indicate that Singapore and Taiwan are co-integrated with Japan, while Hong Kong is integrated with the United States and the United Kingdom. The long-term balance between Malaysia, Thailand and Korea and established markets such as the United States, the United Kingdom and Japan does not exist. The relationship between emerging and developed markets often changes over time. When markets move together the aim of risk minimizing through portfolio diversification is not achived. A study M & M (2002) examine risk and return tradeoff in investing emerging stock markets and developed stock markets. The study examine indices of Europe, east and west

Asia, Africa, Middle East, North America, and Latin America for the period of 01/01/1997 to 11/15/1999. By using Capital asset pricing model, the study identifies that investment returns in emerging markets are much greater than investment returns in developed markets, but emerging stock markets are more volatile than developed stock markets. The study also identifies that link between the emerging markets and industrialized markets are weak. So, when the cointegration is weak between these two markets, it provides important opportunity of diversification to investors of these markets.

Ali, Butt, & Rehman, (2011) uses co-integration approach to investigate the co-movement of Pakistan's stock market with the markets of China, Singapore, Malaysia, Japan, the UK, India, Indonesia, Taiwan, and the USA. The perioed for selection of data for this study is from 1998 to 2008. The finding of the result shows that with the markets of Singapore, USA, Taiwan, UK, and Malaysia there is no co-movement of Pakistan's equity market. So, by investing in these countries' investors can reduce the risk. There is co-movement between the stock prices of Pakistan equity market and the stock prices of Japan, India, Indonesia and China so therefor in these countries there is no possibility of investor risk minimization through the foreign portfolio.

Most of the studies are focus on short term and long term relationship between these markets. Lamba (2005) investigate the short run and long run relationships between Pakistan and major developed countries by applying multivariate co-integration framework and vector error-correction modeling. Time period of the study is from Jul 1997 to Dec 2003. The findings indicate that in the entire sample period of the study, Pakistani market is isolated from major developed markets.

Another study (Ali, Butt, & Rehman 2011) investigate by using co-integration method the co movement of Pakistan's Equity Market with the markets of India, Indonesia, Singapore, USA, Taiwan, Malaysia, China, Japan, and UK for the period 1998 to 2008. This study provides the results that with the markets of Taiwan, USA, Malaysia, Singapore, and UK there is no co-movement of equity market of Pakistan. Whereas equity market of Pakistan stock prices move along with the China stock prices, Indonesia, India, and Japan so in these countries the

opportunity of risk is decrease. Iqbal, Khalid, & Rafiq (2011) examine dynamic linkage of Pakistan with International market by applying the co integration and Granger-causality tests for the time period Jan 2003 to Dec 2009. The finding of the study concludes that no cointegration is found between these markets. Another study (Shah, Husnain, & Ali, 2012) the volatile relationship between the Pakistani stock market and the group of eight countries' equity markets (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States) are analyze by using weekly time series data from June 2004 to May 2009. Multivariate Co-integration approach by Johnson and Julius (1990) is employed in the study and the results shows that there is no long term relationship between the G8 and Pakistani equity market.

Alvi & Chughtai (2014) examines the co movement of Pakistan stock market with International stock markets (UK, USA, etc.) by applying Johansen and Juselius multivariate and bi-variate co-integration for the time period 1st July 2007 to June 2014. The findings of the study conclude that Pakistan stock market has no co-movement equity markets of the selected developed countries. Shezad , Jan, Gulzar,& Ansari (2014) investigate the dynamic linkages of Karachi Stock Exchange with developed markets. To determine the existence of short-term as well as long-term correlations, descriptive statistics, correlation analysis, unit root test, VAR, co-integration test and VECM test are used and time period of the study is from 2001 to 2013. On the basis of these findings, concluded that China, Malaysia, Taiwan and Japan have a poor correlation with KSE-100, have many opportunities for selecting securities in portfolios intended by investors in these markets. The lower level of correlation still attracts both global and institutional investors to get benefit from the diversification of portfolios by investing in these stock markets.

Joyo & Lefen, (2019) Analyzes the co-movements and diversification of the portfolio between Pakistan's financial markets and its trading partners, especially UK and USA. Dynamic Conditional Covariance (DCC)-Generalized Autoregressive Conditional Heteroscedasticity (GARCH) methodologies with student t-distribution are employed in this study to examine time-varying correlation and volatilities of

stock markets of Pakistan and its trading partners. The time period of the study is from 2005 to 2008.

The outcomes of the study display that Pakistani market is closely integrated with its trading partners during the financial crises in 2008. The integration reduces significantly after the period of financial crises among these markets. Therefore there is positive sign for the investors of Pakistan and its trading partners to diversify their portfolio between these markets.

Another study (Menon, Subha, & Sagaran, 2009) examine integration of India stock market with major developed stock markets for the period of ten years, from April 1, 1997 to May 10, 2007. The study uses Engle Granger test of co integration. The results show that there is no cointegration between India stock market and US stock market, and the results also show the presence of strong cointegration between Indian and Singapore stock markets. The link between the Indian stock market with the stock market of USA is investigates from the study period is from Jan 1999 to Aug 2004 by using the daily data (AHMAD, ASHRAF, & AHMED, 2015). Measuring the long-term correlation between the two stock markets the Johansen co-integration test is applied and to measure the short-term causality between these markets the Granger-causality test is used. The finding shows that there is no long-term relationship of India equity market with markets of Japan and USA.

Another study (Chougala & H.S, 2012) examines the correlation of Bombay stock exchange indices with selected indices of international capital markets. This research uses secondary data from January 2011 to February 2016, to understand the relationship and linkage of BSE with selected stock exchanges by using correlation, relative strength index, moving average MACD (Moving average convergence and divergence). There is a high correlation between the BSE Sensex and the New York S&P 500, the NASDAQ Composite, the London Stock Exchange of FTSE, the Japan Stock Exchange Nikkei and the China SSE Composite. Another study (Singh & Kishor, 2017) identifies short term and long term linkages of Indian stock market with developed stock markets. For all five stock exchanges, the regular index returns are taken from 2007 to 2016.The Johansen's co-integration test

is applied in the study to identify the correlation between these markets. The results show that there is significant and positive relations are found among India, USA, UK and Hong Kong equity markets. Seth & Panda (2019) investigate during the post-crisis era, the dynamic relationship between the Indian stock market and the selected Asian and US stock markets. The time period of the study is from March 2009 to December 2015. GARCH model is employed in the study to investigate the time varying correlation between them. The finding of the study highlighted that there is a more stable correlation between the Indian and US stock markets, which means that any shifts in the US market will have a direct effect on the Indian stock market, and it can be inferred that, due to the high correlation coefficient, the diversification strategy for Indian investors is not sufficient for Singapore, Hong Kong, Indonesia and South Korea.

Another study (Samadder & Bhunia, 2018) investigates the integration between important global stock markets, namely, Australia, Canada, France, Germany, India, UK and USA, the purpose of the study is to examine the short-run and long-run relationships with Indian stock market and selected developed stock markets for the time period of the study is from January 2001 to December 2001. The study finds that both the Indian stock market and the US stock market are connected in the long run, but it can take a long time to return to stability, and in the short run, the Indian stock market is linked to France, Germany and the US stock markets, This means that, in the short term, investors may achieve reasonable benefits from international portfolio diversification, but there are limited benefits from long-term international portfolio diversification.

Hoque (2007) Uses Johansen and Juselius multivariate co-integration method and vector error correction models for the period 1990 to 2000, to analyze the dynamics of stock price movements of an emerging market, Bangladesh with that of the USA, Japan and India. Impulse response analysis shows that US market shocks have an effect on the Bangladesh market, Indian market shocks are small, and there is no shock transfer between Indian and Japanese stock markets. The methodology used in the study is autoregressive distributed lag (ARDL) approach to co-integration by Karim et al. (2009), which explores stock market integration

between Indonesia's emerging stock market and its major trading partners Japan, the US, Singapore and China, the study uses weekly stock market data for the period Jul 1998 to Dec 2007. The findings indicate that stock market of Indonesia is co integrated with the stock markets of the USA, Singapore, Japan, and also the stock market of China. So finally the study suggests that there are insufficient opportunities for foreign investors in these markets to benefit from international portfolio diversification. Nidar & Diwangsa (2017) determine the movement of several indices and global economy affect in Indonesian Stock Exchange for the period March 2009 to June 2014. Johenson co integration is used in the study and the results indicate that the Dow Jones index and Singapore Index has significant positive effect on Indonesian stock index.

Wang & Firth (2004) investigate the transmission of returns and uncertainty in the four developing stock markets of Greater China and three developed international markets, Tokyo, London and New York for the period 1994 to 2001 by using a two-stage GARCH model. The study indicates that at least one of the three developed markets influences Chinese stock market returns. The co-integrating relationship in pre-crisis period is unidirectional and it is bi-directional after the Asian financial crisis of 1997. The study indicates that the equity markets of Shanghai and Shenzhen are only slightly integrated with the international capital markets.

Another study Wang and Wang (2010), analyze return and volatility spillovers between China and the United States from 1992 to 2004. There is almost no evidence of return spillovers when it comes to interdependence between the three markets. Furthermore the interdependence of Chinese markets with global and regional markets depends on the transparency of the capital account and the position of the market. The higher the transparency, the greater the world market's influence; similarly, the closer the country is the greater its influence. The higher the transparency, the greater the world market's influence; similarly, the closer the country is the greater its influence. Wang and Wang (2010) also agree that a bi-directional relationship exists between on the one side, the US and Japan and then on the other side Chinese stock markets. Japan shows the biggest influencer

of Chinese market, while the US shows the smallest. A study by Yu & Ping (2012) identifies correlation between China stock market and US stock market for the period 2007 to 2010. GARCH model is applied to study the dynamic correlation between China stock market and US stock market. The results indicate that the correlation of the two markets has increased from 2007 to 2008. The reason behind this is the impacts of financial crisis. Then after that the correlation decreased from 2008 to 2009 but during the period of post financial crisis, the correlation of two markets keeps increasing due to rapid increase in the globalization. Mouawad (2016) states that during the 2008 global financial crisis, as well as during the European debt crisis, the Chinese stock market movement became more aligned with global players.

Another study by Fan, Lu, & Fan (2009) analyze the relationship between China and the major international stock markets, including the U.S., U.K., Japan and Hong Kong stock markets. The Markov-Switching Vector Error Correction Model (MS-VECM) explores both long-term and short-term dynamic relationships between China and the major global stock markets. With the data under review, results indicate that there is long-term co-movement between China and the international stock markets and in the short term, China's stock market has been directly or indirectly influenced by foreign core stock markets, which vary according to different regimes.

Koong & Bai (2018) examines the time-varying trilateral relationships between real oil prices, exchange rate fluctuations, and its effect on stock market returns in China and the USA. The results show that just like dollar and exchange rate, the US and China stock markets correlate positively. In terms of aggregate demand and oil price shocks, the Chinese stock market is more volatile and sensitive than the US stock market.

Yusof & Majid (2006) discusses long-term co-movements between the world's two largest stock markets (USA, JAPAN) and the Malaysian stock market. The study seeks to investigate the market that is actually leads the Malaysian stock market by employing co-integration, variance decompositions, and impulse response functions before, during and after the Asian financial crisis periods of 1997. The data period

is over the pre-, during and post-1997 financial crisis in Asia. The findings show that the Japanese stock market has significantly moved the Malaysian stock market relative to the U.S. stock market in the post-crisis period, by using bivariate and multivariate co-integration. The results of the bivariate co-integration test suggest the presence of a long-run relationship between Malaysian and the U.S. stock markets for time before the financial crisis.

Another study by Gupta & Donleavy (2009) identifies the benefits of diversification for Australian investors to invest in emerging markets. For the period of Feb 1988 to Dec 2005, the study examine choose indices of emerging markets and Australian market, by using the Asymmetric DCC model. This study finds that by investing in emerging markets, Australian investors can continue to benefit because the correlation of Australian equity returns with emerging markets is still lower and Australian investors can increase their risk-adjusted returns by investing in these markets.

Chopra, Awokuse, & A. (2009) examine the growing pattern of the interdependence among ten Asian stock markets, the US and the UK. The technique of rolling co-integration analysis, directed acyclic graph theory (VAR or ECM as a directed acyclic graph), error variance decomposition. The data for period of 1988 to 2003 for the nine emerging and three developed countries indices are selected for the study. The study finds out that there is strong time varying co-integration exist among the stocks, the market co-integration is increased after the 1997 Asian financial crises, Japan and Singapore appears to provide regional leadership as they both have the most significant influence on the other Asian financial markets. In the long run, the data show that Japan and the US have the highest impact on the emerging markets while after the Asian financial crises the impact of Singapore and Thailand has increased, on the other hand US does not have high influence on emerging markets, In short run interest rates in many Asian countries are closely integrated with Japan as compared to US. Another study KARIM & MAJID (2009) investigate the short-term and long-term complex causal relations between Malaysia and its major trading partners (the United States, Japan, Singapore, China, and Thailand). Autoregressive distributed lag (ARDL) and Generalized

Method of Moments (GMM) models are employed to study data for the period of 1992 to 2008. Malaysian stock market is integrated with its main trading partners' stock markets. When the country formulates its policies, each country should keep the consideration of any shocks of its main trading partners.

To investigate daily and monthly stock return correlations between six emerging Asian countries, like India, Korea, Thailand, China, , Singapore and Malaysia, versus the China, US, India and Australia GARCH Dynamic Conditional Correlation (DCC) technique is uses by (Narayan , Srianantha kumar, & Islam, 2014). In the study for daily returns the market correlation between China and five other emerging Asian markets is included which is high as compared to the US and Australia. Nguyen and Elisabeta (2016) investigate a similar outcome and suggest that during the financial crisis period the level of financial integration increased significantly across China and four Asian equity markets like Philippines, Indonesia, Thailand and Malaysia.

A study by Saiti & Noordin (2018) is conduct to quantify the scope to which equity investors based in Malaysia will benefit from diversification of their portfolio into the traditional Asian region and the top 10 largest equity indices in the world. Multivariate GARCH-dynamic conditional correlation is employed in the study and the time period of the study is from 29 June 2007 to 30 June 2016. The study compared to the Southeast Asian region. However in terms of diversification of international portfolio, the findings appear to imply that, relative to the UK, Canada, France, Germany and Switzerland, the traditional US index has more diversification advantages.

2.2 Asian Emerging Markets with International Islamic Markets

Majid, Meera, & Omar (2008) explores empirically the market integration of emerging markets (Malaysia, Thailand, Indonesia, the Philippines, and Singapore) ASEAN and their dependencies with the US and Japan. Two approaches

co-integration, and Generalized Moment Method are employed in the study. Closing daily stock indexes are used for the period from 1 January 1988 to 31 December 2006. The study reveals that the ASEAN stock markets, especially in the post-1997 financial turmoil, are moving towards greater integration either with in themselves or with the US and Japan. This means that the long-run advantages of diversification that investors can achieve through the ASEAN markets has be gain to decrease. As for the long-term causal relationship between the US and Japanese and ASEAN stock markets is concerned, the study finds that Indonesia is relatively independent of both the US and Japan. Malaysia is more dependent on Japan; Thailand is completely independent of the US but somewhat dependent on Japan; the US is more influenced by the Philippines than Japan; and Singapore, the US and Japan has bidirectional Granger causalities.

Another research (Saiti, Bacha, Masih, & BiS, 2013) uses the Dynamic Multivariate GARCH approach makes an attempt to add the knowledge especially in the field of Islamic finance which is growing fast. The base of the study is on Shariah-compliant stock indices (i.e., FTSE Sharia USA index, FTSE Shariah China Index, FTSE Malaysia EMAS Shariah Index, FTSE Shariah India Index and Dow Jones Shariah Index) and the study period is from 2007 to 2011. Conditional correlations and dynamic conditional volatility are varying that are not constant and all these Shariah indices are time varying. Between the FTSE Shariah USA index and the FTSE Shariah China index the dynamic conditional correlation are relatively low and sometimes even its negative. To hedge against unforeseen risks for international and domestic investors in their portfolio diversification there is strong policy implication. For diversifying portfolios different financial markets offer various opportunities. Chinese investors can gain the most due to result of weak correlations by doing diversification into the US stock market. The correlation among these five indices is not constant as they are time varying and dynamic. So, the evaluation of these correlations should do by invertor and they properly manage the investment portfolios.

A study by Hussein & Omran (2005) evaluate the output of the Dow Jones Islamic Market Index (DJIM) against the Dow Jones index from 1995 to 2003 on the basis

of monthly results, and found that in the whole and bull times, the Islamic index outperformed its conventional (non-Islamic) index in the entire and bull periods, but insignificantly underperformed in the bear markets.

The study between Islamic and conventional stock prices for the short run and long run perspectives for UK, France, US and Indonesia for market integration by Majdoub, Mansour, & jouini (2016). To examine long term co-movement between the stocks Johnson co-integration and Gregory and Hansen (1996) is used. To examine the short-term co-movement between the stocks Multivariate Dynamic Conditional Correlation is used the study time is from 2008 to 2013. The past literature shows the long-run relationships for all economies over the period of time only it's not found in UK where no co-integration is found between the Islamic and conventional stock prices. The study of correlation analysis also finds that there is weak correlation between the Indonesian market and the developed markets for both Islamic and conventional stock prices. The investors of these countries find the better opportunity for portfolio diversification and to invest in Indonesia and the investors of Indonesia find an opportunity to invest in these countries.

Alkheil, Khan, Parikh, & Mohanty (2017) investigate that Islamic indices is better perform than conventional indices the study period is from 2002 to 2014. The VARMAX and Johansen's co-integration models are applied. The data sample consists of 32 conventional indices and 32 Islamic stock indices from the MSCI, FTSE, DJ, Jakarta and S&Ps series to analyze the impact of the subprime global financial crisis of 2007 on index performance. The study sample period is divided into three parts pre crisis (2002 to 2006), crisis (2007 to 2009), and post crisis (2010 to 2014) periods. The result indicates that there is a lack of long-term co-integration relations between 31 Islamic pairs and their respective traditional benchmark indices. It suggests that for attracting global portfolios, in troubled financial times it become critical and more relevant. Islamic indices provide a broad diversification opportunity in the long-term. Mansoor & Siddiqui (2019) examine the advantages that Islamic investors achieve from diversification, as they are limited to investing only in sharia-compliant funds compared to traditional investors that do not have restrictions. The study discusses the co-movement of

Pakistan's Funds with the Asia Pacific, North America, Europe, MENA Regional Islamic Funds and the sum of all Islamic Global Funds. From Jan 2009 to Dec 2018, the analysis applied unit root, co-integration and Granger causality tests to monthly index prices. The study reveals that there is no co-movement of Pakistan with the markets of North America, Europe, and MENA regions of the Islamic Fund. Therefore, risk can be minimized by investors in these areas.

Abbes & Trichilli (2015) investigate whether dynamic integration across a wide range of developed and emerging Islamic stock markets in steady and turbulent periods provides potential diversification advantages. Multivariate co-integration test is employed in the study and time period of the study is from 2002 to 2012. The findings indicate a growing integration of stock markets of India, china, Indonesia, Malaysia with developed indices during the time of the global financial crisis. However, our findings vary from those of Karim et al. (2010), which note that the subprime crisis of 2007 does not seem the impact of long-term co-movements between the developed and developing (India, Indonesia, Malaysia etc.) Islamic stocks markets.

The study of the incorporation of the competition between traditional short-run and Long-run Islamic stock prices for the USA, Indonesia, and the United Kingdom by (Majdoub, Mansour, & Jouini, 2016). By using different approach of Johnson co-integration and the data time period is from Sep 2008 to Sep 2013. In the perspective of correlation, poor linkages between the Indonesian market and the developed markets for both Islamic and conventional stock prices is found, which indicates that to reduce risk investors should diversify their portfolios at the international level.

Another study by Majid (2018) discusses the domination of Islamic financial markets of Japan, UK, and the US over Indonesia's Islamic stock market. In order to empirically classify the co-movements among these Islamic stock markets, Vector Error Correction Model (VECM) framework is employed in the study. Time period of the study is from 1999 to 2016. The analysis shows that Indonesian Islamic financial markets, the UK, Japan and the United States are heading to a higher degree of integration. In way of comparison, the Japanese Islamic stock

market co-moved the Indonesian Islamic stock mainly in the bivariate and multivariate frameworks as compared to UK and the US Islamic stock markets. So for the Indonesian investors it is better to invest in UK and US Islamic markets as compared to Japanese Islamic markets.

Same Studies have concentrated on the Islamic financial markets. During the 1999 to 2006 period, Majid & Kassim (2010) used the Autoregressive Distributed Lag (ARDL) method and report that Islamic stock markets appeared to become more interlinked, suggesting a decrease in the benefits of diversification when investing globally in Islamic stocks. Tulasmi and Trihariyanto (2016) use methods of Sharpe, Treynor, and Jensen to compare the returns of the Islamic stocks of Malaysia and Indonesia. Investors in Indonesian Islamic stocks can earn better returns, showing that the returns of Indonesia's Islamic stocks are higher than those of Malaysia.

Najeeb, Bacha, & Masih (2015) investigate the Malaysian Islamic equity in which uses some econometric techniques, like DCC GARCH and continuous wavelet transformation to find the time-varying correlation of Islamic equity indices. The finding of the study shows that for Malaysian equity investors diversification benefits increases by investing in developed markets as compared to Emerging markets. This study answers the question whether Islamic equity investors of Malaysia may invest in Middle East, Asia Pacific Islamic markets, North Africa and Europe. The DCC GARCH used in the study shows the result that the returns of the Asia-Pacific and European Islamic market returns are strong correlated as compared to the returns of Malaysian Islamic index and the returns of the MENA Islamic market, so the benefit of diversification at Asia Pacific and Islamic Market of Europe is low and the benefit of diversification at MENA is more.

Saiti & Noordin (2018) quantify the extent to which equity investors based in Malaysia gain benefit from diversification of their portfolio into the traditional Asian region and the top ten largest equity indices. Multivariate GARCH-dynamic conditional correlation is employed in the study and the time period of the study is from June 2007 to June 2016. The finding of the study is Islamic indices are less volatile than the Malaysian conventional index. Islamic index of japan provide more diversification benefits as compare to other Asian countries like India, China

and Indonesia. On other side of the analysis of developed markets shows that USA provide more diversification benefits as compared to benefits compared to UK, Canada, France, Germany and Switzerland.

Another study Rahim & Masih (2016) using the similar econometric techniques which are used by Najeeb, Bacha, & Masih (2015) explore the Malaysian stock markets interdependence with its major trading partners i.e. Thailand, Singapore, China, Japan and the US. The findings shows that the US Islamic stock index offers greater diversification advantages in a short holding period compared to other Islamic stock indices of the Asian trading partners of Malaysia.

Karim, Kassim, & Arip (2018) examine the co-movement among indices of Indonesia, Malaysia, the USA, Japan and the UK by using Johnson co-integration approach for the period 2006 to 2008. No evidence of co-integration between the Islamic stock markets is found. Thus, even after the subprime crisis, it offers an opportunity for future gains from foreign portfolio diversification. Consequently, the subprime crisis of 2007 does not seem to have an effect on the long-term co-movement between the Islamic capital markets of Indonesia, Malaysia, the United States, Japan and the United Kingdom. In other words, in the long run, these markets drift, arbitrarily away from one another.

Rahim & Masih (2016) identifies better opportunity for the Islamic investors of Malaysia to invest and increases the diversification benefits during 2007 to 2014. For almost all investments, significant diversification advantages are not present. At the same time, trading in the stock indexes of Sharia's offer the modest diversification to major trading partners such as Thailand and Japan offer moderate advantages benefits. Saiti, Nagayev, & Yumus (2019) finds that the chinese equity investors can get benefits from portfolio diversification into Shariah compliant (Islamic) indices. In this study Multivariate MGARCH-DCC model is applied and the sample period is from 2017 to 2019. The results of the study show that there is higher range of unconditional volatility with relative to the Islamic indices. It explore that the Chinese conventional equity investors can get benefit of diversification at different levels as they can diversify their assets into the Shariah-compliant or Islamic indices.

Ansari & Alam (2020) compare the performance of Islamic indices against their conventional counterparts in India. Sharpe ratio, Treynor ratio, information ratio, capital asset pricing model (CAPM) is used to study the performance of funds. The results of the study indicate that Islamic indices provide slightly superior performance than conventional index. So it is better opportunity for the investors of India to invest in Islamic stocks to diversify their investment.

Chapter 3

Data Description and Methodology

3.1 Data Description

This study examines time varying correlation and co-movement in long run and short run between Asian emerging Markets and international conventional as well as international Islamic markets to facilitate the investors and fund manager to get insight about the possible benefits from portfolio diversification. The Asian emerging markets are represented by China, Malaysia, Bangladesh, Pakistan, Indonesia, and India. The international conventional markets are represented by world equity conventional index, US conventional index, and UK conventional index, as well as the international Islamic market is represented by world Islamic equity index. This study examines the Asian emerging market with international conventional and Islamic indices. **Table 3.1** presents the names and time periods of indices studied. The time period are selected on the basis of availability of data.

This study has two streams; the first stream is Asian emerging markets and international conventional markets. And the second stream is Asian emerging markets and international Islamic markets. The returns are calculated from the indices of Asian emerging market and international conventional as well as Islamic markets.

The returns are calculated by computing the difference of natural log of the daily closing prices through following equations:

TABLE 3.1: Details of Sample

S. NO	Names of Indices	Symbol	Time Period
1	China	SSE Composite Index	April 1, 2013 to July 31, 2020
2	Malaysia	KLSE	April 1, 2013 to July 31, 2020
3	Bangladesh	DSEX	April 1, 2013 to July 31, 2020
4	Pakistan	KSE100	April 1, 2013 to July 31, 2020
5	Indonesia	JKSE	April 1, 2013 to July 31, 2020
6	India	BSE	April 1, 2013 to July 31, 2020
7	MSCI World Market Index	S & P Global 1200	April 1, 2013 to July 31, 2020
8	USA conventional index	S & P 500	April 1, 2013 to July 31, 2020
9	UK conventional Market Index	FTSE 100	April 1, 2013 to July 31, 2020
10	MSCI World Islamic Index	DJIM world Index	April 1, 2013 to July 31, 2020
11	USA Islamic Index	DJIM US Index	April 1, 2013 to July 31, 2020
12	UK Islamic Index	DJIM UK Index	April 1, 2013 to July 31, 2020

$$R_t = Ln(X_{t/X_{t-1}}) \tag{3.1}$$

Where R_t is the return of all indices of Asian emerging markets, international conventional and international Islamic markets, Ln is natural log, X_t is the current markets price and divided it on $Xt_(-1)$ which is the previous market price. **Table 3.2** presents time period of all pairs of Asian emerging conventional markets with international conventional markets. The time periods of all the pairs of Asian

emerging markets and international conventional markets are from April 1, 2013 to July 31, 2020.

TABLE 3.2: Time period of all pairs of Emerging Conventional Markets with International Conventional Markets

S.NO	**Emerging Conventional with International Conventional Pairs**	**Time Period**
1	LCHINA-LWE	April 1, 2013 to July 31, 2020
2	LCHINA-LUSC	April 1, 2013 to July 31, 2020
3	LCHINA-LUKC	April 1, 2013 to July 31, 2020
4	LMAL-LWE	April 1, 2013 to July 31, 2020
5	LMAL-LUSC	April 1, 2013 to July 31, 2020
6	LMAL-LUKC	April 1, 2013 to July 31, 2020
7	LBANG-LWE	April 1, 2013 to July 31, 2020
8	LBANG-LUSC	April 1, 2013 to July 31, 2020
9	LBANG-RUKC	April 1, 2013 to July 31, 2020
10	LPAK-LWE	April 1, 2013 to July 31, 2020
11	LPAK-LUSC	April 1, 2013 to July 31, 2020
12	LPAK-LUKC	April 1, 2013 to July 31, 2020
13	LINDO-LWE	April 1, 2013 to July 31, 2020
14	LINDO-LUSC	April 1, 2013 to July 31, 2020
15	LINDO-LUKC	April 1, 2013 to July 31, 2020
16	LINDIA-LWE	April 1, 2013 to July 31, 2020
17	LINDIA-LUSC	April 1, 2013 to July 31, 2020
18	LINDIA-LUKC	April 1, 2013 to July 31, 2020

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladeshi stock index, LPAK = Log of Pakistani stock index, LINDO= Log of Indonesian stock index, LINDIA = Log of Indian stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

Furthermore **Table 3.3** presents the second domain time period of all pairs of Asian emerging markets with international conventional markets. The time periods of all the pairs of Asian emerging conventional markets and international

Islamic markets are from April 1, 2013 to July 31, 2020.

Table 3.3: Time period of all pairs of Emerging Conventional Markets with International Islamic Markets

S.NO	Emerging Conventional with International Islamic Conventional Pairs	Time Period
1	LCHINA-LWEI	April 1, 2013 to July 31, 2020
2	LCHINA-LUSI	April 1, 2013 to July 31, 2020
3	LCHINA-LUKI	April 1, 2013 to July 31, 2020
4	LMAL-LWEI	April 1, 2013 to July 31, 2020
5	LMAL-LUSI	April 1, 2013 to July 31, 2020
6	LMAL-LUKI	April 1, 2013 to July 31, 2020
7	LBANG-LWEI	April 1, 2013 to July 31, 2020
8	LBANG-LUSI	April 1, 2013 to July 31, 2020
9	LBANG-LUKI	April 1, 2013 to July 31, 2020
10	LPAK-LWEI	April 1, 2013 to July 31, 2020
11	LPAK-LUSI	April 1, 2013 to July 31, 2020
12	LPAK-LUKI	April 1, 2013 to July 31, 2020
13	LINDO-LWEI	April 1, 2013 to July 31, 2020
14	LINDO-LUSI	April 1, 2013 to July 31, 2020
15	LINDO-LUKI	April 1, 2013 to July 31, 2020
16	LINDIA-LWEI	April 1, 2013 to July 31, 2020
17	LINDIA-LUSI	April 1, 2013 to July 31, 2020
18	LINDIA-LUKI	April 1, 2013 to July 31, 2020

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladesh stock index, LPAK = Log of Pakistani stock index, LINDO= Log of Indonesian stock index, LINDIA = Log of Indian stock index, LWEI = log of MSCI World Islamic Index, LUKI = Log of UK Islamic index, LUSI = Log of US Islamic index

3.2 Econometric Model

This study explores the co-integration in short run and long run between Asian emerging markets and international conventional markets as well as international Islamic markets through Auto Regressive Distributed Lag Model (ARDL). The study also examines time varying correlation in volatility between Asian emerging

markets and international conventional and international Islamic markets through DCC GARCH. The details of each model are given below:

3.2.1 Auto Regressive Distributed Lag Model (ARDL)

There are many methodologies that find the presence of a longer-term connection between time series variables. Widely acclaimed methods in each methods proposed by Engle (1987), Phillips (1990) and Johansen (1991), these models require that variables should be integrated of order one. The Auto Regressive Distributed Lag (ARDL) model explore the co-integration relationship has become more popular in recent years. This study uses ARDL approach that is also suggested by (Pesaran, Shin, & Smith, 2001)to find the short term and long term relationship between Asian emerging market and international conventional and Islamic markets. Firstly the unit root is applied on the data to check stationarity of data. This test is necessary, because (Ouattara, 2004) suggest that bound test assumes that variables are integrated of order zero or order one, and no variable is integrated at order two because estimated F-statistics given by (Pesaran, Shin, & Smith, 2001) becomes null and invalid with the presence of order two variables. Secondly when the data is integrated at order one or order zero, the short term and long term correlation is also tested. Through error correction model (ECM) the short term relationship is examined that deal in short run with the dynamics of variable and on the other side it deal with the speed of adjustment toward long term co-integration. Therefore, through Dynamic model the coefficient of speed of adjustment is measured. The following pairs examine the co movement of Asian emerging markets with international conventional market as well as international Islamic market.

$$\begin{aligned} LA_t &= \beta_0 + \beta_1 LIC_t \\ LA_t &= \beta_0 + \beta_1 LII_t \end{aligned} \tag{3.2}$$

Where,

A = Asian emerging markets

IC= International conventional markets

II= International Islamic markets

The above equation may be represented in ARDL as,

$$LA_t = \beta_0 + \sum_{i=1}^{n} \Psi_1 LA_{t-i} + \sum_{i=1}^{n} \beta_i LIC_{t-i} + \sum_{i=1}^{n} \beta_i LII_{t-i} + \mu_t \tag{3.3}$$

Where i scale from 1 to n, p and q respectively.

Finally, in last phase, equation for error correction is estimated using the variables differences and lagged long variables. It also determines the speed at which returns are adjusted into equilibrium.

The following equation represents the ECM as:

$$LA_t = \Gamma_0 + \Gamma_1 \Delta LIC_{t-i} + \Gamma_2 \Delta LII_{t-i} + ECM + \mu_t \tag{3.4}$$

Cumulative sum of recursive residuals (CUSUM) is used to test the stability of long and short term coefficients. When the plot of CUSUM is within the critical limit of 0.05 percent, then it shows the stability and fitness of the model.

3.2.2 DCC GARCH

Multivariate GARCH model is used to estimate dynamic conditional correlation but correlation and volatility is the function of past returns. This process is introduce and implemented by Engle (2002) and this is the extended from of Constant Correlation estimator (CCC) drawn by introducing the time varying impact in the correlation matrix. It is observed that DCC GARCH results are more accurate as compared to Constant Correlation estimator (CCC).

There are two steps in DCC approaches of the volatilities and correlations. The correlation is expanded marginally if the two stocks move in same way and the correlation diminishes when the two same stocks move inversely or in opposite

direction. This effect of movement of stocks is stronger in down markets. From a long run mean the correlation is sometime temporarily deviates. For both upper and lower tails of the multi-period joint density higher tail dependence is given by a symmetric DCC model while in the lower tail of the multi-period density higher tail dependence is given by an asymmetric DCC or ADCC.

DCC is defined as ...

$$Q_t = \overline{R} + \theta_1(\varepsilon_{t-i}\varepsilon_{t-i}^{'} - \overline{R}) + \theta_2(Q_{t-1} - \overline{R}) \tag{3.5}$$

ADCC is defined as under,

$$Q_t = \overline{R} + \theta_1(\varepsilon_{t-i}\varepsilon_{t-i}^{'} - \overline{R}) + \theta_2(Q_{t-1} - \overline{R}) + \theta_3(\eta_t\acute{\eta}_t - \overline{N}) \tag{3.6}$$

Chapter 4

Data Analysis and Discussions

4.1 Descriptive Statistics and Unit Root Test

Table 4.1 & 4.2 shows the descriptive statistics of Asian emerging markets and international conventional markets as well as international Islamic markets to represents the quantitative picture of returns in an understandable manner.

Table 4.1: Descriptive Statistics

	RCHINA	**RBANG**	**RINDIA**	**RINDO**	**RMAL**	**RPAK**
Mean	0.0003	0.0001	0.0004	0.0001	0.0000	0.0005
Median	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
Maximum	0.0576	0.1029	0.0897	0.1019	0.0685	0.0480
Minimum	(0.0849)	(0.0865)	(0.1315)	(0.0658)	(0.0526)	(0.0686)
Std. Dev.	0.0137	0.0086	0.0108	0.0103	0.0064	0.0105
Skewness	(0.9962)	0.3324	(1.1190)	(0.0313)	(0.2374)	(0.5143)
Kurtosis	10.1979	29.2272	23.9844	12.0907	16.3750	7.7992
Jarque-Bera	4,450.7798	54,921.4314	35,535.4835	6,594.3232	14,291.8731	1,922.1986
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Descriptive statistics are divided in two parts i.e. measure of central tendency and measure of variability. Mean, median and mode are included in central tendency

whereas standard deviation, variance, minimum, maximum, skewness and kurtosis are explained by measure of variability. Average mean returns measures the performance of the indices of Asian emerging markets and international conventional and Islamic markets, so for all the indices the mean is positive it indicates that all markets have positive average returns. The results show that Pakistan conventional market and USA Islamic market index exhibit the maximum average return of 0.05%. Whereas, Bangladesh conventional index shows the maximum return earned in a day is 10.29% and the maximum loss in a day is incurred by UK Islamic index that is 12.32%.

TABLE 4.2: Descriptive Statistics

	RUKC	**RUKI**	**RUSC**	**RUSI**	**RWE**	**RWEI**
Mean	0.0000	0.0002	0.0004	0.0005	0.0003	0.0004
Median	0.0002	0.0004	0.0003	0.0004	0.0005	0.0006
Maximum	0.0905	0.1058	0.0938	0.0953	0.0873	0.0824
Minimum	(0.1087)	(0.1232)	(0.1198)	(0.1209)	(0.0949)	(0.0919)
Std. Dev.	0.0100	0.0112	0.0107	0.0109	0.0090	0.0088
Skewness	(0.8028)	(0.7589)	(0.6871)	(0.5715)	(1.1772)	(0.9850)
Kurtosis	17.5230	19.9040	25.7255	23.4720	26.3661	23.7534
Jarque-Bera	17,035.2759	22,983.9426	41,358.8808	33,545.1431	44,006.5714	34,676.4035
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The highest risk of 1.37% is observed in China conventional index and the lowest risk of 0.64% is observed in Malaysia conventional index. Skewness as the degree of deviation from the symmetrical bell curve, the skewness of Bangladesh is positive and for the rest of the markets it is negative. Kurtosis of all variables are greater than 3, that shows presence of peaked and fat tail distribution in the returns of Asian emerging markets and international conventional and Islamic markets. Finally the Jarque-Bera probability is significant which shows that the data is normal.

TABLE 4.3: Unit Root Analysis

Unit Root Test	ADF-Level	ADF-1st Diff	PP-Level	PP-1st Diff	Integrated Order
CHINA	-1.7874	-41.6726	-1.8271	-41.6582	I(1)
	(0.3871)	0.0000	(0.3675)	0.0000	
INDIA	-2.9186	-16.3311	-2.7789	-44.1923	I(1)
	(0.1567)	0.0000	(0.2053)	0.0000	
INDO	-2.0021	-40.2139	-1.9144	-40.1093	I(1)
	(0.2861)	0.0000	(0.3258)	0.0000	
MAL	-3.1187	-41.2139	-1.9144	-40.1093	I(1)
	(0.1021)	0.0000	(0.3258)	0.0000	
BANG	-2.4729	-16.3362	-2.4735	-45.9403	I(1)
	(0.1223)	0.0000	(0.1222)	0.0000	
PAK	-2.9376	-36.9882	-2.9091	-37.4774	I(0)
	(0.0413)	0.0000	(0.0445)	0.0000	
USC	-4.5428	-13.8319	-4.5953	-52.183	I(0)
	(0.0013)	0.0000	(0.0010)	0.0000	
USI	-3.9414	-13.8319	-4.5953	-52.3272	I(0)
	(0.0107)	0.0000	(0.0010)	0.0000	
UKC	-2.6169	-43.7856	-2.6954	-43.7856	I(1)
	(0.0896)	(0.0001)	(0.0749)	0.0000	
UKI	-2.9052	-42.5694	-3.0353	-42.6024	I(0)
	(0.0449)	0.0000	(0.0319)	0.0000	
WE	-3.8622	-13.2881	-3.6363	-44.6719	I(0)
	(0.0138)	0.0000	(0.0271)	0.0000	
WEI	-3.4338	-13.5539	-3.2398	-45.09	I(0)
	(0.0472)	0.0000	(0.0770)	0.0000	

Where CHINA = Chinese stock index, MAL = Malaysian stock index, BANG= Bangladeshi stock index, PAK = Pakistani stock index, INDO= Indonesian stock index, INDIA = Indian stock index, WE = MSCI World Market Index, UKC = UK Conventional index, USC = US conventional index. , WEI = MSCI World Islamic Index, UKI = UK Islamic index, USI = US Islamic index

Literature provides that financial time series are generally non-stationary in nature. Therefore, it is necessary to apply the unit root test. Many studies recommend applying unit root test and identify level of integration is necessary before examining the co-integration. Therefore, Augmented Dickey Fuller (ADF) and Phillip-Peron (PP) tests are applied to examine the order of integration.

Table 4.3 displays the results of unit root test. Most of the index are not stationary at level but at first difference of logarithmic transformation, it becomes stationary. Pakistan, USA conventional, and USA Islamic, UK conventional UK Islamic, MSCI World Market, MSCI World Islamic market, are stationary at level. As all the pairs are not integrated at same order, which shows that it is safe to employ the ARDL Model. The study is tested for both the assumptions of trend and no trend is to investigate the nature of variables.

4.2 Long Run and Short Run Link between Asian Markets and International Conventional and Islamic Markets

This section is based on two sub sections; the first sub section discusses the co-movement of Asian emerging markets with international conventional markets. Second sub section exhibits the results of the relationship between Asian emerging markets and international Islamic markets.

4.2.1 ARDL Model for Link between International Conventional Markets and Asian Emerging Markets

Table 4.4 exhibits the criteria used for choosing number of lags between the Asian emerging markets and international conventional markets. The lag length for the pairs of world equity and Malaysia, USA conventional and Malaysia are 3, the lag length for the pairs of UK conventional and Pakistan are 2, and the lag length for the remaining all pairs are 4.

TABLE 4.4: Lag Length Selection criteria of International conventional Markets and Asian Emerging Markets

LCHINA-LWE		LCHINA-LUSC		LCHINA-LUKC		LMAL-LWE		LMAL-LUSC		LMAL-LUKC	
Lag	**AIC**	**Lag**	**AIC**	**Lag**	**AIC**	**Lag**	**AIC**	**Lag**	**AIC**	**Lag**	**AIC**
0	-1.8903	0	-1.155	0	-2.8722	0	-3.8978	0	-3.2455	0	-5.0199
1	-12.36	1	-11.9814	1	-12.1365	1	-13.9154	1	-13.5068	1	-13.7221
2	-12.3835	2	-12.0476	2	-12.1494	2	-14.0639	2	-13.6822	2	-13.8047
3	-12.3994	3	-12.0533	3	-12.1479	3	**-14.0864***	3	**-13.7001***	3	-13.8082
4	-12.3995*	4	**-12.0553***	4	-12.1507*	4	-14.08606	4	-13.6991	4	**-13.8100***
LBANG-LWE		LBANG-LUSC		LBANG-LUKC		LPAK-LWE		LPAK-LUSC		LPAK-LUKC	
Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC
0	-2.7678	0	-1.9304	0	-4.1355	0	-1.9112	0	-1.2237	0	-2.8418
1	-13.2719	1	-12.9198	1	-13.0531	1	-12.8534	1	-12.495	1	-12.6409
2	-13.2804	2	-12.9585	2	-13.0555	2	-12.8916	2	-12.569	2	**-12.6744***
3	-13.3066	3	-12.9755	3	-13.0677	3	-12.9122	3	-12.5796	3	-12.6722
4	-13.3203*	4	**-12.9905***	4	**-13.0759***	4	**-12.9158***	4	**-12.5843***	4	-12.6715
LINDO-LWE		LINDO-LUSC		LINDO-LUKC		LINDIA-LWE		LINDIA-LUSC		LINDIA-LUKC	
Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC
0	-3.5516	0	-2.6007	0	-4.6119	0	-3.6292	0	-3.2451	0	-2.9699
1	-12.9798	1	-12.5811	1	-12.7572	1	-13.0042	1	-12.5596	1	-12.8057
2	-13.0662	2	-12.7179	2	-12.7974	2	-13.0942	2	-12.7106	2	-12.841
3	-13.0856	3	-12.7259	3	-12.7954	3	-13.1251	3	-12.7318	3	-12.8434
4	**-13.0942***	4	**-12.7343***	4	**-12.7998***	4	**-13.1384***	4	**-12.7436***	4	**-12.8649***

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladeshi stock index, LPAK = Log of Pakistani stock index, LINDO= Log of Indonesian stock index, LINDIA = Log of Indian stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

TABLE 4.5: ARDL Model for Link between International Conventional Markets and Emerging Markets

			DV(-1)	DV(-2)	DV(-3)	IV	IV(-1)	IV(-2)	IV(-3)	IV(-4)	C	F-Stat.	Prob. F.	DW Stat.
LCHINA-LWE	ARDL(1, 4)	Coef	0.9971	-	-	0.342	-0.1099	-0.2033	0.0524	-0.0788	0.0045	63364	0.0000	1.9629
		Prob.	0.0000	-	-	0.0000	0.0209	0.0000	0.2706	0.0203	0.8120			
LCHINA-LUSC	ARDL(1, 4)	Coef	0.9970	-	-	0.2373	0.0054	-0.1724	0.0002	-0.069	0.0118	62337	0.0000	1.9642
		Prob.	0.0000	-	-	0.0000	0.8855	0.0000	0.9957	0.0178	0.4290			
LCHINA-LUKC	ARDL(1, 4)	Coef	0.9973	-	-	0.2752	-0.1125	-0.0988	0.0217	-0.0819	-0.0123	62174	0.0000	1.9443
		Prob.	0.0000	-	-	0.0000	0.0091	0.0219	0.615	0.0075	0.7334			
LMAL-LWE	ARDL(2, 4)	Coef	0.9470	0.0474	-	0.1966	0.0633	-0.2397	0.0115	-0.0336	0.0564	36480	0.0000	1.9933
		Prob.	0.0000	0.0383	-	0.0000	0.0029	0.0000	0.588	0.022	0.0031			
LMAL-LUSC	ARDL(1, 4)	Coef	0.9929	-	-	0.1222	0.1017	-0.1742	-0.0189	-0.0324	0.0656	40160	0.0000	2.0319
		Prob.	0.0000	-	-	0.0000	0.0000	0.0000	0.2545	0.0115	0.0012			
LMAL-LUKC	ARDL(1, 4)	Coef	0.9929	-	-	0.1222	0.1017	-0.1742	-0.0189	-0.0324	0.0656	40160	0.0000	2.0319
		Prob.	0.0000	-	-	0.0000	0.0000	0.0000	0.2545	0.0115	0.0012			
LBANG-LWE	ARDL(3, 4)	Coef	0.9893	0.084	-0.0758	0.112	-0.1678	0.1308	-0.1257	0.0491	0.0331	58083	0.0000	1.9957
		Prob.	0.0000	0.0088	0.0009	0.0000	0.0000	0.0000	0.0000	0.0239	0.0154			
LBANG-LUSC	ARDL(3, 4)	Coef	0.9864	0.0880	-0.0768	0.0908	-0.1121	0.0758	-0.1064	0.0507	0.0300	57995	0.0000	1.9946
		Prob.	0.0000	0.0059	0.0008	0.0000	0.0000	0.0021	0.0000	0.0061	0.0170			
LBANG-LUKC	ARDL(3, 3)	Coef	0.9741	0.1119	-0.0918	0.0851	-0.1227	0.1091	-0.0655	-	-0.0039	65954	0.0000	1.9999
		Prob.	0.0000	0.0004	0.0001	0.0000	0.0000	0.0001	0.0008	-	0.8645			

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladeshi stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

Table 4.6: ARDL Model for Link between International Conventional Markets and Emerging Markets (a)

		DV(-1)	DV(-2)	DV(-3)	DV(-4)	IV	IV(-1)	IV(-2)	IV(-3)	IV(-4)
LPAK-LWE	ARDL(2, 4)	1.150	-0.1529	-	-	0.1303	-0.0408	-0.0261	0.0219	-0.0841
		0.000	0.000	-	-	0.000	0.2719	0.4792	0.5532	0.0015
LPAK-LUSC	ARDL(2, 4)	1.149	-0.1519	-	-	0.0921	0.0089	-0.0233	-0.003	-0.0743
		0.000	0.000	-	-	0.000	0.7603	0.4321	0.9279	0.001
LPAK-LUKC	ARDL(2,2,4)	1.165	-0.1685	-	-	0.1275	-0.0696	-0.0531	-	-
		0.000	0.000	-	-	0.000	0.037	0.0248	-	-
LINDO-LWE	ARDL(4, 4)	1.013	-0.0622	-0.0317	0.0755	0.3478	-0.039	-0.3145	0.1182	-0.1088
		0.000	0.0565	0.3193	0.0006	0.000	0.2671	0.000	0.0009	0.000
LINDO-LUSC	ARDL(4, 4)	1.023	-0.0709	-0.0248	0.0676	0.2563	0.0396	-0.2595	0.0579	-0.0922
		0.000	0.0303	0.4382	0.0018	0.000	0.1537	0.000	0.0389	0.000
LINDO-LUKC	ARDL(4, 4,0)	1.029	-0.0708	-0.0276	0.057	0.2835	-0.082	-0.158	0.0526	-0.0786
		0.000	0.0315	0.3986	0.0109	0.000	0.0106	0.000	0.1023	0.0008
LINDIA-LWE	ARDL(4, 4)	0.903	0.0261	0.0157	0.0453	0.5057	-0.178	-0.2698	0.1079	-0.15
		0.000	0.4042	0.6107	0.04	0.000	0.000	0.000	0.0036	0.0239
LINDIA-LUSC	ARDL(3, 4)	0.897	0.0421	0.0486	-	0.3661	-0.0158	-0.2419	0.0124	-0.1087
		0.000	0.1756	0.0346	-	0.000	0.5901	0.000	0.6557	0.000
LINDIA-LUKC	ARDL(4,4,0)	0.953	-0.0019	0.0062	0.0383	0.4769	-0.3134	-0.072	0.0794	-0.1608
		0.000	0.9527	0.8461	0.0897	0.000	0.000	0.0366	0.0207	0.000

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladeshi stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

TABLE 4.7: ARDL Model for Link between International Conventional Markets and Emerging Markets (b)

		D	D(-1)	D(-2)	D(-3)	D(-4)	C	F-Stat.	Prob. F.	DW St.
LPAK-LWE	ARDL(2, 4)	-	-	-	-	-	0.0260	122776.2	0.000	2.001
		-	-	-	-	-	0.0677	-	-	-
LPAK-LUSC	ARDL(2, 4)	-	-	-	-	-	0.0289	122419.4	0.000	2.001
		-	-	-	-	-	0.0127	-	-	-
LPAK-LUKC	ARDL(2,2,4)	-0.0147	0.058	-0.0421	0.021	-0.0227	-0.0013	85964.4	0.000	2.002
		0.1529	0.000	0.0040	0.152	0.0275	0.9625	-	-	-
LINDO-LWE	ARDL(4, 4)	-	-	-	-	-	0.0193	38248.3	0.000	2.001
		-	-	-	-	-	0.1899	-	-	-
LINDO-LUSC	ARDL(4, 4)	-	-	-	-	-	0.027	37088.5	0.000	1.998
		-	-	-	-	-	0.0795	-	-	-
LINDO-LUKC	ARDL(4, 4,0)	0.0011	-	-	-	-	-0.0469	32413.1	0.000	2.000
		0.0754	-	-	-	-	0.0933	-	-	-
LINDIA-LWE	ARDL(4, 4)	-	-	-	-	-	-0.0157	109300	0.000	1.977
		-	-	-	-	-	0.2321	-	-	-
LINDIA-LUSC	ARDL(3, 4)	-	-	-	-	-	0.0286	115970.9	0.000	1.980
		-	-	-	-	-	0.0165	-	-	-
LINDIA-LUKC	ARDL(4,4,0)	0.0014	-	-	-	-	-0.042	95670.8	0.000	1.980
		0.0491	-	-	-	-	0.1045	-	-	-

LPAK = Log of Pakistani stock index, LINDO= Log of Indonesian stock index, LINDIA = Log of Indian stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

Table 4.5, 4.6 and **4.7** reports Shows the results regarding ARDL model link between international Conventional markets and Asian emerging markets. Findings indicate that MSCI, USA, and UK conventional markets returns have statistically significantly impact on the returns of China, Malaysia, Bangladesh, Pakistan, Indonesia, and Indian markets. All the pairs of Asian emerging markets have no lag effect with International conventional markets. Firstly, cumulative sum of recursive residuals (CUSUM) is plotted to study the stability in ARDL model. **Figure 4.1, 4.2, and 4.3** displays that CUSUM for the pairs of international conventional markets and Asian emerging markets in critical limits of 0.05 that shows overall model is stable and fit. ARDL Model is based on co-movement of international conventional markets and Asian emerging markets.

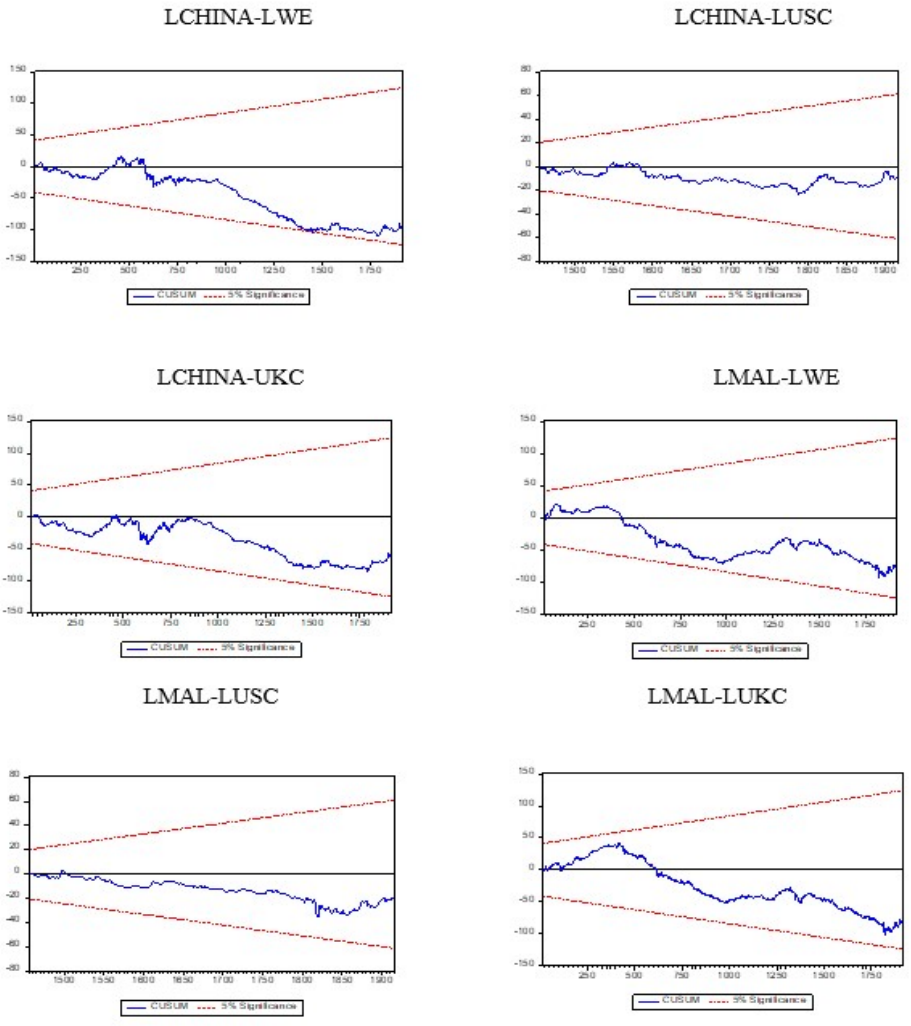

FIGURE 4.1: CUSUM Test for International Conventional Markets and Emerging Asian Markets (a)

Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), Hannan-Quinn (HQ) and Log Likelihood (LL) equation are the most common measures for the number of lags estimation. If there is no autocorrelation then the lag period that offers the smallest critical value is the lag period of model, the decision is based on AIC.

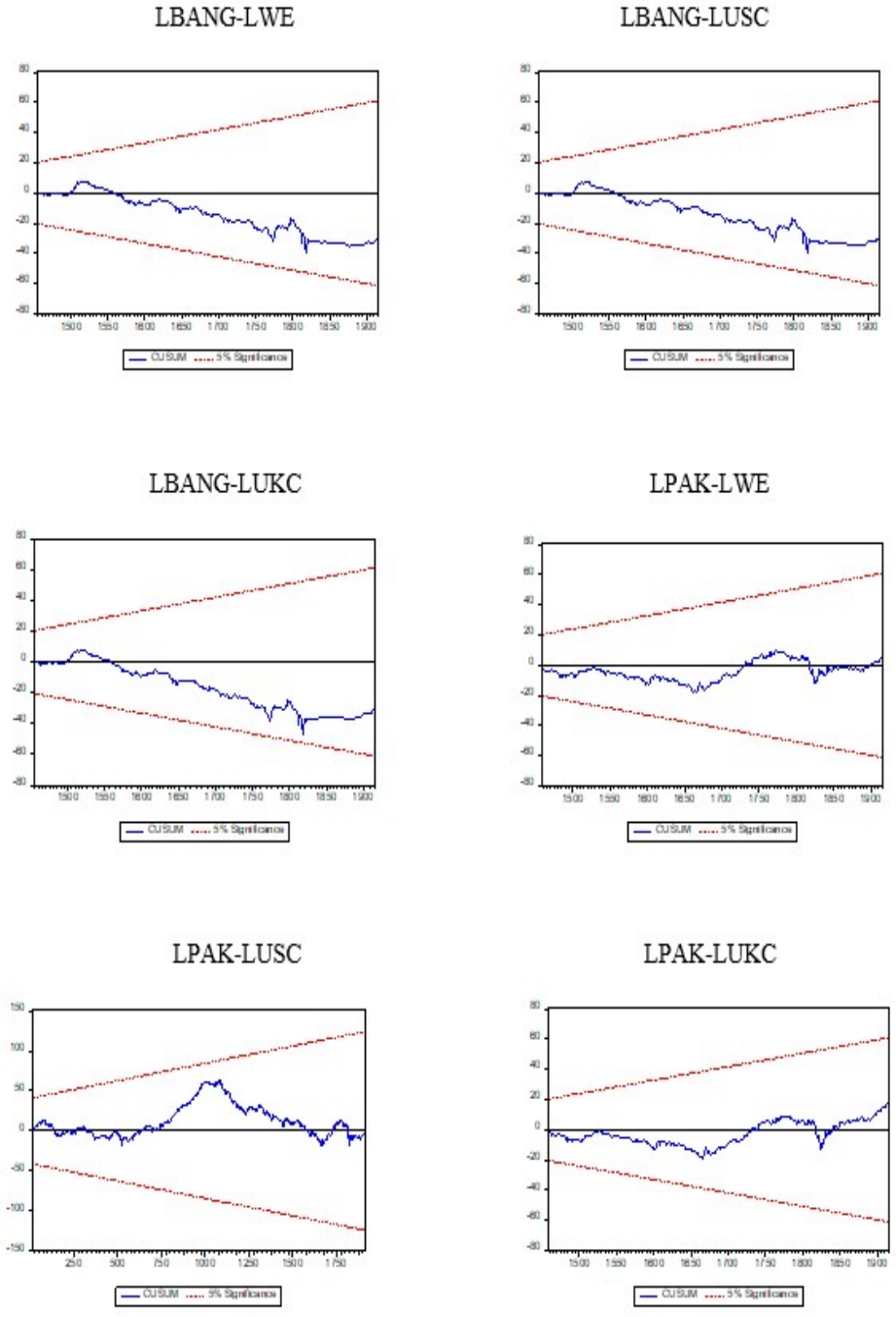

FIGURE 4.2: CUSUM Test for International Conventional Markets and Emerging Asian Markets (b)

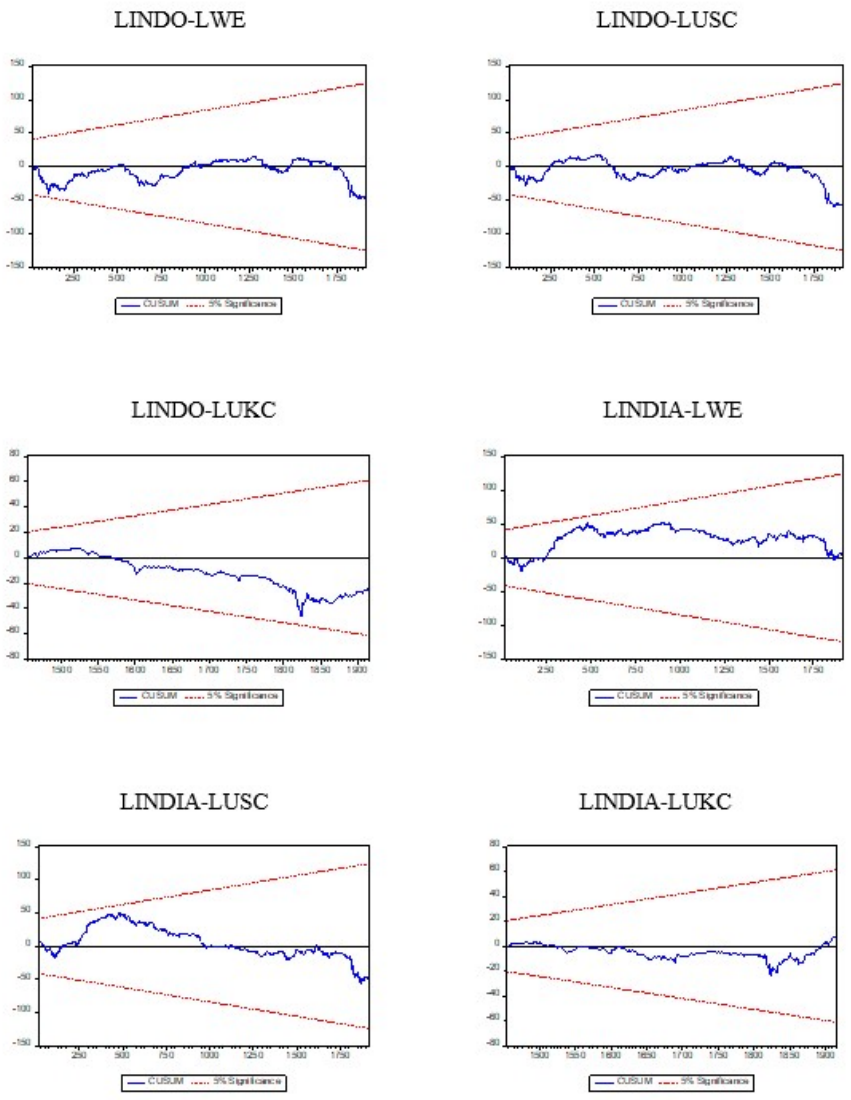

FIGURE 4.3: CUSUM Test for International Conventional Markets and Emerging Asian Markets (c)

Table 4.8 and **4.9** reports the findings of error correction model that captures the short term link between international conventional markets and Asian emerging markets. MSCI world market, UK conventional market and USA conventional market have significant short term influence with markets of China, Malaysia, Bangladesh, Pakistan, Indonesia, and India.

It is also observed that MSCI world market, USA and UK conventional markets have significant short term relationship and insignificant long run relationship with China and Malaysia, Error correction term with Malaysia is negative and significant which indicates that the adjustment process is below from 0.95 percent.

TABLE 4.8: Error correction Model for Short Run Relationship between International Conventional Markets and Asian Emerging Markets

		DV(-1)	DV(-2)	IV	IV(-1)	IV(-2)	IV(-3)	D(D1)	ECM(-1)
ΔLCHINA	Coef	-	-	0.3420	0.2298	0.0265	0.0788	-	-0.0029
-ΔLWE	Prob.	-	-	0.0000	0.0000	0.4352	0.0202	-	0.0897
ΔLCHINA	Coef	-	-	0.2367	0.2406	0.0683	0.0675	-0.0201	-0.0031
-ΔLUSC	Prob.	-	-	0.0000	0.0000	0.0204	0.0202	0.1330	0.0892
ΔLCHINA	Coef	-	-	0.2752	0.159	0.0602	0.0819	-	-0.0027
-ΔLUKC	Prob.	-	-	0.0000	0.0000	0.0487	0.0074	-	0.0651
ΔLMAL	Coef	-0.0474	-	0.1966	0.2618	0.0221	0.0336	-	-0.0056
-ΔLWE	Prob.	0.038	-	0.0000	0.0000	0.1626	0.0219	-	0.0015
ΔLMAL	Coef	-	-	0.1222	0.225	0.0513	0.0318	-0.0123	-0.0095
-ΔLUSC	Prob.	-	-	0.0000	0.0000	0.0001	0.013	0.0370	0.0001
ΔLMAL	Coef	-0.0159	0.0458	0.1953	0.1768	0.0171	0.0425	-	-0.005
-ΔLUKC	Prob.	0.4873	0.045	0.0000	0.0000	0.2435	0.0022	-	0.008
ΔLBANG	Coef	-0.0075	0.0762	0.1135	-0.0553	0.0751	-0.0505	0.0002	-0.0039
-ΔLWE	Prob.	0.7435	0.0008	0.0000	0.0111	0.0006	0.0201	0.9851	0.0052
ΔLBANG	Coef	-0.0105	0.0773	0.0917	-0.0208	0.0548	-0.0515	-0.0005	-0.0037
-ΔLUSC	Prob.	0.6454	0.0007	0.0000	0.2659	0.0034	0.0053	0.9542	0.0057
ΔLBANG	Coef	-0.0216	0.0902	0.0844	-0.044	0.0652	-	0.0005	-0.006
-ΔLUKC	Prob.	0.3427	0.0001	0.0000	0.0234	0.0008	-	0.9571	0.0007

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladeshi stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

TABLE 4.9: Error correction Model for Short Run Relationship between International Conventional Markets and Asian Emerging Markets (a)

		DV(-1)	DV(-2)	DV(-3)	IV	IV(-1)	IV(-2)	IV(-3)	D(D1)	D(-1)	D(-2)	D(-3)	ECM(-1)
ΔLPAK-ΔLWE	Coef	0.1544	-	-	0.1391	0.089	0.0646	0.0825	-0.0141	0.0477	0.0055	0.0256	-0.0044
	Prob.	0.0000	-	-	0.0000	0.0007	0.0143	0.0017	0.1683		0.5901	0.0123	0.0011
ΔLPAK-ΔLUSC	Coef	0.1519	-	-	0.0921	0.1002	0.0769	0.0743	-	-	-	-	-0.0034
	Prob.	0.0000	-	-	0.0000	0.0000	0.0008	0.0009	-	-	-	-	0.0046
ΔLPAK-ΔLUKC	Coef	0.1685	-	-	0.1275	0.0531	-	-	-0.0147	0.0439	0.0018	0.0227	-0.0039
	Prob.	0.0000	-	-	0.0000	0.0242	-	-	0.1524	0.0000	0.8604	0.0273	0.0006
ΔLINDO-ΔLWE	Coef	0.0183	-0.0438	-0.0755	0.3478	0.3051	-0.0093	0.1088	-	-	-	-	-0.0056
	Prob.	0.422	0.0554	0.0006	0.0000	0.0000	0.722	0.0000	-	-	-	-	0.032
ΔLINDO-ΔLUSC	Coef	0.0281	-0.0428	-0.0676	0.2563	0.2938	0.0343	0.0922	-	-	-	-	-0.0051
	Prob.	0.2175	0.0608	0.0018	0.0000	0.0000	0.1325	0.0000	-	-	-	-	0.0253
ΔLINDO-ΔLUKC	Coef	0.0414	-0.0294	-0.057	0.2832	0.1839	0.026	0.0785	-0.0027	-	-	-	-0.0126
	Prob.	0.0701	0.1982	0.0107	0.0000	0.0000	0.2698	0.0008	0.7764	-	-	-	0.0005
ΔLINDIA-ΔLWE	Coef	-0.0871	-0.061	-0.0453	0.5057	0.3119	0.042	0.15	-	-	-	-	-0.0102
	Prob.	0.0002	0.0083	0.0397	0.0000	0.0000	0.132	0.0000	-	-	-	-	0.0004
ΔLINDIA-ΔLUSC	Coef	-0.0907	-0.0486	-	0.3661	0.3382	0.0963	0.1087	-	-	-	-	-0.0119
	Prob.	0.0001	0.0345	-	0.0000	0.0000	0.0001	0.0000	-	-	-	-	0.0013
ΔLINDIA-ΔLUKC	Coef	-0.0427	-0.0448	-0.0383	0.4767	0.1534	0.0816	0.1607	-0.0024	-	-	-	-0.0046
	Prob.	0.0611	0.0493	0.0895	0.0000	0.0000	0.0009	0.0000	0.796	-	-	-	0.0005

LPAK = Log of Pakistani stock index, LINDO= Log of Indonesian stock index, LINDIA = Log of Indian stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

Structural Break is created between US conventional and Malaysian market, adding dummy variable to address the Structural Break. MSCI world market and USA conventional market have significant short term relationship with Bangladesh market but in-significant relationship in long term.

On the other hand, UK conventional market has significant short term and long term relationships with Bangladesh conventional market, Error correction term is negative and significant, that tells the adjustment process is slow and below 0.60 percent.

MSCI world market, USA, and UK conventional markets have significant short term relationship but insignificant long term relationship with Pakistan and Error correction term is negative and significant, that says the adjustment process is below from 0.45 percent.

MSCI world market and UK conventional markets have significant short term and long term relationship with Indonesian market, but USA conventional market has significant short term relationship but relationship in long term is insignificant with Indonesian market.

Error correction term is negative and significant, that states the adjustment process is below from 0.57 percent. MSCI world market, USA, and UK conventional market have statistically significant short term and long term relationship with Indian market, Error correction term is negative and significant, that tells the adjustment process is very slow and below 1.26 percent.

Table 4.10 is noted that MSCI world market, USA, and UK conventional markets have statistically insignificant long run effect on China, Malaysia and Pakistan. MSCI world market and USA conventional market has insignificant long run impact on Bangladesh but UK conventional market has significant and positive long run effect on Bangladesh market.

MSCI world market and UK conventional market has significant positive long run influence on Indonesia but USA conventional market has insignificant impact on Indonesia. MSCI world market and USA, and UK conventional markets have significant and positive impact on Indian market.

Table 4.10: ARDL Model for Long Run Relationship between Internationals Conventional Markets and Emerging Markets

	LCHINA-LWE		**LCHINA-LUSC**		**LCHINA-LUKC**		**LMAL-LWE**		**LMAL-LUSC**		**LMAL-LUKC**	
	Coeff.	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**
IV	0.8383	0.3153	0.5658	0.4261	1.4334	0.3742	-0.3422	0.0775	-0.0741	0.4727	-0.15	0.709
D	-	-	-0.0264	0.938	-	-	-	-	-0.0917	0.0441	-	-
C	1.581	0.8039	3.5804	0.5111	-4.6131	0.7458	10.0285	0	8.0215	0	8.7687	0.0136
	LBANG-LWE		**LBANG-LUSC**		**LBANG-LUKC**		**LPAK-LWE**		**LPAK-LUSC**		**LPAK-LUKC**	
	Coeff.	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**
IV	0.2651	0.6515	0.1312	0.779	0.9661	0	1.0092	0.3153	0.2469	0.5581	1.2331	0.1254
D	-0.2336	0.1256	-0.2339	0.1676	-0.1264	0.1338	-0.2593	0.8039	-	-	-0.0724	0.6194
C	6.5377	0.1435	7.5428	0.0365	-	-	2.8719	0.4975	8.6083	0.0087	-0.3346	0.9624
	LINDO-LWE		**LINDO-LUSC**		**LINDO-LUKC**		**LINDIA-LWE**		**LINDIA-USC**		**LINDIA-UKC**	
	Coeff.	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**
IV	0.6703	0.025	0.4194	0.0615	1.391	0	1.5513	0	1.0189	0	2.2001	0.0013
D	-	-	-	-	0.0911	0.0274	-	-	-	-	0.3114	0.0047
C	3.4388	0.1312	5.287	0.0023	-3.7234	0.073	-1.5342	0.2097	2.3968	0.0012	-9.1304	0.1296

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladeshi stock index, LPAK = Log of Pakistani stock index, LINDO= Log of Indonesian stock index, LINDIA = Log of Indian stock index, LWE = Log of MSCI World Market Index, LUKC = Log of UK Conventional index, LUSC = Log of US conventional index

Table 4.11: Lag Length Selection criteria for link between International Islamic Markets and Asian Emerging Markets

LCHINA-LWEI		**LCHINA-LUSI**		**LCHINA-LUKI**		**LMAL-LWEI**		**LMAL-LUSI**		**LMAL-LUKI**	
Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC
0	-1.4273	0	-0.9803	0	-2.6721	0	-3.5492	0	-3.1528	0	-4.8043
1	-12.4017	1	-11.9415	1	-11.8963	1	-13.9503	1	-13.4648	1	-13.4853
2	-12.4285	2	-12.0109	2	**-11.9036***	2	-14.0974	2	-13.639	2	-13.5646
3	-12.4419	3	-12.0141	3	-11.9024	3	**-14.1170***	3	**-13.6551***	3	-13.57
4	**-12.4423***	4	**-12.0169***	4	-11.9023	4	-14.116	4	-13.654	4	**-13.5745***
LBANG-LWEI		**LBANG-LUSI**		**LBANG-LUKI**		**LPAK-LWEI**		**LPAK-LUSI**		**LPAK-LUKI**	
Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC
0	-2.1868	0	-1.7037	0	-3.3575	0	-1.3752	0	-0.9573	0	-2.3496
1	-13.309	1	-12.8791	1	-12.8095	1	-12.8897	1	-12.4542	1	-12.4058
2	-13.3175	2	-12.9174	2	-12.8103	2	-12.9294	2	-12.528	2	-12.4422
3	-13.341	3	-12.9318	3	-12.8239	3	-12.9463	3	-12.5351	3	-12.4445
4	**-13.3525***	4	**-12.9452***	4	**-12.8319***	4	**-12.9490***	4	**-12.5387***	4	**-12.4450***
LINDO-LWEI		**LINDO-LUSI**		**LINDO-LUKI**		**LINDIA-LWEI**		**LINDIA-LUSI**		**LINDIA-LUKI**	
Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC	Lag	AIC
0	-2.8291	0	-2.2999	0	-3.5632	0	-3.0359	0	-2.7616	0	-2.5466
1	-13.0158	1	-12.535	1	-12.5213	1	-13.0209	1	-12.4989	1	-12.5576
2	-13.1008	2	-12.6685	2	-12.5637	2	-13.1159	2	-12.6505	2	-12.5837
3	-13.1166	3	-12.6736	3	-12.5655	3	-13.1434	3	-12.6706	3	-12.5917
4	**-13.1266***	4	**-12.6831***	4	**-12.5699***	4	**-13.1561***	4	**-12.6826***	4	**-12.6037***

TABLE 4.12: ARDL Model for Link between International Islamic Markets and Asian Emerging Markets

			DV(-1)	DV(-2)	DV(-3)	IV	IV(-1)	IV(-2)	IV(-3)	IV(-4)	C	F-Stat.	Prob. F.	DW Stat.
LCHINA-LWEI	ARDL(1, 4)	Coef	0.9974	-	-	0.3644	-0.1161	-0.2023	0.0345	-0.0791	0.0104	63847	0.0000	1.9701
		Prob.	0.0000	-	-	0.0000	0.0155	0.0000	0.472	0.0217	0.5391			
LCHINA-LUSI	ARDL(1, 4)	Coef	0.9973	-	-	0.2355	0.0142	-0.1715	-0.0056	-0.0714	0.0124	62594	0.0000	1.9702
		Prob.	0.0000	-	-	0.0000	0.6998	0.0000	0.8793	0.012	0.4137			
LCHINA-LUKI	ARDL(1, 4)	Coef	0.9977	-	-	0.2286	-0.1134	-0.0876	0.0403	-0.0819	-0.0051	61460	0.0000	1.94
		Prob.	0.0000	-	-	0.0000	0.0037	0.0249	0.3018	-0.0648	0.8808			
LMAL-LWEI	ARDL(2, 4)	Coef	0.946	0.0485	-	0.1992	0.0652	-0.2368	0.0075	-0.0371	0.0572	36355	0.0000	1.9917
		Prob.	0.0000	0.0342	-	0.0000	0.0025	0.0000	0.7272	0.0133	0.0044			
LMAL-LUSI	ARDL(1, 4)	Coef	0.993	-	-	0.1162	0.1039	-0.1666	-0.0215	-0.0338	0.0665	40095	0.0000	2.0325
		Prob.	0.0000	-	-	0.0000	0.0000	0.0000	0.1863	0.0071	0.0016			
LMAL-LUKI	ARDL(1, 4)	Coef	0.9958	-	-	0.1693	-0.0218	-0.1294	0.0235	-0.0433	0.0451	40696	0.0000	2.0605
		Prob.	0.0000	-	-	0.0000	0.1989	0.0000	0.1654	0.0003	0.0096			
LBANG-LWEI	ARDL(3, 4)	Coef	0.989	0.0839	-0.0753	0.1155	-0.1666	0.1282	-0.1318	0.0531	0.034	58106	0.0000	1.9969
		Prob.	0.0000	0.0089	0.001	0.0000	0.0000	0.0000	0.0000	0.0164	0.0109			
LBANG-LUSI	ARDL(3, 4)	Coef	0.9854	0.0893	-0.0771	0.089	-0.108	0.0726	-0.106	0.0511	0.0316	57985	0.0000	1.9959
		Prob.	0.0000	0.0052	0.0007	0.0000	0.0000	0.0025	0.0000	0.0048	0.0132			
LBANG-LUKI	ARDL(3, 3)	Coef	0.9703	0.1191	-0.0926	0.0588	-0.0906	0.0871	-0.058	-	0.049	65599	0.0000	2.001
		Prob.	0.0000	0.0002	0.0000	0.0007	0.0003	0.0004	0.0008	-	0.0215			

Where LCHINA = Log of china, LMAL = Log of Malaysia, LBANG= Log of Bangladesh, LWEI = Log of MSCI World Islamic Market, LUKI = Log of UK Islamic Market, LUSI = Log of USA Islamic Market

TABLE 4.13: ARDL Model for Link between International Islamic Markets and Asian Emerging Markets (a)

			DV(-1)	DV(-2)	DV(-3)	DV(-4)	IV	IV(-1)	IV(-2)	IV(-3)	IV(-4)	D(1)	C	F-Stat.	Prob. F.	DW Stat.
LPAK-LWEI	ARDL(2, 4)	Coef	1.1492	-0.1523	-	-	0.1330	-0.0347	-0.0303	0.0117	-0.0794		0.0300	122778	0.0000	1.9999
		Prob.	0.0000	0.0000	-	-	0.0000	0.3564	0.4187	0.7538	0.0032		0.0207			
LPAK-LUSI	ARDL(2, 4)	Coef	1.1489	-0.152	-	-	0.0882	0.0127	-0.026	-0.0046	-0.0700		0.0298	122273	0.0000	1.9995
		Prob.	0.0000	0.0000	-	-	0.0001	0.657	0.3693	0.8717	0.0015		0.0113			
LPAK-LUKI	ARDL(2, 3)	Coef	1.1534	-0.1565	-	-	0.1163	-0.0447	-0.0224	-0.0495	-		0.0353	143474	0.0000	1.9978
		Prob.	0.0000	0.0000	-	-	0.0000	0.1367	0.4518	0.0185	-		0.1675			
LINDO-LWEI	ARDL(4, 4)	Coef	1.0169	-0.0651	-0.0337	0.0789	0.3584	-0.05	-0.3217	0.1338	-0.12		0.0215	38218	0.0000	1.998
		Prob.	0.0000	0.0459	0.2891	0.0003	0.0000	0.1598	0.0000	0.0002	0.0000		0.1413			
LINDO-LUSI	ARDL(4, 4)	Coef	1.0289	-0.0761	-0.0253	0.0689	0.2397	0.0455	-0.2519	0.0632	-0.0957		0.0243	36777	0.0000	1.9965
		Prob.	0.0000	0.0204	0.4302	0.0015	0.0000	0.0941	0.0000	0.0214	0.0000		0.1086			
LINDO-LUKI	ARDL(4,4,0)	Coef	1.0124	-0.0656	-0.0114	0.0622	0.2553	-0.0752	-0.1381	0.0283	-0.0699	-0.0003	0.0179	32591	0.0000	2.0047
		Prob.	0.0000	0.0441	0.7236	0.0055	0.0000	0.0087	0.0000	0.3255	0.0008	0.6089	0.4626			
LINDIA-LWEI	ARDL(4, 4)	Coef	0.9071	0.0286	0.0201	0.0376	0.4969	-0.1598	-0.2756	0.0913	-0.1458		0.0104	107363	0.0000	1.9774
		Prob.	0.0000	0.3627	0.5160	0.0887	0.0000	0.0000	0.0000	0.0153	0.0000		0.3353			
LINDIA-LUSI	ARDL(3, 4)	Coef	0.9015	0.0434	0.0476		0.3357	0.0065	-0.2268	-0.0001	-0.1088		0.0234	113711	0.0000	1.9799
		Prob.	0.0000	0.1649	0.0388		0.0000	0.8211	0.0000	0.9969	0.0000		0.0409			
LINDIA-LUKI	ARDL(4,4,0)	Coef	0.9515	-0.0144	0.0184	0.0425	0.4146	-0.2864	-0.0618	0.058	-0.1181	-0.0002	-0.0277	93199	0.0000	1.9943
		Prob.	0.0000	0.6517	0.5639	0.0616	0.0000	0.0000	0.0469	0.0605	0.0000	0.8120	0.2315			

Where LPAK = Log of Pakistan, LINDO= Log of Indonesia, LINDIA = Log of India, LWEI = Log of MSCI World Islamic Market, LUKI = Log of UK Islamic Market, LUSI = Log of USA Islamic Market

4.2.2 ARDL Islamic Markets and Asian Emerging Markets

ARDL model is applied to study link between international Islamic markets and Asian emerging markets. **Table 4.11** shows the criteria for choosing number of lags, the lag period which provides the lowest critical value is known as the lag period of the model. The lag length for the pairs of China conventional market and UK Islamic market are 2, the lag length for the pairs of Malaysia and world Islamic market, Malaysia and USA Islamic market are 3, and the lag length for all remaining pairs are 4. **Table 4.12** and **4.13** Shows the results regarding ARDL model link between international Islamic markets and Asian emerging markets. Findings indicate that MSCI, USA, and UK Islamic markets returns have statistically significant impact on the returns of China, Malaysia, Bangladesh, Pakistan, Indonesia, and Indian Islamic markets. All the pairs of Asian emerging markets have no lag effect with International Islamic markets.

In **Figure 4.4, 4.5**, and **4.6**, CUSUM is plotted to study the stability in the ARDL model, for all pairs of Asian emerging markets and international Islamic markets. It indicates that line is inside the critical limits of 0.05 which shows the overall goodness of fit and stability of all models.

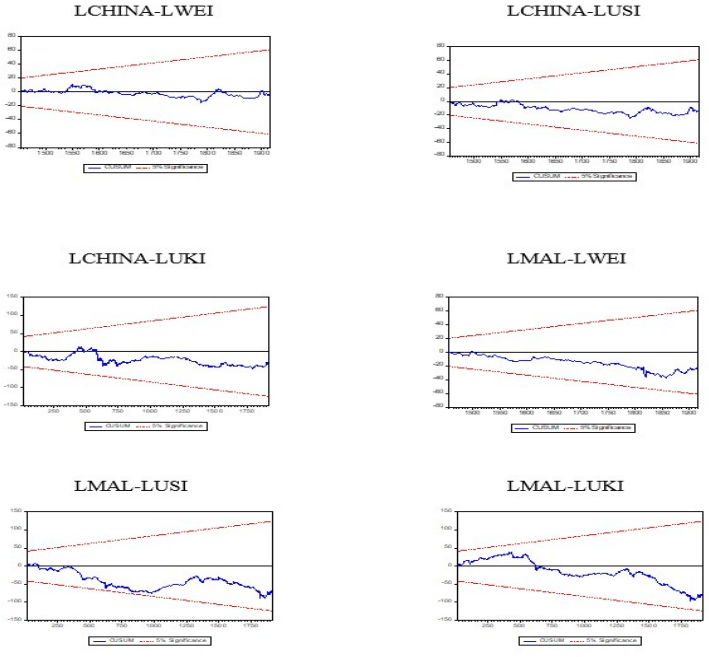

FIGURE 4.4: CUSUM Test for International Islamic Markets and Emerging Asian Markets (a)

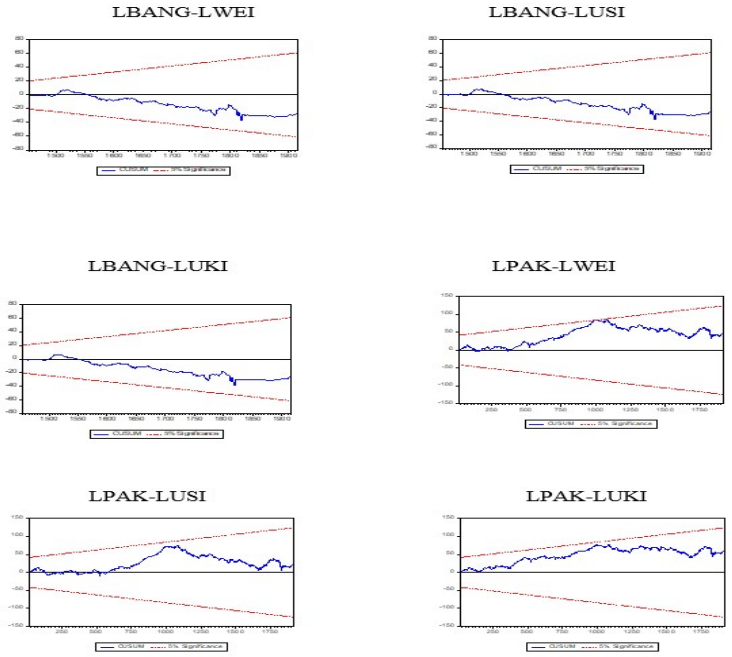

FIGURE 4.5: CUSUM Test for International Islamic Markets and Emerging Asian Markets (b)

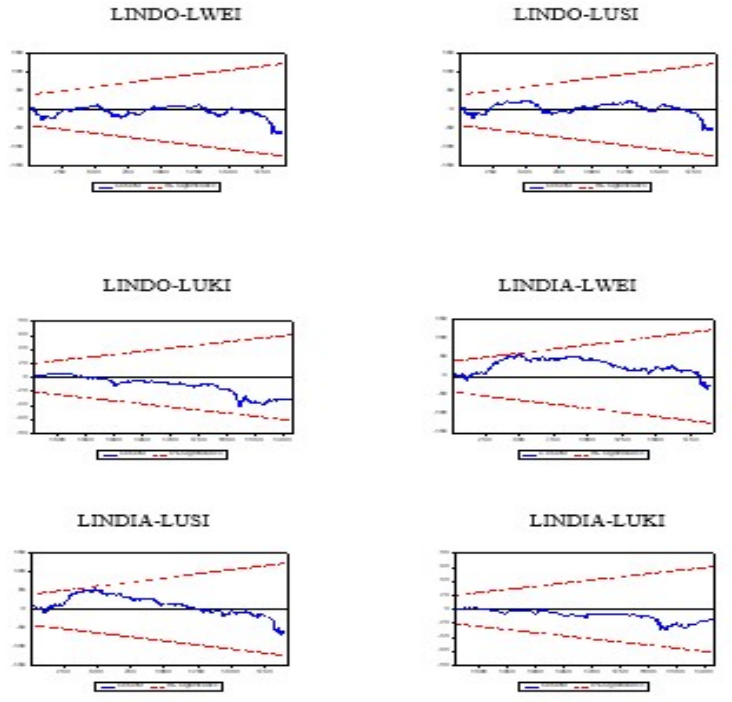

FIGURE 4.6: CUSUM Test for International Islamic Markets and Emerging Asian Markets (c)

Table 4.14 and **4.15** displays the findings of error correction model that captures

the short term impact of international Islamic markets on Asian emerging markets. According to the results of error correction model reports that MSCI world Islamic, UK and USA Islamic markets have significant short term effect with China, Malaysia, Bangladesh, Pakistan, Indonesia, and India Islamic markets.

Moreover it is observed that MSCI world Islamic, USA Islamic and UK Islamic markets have significant short run and insignificant in long run relationship with China, disequilibrium is not arise between these pairs.

MSCI world Islamic, USA and UK Islamic markets have significant in short run relationship with Malaysia, in long run only USA Islamic market has significant relationship with Malaysia, Error correction term is negative and significant that states the adjustment process is slow and below 0.86 percent.

Structural Break is produce between MSCI world Islamic market and Malaysian market, adding dummy variable to address the Structural Break. MSCI world Islamic, USA Islamic, and UK Islamic Markets have significant in short run relationship with Bangladesh.

But in long run UK Islamic market has significant relationship with Bangladesh, Error correction term is negative and significant, that tells the adjustment process are below 0.34 percent.

MSCI world Islamic, USA Islamic, and UK Islamic markets are statically significant in long and short run with Pakistan, Error correction term is negative and significant, that tells the adjustment process are below 0.32 percent. MSCI world Islamic, USA Islamic, and UK Islamic markets have significant in short run and insignificant in long run with Indonesia.

Error correction term is negative and significant except the pair of UK Islamic market, the significant pairs shows the adjustment process below from 0.38 percent. MSCI world Islamic, USA Islamic, and UK Islamic markets have significant in short run with India.

But in long run MSCI world Islamic and USA Islamic markets are significant with India. Error correction term is negative and significant, that tells the adjustment process are below from 0.76 percent.

TABLE 4.14: Error Correction Model for Short Run Relationship between International Islamic Markets and Asian Emerging Markets

		DV(-1)	DV(-2)	IV	IV(-1)	IV(-2)	IV(-3)	D(D1)	ECM(-1)
ΔLCHINA-ΔLWEI	**Coef**	-	-	0.3634	0.2468	0.044	0.0770	-0.0179	-0.0028
	Prob.	-	-	0.0000	0.0000	0.2006	0.0253	0.1752	0.1132
ΔLCHINA-ΔLUSI	**Coef**	-	-	0.2351	0.2481	0.0761	0.0695	-0.0205	-0.0030
	Prob.	-	-	0.0000	0.0000	0.0082	0.0144	0.1250	0.1057
ΔLCHINA-ΔLUKI	**Coef**	-	-	0.2286	0.1121	0.0245	0.0648	-	-0.0023
	Prob.	-	-	0.0000	0.0000	0.3680	0.0174	-	0.0664
ΔLMAL-ΔLWEI	**Coef**	-0.0485	-	0.1988	0.2661	0.0297	0.0362	-0.0119	-0.0085
	Prob.	0.0333	-	0.0000	0.0000	0.0649	0.0155	0.0381	0.0002
ΔLMAL-ΔLUSI	**Coef**	-	-	0.1162	0.2219	0.0553	0.0338	-	-0.007
	Prob.	-	-	0.0000	0.0000	0.0000	0.0071	-	0.0004
ΔLMAL-ΔLUKI	**Coef**	0.1693	0.1493	-	0.1493	0.0198	0.0433	-	-0.0042
	Prob.	0.0000	0.0000	-	0.0000	0.0947	0.0003	-	0.0081
ΔLBANG-ΔLWEI	**Coef**	-0.0080	0.0756	0.1166	-0.0502	0.0778	-0.0539	0.0008	-0.0033
	Prob.	0.7277	0.0009	0.0000	0.0235	0.0005	0.0148	0.9235	0.0053
ΔLBANG-ΔLUSI	**Coef**	-0.0116	0.0774	-	-0.0182	0.0543	-0.0516	-0.0002	-0.0033
	Prob.	0.6103	0.0007	-	0.3212	0.0031	0.0043	0.982	0.0056
ΔLBANG-ΔLUKI	**Coef**	-0.0269	0.0922	0.0617	-0.0313	0.0557	-	0.0003	-0.0019
	Prob.	0.2380	0.0001	0.0003	0.0699	0.0013	-	0.9683	0.0254

Where LCHINA = Log of Chinese stock index, LMAL = Log of Malaysian stock index, LBANG= Log of Bangladeshi stock index, LWEI = MSCI World Islamic Index, LUKI = Log of UK Islamic index, LUSI = Log of US Islamic index

TABLE 4.15: Error correction Model for Short Run Relationship between International Islamic Markets and Asian Emerging Markets (a)

		DV(-1)	DV(-2)	DV(-3)	IV	IV(-1)	IV(-2)	IV(-3)	D(D1)	ECM(-1)
ΔLPAK-ΔLWEI	Coef	0.1523	-	-	0.1330	0.0979	0.0677	0.0794	-	-0.0031
	Prob.	0.0000	-	-	0.0000	0.0003	0.012	0.0031	-	0.0039
ΔLPAK-ΔLUSI	Coef	0.152	-	-	0.0882	0.1005	0.0746	0.0700	-	-0.0031
	Prob.	0.0000	-	-	0.0001	0	0.0009	0.0015	-	0.0049
ΔLPAK-ΔLUKI	Coef	0.1565	-	-	0.1163	0.0719	0.0495	-	-	-0.0031
	Prob.	0.0000	-	-	0.0000	0.0006	0.0182	-	-	0.0017
ΔLINDO-ΔLWEI	Coef	0.0199	-0.0452	-0.0789	0.3584	0.3079	-0.0138	0.1200	-	-0.0030
	Prob.	0.3822	0.0476	0.0003	0.0000	0.0000	0.6059	0.0000	-	0.0570
ΔLINDO-ΔLUSI	Coef	0.0326	-0.0435	-0.0689	0.2397	0.2844	0.0325	0.0957	-	-0.0037
	Prob.	0.1523	0.0565	0.0015	0.0000	0.0000	0.145	0.0000	-	0.0389
ΔLINDO-ΔLUKI	Coef	0.0149	-0.0507	-0.0622	0.2552	0.1796	0.0415	0.0698	-0.0028	-0.0025
	Prob.	0.5137	0.0262	0.0054	0.0000	0.0000	0.0456	0.0008	0.7738	0.0929
ΔLINDIA-ΔLWEI	Coef	-0.0864	-0.0577	-0.0376	0.4969	0.3301	0.0546	0.1458	-	-0.0065
	Prob.	0.0002	0.0127	0.0885	0.0000	0.0000	0.0553	0.0000	-	0.0143
ΔLINDIA-ΔLUSI	Coef	-0.0909	-0.0476	-	0.3357	0.3357	0.1089	0.1088	-	-0.0075
	Prob.	0.0001	0.0386	-	0.0000	0.0000	0.0000	0.0000	-	0.0133
ΔLINDIA-ΔLUKI	Coef	-0.0466	-0.061	-0.0425	0.4145	0.1219	0.0601	0.1180	-0.0023	-0.0020
	Prob.	0.0417	0.0077	0.0614	0.0000	0.0000	0.0060	0.0000	0.8059	0.0028

LPAK = Log of Pakistani stock index, LINDO= Log of Indonesian stock index, LINDIA = Log of Indian stock index, LWEI = MSCI World Islamic Index, LUKI = Log of UK Islamic index, LUSI = Log of US Islamic index

TABLE 4.16: ARDL Model for Long Run Link between International Islamic Markets and Asian Emerging Markets

	LCHINA-LWEI		**LCHINA-LUSI**		**LCHINA-LUKI**		**LMAL-LWEI**		**LMAL-LUSI**		**LMAL-LUKI**	
	Coeff.	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**
IV	0.7169	0.436	0.5577	0.4407	1.3241	0.5095	-0.0617	0.6512	-0.2528	0.0104	-0.425	0.3976
D	-0.126	0.7203	-0.09	0.8027	-	-	-0.1204	0.017	-	-	-	-
C	2.1917	0.766	3.3117	0.5788	-2.1869	0.8875	7.9482	0.0000	9.5227	0.0000	10.7109	0.0057
	LBANG-LWEI		**LBANG-LUSI**		**LBANG-LUKI**		**LPAK-LWEI**		**LPAK-LUSI**		**LPAK-LUKI**	
	Coeff.	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**
IV	0.0134	0.9827	-0.016	0.976	1.1185	0.0000	0.1102	0.8377	0.1056	0.8075	-0.1185	0.8985
D	-0.2235	0.2401	-0.216	0.2813	-0.4356	0.2003	-	-	-	-	-	-
C	8.4486	0.0885	8.6883	0.05	-	-	9.6353	0.0271	9.6387	0.008	11.4771	0.1095
	LINDO-LWEI		**LINDO-LUSI**		**LINDO-LUKI**		**LINDIA-LWEI**		**LINDIA-USI**		**LINDIA-UKI**	
	Coeff.	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**	**Coeff.**	**Prob.**
IV	0.169	0.7564	0.2324	0.4599	0.1825	0.8722	1.0785	0.0000	0.861	0.0000	3.1577	0.1709
D	-	-	-	-	-0.1182	0.6721	-	-	-	-	-0.0788	0.8297
C	7.1361	0.1013	6.5699	0.0116	7.1891	0.4111	1.5913	0.3479	3.1037	0.0117	-13.895	0.4308

Where LCHINA = Log of china, LMAL = Log of Malaysia, LBANG= Log of Bangladesh, LPAK = Log of Pakistan, LINDO= Log of Indonesia, LINDIA = Log of India, LWEI = Log of MSCI World Islamic Market, LUKI = Log of UK Islamic Market, LUSI = Log of USA Islamic Market

Table 4.16 is noted that MSCI world Islamic, USA Islamic, and UK Islamic markets have insignificant long run effect on China, Pakistan and Indonesia markets. MSCI world Islamic and UK Islamic markets have insignificant long run effect on Malaysia but only USA Islamic market has significant long run effect on Malaysia. MSCI world Islamic and USA Islamic markets have insignificant long run influence on Bangladesh but only UK Islamic markets has significant long run impact on Bangladesh. MSCI world Islamic and USA Islamic have significant long run impact on India but UK Islamic market has insignificant long run impact on India.

4.3 Time Varying Conditional Correlation Between International Markets and Asian Emerging Markets

In this study DCC GARCH model has applied to examine time varying correlation over period of time for all the pairs of Asian emerging markets and international conventional and international Islamic markets. **Table 4.17** shows that the results are significant for all Asian emerging markets and international conventional as well as international Islamic markets, which mean that GARCH based model can be applied.

Table 4.17: ARCH Effect

	Value	**Probability**
RCHINA	82.3659	0.0000
RINDIA	71.0713	0.0000
RINDO	72.3937	0.0000
RMAL	248.1828	0.0000
RPAK	27.4030	0.0000
RBANG	20.8690	0.0000
RUSC	385.7823	0.0000
RUSI	332.2207	0.0000
RUKC	69.7723	0.0000
RUKI	64.9561	0.0000
RWE	241.6891	0.0000
RWEI	251.4987	0.0000

Where RCHINA = Return of Chinese stock index, RMAL = Return of Malaysian stock index, RBANG= Return of Bangladeshi stock index, RPAK = Return of Pakistani stock index, RINDO= Return of Indonesian stock index, RINDIA = Return of Indian stock index, RWE = Return of MSCI World Market Index, RUKC = Return of UK Conventional index, RUSC = Return of US conventional index, RWEI = Return of MSCI World Islamic Index, RUKI = Return of UK Islamic index, RUSI = Return of US Islamic index

Table 4.18: DCC GARCH Model of International Conventional Markets with Emerging Conventional Markets

		Theta-1	**Theta-2**	**Selected Model**
RCHINA-RWE	Coef.	0.022544	0.911832	GJR/TGARCH
	Prob.	(0.1196)	0.0000	
RCHINA-RUSC	Coef.	0.02849	0.740259	GJR/TGARCH
	Prob.	(0.2094)	(0.0050)	
RCHINA-RUKC	Coef.	-0.01271	0.790912	GARCH
	Prob.	0.0000	0.0000	
RMAL-RWE	Coef.	-0.007686	0.681295	EGARCH
	Prob.	(0.4921)	(0.0558)	
RMAL-RUSC	Coef.	-0.008881	0.738349	EGARCH
	Prob.	(0.2271)	(0.0057)	
RMAL-RUKC	Coef.	0.0111	0.9304	GJR/TGARCH
	Prob.	(0.1236)	0.0000	
RBANG-RWE	Coef.	0.0096	0.9306	GJR/TGARCH
	Prob.	(0.2864)	0.0000	
RBANG-RUSC	Coef.	0.0062	0.9398	GJR/TGARCH
	Prob.	(0.4565)	0.0000	
RBANG-RUKC	Coef.	0.0184	0.8450	GJR/TGARCH
	Prob.	(0.2433)	0.0000	
RPAK-RWE	Coef.	0.0434	0.4623	EGARCH
	Prob.	(0.0466)	(0.0324)	
RPAK-RUSC	Coef.	0.0398	0.4937	EGARCH
	Prob.	(0.0691)	(0.0174)	
RPAK-RUKC	Coef.	0.0168	0.9136	GJR/TGARCH
	Prob.	(0.1121)	0.0000	
RINDO-RWE	Coef.	0.0439	0.6560	EGARCH
	Prob.	(0.0543)	(0.0066)	
RINDO-RUSC	Coef.	0.0277	0.7589	EGARCH
	Prob.	(0.1971)	(0.0061)	
RINDO-RUKC	Coef.	0.0440	0.8129	GJR/TGARCH
	Prob.	(0.0075)	0.0000	
RINDIA-RWE	Coef.	0.0113	0.9515	EGARCH
	Prob.	(0.1331)	0.0000	
RINDIA-RUSC	Coef.	0.0148	0.5372	EGARCH
	Prob.	(0.4064)	(0.1761)	
RINDIA-RUKC	Coef.	0.0249	0.9395	GJR/TGARCH
	Prob.	(0.0029)	0.0000	

Where RCHINA = Return of Chinese stock index, RMAL = Return of Malaysian stock index, RBANG= Return of Bangladeshi stock index, RPAK = Return of Pakistani stock index, RINDO= Return of Indonesian stock index, RINDIA = Return of Indian stock index, RWE = Return of MSCI World Market Index, RUKC = Return of UK Conventional index, RUSC = Return of US conventional index

Table 4.18 reports the results of DCC GARCH for selected pairs of Asian emerging markets and international conventional markets where heteroscedasticity is present. It is also shows the suitable bivariate DCC models. On the basis of lowest AIC, the appropriate model is selected. The table 4.18 shows the coefficient and P values of theta 1 for the effect of past residual shocks and theta 2 for lagged dynamic conditional correlation. Theta 1 is insignificant, and Theta 2 is significant for the pairs of Chinese market with USA conventional market, Chinese market with MSCI world conventional market, Malaysia conventional market with USA conventional market. Malaysian market with UK conventional market, Bangladesh market with MSCI world conventional market, Bangladesh market with UK conventional market, Bangladesh market with USA conventional market. Pakistan market with UK conventional market, Pakistani market with USA conventional market, Indonesian market with MSCI world market, Indonesian market with USA conventional market. Indian market with MSCI world market. It designates that past residual shock have not present and lagged dynamic conditional correlation have present between these pairs.

Theta 1 and 2 both are significant for the pairs of Chinese market with UK conventional market, Pakistani market with MSCI world market, Indonesian market with UK conventional market, and Indian market with UK conventional market it indicates that past residual shock and lagged dynamic conditional correlation both are present between these pairs. Theta 1 and theta 2 both are insignificant for the pairs of Malaysian market with MSCI world market, Indian market with USA conventional market, it shows that past residual shock and lagged dynamic conditional correlation is not present between these pairs.

Table 4.19 reports the results of DCC GARCH of all pairs of Asian emerging markets and international Islamic markets. Theta 1 and theta 2 is found positively statistically significant for the pairs of Chinese market and MSCI world Islamic

market. Pakistani market with MSCI world Islamic market, Pakistani market with USA Islamic market, Indian market with UK Islamic market.

TABLE 4.19: DCC GARCH model of International Islamic Markets with Emerging Markets

		Theta-1	**Theta-2**	**Selected Model**
RCHINA-RWEI	Coef.	0.0314	0.8835	GJR/TGARCH
	Prob.	(0.0459)	0.0000	
RCHINA-RUSI	Coef.	0.03763	0.73024	GJR/TGARCH
	Prob.	(0.0866)	(0.0003)	
RCHINA –RUKI	Coef.	-0.010313	0.460434	EGARCH
	Prob.	0.0000	(0.3655)	
RMAL-RWEI	Coef.	-0.007312	0.684837	EGARCH
	Prob.	(0.5004)	(0.0919)	
RMAL-RUSI	Coef.	-0.00991	0.733149	EGARCH
	Prob.	(0.2426)	(0.0079)	
RMAL-RUKI	Coef.	0.0088	0.9117	GJR/TGARCH
	Prob.	(0.2501)	0.0000	
RBANG-RWEI	Coef.	0.0100	0.9170	GJR/TGARCH
	Prob.	(0.3124)	0.0000	
RBANG-RUSI	Coef.	0.0043	0.9343	GJR/TGARCH
	Prob.	(0.6207)	0.0000	
RBANG-RUKI	Coef.	0.0165	0.8291	GJR/TGARCH
	Prob.	(0.3406)	0.0000	
RPAK-RWEI	Coef.	0.0493	0.5314	EGARCH
	Prob.	(0.0213)	(0.0020)	
RPAK-RUSI	Coef.	0.0424	0.5006	EGARCH
	Prob.	(0.0498)	(0.0070)	
RPAK-RUKI	Coef.	0.0535	0.4696	GJR/TGARCH
	Prob.	(0.0404)	(0.1390)	
RINDO-RWEI	Coef.	0.0296	0.7542	EGARCH
	Prob.	(0.2359)	(0.0233)	
RINDO-RUSI	Coef.	0.0138	0.9417	EGARCH
	Prob.	(0.1409)	0.0000	
RINDO-RUKI	Coef.	0.0179	0.9098	GJR/TGARCH
	Prob.	(0.2234)	0.0000	
RINDIA-RWEI	Coef.	0.0363	0.4257	EGARCH
	Prob.	(0.0944)	(0.1801)	
RINDIA-RUSI	Coef.	0.0253	0.4976	EGARCH
	Prob.	(0.1945)	(0.1027)	
RINDIA-RUKI	Coef.	0.0272	0.9279	GJR/TGARCH
	Prob.	(0.0022)	0.0000	

Where RCHINA = Return of Chinese stock index, RMAL = Return of Malaysian stock index, RBANG= Return of Bangladeshi stock index, RPAK = Return of Pakistani stock index,

RINDO= Return of Indonesian stock index, RINDIA = Return of Indian stock index, RWEI = Return of MSCI World Islamic Index, RUKI = Return of UK Islamic index, RUSI = Return of US Islamic index

It shows that past residual shock and lagged dynamic conditional correlations are present between these pairs. Theta 1 is insignificant and Theta 2 is significant for the pairs of Chinese market with USA Islamic market, Malaysian market with USA Islamic market, Malaysian market with UK Islamic market, Bangladeshi market with MSCI world Islamic market, Bangladeshi market with USA Islamic market, Bangladeshi market with UK Islamic market, Indonesian market with MSCI world Islamic market, Indonesian market with USA Islamic market, Indonesian market with UK Islamic market. It displays that lagged dynamic conditional correlation are present between these pairs.

Theta 2 is significant; it indicates that lagged dynamic conditional correlation is present between these pairs. Theta 1 is significant for the pairs of Chinese market with UK Islamic market, Pakistani market with UK Islamic market, it indicates that past residual shock is present, and Theta 2 is insignificant it noted that that lagged dynamic conditional correlation is not present between these pairs. Theta 1 and Theta 2 both are insignificant for the pairs of Malaysian market with MSCI world Islamic market, Indian market with MSCI world Islamic market, Indian market with USA Islamic market. It indicates that past residual shock and lagged dynamic conditional correlation are not present between these pairs.

Chapter 5

Conclusion & Recommendations

5.1 Conclusion

The purpose of this research is to investigate the bivariate relationship of Asian emerging markets with international conventional as well as international Islamic markets in the background of co-movement. The long run and short run co-movement are examined in first stage, the time varying correlation in the volatility for the pairs of Asian emerging markets and international conventional as well as international Islamic markets. The Asian emerging markets include China, Malaysia, Bangladesh, Pakistan, Indonesia, and India. The international markets include MSCI World Market, USA, and UK conventional as well as Islamic indices.

The methodologies applied include auto-regressive distributive lags (ARDL) and DCC GARCH. Short run and long run relationship of Asian emerging markets with international conventional as well as international Islamic markets are examined through ARDL approach. Time varying correlation in the volatility is examined through DCC GARCH approach.

The results of ARDL for Asian emerging markets with International conventional markets states that, MSCI world market, USA conventional and UK conventional markets insignificant in long run but significant in short term with China, Pakistan and Malaysia markets. MSCI world market and USA conventional market with Bangladeshi market have significant short term relationship but in-significant long

run relationship. On the other hand, UK conventional market with Bangladeshi market has significant short term and long term relationships. MSCI world market, USA, and UK conventional markets market has significant short term relationship with Indonesian market. MSCI world market and UK conventional market have significant long run relationship with Indonesian market. Whereas, MSCI world market, USA, and UK conventional market with Indian market have statistically significant both in long and short run.

The results of ARDL for the pairs of Asian conventional markets with international Islamic markets reports that MSCI world Islamic, USA Islamic and UK Islamic markets with Chinese market have significant short run relationship but in-significant in long run relationship. MSCI world Islamic, USA Islamic and UK Islamic markets with Malaysian market have significant in short run relationship but in long run USA Islamic market have significant only with Malaysian market.

MSCI world Islamic, USA Islamic, and UK Islamic Markets with Bangladeshi market have significant short run relationship but in long run UK Islamic market has significant only with Bangladeshi market. MSCI world Islamic, USA Islamic, and UK Islamic markets with Pakistani and Indonesian markets have significant short run relationship but insignificant in long run relationship. MSCI world Islamic, USA Islamic, and UK Islamic markets with Indian market have significant short run relationship but in long run USA Islamic market has significant only with Indian market.

DCC GARCH model is applied in order to measure whether correlation is constant or time varying over the period for all pairs of Asian emerging markets with international conventional markets. The findings of the pairs of USA conventional market with Chinese market, MSCI world conventional market with Malaysian market, MSCI world conventional market with Chinese market, USA conventional market with Malaysian market, UK conventional market with Malaysian market, MSCI world conventional market with Bangladeshi market, UK conventional market with Bangladeshi market, UK conventional market with Pakistani market.

USA conventional market with Pakistani market, MSCI world conventional market with Indonesian market, USA conventional market with Indonesian market, and

MSCI world conventional market with Indian market exhibit that past residual shock have not present and lagged dynamic conditional correlation have present between these pairs. For the pairs of UK conventional market with Chinese market, MSCI world market with Pakistani market, UK conventional market with Indonesian market, and UK conventional market with Indian market indicates that past residual shock and lagged dynamic conditional correlation both are present between these pairs.

For the pairs of UK conventional market with Bangladeshi market it indicates that past residual shock present lagged dynamic conditional correlation is not present between these pairs. USA conventional market with Indian market shows that past residual shock and lagged dynamic conditional correlation not present between these pairs.

The results of DCC GARCH for international Islamic markets with Asian emerging markets, For the pair of MSCI world Islamic market with Chinese market, MSCI world Islamic market with Pakistani market, USA Islamic market with Pakistani market, UK Islamic market with Indian market shows that past residual shock and lagged dynamic conditional correlations are present between these pairs. For the pairs of USA Islamic market with Chinese market.

USA Islamic market with Malaysian market, UK Islamic market with Malaysian market, MSCI world Islamic market with Bangladeshi market, USA Islamic market with Bangladeshi market, UK Islamic market with Bangladeshi market, MSCI world Islamic market with Indonesian market, USA Islamic market with Indonesian market, UK Islamic market with Indonesian market displays that lagged dynamic conditional correlation are present between these pairs. It also shows that past residual shock is also present between these pairs. For the pairs of UK Islamic market with Chinese market, UK Islamic market with Pakistani market, indicates that past residual shock is present, and lagged dynamic conditional correlation is not present between these pairs. For the pairs of MSCI world Islamic market with Malaysian market, MSCI world Islamic market with Indian market, USA Islamic market with Indian market shows that past residual shock and lagged dynamic conditional correlation are not present between these pairs.

Saiti & Noordin (2018) Explore time varying correlation and compares Malaysian market with Asian conventional as well as Islamic markets and international conventional as well as Islamic markets the results conclude that US Islamic and US conventional markets provides more diversification benefits as compared to UK, Canada, Switzerland, France, as well as Germany markets, Malaysian market is also included in this study and the results shows that UK, and US conventional market is not integrated with Malaysian market and it provides more diversification benefits, however US Islamic market is integrated with Malaysian market and it provide less diversification benefits as compared to other international markets.

5.2 Policy Implication and Recommendations

From overall ARDL results, it is observed that MSCI world and MSCI world Islamic, UK conventional and UK Islamic, USA conventional and USA Islamic markets are found significantly influencing the Indian market in short run, and long run. Therefore, investors for both shorter and longer time horizon should not include the same markets while constructing their portfolio as this will increase the risk. However MSCI world and MSCI world Islamic, UK conventional and UK Islamic, USA conventional and USA Islamic markets are correlated with Pakistani and Chinese markets only in short run, so the investors of long run horizon should consider these markets while constructing their portfolio due to more diversification benefits in long run.

On other side MSCI world and MSCI world Islamic, UK conventional and UK Islamic, USA conventional and USA Islamic markets are correlated with Malaysian and Bangladeshi markets in short run. USA Islamic market is to be seen correlated with Malaysian market and UK Islamic as well as UK conventional markets are correlated with Bangladeshi market in long run therefore, investors of long run horizon should be careful while constructing their portfolio.

In terms of comparison of MSCI world and MSCI world Islamic, UK conventional and UK Islamic, USA conventional and USA Islamic markets are correlated with Indonesian markets in short run. However, only UK conventional and MSCI world

markets are correlated with Indonesian market in long run therefore, investors should be careful at the time of investing and construct their portfolio accordingly to increase their diversification benefits.

Moreover, this study finds very little evidence of past residual shocks on conditional correlation for the pairs of markets of UK conventional markets with Chinese, Indonesian and Indian markets as well as World equity market with Pakistani market. However, Chinese and Pakistani assets markets show significant effect of past residual shocks on conditional correlation. In further, the lagged dynamic conditional correlation is present for all the pairs of MSCI world market with Asian emerging markets except for the pairs of MSCI world market with Malaysian market and US conventional market with Indian market and the findings of Asian Markets with Islamic markets exhibit mixed results.

The understanding of co-movement and time varying correlation in volatility between Asian emerging markets and international conventional as well as Islamic markets are necessary for risk management and also for diversification of portfolios. When the investors include assets of Asian emerging markets and international conventional as well as Islamic markets in their portfolio, they cannot achieve benefits of short term portfolio diversification because in short term these markets are correlated with each other's. However long term benefits of diversification will be achieve to invest in those markets which are less correlated with each other's.

Finally, this study is valuable for regulators in order to construct macro stabilizing policies, efficient resource allocation and risk management. This study also provides useful insights for foreign investors, traders and fund managers in preparing investing and trading objectives for portfolio constructing and portfolio diversification.

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