Stock Market Co-movements and their Determinants between Emerging Economies

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STOCK MARKET C0-MOVEMENTS AND THEIR DETERMINANTS BETWEEN EMERGING ECONOMIES

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In the name of Allah, the most merciful and beneficent

DEDICATION

I dedicate this thesis to my dearly loved parents (late) and my supervisor

whose support has enabled me

to complete this research study successfully.

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DECLARATION

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied from any source. It is further declared that I have prepared this thesis entirely on the basis of my personal efforts made under the sincere guidance of my supervisor and colleagues. No portion of work, presented in this thesis has been submitted in support of any application for any degree or qualification of this or any other university or institute of learning.

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APPRECIATION AND GRATITUDE

First of all, I bow my head to the Omnipotent, the Omnipresent and the Omniscient Al-Mighty ALLAH. who made me capable of learning, blessed me with the knowledge & intellect and facilitated me with the finest of the mentors all through my academic years. Words would barely express my feelings of gratitude for the kind support and valuable guidance; I received from my supervisor, Dr Syed Zulfiqar Ali Shah.

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ABSTRACT

This study has been conducted to examine the determinants of stock market co movement between Pakistan and emerging economies for the period 2001 to 2014. The results of Johansen and Juselius cointegration tests reveal that there is long term integration between the stock market of Pakistan and the stock markets of Brazil, Chile, China, Egypt, India, Indonesia, Israel, Korea, Malaysia, Morocco, Poland, Thailand and Turkey. This study investigates the determinants of stock market co-movement between Pakistan and emerging stock markets where cointegration is found. Results of the panel data reveal that there are four significant underlying forces of integration between Pakistan and emerging stock markets. These are GDP growth rate differential, inflation rate differential, world market volatility and quarter effect.

This study also reports the driving forces of co-movement between Pakistan and each emerging market where the co-integration is found. It has been found that no similarity is found in the determinants of integration between Pakistan and each emerging stock market. This study also reports the determinants of stock market co-movement between Pakistan and emerging markets before crisis (2004 Q_1 – 2007 Q_3), during the crisis (2007 Q_4 – 2009 Q_4) and after the crisis period **(**2010 Q1 – 2014 Q_4). It has been found that the determinants of integration between Pakistan and emerging markets vary before, during and after the crisis indicating that such determinants are crisis contingent variables.

This study contributes to the literature of stock-market integration by exploring fundamental determinants between Pakistan and emerging economies. The findings of this study have significant implications for policy makers in Pakistan while designing the

strategies for macroeconomic harmonization and stability of the country's economy against financial shocks.

Keywords: Economic integration, Portfolio Diversification, Stock Markets, International Financial Markets, Financial Crisis

Jel Classification: F15, G11, E44, G15, G01.

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CHAPTER 1

INTRODUCTION

Recently the issue of dynamic interdependence among the different stock markets has become an imperative topic of increasing interest. Such rise of interests and inspirations can be described by several reasons, but the most appropriate of all includes the quest for likely benefits of risk management and especially portfolio diversification (Karim et al., 2017). The benefits of portfolio diversification were documented by Markowitz (1952) and motivated by low correlations. It is documented that the main idea of portfolio theory is associated with benefits obtained from geographic and sector wise diversification. International diversification leads to lower risk and higher return as compared to domestic diversification (Kizys and Pierdzioch, 2009). So, investors should invest in the domestic as well as in the international stock market.

There has been a substantial increase in the economic and financial linkages among economies. The main causes of these strong linkages between global economies are technological advances, removal of statutory controls, market liberalization and the growth of several emerging markets. These factors have contributed to more interlinked economies which in turn are said to have given rise to a higher degree of stock market co-movement, particularly in time periods of financial crisis (Mobarek et al., 2016).

It is well recognized from the financial perspective that stock market co-movement can also lead to market contagion. Forbes and Rigobon (2002) define financial contagion as a

significant increase in cross-market linkages after a crisis to an individual country. More specifically, if stock markets show substantial raise in co-movement of stock markets during period of crisis as compared with tranquil periods, it is contagion. If stock market co-movement does not rise in a significant manner after the shock, then any continued level of market correlation between the two economies can be considered only as interdependence.

1.1. Stock Market Co-movement

Stock market co-movement refers to a tendency of two or more stock markets to move simultaneously together, so their price movements are positively correlated. The national stock markets are considered to be integrated if securities with the similar risk features are priced the same, even if the securities are traded in different stock markets" (Marashdeh and Shrestha, 2010). Put differently, when securities of two stock markets have similar return patterns, it is called integration of stock markets. On the basis of this, many researchers like Bracker and Koch (1999), Pretorius (2002) hypothesize that the extent of co-movement between the returns of national stock markets shows the extent of integration in these stock markets. Bracker et al (1999) emphasize the nature as well as the extent of co-movement and states that if the stock markets of two countries show greater co-movement on similar day or a stronger lead lag relationship across days, this reflects greater integration of two national stock markets.

Generally, there are three kinds of explanations for the co-movement of stock markets. Economic integration is the first type explaining that stronger integration of economies

leads to the stronger integration of their stock markets. In economic integration, the extent of integration of two stock markets can be influenced by two categories of economic variables from a macroeconomic point of view. Firstly, the stronger the mutual trade relationship of two countries, the higher the extent of stock market co-movement must be in these countries. More specifically, the extent of stock market co-movement is dependent upon the extent of bilateral trade. Secondly, the correlation between macroeconomic variables (interest rate, inflation rate) of two countries persuade the correlation in their stock markets as the returns of stock markets are influenced by these macroeconomic variables. The similarity in these macroeconomic variables of two countries leads towards the similarity in the stock market performance of these countries.

The second type of explanation as to why there is co-movement between the stock markets includes financial indicators (characteristics of stock market) that affect the degree of stock market co-movement. These financial indicators are industrial similarity; stock market size as well as the volatility of the stock market (Pretorius, 2002). The third category is the contagion effect. This can be defined as the part of co-movement between the stock markets that cannot be described by financial as well as economic fundamentals (Claessens & Forbes, 2004).

In recent financial disaster (2007–10), the unexpected and instantaneous destruction of wealth that occurs during a financial storm has opened up the marvelous interest for exploring the determinants of stock market co-movement for good understanding the reasons of the unexpected and instant decline of wealth. To examine the tendency of one

economy to be influenced by financial storms have massive importance for avoiding the upcoming crisis. The extent of economic integration as well as the financial integration between the two countries may certainly be reflected by the extent of stock market co-movement. Indeed, the dynamic structures of global economies have improved the complexity behind the performance of stock markets. As countries become more financially and economically connected, it is now important to elucidate the development of co-movement among stock markets on global level for knowing this higher level of integration (Arouri et al., 2013).

The current literature[1] discusses the two different approaches. One is called the Fundamental approach. According to this approach, the co-movement between two stock markets is a rational consequence of economic and financial interdependences. There is no logic for contagion in the time of crisis; the decline in different markets is a reasonable outcome of economic and financial interdependences. The economic and financial interdependences are fundamental causes. These fundamental causes describe integration of two markets where co-movements occur. In case the two different countries are firmly connected due to economic and financial fundamentals, then a financial storm in one market would have a substantial influence on other market.

Another is the behavioral approach, which states that co-movement is the consequence of behavior of investors after financial storm. The behavior of investors is different in normal time and in the period of financial crisis. Such difference in the behavior of

[1] See for example Forbes and Rigobon (2002), Bracker and Koch (1999)

investors is because of the informational factors. The behavioral approach is based on type of informational factors, which is further based on the Keynesian 'beauty contest' (Pretorius, 2002).In such contest, every judge votes the way he thinks the other judges will vote. In the same way, once investors believe that a specific investment is being sold by the other investors, then they also try to sell that investment in the market.

Behavioral approach explains the herding behavior of investors in the stock market. When a sufficient number of investors think that other investors are not satisfied with the particular class of asset of emerging markets; they also sell those securities of the emerging markets. Such type of investor's behavior leads to extensive increase or decline in emerging economies and if this co-movement is not explained by fundamentals, then it is called contagion. Fundamental and behavioral approaches are the two different approaches and thus have different implications for contagion. The fundamental approach explains the economic interdependence and financial interdependence of markets where co-movements occur. Behavioral approach responds to behavior of investors that is completely changed in times of crisis and stability. Current behavioral causes would justify contagion.

1.2. Theoretical Framework

Overarching theory of research study is the Theory of Stock Market Co-movement. This theory primarily focuses on the two leading approaches (Forbes and Rigobon, 2002). One is called Theories of non-contingent crisis (Fundamental approach) and the second is termed as theories of contingent crisis (Behavioral approach).

1.2.1. Theories of Non-contingent to Crisis

This theory assumes that transmission mechanism after a crisis is not significantly dissimilar from those before the crisis. According to the theory of non-contingent to crisis, excessive co-movements of two different markets are due to the continuation of the before crisis linkages. This is often termed as the Fundamental Approach. Excessive co-movements, in this case, is the repercussion of the strong bilateral trade, financial links and economic interdependence (Forbes and Rigobon, 2002).

According to the fundamental approach, the latest literature[2] has classified the fundamental driving forces of co-movements between stock markets as macroeconomic (bilateral trade, interest rate, inflation rate, industrial production growth, absolute changes in the bilateral exchange rate, volatility in the bilateral exchange rate), financial (national equity market size, volatility across the world stock market).

1.2.1.1. Discounted Cash Flow Model (Convergence of Macroeconomic Variables)

According to this model, stock prices (P) can be expressed as the expected discounted stream of dividends:

$$P = \frac{(1+g)Do}{k-g}$$

where D_0 is dividend paid , g is the dividends constant growth rate and k is the discount rate. The model states that the macroeconomic forces influence k, or g will systematically affect stock returns. The model proposes that any macroeconomic variables (e.g. inflation rates, interest rates) that affect the discount rate or cash flows will also influence the stock

[2] Bracker and Koch (1999), Forbes and Chinn (2004), Mobarek et al (2016)

prices and then returns. The effect of inflation and interest rate on stock prices/discount rate and the affect of industrial production growth rate on stock prices/cash flows is well established phenomena (Chen et al., (1986).

This model is based on the theory of non-contingent to crisis, provides an explanation of the factors that influence the stock market performance of an individual country. According to the model, the factors that influence the discount rate or stream of cash flows also affect the prices of stocks and then returns. The model proposes numerous macroeconomic variables (inflation rates, interest rates) that affect the performance of an equity market (Bracker and Koch, 1999). These macro-economic variables affect the discount rate or growth rate in dividends and then influence the stock prices and returns.

According to this model, similarities in the macroeconomic variables of the two different countries lead to the similarities in the performance of these stock markets. The convergence of macroeconomic variables leads towards convergence in stock market performance. For example, if the interest rates of two different economies are similar, because of similar monetary policy that is the reason of higher co-movement between stock markets. On the contrary, divergence of macroeconomic variables, in the form of larger differentials, leads towards divergence in stock market performance. For example, larger differentials in the interest rate, growth rate and inflation rates are the reasons of lower level of co-movement. In addition to this, if deviation between the macroeconomic variables of two different countries increases overtime, that causes a lower amount of co-movement in two different stock markets. In nutshell, the model suggests that the extent

to which any of the macro economic variables between economies converge (diverge), their security prices are anticipated to converge (diverge).

1.2.1.2. International Capital Goods Trade Hypothesis

International Capital Goods Trade Hypothesis was first explained by Bachman et al, (1996) and then by Forbes and Chin in 2004. The hypothesis describes that the movement of traded goods through bilateral trade would substitute in the long run for the movement of financial capital. Because of the strong bilateral trade relationships, the economies and the stock markets of the two different countries are anticipated to be highly interdependent. If a considerable magnitude of total exports of economy X is exported to economy Y, then a downturn in economy Y become the reason of downturn in its total imports from economy X. There will be a downturn in economy Y's stock market linked with the decline in economy Y and because of the reduction in exports to economy Y, there will be slump in economy X's stock market. Because of the strong bilateral trade relationships of two economies, the stock markets of these economies show a co-movement. The stronger the bilateral trade relationships, the higher will be the extent of co-movement between the stock markets. So, the extent of bilateral trade of two different countries is estimated to explain co-movement or correlation of these stock markets.

1.2.1.3. Flow Oriented Hypothesis of Exchange Rate

The Flow Oriented Hypothesis of Exchange Rate was described by Dornburch and Fisher (1980) that an exchange rate change influences the bilateral trade conditions and then stock prices of two financial markets. The greater change in exchange rate brings more

benefit to the country with the decline in the worth of currency. Therefore, the exchange rate changes between the two economies must have the negative correlation with the co-movement of these stock markets.

Flow Oriented Hypothesis of Exchange Rate further describes that exchange rate volatility influences the bilateral trade conditions and therefore the stock prices of two markets (Lin and Cheng, 2008). The greater volatility in the exchange rate brings greater uncertainty in the economy as well as in the process of integration between stock markets. Consequently, exchange rate volatility must show a negative correlation with the co-movement of these stock markets.

1.2.1.4. World Market Volatility

Because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, resulting in higher correlation between the different pairs of stock markets. Taking into account this potential impact of world market volatility on stock market co-movements, Bracker et al (1999) and Carrieri et al. (2006) used the world market volatility as a fundamental determinant of stock market co-movement.

1.2.2. Crisis Contingent Hypothesis

Forbes and Rigobon (2002) described the crisis contingent hypothesis on the assumption that due to the different investor's behavior during period of crisis, channel of

transmission may be also different. This approach is often termed as Behavioral approach.

1.3. Research Gap

The following research gaps are dealt with in this study:

1. The integration of Asian emerging markets remains an open question that has not been adequately addressed (Dhanaraj et al., 2017).
2. Earlier studies on the determinants of co-movement between stock markets focus primarily on well-developed markets with little interest to emerging markets. There are still avenues for research in this area (Karim et al., 2017). The extent to which emerging financial markets are integrated with Pakistan financial market remains an open question that has not been adequately measured.
3. The existing research on stock market co-movement has not adequately focused that whether or not the economic integration between emerging economies will result the co-movement between these countries (Mobarek et al., 2016).
4. The current research on stock market co-movement has not adequately focused whether or not the volatility in the bilateral exchange rate and absolute changes in the bilateral exchange rate between emerging economies will result the co-movement between the stock markets of these countries (Mobarek et al., 2016).
5. The existing literature has not focused on the common determinants of stock market co-movements in the periods of crisis and stability (Mobarek et al., 2016).

1.4. Problem Statement

The consequence of most recent financial crisis (2007 – 10) resulted in the unexpected and immediate deterioration of wealth. The after effects of the world financial storm are still evident and nearly all countries are still suffering from post the world financial storm. The World Bank has currently advised the G20 nations about the occurrence of extremely critical and most damaging economic meltdown in the near future. As the latest literature proposes that by examining the tendency of one economy to be influenced by international financial storm, the prevention of the future crisis can be achieved. This feature has attracted the attention of academicians and practitioners towards the identification of the integration and the determination of macro-economic fundamentals that might describe how stock markets of different countries are integrated with each other. This aspect will help the practitioners and academicians to find out the causes of the unexpected and instantaneous decline of wealth. Yet, the modern research has not adequately addressed on the underlying forces of stock market co-movement especially in Asia and emerging economies and still there are many missing pieces of puzzle. In addition, very few studies that investigate the determinants of co-movements are silent regarding the stability and commonality of the transmission mechanisms among the country pairs.

1.5. Research Questions

The following research questions are dealt with in this study.

1. Are financial markets co – integrated?

2. Whether or not the similarity in macro-economic variables between two different countries will result in higher levels of stock market co-movement?
3. Whether or not, stronger the bilateral trade relationship between two different countries will result in higher levels of stock market co-movement?
4. Whether or not, greater the absolute changes in the bilateral exchange rate will result in lower levels of stock market co-movement?
5. Whether or not, greater the volatility in the bilateral exchange rate will result in lower levels of stock market co-movement?
6. Whether or not the volatility in the world stock market will result in higher levels of stock market co-movement?
7. Whether or not the determinants of co-movement differ between tranquil and crisis periods?

1.6. Objectives of the Study

The following are the major research objectives of this study:

1. To determine the existence of stock markets co-movement between Pakistan and emerging economies.
2. To examine the linkages between the convergence (divergence) of macroeconomic variables and the extent of stock market co-movement between Pakistan and emerging economies.
3. To study the linkages between the extent of bilateral trade and the degree of stock market co-movement.

4. To study the relationship between the absolute change in the bilateral exchange rate and the co-movement of stock markets between Pakistan and emerging economies.
5. To study the relationship between volatility in the bilateral exchange rate and the co-movement of stock markets between Pakistan and emerging economies.
6. To study the relationship between the volatility in the world stock market and the co-movement between the stock markets.
7. To check the commonality of driving forces of stock market co-movements in the periods of crisis and stability.

1.7. Potential Contributions

Following are the major contributions of the study:

1.7.1. Practical Contributions

1. This study determines the integration between Pakistan and vibrant emerging stock markets.
2. It helps in developing an understanding why stock markets are integrated between Pakistan and emerging countries by investigating the fundamental determinants (economic/ financial) of stock market co-movements.
3. The study contributes in developing the reasonable understanding of the co-movement between stock markets as majority of the fundamental determinants (economic/financial determinants) has been studied. Because of such contribution, this study has the uniqueness.

4. The potential contribution of this study is that it focuses on the vibrant emerging markets, as previous studies on the driving forces of stock market co-movement usually ignore the emerging markets.
5. This research adds in the current literature by focusing on the common driving forces of stock market co-movements before, during and after the crisis.

1.7.2. Academic Contribution

1.7.2. 1. Contextual Contribution

1. The contribution of this study is that it specifically focuses on the fundamental determinants (economic/financial) of stock market co-movement of Pakistan with emerging economies. This will help to develop the understanding why Pakistan stock markets are correlated with other emerging markets?
2. The contribution of this study is that it develops the understanding how far the two Asian powers (China, India) are economically integrated with Pakistan. The study is very important in the Asian context because of the shifting of global economic power towards China and India.
3. The contextual contribution of the study is that it confirms whether or not the similarity in macroeconomic variables between Pakistan and emerging economies results in higher levels of stock market co-movement.
4. The contextual contribution of the study is whether or not the volatility in the bilateral exchange rate and the absolute changes in the bilateral exchange rate between

Pakistan and emerging economies results in higher levels of co-movement between stock markets.

5. This study empirically confirms about the relationship between volatility in the world stock market and the co-movement of stock markets between Pakistan and emerging stock markets.
6. The contribution of the study is to focuses on the common driving forces of stock market co-movements before, during and after the crisis between Pakistan and emerging economies. If the determinants of co-movement/correlations do not change in the periods of crisis and stability, they are non-crisis contingent. If the determinants change in the periods of crisis and stability, they are termed as crisis contingent. This study contributes to determine the crisis contingent and non-crisis contingent determinants.

1.8. Significance of the Study

Following is the significance of this study:

1. It facilitates in the decision making regarding investment across different countries. Such study is very important from the international investor's point of view who tries to find out the diversification opportunities to increase their portfolio's expected return or to lower the risk of the portfolio.

2. It helps in developing the proper understanding why integration occurs between the stock markets by investigating the fundamental determinants of stock market co-movement.

3. It helps to understand why the degree of integration between stock markets is extremely related in the perspective of economies targeting for macroeconomic harmonization.

4. It provides an important insight to policy makers while designing the strategies to sustain the ability of the country's economy against global shocks. Current literature emphasizes that any financial crisis can contaminate from one economic system to another, if two markets are integrated. Therefore, this study is very essential for regulators in developing the proper understanding of the extent of stock market integrations as well as the strength of integration between the stock markets.

The work is organized as follows:

Chapter 2 explains the background of the international stock market integration and the conditions for integration of stock markets which leads the financial integration in the form of stock market co-movements. This chapter also covers the significance of the international stock market integration for both academicians and practitioners. Chapter 3 provides empirical review of literature regarding the studies showing the no/ limited cross market co-movement and studies showing the cross market co-movement. This chapter also covers the theoretical background of the fundamental determinants of stock market co-movement by discussing the supporting models and hypothesis to Theory of Non-contingent to crisis. It also covers the empirical review of studies showing the determinants of stock market co-movement. Chapter 4 covers the research methodology used in this work and it consists of information regarding the population, size of sample,

data collection, variables, econometric models and data analysis tools used for processing data. Chapter 5 covers the results and then discussions about the different aspects of analysis and chapter 6 covers the findings as well as the conclusion of the research.

CHAPTER 2

INTERNATIONAL STOCK MARKET INTEGRATION

This chapter explains the background of the international stock market integration and the conditions for stock market integration which leads the financial integration in the form of stock market co-movements. This chapter also covers the significance of the international stock market integration for both academicians and practitioners.

2.1. Context of International Stock Market Integration

In national stock markets, the quantity of foreign registered firms and non-resident stock transactions has been constantly increasing in today's liberalized world. Although such type of stock market trend has taken place among developed countries, currently such diverse trend has been extended to emerging stock markets of the world (Yang et al., 2005). The main possible factors behind the emergence of these multicultural stock markets are the removals of statutory controls, technological advances, foreign investments, capital movements and the world trade. On the other hand, there is the great amount of difference between the concept multicultural stock markets and the integrated stock markets as later is more complex than the earlier one.

2.2. International Stock Market Integration

The integration of stock markets is elucidated by two different theoretical explanations: one is the law of one price (LOP) and the second is the synchronization of stock markets.

The law of one price is described with the help of asset pricing models and stock markets synchronization is measured by using the different techniques of econometrics like correlation coefficients, co-integration techniques and co-movement models.

2.2.1. Law of One Price

The Law of One Price states that, "national stock markets are considered to be integrated if securities with the similar risk features are priced the same, even if the securities are traded in different stock markets" (Marashdeh and Shrestha, 2010). Put differently, if securities are similar from the risk point of view and are being traded in different stock markets, they must have the similar price in both stock markets when costs of transactions as well as taxes are not considered. Thus, the integration of stock markets means that Law of One Price holds; the same assets with similar risk characteristics should have similar returns in different stock markets.

2.2.2 Synchronization of Stock Markets

Stock market integration is a situation in which financial securities have similarity in the patterns of their returns. On the basis of this, many researchers like Bracker et al., (1999), Bracker and Koch (1999), Pretorius (2002) developed a hypothesis that the extent of co-movement between the returns of stock markets shows the extent of integration of these stock markets.

2.3. Conditions for International Stock Market Integration

In spite of the fact that the reasons of integration between stock markets at international level are still unclear and are being studied by different researchers with various, stock market liberalization and technological advances are the two certain conditions for the integration of international stock markets and there are also some factors who accelerate the process of integration between international stock markets.

As Hartmann et al. (2004) propose the liberalization or deregulation of the national stock market is the primary condition for the integration of such national stock markets with each other. Stock market liberalization can be accomplished with deregulation of market and institutional deregulation. The market deregulation is to reduce the stock market rules and mostly controls the transaction, taxation and investment rules. On the other hand, the institutional deregulation is to reduce the financial organization rules that are required to obtain a fair market by removing the privileges of some institutions (Buch and Heinrich, 2002). Technological advance is another important condition for the integration of international stock markets. Thus for the integration process of national stock markets, it is very essential to have the cheap, reliable and fast trading across borders without requiring any intermediaries (Licht, 1997).

The underlying forces of integration between the stock markets can be separated into two main classes; one is the attributes of domestic market and the second is macroeconomic fundamentals. Bekaert et al. (2003) and Carrieri et al. (2004) undoubtedly state that market development is very important driving force of international stock market

integration as the international capital flows are attracted by the better developed markets. Furthermore, positive contribution of economies of scale in the international stock market integration process has also been suggested by O‟Sullivan and Sheffrin (2003) explaining that developed stock markets tend to more cost effective and such condition leads to the more willingness for investment across borders. In conclusion, Bekaert and Harvey (1997) also highlight that trade openness among countries has positive contribution in the integration of national stock markets.

In addition to the domestic market based factors, it is clear that macroeconomic fundamentals also significantly influence the integrations of national stock markets i.e., inflation and interest rates are one of the key factors on this integration process as these macroeconomic fundamentals have direct effects on the investment costs and cash flows of firms. Therefore, it can be said that regional or global incidents that directly influence these macroeconomic variables may too significantly influence the integration of international stock markets.

2.4. Importance of International Stock Market Integration

International stock market integration is a vital issue for global portfolio diversification strategies, the macroeconomic development, the design and scope of macroeconomic policies of nations, the efficient market hypothesis and stability of countries. The main implication of national stock market integration aspect is on the strategies of international portfolio diversification. The Modern Portfolio Theory clearly states that there is a positive relationship between the correlation of assets in a portfolio and the total risk of a

portfolio. Therefore investors, who want to reduce the variance (risk) of their portfolios, should form their portfolios with weakly correlated assets. This basic rule stands the same for an international level: if national stock markets show low correlation level, then a substantial gain from an international portfolio diversification among those markets exists. By analyzing ten advanced countries, Grubel (1968) shows that due to internationally diversified portfolio, the return of an international investor can increase around 68 per cent while keeping the risk constant. Results of Grubel were further supported by Levy and Sarnat (1970) in a study while adding that it is very important for an investor to know the structure of the stock markets integration before diversifying his international portfolio among these markets and diversify his stocks among international markets that do not copy or follow each other's daily movements. As pointed out by the researchers, if an investor wants to be able to obtain the benefit of an international diversification strategy, the basic condition is developing the portfolios with the assets from segmented stock markets. Therefore, an investor, who wants to diversify his portfolios with the stocks of the emerging countries stock markets, can get the valuable insights by investigating the integration of international stock markets.

Secondly, in addition to the vital impact of international stock market integration on global portfolio diversification strategies, a detail analysis of international stock market integration has significant implications on the market efficiency. The stock market integration and the weak form of market efficiency may contradict with each other, if movements in one stock market can be used to forecast changes of another stock market (Chancharat, 2009). Efficient market hypothesis (EMH) describes an efficient financial

market should be able to adjust itself quickly on the basis of new information (Fama et al., 1969). As Beechey et al. (2000) suggest, in an efficient financial markets asset prices should reflect all the available information consistent with the economic fundamentals. Then, theoretically, because of the same risk exposure, it is anticipated that fully integrated stock markets will have the well-matched returns (Bekaert and Harvey, 1995). The integration of the financial markets fundamentally indicates the stock markets efficiency" (Kassim, 2010). Thus, studying the underlying forces of integration between stock markets add a serious input to the field of market efficiency.

Thirdly, to understand the degree of integration between stock markets is extremely related in the perspective of economies targeting for macroeconomic harmonization (Pretorius, 2002, Kassim, 2010). So, it can be said that stock markets integration has very essential role for economies that plan for macroeconomic harmonization. The particular aim of these countries is to attract the global investors by creating the efficient capital markets. Such markets have the qualities of low transaction costs, higher liquidity and increased level of economic activities with its regional countries. Furthermore, by offering risk diversification options to investors and increasing the liquidity, these markets aim to improve corporate governance quality, the information flow and the effectiveness of managerial and organizational structures (Chittedi, 2009). Consequently, analyzing the strength of stock market integration with other advanced countries, in theory, can provide an important insight about its liquidity level, transaction costs, quality of corporate governance and its trading activities with other economies of the world. Finally, studying the dynamics of integration between stock markets gives an important

insight to policymakers while designing the strategies to sustain the stability of the country's economy against global shocks. For example, by studying case of Asian financial crisis (1997-1998), Von Hagen and Ho (2007) emphasize that any systematic shock (e.g., financial crisis) can contaminate from one economic system to another, if two markets are integrated. Therefore, it is very essential for regulators to develop the proper understanding of the extent of stock market integrations as well as the strength of integration between the stock markets "to remain vigilant and undertake pre-emptive measures to prevent the systematic shocks" (Kassim, 2010).

The international integration of stock markets is a particular field of financial integration and is subject to substantial practical investigations. The main purpose of international stock market integration is to examine the similarity in the movements of daily returns of stock markets. The studies of integration between stock markets particularly look at the interdependence between two countries daily stock returns on the same day or across days. Such studies are very important from the international investor's point of view who tries to find out the diversification opportunities to increase their portfolio's expected return or to lower the risk of the portfolio. For example, MacDonald (2001) displays the increased level of integration among the stock markets of the developed European countries, Czech Republic, and the US over time and verifies the effect of such integration on the expected return as well as the risk of the diversified portfolio. In addition to this, Lucey and Voronkova (2008) confirm that point of view and emphasize that positive correlation between two stock markets decreases the profits of diversification. On the contrary, there are some scholars who do not agree to take this

point of view that integrated stock markets reduce the benefits of diversification at international level. Among these scholars, Baele et al. (2004) emphasize that integrated European stock markets can decline the exposure and permit the international investors for diversification because of the smoothing of economic shocks. Beside the ambiguity of potential outcome of integration levels between equity markets on the benefits of diversification, there is no harmony in the modern literature about the effects of financial meltdown on the integration levels of international stock markets.

2.5. What is an Emerging Market?

In spite of the fact that there is a range of emerging market definitions, one must comprehend that the exact criteria for the classification of countries into emerging markets is still lacking. Instead, such definitions explain the similar aspects of the countries to categorize as emerging markets. For example, according to the International Finance Corporation, the definition of emerging market is based on two most important features of the emerging markets group: one is the economic growth and second is the market development or market sophistication. In accordance to this point of view presented by International Finance Corporation, Das (2010) defines emerging markets as nations who are in the liberalization process and fast economic growth with low to middle per capita income. In spite of the fact that, International Finance Corporation explains the emerging market on the basis of two important features, there are more common important features of emerging markets. Li and Hoyer-Ellefsen (2004) emphasize that GDP and GNP per capita, ratio of market capitalization to GDP can also be used as the important features for the grouping of emerging markets. Mody (2004)

highlight that emerging markets are those which are in transition in numerous demographic features (educational status, life expectancy and fertility rate) and in transition in different economic and political issues where the emerging markets plan to raise the development of their institutions and to have strong economic and political relations with other countries.

2.5.1. Country Classification

As stated above, there is no harmony on the definition and then categorization of countries into emerging markets. Therefore, for the classification of countries into emerging markets, Standard and Poor, the International Finance Corporation, the International Monetary Fund and Morgan Stanley Capital International use their own criteria. For example, the International Finance Corporation and the Standard & Poor use two main criteria. First, a country is required to be classified by the World Bank as a lower or middle income country and the second; a country is required to have a lower market value than its gross domestic product. Relaxation is provided by these financial institutions to fulfil at least one of these two conditions to be considered as emerging market. Therefore, there is no uniform classification of emerging markets as the institutions have their own criteria which are generally very broad. Because of this situation, there exist various lists of emerging markets. Morgan Stanley Capital International has a lead role in the provision of investment data and computation of different indices particularly for emerging markets. Such institute classifies twenty one economies as emerging markets and divides all twenty one countries into three different categories on the basis of their regions. The detail list of emerging markets is given in

table 2.1. In addition to this, FTSE Emerging is another very important emerging market economies index which is jointly published by the London Stock Exchange and The Financial Times. According to the FTSE Emerging index, it has six advanced emerging economies and sixteen secondary emerging market economies. The detail list is provided in table 2.2.

Table 2.1: List of Emerging Markets by Morgan Stanley Capital International (MSCI)

Region 1 (Americas)	**Region 2 (Africa, Europe and Middle East)**	**Region 3 (Asia)**
Argentina	The Czech Republic	China
Brazil	Egypt	India
Chile	Hungary	Indonesia
Colombia	Morocco	Korea
Mexico	Poland	Malaysia
Peru	Russia	Philippines
	South Africa	Taiwan
	Turkey	Thailand
		Pakistan

Table 2.2: List of Emerging Markets by FTSE Emerging Index

Advanced Emerging Economies		**Secondary Emerging Market Economies**			
S. No	**Country**	**S. No**	**Country**	**S. No**	**Country**
1	Brazil	1	Argentina	9	Malaysia
2	Hungary	2	Chile	10	Morocco
3	Mexico	3	China	11	Pakistan
4	Poland	4	Colombia	12	Peru
5	South Africa	5	the Czech Republic	13	the Philippines
6	Taiwan	6	Egypt	14	Russia
		7	India	15	Thailand
		8	Indonesia	16	Turkey

CHAPTER 3

LITERATURE REVIEW

This chapter provides theoretical and empirical review of literature regarding the studies showing the no/ limited cross market co-movement and studies showing the cross market co-movement. This chapter also covers the theoretical background of the fundamental determinants of stock market co-movement by discussing the supporting models and hypothesis to Theory of Non-contingent to crisis. These include the Cash Flow Model, International Capital Goods Trade Hypothesis and Flow Oriented Hypothesis of Exchange Rate Determination. It also covers the empirical review of studies showing the determinants of stock market co-movement.

3.1. Definition of International Stock Market Integration

In international finance literature, the stock market integration is elucidated by two different theoretical explanations: one is the law of one price (LOP) and the second is the synchronization of stock markets. The law of one price is described with the help of asset pricing models and stock markets synchronization is measured by using the different econometric techniques like correlation coefficients, co-integration techniques and co-movement models.

3.1.1. Law of One Price (LOP)

The Law of One Price states that, “national stock markets are considered to be integrated if securities with the similar risk features are priced the same, even if the securities are

traded in different stock markets (Marashdeh and Shrestha, 2010). In other words, if similar securities are traded in different stock markets, they should have the similar price in both stock markets when transaction costs and taxes are not considered. Thus, the integration of stock markets means that Law of One Price holds; the same assets with similar risk characteristics should have similar returns in different stock markets.

3.1.2 Synchronization of Stock Markets

Stock market integration is a situation where financial securities have similarity in the return patterns. On the basis of this, many researchers like Mobarek et al (2016), Bundo (2017), Adam et al (2016), Pretorius (2002), Bracker and Koch (1999) hypothesize that the level of the co-movement between the returns of two national stock markets show the strength of integration between these stock markets.

3.2. Studies Showing the No/ limited Cross Market Co-movement

The area of the stock market integration literature studies the co-movement of international stock prices. Initial studies document evidence of low correlation in different stock markets. In spite of the different empirical techniques, studies usually found that correlations between the returns of different stock markets are low and countrywide factors influence the stock prices and then returns. Current studies of interdependence of global stock indices have revealed the inconsistent results. This variation in results is because of the differences in sample periods, frequency of observations, selection of markets and empirical methodologies (Worthington et al, 2003).

The issue of integration between Pakistani Stock Market and the key stock markets was examined by applying correlation analysis, Engle & Granger cointegration and error correction method (Hussain and Saidi, 2000). Results revealed that international investors can get the benefit of diversification because of the no cointegration between Pakistan and selected markets. Another study relating to the integration between stock price indices of the advanced countries and South Asian countries was analyzed by Naeem in 2002. Results of the Johansen bivariate and multivariate cointegration analysis revealed no integration among the South Asian equity market. Results further revealed no cointegration between South Asian equity markets and equity markets of the United Kingdom and of the USA.

Ali et al (2011) applied co integration test while investigating the co movement of Pakistan's stock market with the equity markets of China, India, Indonesia, Japan, Malaysia, Singapore, Taiwan, USA and UK. The results show no integration between Pakistan's stock market and the markets of Malaysia, Singapore, Taiwan, UK and USA. Therefore, investors can obtain the diversification benefits in these countries. On the contrary, investors cannot reduce the risk by means of portfolio diversification in the equity markets of India, China, Japan and Indonesia as co-integration was found. Another study was carried out in Africa by Sam (2011) to check whether the stock markets of Africa have become more integrated into the world capital market and reported that there is the low correlation among African stock markets and no correlation between African and global stock markets. It was further reported that these markets experienced time varying integration.

3.3. Studies Showing the Cross Market Co-movement

Recently, the results of different studies of stock market interdependence reveal that a substantial degree of integration is found among the stock markets (Mobarek et al, 2016). Nasser and Massomeh (2016) examined integration among five emerging markets namely Brazil, China, Mexico, Russia and Turkey along with the developed markets of US, UK and Germany. The study found the short run integration between the chosen emerging and developed economies. On the other hand, long run relationship was prevalent only between the emerging markets and Germany.

Al-Nasser and Hajilee (2016) studied the stock markets integration among emerging economies (Brazil, China, Mexico, Russia, and Turkey) and developed economies (US, UK and Germany). Results of ARDL model revealed that short term integration is found between the stock markets of growing and developed countries. It was further reported that only German stock market is integrated with Brazil, China, Mexico, Russia and Turkey.

Adam et al (2016) examined the integration between the stock markets of Indonesia and Malaysia by applying the cointegration test. Results suggested that cointegration is found between Jakarta Islamic Index and Hijrah Shariah Index. The integration between the Hijrah Shariah Index and Jakarta Islamic Index was also confirmed by applying the VAR model.

Bundo (2017) analysed the extent of integration between the stock markets of South Asian Development Community by applying cointegration analysis. Results revealed that when using the US market as benchmark no cointegrating vector was identified. It was further reported that one cointegrating vector was identified when using the SSA index as benchmark.

Bashiri and Zadeh (2014) examined the interdependence between stock markets of Malaysia, Indonesia, Philippines, Japan, Turkey and those in USA by using the monthly data for the period 1995 to 2010. Results revealed that integration is found between US stock markets and all Asian stock markets. It was further reported that extent of integration between Japan and other Asian markets is found low. In another study conducted by Deltuvait (2015), the integration of the Baltic stock markets was examined by applying the cross correlation analysis, Granger causality test. Results of different techniques showed the higher integration of Lithuanian and Estonian stock markets.

Ozlen (2015) examined the stock markets integration between Turkey and three advanced countries (US, UK, and Germany) by applying the Vector Error Correction Model. Results of a model revealed that stock markets integration is found between Turkey and three developed countries.

Co-movement between Asian stock markets was studied by Meric et al (2012) by using the Principal component analysis and Granger causality statistical technique and found that the diversification benefits have diminished due to the contemporaneous co-

movement of stock markets. It was reported that stock markets of India, Japan and Singapore are the influential one while stock markets of South Korea and Philippine are the least influential markets.

In another study conducted by Khandaker (2013), the behavior of Shanghai Stock Exchange with other stock markets was analyzed and found the evidence of higher stock price co-movement behavior of the Shanghai Stock Exchange with other markets. It was further reported that the Shanghai Stock Exchange market capitalization drop significantly during the period of crisis.

The integration of stock markets of Hungary, Turkey and Russia and was studied by applying cointegration, Granger Causality test, Vector Error Correction Model (Akhtar, 2009). Results revealed the existence of cointegration among stock markets of all countries. Results of Granger Causality test further discovered that there was bidirectional causality between stock markets of Turkey and Russia. Turkish stock market does not granger cause Hungarian stock market. On the contrary, Hungarian stock market granger causes Turkish stock market.

Salahudin et al (2014) examined the changing patterns of stock market co-movements enabling instantaneous evaluation of short and long term co-movements over time by applying the DCC-GARCH and wavelet-based measures of co-movements. The results suggested that differences in the dynamics of stock market co-movement could be the outcome of the different types of the financial crises.

The Co-movement between stock markets of United Kingdom, Japan, Germany and United States was examined by Rua and Nunes (2009) in time and frequency domain by applying the wavelet analysis. They found that because of the stronger co-movement between countries at lower frequencies, diversification strategy was not important. Results further reported that the extent of integration is different across countries as well as sectors. Majid et al (2009) documented that emerging markets like Indonesia, Malaysia, Thailand, Philippines and Singapore were moving towards a greater integration. Because of high interdependence, benefits of diversifications are limited for global investors.

Another study relating to the price integration among six Asian emerging stock markets and three developed markets (Worthington et al., 2003) was analyzed by applying the Multivariate cointegration and VAR techniques. Results revealed that during the pre and post crisis periods, Asian markets are highly integrated. They further reported that main factors for the integration between different markets are long-term trend in trade, investment interaction, universal microeconomics restructurings and monetary policy convergence.

Worthington and Higgs (2004) analyzed the short and long term price co-movement among eleven emerging and seven developed markets by applying the multivariate cointegration, generalized variance decomposition and Granger causality test. Results revealed both long and short run association between the APEC equity markets. Another study relating to the nature of bivariate co-integration relations was analyzed by Cotter

(2004) between the Ireland and Britain stock markets and between the Germany and the USA stock markets. Results of the multivariate GARCH technique showed that during 1990, the Ireland stock market was strongly integrated with the British stock market.

The integration between the stock markets of Pakistan, Bangladesh, India, and Sri Lanka was examined while applying the granger causality approach (Narayan et al., 2004). Results revealed that stock prices in Bangladesh, Sri Lanka and India granger cause stock prices in Pakistan in the long run. In addition to this in the short run, results show the unidirectional Granger causality running from stock prices in Sri Lanka to India as well as in Pakistan to India and Sri Lanka.

Another study was carried out in Bangladesh by Hoque (2007) relating to the long term co-integration of Bangladesh stock market with India, Japan and the USA by applying co-integration test and to test short term co-integration, vector error correction model and impulse response were employed. The diversification benefits were not possible from diversification as the results showed no co-integration.

Stock market integration of twenty two emerging economies with the US stock market was examined by wavelet coherency analysis (Graham et al, 2012). Results showed the higher degree of stock market co-movement at comparatively lower frequencies before the crisis and the higher degree of co-movement at comparatively higher frequencies after the crisis between twenty emerging stock markets and the US stock market.

It is sensible to conclude that even though the outcomes of the study are mixed, the minority of the practical evidences advocates that global stock market integration has enhanced over time. Increasing integration of stock markets can be expected to lessen the benefits of global portfolio diversification across different countries. Lastly, to examine co-movement among equity markets is valuable for decision makers. If stock markets of two countries are closely integrated then there are the chances that financial shocks in one country may spill over to other country. This aspect requires closer collaboration among the policy makers of these countries, whose stock markets are integrated.

H_1: There is the co-movement between the stock markets of two countries.

3.4. Fundamental Determinants of Stock Market Co-movement

The existing literature presents many researches that show the existence of stock market interdependence, with the idea that stock markets have been showing co-movements with each other. Academic literature allots this increased level of stock market integration to development in the closer economic and financial linkages. Though, it is obvious that very few studies have been conducted regarding the driving forces of co-movement among the stock markets, which makes it an interesting research area. Consequently, the attention is directed towards research in the nature of links which lead the interdependence of international stock markets. Can the extent of integration be explained by the fundamental determinants? In other words, either the co-movement of stock markets is contagion in reality or can it be clarified by economic or financial fundamentals?

3.4.1 Economic integration

The extent of stock market co-movement can be influenced by two categories of economic variables from a macroeconomic point of view. The interdependence of stock market is dependent upon the extent to which two economies are integrated with each other. Firstly, the stronger the bilateral trade relationships of two economies, the higher the level of co-movement must be between the stock markets of these economies. More specifically, the extent of stock market co-movement is dependent upon the extent of bilateral trade. Secondly, cash flow model describes that stock market performance is usually influenced by the macroeconomic variables like interest and inflation rates. Therefore, the correlation between macroeconomic variables will also affect the correlation between these stock markets, as the stock market prices and hence returns are also influenced by the said variables. The extent of similar stock market performance of two countries is dependent upon the extent of similarity in the macroeconomic variables of these two countries. In the same way, the extent of convergence (divergence) of stock market performance in two countries is dependent upon the extent of convergence (divergence) of the macroeconomic variables in these countries.

3.4.1.1 Bilateral Trade

International Capital Goods Trade Hypothesis states that economies as well as stock markets of two countries are anticipated to be highly integrated due to their strong bilateral trade relationship. If a considerable proportion of total exports of country X is exported to country Y, then a decline in Y will become the reason of reduction in its imports from X. There will be a downturn in country Y's stock market because of the

decline in country Y and because of the reduction in exports to country Y, there will be downturn in the stock market of country X. Because of the strong bilateral trade relationships of two countries, the stock markets of these countries will show a co-movement. The stronger the bilateral trade relationships, the higher will be the level of co-movement in these stock markets. So, the extent of bilateral trade between two different economies is anticipated to clarify co-movement between stock markets of these countries.

3.4.1.2. Interest Rate

The discounted cash flow model (Chen et al., 1986, Pretorius, 2002) states that if interest rate of two different economies shows the similar trend over time, because of the similar monetary policy, then the stock markets show a co-movement due to the influence of interest rates on stock prices. So, larger differential of interest rates is the reason of lower level of co-movement. Put differently, the interest rate differential between the two economies must have the negative correlation with the co-movement of these stock markets. Taking into account this potential impact of interest rate on stock market co-movements, Mobarek et al (2016), Walti (2005), Pretorius (2002), Arouri (2006) and carrier (2007) used interest rate as a fundamental macroeconomic driving force of co-movement or correlations between national markets.

3.4.1.3. Inflation Rate

According to the discounted cash flow model (Chen et al., 1986, Pretorius, 2002), if the inflation rate of two different economies shows the similar trend over time, because of

similar monetary policy, then the stock markets show a co-movement due to the influence of inflation rates on stock prices. So, larger inflation rate differential is the reason of a lower level of co-movement. Put differently, the inflation rate differential between the two economies must have the negative correlation with the co-movement of these stock markets. Keeping in view, the potential effect of inflation rate on stock market co-movements, Mobarek et al (2016), Guesmi and Teulon (2014), Walti (2005) and Pretorius (2002) used the inflation rate as a fundamental macroeconomic determinant of correlations across national markets.

3.4.1.4. GDP Growth Rate

If GDP growth rate of two different economies shows the similar trend over time, because of similar monetary policy, then the influence of GDP growth rate on stock returns is the reason of a co-movement between stock markets. So, larger GDP growth rate differential is the reason of a smaller amount of co-movement. Put differently, the GDP growth rate differential between the two economies must have the negative correlation with the co-movement of these stock markets. Taking into account this potential impact of GDP growth rate on stock market co-movements, Johnson and Soenen (2003), Mobarek et al (2016) used the GDP growth rate as a fundamental macroeconomic driving force of correlations across national markets.

3.4.2. Volatility in the Bilateral Exchange Rate

Dornburch and Fisher (1980) describes the Flow Oriented Hypothesis of Exchange Rate determination that an exchange rate change will influence the bilateral trade conditions

and will have an influence on the stock prices and then returns of stock markets. The greater the volatility in the exchange rate, the greater will be the uncertainty in the economy as well as in the integration of stock markets. Consequently, volatility in the exchange rate must show a negative association with the co-movements of stock markets.

3.4.3. Absolute Change in the Bilateral Exchange Rate

Flow Oriented Hypothesis of Exchange Rate states that larger exchange rate change will bring more benefit to the country with the decline in the worth of currency. Therefore, the rate of change in the exchange rate must show a negative association with the stock market co-movement.

3.4.4. World Market Volatility

Because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, resulting in higher correlation between the different pairs of stock markets. Taking into account this potential impact of world market volatility on stock market co-movements, Bracker et al (1999) and Carrieri et al. (2006) used the world market volatility as a fundamental determinant of stock market co-movement.

3.4.5. Quarterly Effect

In literature, it is recognized that different stock markets have experienced periodic patterns in market activity and valuation. Meric and Meric (1989) report that correlation

matrix throughout the summer is less stable. Due to this, we account for potential seasonality by adding quarterly dummy variables.

3.5. Empirical Evidences of Determinants of Stock Market Co-movement

Bakri et al (2017) examined the fundamental driving forces of integration among 10 Islamic stock markets by applying Pooled OLS and found that all variables are insignificant in describing the integration between stock markets. Results of the panel data estimation have found that only GDP growth differential and inflation differential are significant in explaining the comovement between the stock markets of Islamic countries.

Another study related to the driving forces of stock market co-movement was conducted by Mobarek (2016) and reported that import dependence as well as size differential of stock markets are significant in explaining the co-movement between the returns of stock markets. In addition to these determinants, GDP growth rate differential and time trend has also significant relationship with the co-movement of stock market.

Guesmi and Teulon (2014) examined the underlying forces of stock market integration of Middle East countries (Turkey, Israel, Jordan and Egypt). Results revealed that domestic factors (inflation, rate of spread variation and exchange rate volatility) and global factors (global interest rate, world market returns, and world market dividend yields) are significant in explaining the integration between the stock markets of Middle East countries.

Narayan et al. (2014) examined the integration of stock markets among emerging Asian economies and developed markets by applying the EGARCH-dynamic conditional correlations (DCC). Results of the study revealed strong correlations during the period of financial crisis. Results further reported that price differentials, exchange rate risk, global financial crisis, bilateral trade relations, openness variable and domestic market characteristics are underlying forces of stock market integration.

Walti (2005) reported that bilateral trade, economic structure similarity, common language and informational asymmetries were significant in explaining the co-movement between the stock markets. Morgado & Tavares (2007) strongly recommend that extent of stock market co-movement is dependent upon the extent of bilateral trade. Put differently, they suggest that bilateral trade intensity influences the stock market co-movement positively. In addition to the bilateral trade, other significant determinants like real exchange rate volatility, dissimilarity of export structure and asymmetry of output growth have negative relationship with the co-movement of stock markets.

Otto et al., (2001) worked to find the relationship between bilateral trade and output co-movements and found that bilateral trade influences output co-movements in a positive manner. Similar findings were also found by Bekaert and Harvey (1997) who reported that bilateral trade is significant in describing the co-movement between emerging stock markets.

Contrary to the above, Kose, Prasad and Terrones (2003) found that results do not support the hypothesis that bilateral trade and stock market co-movement has the positive relationship. Another study related to the bilateral trade and co-movement of stock markets was conducted by Morgado & Tavares (2007) and found the bilateral trade has the positive effect on stock market co-movement.

In a research work performed by Bracker et al, (1999), who analyzed the driving forces of stock market co-movement and reported that numerous factors like bilateral trade and size differentials of two markets are notably linked with the degree of stock market co-movement. In addition to this, a time trend and regional dummy variable was also significant in explaining the co-movement between the returns of two stock markets.

Another study related to the bilateral trade and stock market co-movement was conducted by (Johnson & Soenen, 2003) and found that trade is significantly correlated with the degree of stock market co-movement over time. Johnson & Soenen (2003) then argue that bilateral trade is important in describing the co-movement between the returns of two stock markets.

Pretorius (2002) studied the driving forces of co-movement between stock markets and found that significant results were observed between the bilateral trade and the stock market co-movement. In addition to this, industrial production growth differential was also significant for describing the co-movement between stock markets of two countries.

Bracker and Koch (1999) suggested that extent of stock market co-movement is dependent upon the extent of economic integration between two countries. Put differently, if the two countries have strong economic integration then they must have the greater co-movement in their stock markets. Results point out that the extent of stock market co-movement (measured as the magnitude of the correlation structure) has positive association with trend and volatility in the world market. In addition to this, the extent of stock market integration has negative association with the volatility in the bilateral exchange rate, real interest rate differentials, term structure differentials and the return on a world market index.

Serra (2000) studied the effect of industry and country factors on the correlation structure of returns and observed that stock market returns are influenced by country factors and stock market correlation of two countries in not influenced by the industrial composition of these countries. In another study, Carrieri et al. (2006) found that world market volatility has the inverse relationship with the integration of stock markets. On the contrary, they also found that world market volatility has the positive relationship with the integration of stock markets after managing for trade, size of the market and financial liberalization.

Lin & Cheng (2008) analyzed the driving forces of the stock market co-movement and reported that volatility in the stock market, interest rate differentials and the rate of change in exchange rate are significant in explaining the co-movement between the returns of stock markets.

H_2: Greater (lesser) the divergence between the interest rate differentials, lower (higher) will be the co-movement between the stock markets.

H_3: Greater (lesser) the divergence between the inflation rate differentials, lower (higher) will be the co-movement between the stock markets.

H_4: Greater (lesser) the divergence between the GDP growth rate differentials, lower (higher) will be the co-movement between the stock markets.

H_5: Greater (lesser) the absolute changes in the bilateral exchange rate, lower (higher) will be the co-movement between the stock markets.

H_6: Greater (lesser) the volatility in the bilateral exchange rate, lower (higher) will be the co-movement between the stock markets.

H_7: Greater the volatility in the world equity market, the greater will be the co-movement between the stock markets.

H_8: Stronger the bilateral trade ties between the two countries, higher will be the co-movement between the stock markets.

CONCEPTUAL FRAMEWORK (FUNDAMENTAL DETERMINANTS OF STOCK MARKET COMOVEMENT)

(Figure 3.1)

It is clear from the literature that previous studies have focused on the integration of stock markets by studying the co-movements between the stock markets. However, there are very few studies that try to find out the underlying forces of stock market co-movement. The main aim of the thesis is to unfold the determinants behind stock market co-movements between Pakistan and emerging markets. This aspect may really be of greater worth for international investors that try to diversify their portfolios and for policy-makers that are interested to know about the determinants of stock market co-movement between emerging economies that may influence the national stock market, especially during periods of financial crisis.

CHAPTER 4

RESEARCH METHODOLOGY

4.1. Introduction

This section covers the methodology applied in this work and it also explains its population, size of sample, data collection, variables, econometric models and data analysis tools applied for data processing.

4.2. Population

Population consists of all emerging economies by the MSCI Global Investable Market Indices (Lucey & Zhang, 2010).

4.3. Sample

Due to non availability of some data, the purposive sample consists of 19 emerging economies by the MSCI Global Investable Market Indices. Table 4.1 shows the indices used for stock markets of Argentina, Brazil, Chile, China, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Morocco, Pakistan, Philippines, Peru, Poland, Thailand, and Turkey were MERVAL index, BOVESPA index, IGPA index, SHASHR index, PX index, HRMS index, BUX index, NIFTY index, IDX composite index, TA 100 index, KOSPI index, FBMKLCI index, MASI index, KSE 100 index, PSEI index, S&P/ BVL index, WIG index, SEI index, XUI 100 index.

4.4. Sample Period

The study period goes from 01 January 2001 to 31 December, 2014 and consists of the global financial crisis that started suddenly in the financial institutions of USA in 2007 and escalated from the USA to another developed countries in the first six months of the year 2008.

4.5. Research Limitations

Since, it would be almost impossible to incorporate every potential determinant of stock market co-movement; we limit this study to fundamental driving forces of stock market co-movement.

Table 4.1: Description of Indices

Country	**Stock Market Index**	**Country**	**Stock Market Index**
Argentina	MERVAL index	Korea	KOSPI index
Brazil	BOVESPA index	Malaysia	FBMKLCI index
Chile	IGPA index	Morocco	MASI index
China	SHASHR index	Pakistan	KSE 100 index
Czech	PX index	Philippine	PSEI index
Egypt	HRMS index	Peru	S&P/ BVL index
Hungary	BUX index	Poland	WIG index
India	NIFTY index	Thailand	SEI index
Indonesia	IDX composite index	Turkey	XUI 100 index
Israel	TA 100 index		

4.6. Data Collection

Daily data of different emerging stock indices is collected from the Data Stream. Daily data is selected to evade incorrect correlation problem. This problem is frequently found in annual as well as quarterly data while not compromising on the available degrees of freedom necessary in choosing suitable lag structures (Patra and Poshakwale, 2006). Because of the dissimilar stock market holidays, missing data is the main problem which raised in investigating the integration of the stock markets. To manage such problematic issue, Occam's razor technique is used in this study by just filling in with last day price of the stock market (Majid et al., 2009, Hirayama and Tsutsui, 1998). The reasoning of this technique is that closed stock exchange did not publicize any type of information. Because of no latest publicized information, the last day information is forwarded to the next working day. Secondary data for the determinants of stock market co-movement were collected from Data Stream, State Bank of Pakistan, World Bank, the KSE website and trading economics website.

4.7. Unit Root Tests for Examining the Stationarity of Variables

4.7.1. The Simple Dickey-Fuller Test for Unit Roots

Dickey and Fuller (1979, 1981) devised a procedure to formally test for non-stationarity. The key insight of their test is that testing for non-stationarity is equivalent to testing for the existence of a unit root. Thus the obvious test is the following which is based on the simple AR (1) model of the form:

$$Y_t = \phi Y_{t-1} + \mu_t \quad \text{----------} \quad (4.1)$$

What we need to examine here is whether ϕ is equal to 1 (unity and hence 'unit root'). Obviously, the null hypothesis is H_0: $\phi = 1$ and the alternative hypothesis is H_1: $\phi < 1$. We can obtain a different (more convenient) version of the test by subtracting y_{t-1} from both sides of (4.1):

$Y_t - Y_{t-1} = \phi y_{t-1} - Y_{t-1} + \mu_t$

$\Delta Y_{t-1} = (\phi - 1)\, Y_{t-1} + \mu_t$

$\Delta Y_{t-1} = \gamma\, Y_{t-1} + \mu_t$ ---------- (4.2)

Where of course $\gamma = (\phi - 1)$. Then now the null hypothesis is H_0: $\gamma = 0$ and the alternative hypothesis is H_a: $\gamma < 0$, where if $\gamma = 0$ then Y_t follows a pure random-walk model.

4.7.2. The Augmented Dickey-Fuller (ADF) Test for Unit Roots

As the error term is unlikely to be white noise, Dickey and Fuller extended their test procedure suggesting an augmented version of the test which includes extra lagged terms of the dependent variable in order to eliminate autocorrelation. The three possible forms of the ADF test are given by the following equations:

$$\Delta Y_t = \gamma\, Y_{t-1} + \sum_{i=1}^{p} \beta i \Delta Y_{t-i} + \mu_t \quad \text{---------- (4.3)}$$

$$\Delta y_t = \alpha_0 + \gamma\, Y_{t-1} + \sum_{i=1}^{p} \beta i \Delta Y_{t-i} + \mu_t \quad \text{---------- (4.4)}$$

$$\Delta y_t = a_0 + \gamma\, Y_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta i \Delta Y_{t-i} + \mu_t \quad \text{---------- (4.5)}$$

4.7.3. The Philips-Perron Test

The distribution theory supporting the Dickey-Fuller tests is based on the assumption that the error terms are statistically independent and have a constant variance. So, when using the ADF methodology we have to make sure that the error terms are uncorrelated and that

they really have a constant variance. Philips and Perron (1988) developed a generalization of the ADF test procedure that allows for fairly mild assumptions.

This study applies both ADF and PP tests for unit root although ADF statistics is preferred over Philips-Perron test. The reason behind this is that it is considered superior and reliable for time series with autoregressive structure, as white noise residuals are ensured in the regression (Patra and Poshakwale, 2006). Firstly, in order to check the order of integration of variables, Augmented Dickey Fuller Test is applied. ADF test is used with trend and without trend on the indices of emerging markets at level and the first difference as well. In order to endorse the results of Augmented Dickey Fuller Test, Philips-Perron test is also applied at level as well the first difference to check the co-integration between the stock markets of emerging economies.

4.8. Introduction of Cointegration

Most macroeconomic variables are trended and therefore the spurious regression problem is highly likely to be present in most macro econometric models. One way of resolving this is to difference the series successively until stationarity is achieved and then use the stationary series for regression analysis. However, this solution is not ideal. There are two main problems with using first differences. If the model is correctly specified as a relationship between y and x (for example) and we difference both variables implicitly we are also differencing the error process in the regression. This would then produce a non-invertible moving average error process and would present serious estimation problems. The second problem is that if we difference the variables the model can no longer give a unique long run solution. By the mean that if we pick a particular value for

x than regardless of the initial value for y then dynamic solution for y will eventually converge on a unique value.

If the two variables are non-stationary, we can represent the error as a combination of two cumulated error processes. These cumulated error processes are often called stochastic trends and normally we would expect that they would combine to produce another non-stationary process. However in the special case that *X* and *Y* are really related then we would expect them to move together and so the two stochastic trends would be very similar to each other and when we combine them together it should be possible to find a combination of them which eliminates the non-stationarity. In this special case we say that the variables are cointegrated. In theory, this should only happen when there is really a relationship linking the two variables together and cointegration becomes a very powerful way of detecting the presence of economic structures.

Cointegration then becomes an over-riding requirement for any economic model using non-stationary time series data. If the variables do not cointegrate then we have the problems of spurious regression and econometric work becomes almost meaningless. On the other hand if the stochastic trends do cancel then we have cointegration and everything works even more effectively than we previously would have thought.

The key point here is that if there really is a genuine long-run relationship between Y_t and X_t, then although then variables will rise over time (because they are trended), there will be a common trend that links them together. For an equilibrium, or long-run relationship to exist, what we require, then, is a linear combination of Y_t and X_t that is a stationary

variable (an I(0) variable). A linear combination of Y_t and X_t can be directly taken from estimating the following regression:

$Y_t = \beta_1 + \beta_2 X_t + \mu_t$ ---------- (4.6)

and taking the residuals:

$\hat{u}_t = Y_t - \hat{\beta}_1 - \hat{\beta}_2 X_t$ ---------- (4.7)

If $\hat{u}_t \sim I(0)$ then the variables Y_t and X_t are said to be cointegrated.

4.9. Measuring Stock Market Integration (Long Term Integration)

If the time series are found to be non-stationary, their usage while running the regression leads to the spurious results (Liu and Shrestha, 2008). After establishing the order of integration, the further step is to study the co-movement. For this purpose, cointegration test (Johansen and Juselius, 1990) is applied subject to the condition that all series are integrated at the same order. The test is based on the trace and eigen value statistics.

4.10. Variables of Study

4.10.1. Correlation between Country *i* and *j* (Cor_{ij})

Following the Pretorius (2002) model to determine the comovements among the stock markets of the sample countries, the correlations between daily rate of return of countries *i* and *j* during quarter t are measured.

4.10.2. Bilateral Trade

The sum of the value of bilateral trade as a proportion of each country's total trade is used, following Pretorius, E., (2002).

$$Trade_{ij} = \frac{X_{ij} + M_{ij}}{X_i + M_i} + \frac{X_{ji} + M_{ji}}{X_j + M_j}$$

Where X_{ij} and M_{ij} is the exports and imports from country i to country *j*. X_i and M_i is the total export and total import of country *i*.

4.10.3. Interest Rate Differential

As direction of causality is not involved in case of correlation, therefore, it is needed to take the absolute value of the interest rate differential as it is important that how much is the difference between the interest rates of two different countries. It is not important that which country has the larger interest rate and which country has the smaller interest rate. The most important thing is how large is the difference between the interest rates of two different economies. So, the interest rate differential in absolute value between the two countries must have an inverse relationship with the stock market co-movement. The absolute value of the interest differential between markets *i* and *j* is $|Int_i - Int_j|_t$ following Pretorius, E., (2002).

4.10.4. Inflation Rate Differential

As direction of causality is not involved in case of correlation, therefore, it is needed to take the absolute value of the inflation rate differential as it is important that how much is the difference between the inflation rates of two different countries. It is not important that which country's inflation rate is larger or smaller one. The most important thing is how large is the difference between the inflation rates of two different economies. So,

the inflation rate differential in absolute value between the two countries must have an inverse relationship with the stock market co-movement. The absolute value of the inflation differential between markets *i* and *j* is $|Inf_i - Inf_j|_t$ following Pretorius, E., (2002).

4.10.5. GDP Growth Rate Differential

As direction of causality is not involved in case of correlation, therefore, it is needed to take the absolute value of the gdp growth rate differential as it is important that how much is the difference between the gdp growth rate of two different countries. It is not important that which country has the larger gdp growth rate and which country has the smaller gdp growth rate. The most important thing is how large is the difference between the gdp growth rates of two different economies. So, the gdp growth rate differential in absolute value between the two countries must have an inverse relationship with the stock market co-movement. The absolute value of the GDP growth rate differential between two stock markets *i* and *j* is $Gr = |G_i - G_j|_t$ following Mobarek et al., (2016).

4.10.6. Absolute Change in the Bilateral Exchange Rate

Percent change in bilateral exchange rate during quarter t is calculated suggesting a possible indirect negative relationship between the absolute exchange rate changes and the co-movement of the two stock markets following Bracker et al., (1999) and Lin and Cheng (2013).

4.10.7. Volatility in the Bilateral Exchange Rate

Standard deviation in daily bilateral exchange rate during quarter t is calculated for the volatility in the bilateral exchange rate suggesting that the greater the exchange rate volatility; lower will be the co-movement between the stock markets. So, exchange rate volatility must reveal a negative association with the co-movement of two stock markets following Bracker et al., (1999) and Lin and Cheng (2013).

4.10.8. World Market Volatility

Standard deviation of daily world stock market index return during quarter t is calculated for volatility in the world market suggesting a positive association between the volatility in the world market and the co-movement of the stock markets following Bracker et al (1999).

4.10.9. Quarterly Effect

We account for potential seasonality by adding quarterly dummy variables.

Table 4.2: Potential Determinants of Stock Market Co-movement

Variable	Description	Reference
Cor_{ij}	Correlation between daily rate of return of countries *i* and *j* during quarter *t*.	Pretorius (2002). Bracker and Koch (1999)
Bilateral trade	$Trade_{ijt} = \frac{X_{ij} + M_{ij}}{X_i + M_i} + \frac{X_{ji} + M_{ji}}{X_j + M_j}$ Where X_{ij} and M_{ij} is the export and import from country i to country *j* and X_i and M_i is the total export and total import of country *i* during quarter *t*.	Pretorius (2002).
Inflation rate differential	$INF = \lvert Inf_i - Inf_j \rvert_t$ Where INF is the Inflation rate differential between markets *i* and *j* during quarter *t*.	Pretorius (2002). Bracker and Koch (1999)
Interest rate differential	$INT = \lvert Int_i - Int_j \rvert_t$ Where INT is the interest rate differential between markets *i* and *j*.	Pretorius (2002). Bracker and Koch (1999)
GDP growth rate differential	$GDP = \lvert Gdp_i - Gdp_j \rvert_t$ Where GDP is the GDP growth rate differential between country *i* and *j* during quarter *t*.	Mobarek et al., (2016).
Volatility in the bilateral exchange rate	XRSD = Standard Deviation in daily bilateral exchange rate during quarter t.	Lin and Cheng (2013). Bracker and Koch (1999)
Absolute change in the bilateral exchange rate	XRCH = Percent change in bilateral exchange rate during quarter t.	Lin and Cheng (2013). Bracker and Koch (1999)
World market volatility	WLDVOL = Standard deviation of daily world stock market index return during quarter t	Bracker and Koch (1999)

4.11. Econometric Model for Fundamental Determinants of Stock Market Co-movement

The final regression model incorporates all of the determinants mentioned as earlier:

$$Cor_{ij} = \beta_0 + \beta_1|Int_i - Int_j|_t + \beta_2|Inf_i - Inf_j|_t + \beta_3 | Gdp_i - Gdp_j |_t + \beta_4 TRADE_{ijt} + \beta_5|XRCH_{ij}|_t + \beta_6 XRSD_{ijt} + \beta_7 WMV_t + \beta_8 Q_3 + \beta_9 Q_4 + \varepsilon_{ijt} \text{ ---------- (4.8)}$$

Cor_{ij} = Estimated correlation between daily returns in countries i and j during quarter t

ε_{ijt} = disturbance term, assumed to be iid N $(0, \sigma^2)$

Int_{it} = Interest rate in country *i* during quarter *t*

Inf_{it} = Inflation rate in country *i* during quarter t

Gdp_{it} = GDP growth rate in country *i* during quarter *t*

$XRCH_{ijt}$ = Percent change in bilateral exchange rate during quarter *t*

$XRSD_{ijt}$ = Standard deviation in daily bilateral exchange rate during quarter t

WMV_t = Standard deviation of daily world stock market index return during quarter *t*

Q_3 = Dummy variable equal to 1 in 3rd quarter of every year

Q_4 = Dummy variable equal to 1 in fourth quarter of every year

4.12. Panel Data Regression Analysis

Current study uses panel data therefore alternate model of panel data are used to select the appropriate on. Depending upon the existence of homogeneity or heterogeneity, we have to select appropriate model from the following three options.

4.12.1. Common Constant Model/ Pooled Regression

The underlying assumption of common constant method is there are no differences among the data matrices of the cross sectional dimension. Such method is also called as the Pooled OLS method of estimation. Put differently, the common constant method is useful under the hypothesis that the data set is a priori homogeneous.

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \beta_k X_{kit} + \mu_{it} \qquad (4.9)$$

The F statistic to check homogeneity (i.e. Common Constant) or heterogeneity (i.e. Fixed/Random effect) is applied.

$$F = \frac{\left(R_{FE}^2 - R_{CC}^2\right)/\left(N-1\right)}{\left(1-R_{FE}^2\right)/\left(NT-N\,k\right)} \approx F\left(N-1, NT-N-k\right) \qquad (4.10)$$

4.12.2. Fixed Effect Model

It essentially captures all effects which are specific to a particular individual and which do not vary over time. So if we had a panel of countries the fixed effects would take full account of things such as geographical factors, natural endowments and any other of the many basic factors which vary between countries but not over time. Of course, this means that we cannot add extra variables, which also do not vary over time, such as country size for example, as this variable will be perfectly co-linear with the fixed effect.

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \beta_k X_{kit} + \mu_{it} \quad (4.11)$$

Which can be rewritten in a matrix notation as:

$$Y = D\alpha + X\beta + \mu \quad (4.12)$$

4.12.3. Random Effect Model

Another estimation model is called as the random effect model. The difference between the random effect method and fixed effect method is that random handles constant for every section as random not as fixed parameter.

$$\alpha_i = \alpha + v_i \quad (4.13)$$

The random effects model therefore takes the following form

$$Y_{it} = (\alpha + v_i) + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \beta_k X_{kit} + \mu_{it} \quad (4.14)$$

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \beta_k X_{kit} + (v_i + \mu_{it}) \quad (4.15)$$

4.13. Specification Tests for the Panel Models

4.13.1. F Test (Redundant Fixed Effects Tests)

Redundant Fixed Effect test is conducted to determine that either the data is heterogeneous or homogeneous across the cross sections. If it is heterogeneous, we need to apply fixed or random effect model. Otherwise, common constant/Pooled OLS is sufficient. Null Hypothesis of this test is that the cross sections are homogenous.

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4.13.2. Hausman Test

The next step is to confirm, either fixed effects model is better than random effects model. For this purpose, the specification test developed by Hausman is used. The Hausman test is formulated to assist in making a choice between the fixed effects and random effects approaches. Hausman (1978) adapted a test based on the idea that under the hypothesis of no correlation, both OLS and GLS are consistent but OLS is inefficient, while under the alternative OLS is consistent but GLS is not . More specifically, Hausman assumed that there are two estimators and of the parameter vector and he added two hypothesis-testing procedures. Under H_0, both estimators Traditional Panel Data Models are consistent but inefficient, and under H_1, is consistent and efficient, but is inconsistent.

For the Panel data the appropriate choice between the fixed effects and the random effects methods investigates whether the regressors are correlated with the individual effect. In other words, given a panel data model where fixed effects would be appropriate the Hausman test investigates, whether random effects estimation could be almost as good. According to Ahn and Moon (2001), the Hausman statistic may be viewed as a distance measure between the fixed effects and the random effects estimators. Thus we actually test H_0, that random effects are consistent and efficient, versus H1, that random effects are inconsistent (as the fixed effects will be always consistent). The Hausman test uses the following test statistic:

$$H=(\hat{\beta}^{FE}-\hat{\beta}^{RE})[\text{var}(\hat{\beta}^{FE})-\text{var}(\hat{\beta}^{FE})^{-1}(\hat{\beta}^{FE}-\hat{\beta}^{RE})\approx x^2(k) \qquad (4.16)$$

If the value of the statistic is large, then the estimate is significant, so we reject the null hypothesis that the random effects model is consistent and we use the fixed effects estimators. In contrast, a small value of the Hausman statistic implies that the random effects estimator is more appropriate.

CHAPTER 5

RESULTS AND DISCUSSION

5.1. Results of Stock Market Integration (long Term Integration)

Descriptive statistics for stock returns, unit root tests, cointegration test of data period 2001 - 2014 are presented in under mentioned tables.

5.1.1. Descriptive Statistics

Table 5.1 presents descriptive statistics for stock returns. The stock returns have been calculated using the following method.

$$R_{it} = \frac{\text{Index}_{it} - \text{Index}_{it-1}}{\text{Index}_{it-1}}$$

Where i = country and t = time period

We note that all emerging stock markets posted positive average performance during the time period. We examine the volatility of all countries market returns. It is reported in the modern literature that volatility is usually found in the emerging stock markets. The mean value for the Argentina stock market return is 0.000788 and the maximum (minimum) value is 0.174879 (-0.137266) with a standard deviation of 0.021716 showing that there is a variation in the emerging stock market returns. The average value for the Brazil stock market return is 0.000700 and the maximum (minimum) value is 0.333992 (-0.158267) with a standard deviation of 0.021608 showing that there is a variation in the emerging stock market returns.

The mean value for the Chile stock market return is 0.000270 and the maximum (minimum) value is 0.094807 (-0.058036) with a standard deviation of 0.007756 showing that there is a variation in the emerging stock market returns. The average value for the China stock market return is 0.000462 and the maximum (minimum) value is 0.321161 (-0.168290) with a standard deviation of 0.017432 showing that there is a variation in the emerging stock market returns.

The mean value for the Czech stock market return is 0.000193 and the maximum (minimum) value is 0.131609 (-0.149435) with a standard deviation of 0.013506 showing that there is a variation in the emerging stock market returns. The average value for the Egypt stock market return is 0.000528 and the maximum value is 0.146881 with a standard deviation of 0.014804 showing that there is a variation in the emerging stock market returns.

The mean value for the Hungary stock market return is 0.000612 and the maximum (minimum) value is 0.145868 (-0.165013) with a standard deviation of 0.017080 showing that there is a variation in the emerging stock market returns. The average value for the Indonesia stock market return is 0.000583 and the maximum (minimum) value is 0.140283 (-0.119549) with a standard deviation of 0.015542 showing that there is a variation in the emerging stock market returns. The mean value for the India stock market return is 0.000489 and the maximum (minimum) value is 0.162229 (-0.120892) with a standard deviation of 0.015267 showing that there is a variation in the emerging stock market returns.

The average value for the Korea stock market return is 0.000277 and the maximum (minimum) value is 0.119457 (-0.120188) with a standard deviation of 0.017739 showing that there is a variation in the emerging stock market returns. The mean value for the Israel stock market return is 0.000468 and the maximum (minimum) value is 0.102759 (-0.098609) with a standard deviation of 0.012594 showing that there is a variation in the emerging stock market returns. The average value for the Morocco stock market return is 0.000315 and the maximum (minimum) value is 0.046600 (-0.065900) with a standard deviation of 0.006969 showing that there is a variation in the emerging stock market returns.

The mean value for the Malaysia stock market return is 0.000201 and the maximum (minimum) value is 0.231427 (-0.214578) with a standard deviation of 0.013214 showing that there is a variation in the emerging stock market returns. The stock index for Morocco shows the minimum volatility among all the emerging stock markets. The average value for the Pakistan stock market return is 0.000641 and the maximum minimum) value is 0.136124 (-0.123784) with a standard deviation of 0.015236 showing that there is a variation in the emerging stock market returns. The mean value for the Peru stock market return is 0.000548 and the maximum (minimum) value is 0.136730 (-0.124454) with a standard deviation of 0.013977 showing that there is a variation in the emerging stock market returns.

Poland is shown to have realized the average return of 0.000472 among the emerging markets while the maximum (minimum) value is 0.082132 (-0.097751) with a standard

deviation of 0.014644 showing that there is a variation in the emerging stock market returns. The mean value for the Philippines stock market return is 0.000282 and the maximum (minimum) value is 0.175597 (-0.122683) with a standard deviation of 0.014135 showing that there is a variation in the emerging stock market returns.

The average value for the Thailand stock market return is 0.000142 and the maximum (minimum) value is 0.120187 (-0.148395) with a standard deviation of 0.015715 showing that there is a variation in the emerging stock market returns. Turkey is shown to have achieved the maximum return of 0.194510 and maximum volatility of 0.024546 among all the emerging markets. The mean value for the Turkey stock market return is 0.001419 and the minimum value is -0.181093.

Table 5.1: Descriptive Statistics for Daily Stock Market Returns

Variable	Mean	Median	Maximum	Minimum	Std. Dev
Argentina	0.000788	5.06E-05	0.174879	-0.137266	0.021716
Brazil	0.000700	0.000000	0.333992	-0.158267	0.021608
Chile	0.000270	0.000000	0.094807	-0.058036	0.007756
China	0.000462	0.000000	0.321161	-0.168290	0.017432
Czech Republic	0.000193	0.000000	0.131609	-0.149435	0.013506
Egypt	0.000528	0.000000	0.146881	-0.158002	0.014804
Hungary	0.000612	8.89E-05	0.145868	-0.165013	0.017080
India	0.000489	0.000246	0.162229	-0.120892	0.015267
Indonesia	0.000583	0.000176	0.140283	-0.119549	0.015542
Israel	0.000468	0.000000	0.102759	-0.098609	0.012594
Korea	0.000277	0.000000	0.119457	-0.120188	0.017739
Malaysia	0.000201	0.000000	0.231427	-0.214578	0.013214
Morocco	0.000315	2.54E-05	0.046600	-0.065900	0.006969
Pakistan	0.000641	0.000000	0.136124	-0.123784	0.015236
Peru	0.000548	0.000000	0.136730	-0.124454	0.013977
Philippines	0.000282	0.000000	0.175597	-0.122683	0.014135
Poland	0.000472	0.000000	0.082132	-0.097751	0.014644
Thailand	0.000142	0.000000	0.120187	-0.148395	0.015715
Turkey	0.001419	0.000338	0.194510	-0.181093	0.024546

5.1.2. Unit Root Test

In Table 5.2, the results of ADF test are mentioned. It is confirmed that all stock indices have unit root in log level means that series are non stationary, as statistics for all stock indices is not significant. Conversely, ADF statistics of all emerging stock indices are significant for the first difference at 5 % level of significance. The results are indifferent for both the models; with constant & with constant and trend. The results show that all emerging stock market indices are integrated of order one, I (1). Results of ADF test are hereby confirmed by the Philips-Perron test. Because of this, we can move towards the cointegration analysis aiming at examining that either there is a long run relationship between Pakistan and selected emerging stock markets or not?

Table 5.2: Results of Augmented Dickey Fuller Test and Philips-Perron Test

Countries	Level ADF test statistics	1st Difference ADF test statistics	Level PP test statistics	1st Difference PP test statistics
Argentina	0.267151	-67.15119*	0.139838	-67.09760*
Brazil	-1.698076	-70.83941*	-1.697078	-70.93268*
Chile	-0.269076	-57.29638*	-0.328134	-57.57800*
China	-1.827382	- 71.29789*	- 1.836200	- 71.29563*
Czech	-1.085443	-65.90004*	-1.166586	-65.81995*
Egypt	- 0.130037	- 62.36111*	- 0.283974	- 62.62445*
Hungary	-2.886649	68.30521*	-2.849389	-68.25902*
India	0.142693	-65.44913*	- 0.104634	- 65.98459*
Indonesia	0.105579	- 62.43098*	- 0.012111	- 62.31436*
Israel	-1.510115	-69.67378*	-1.510099	-69.65852*
Korea	-1.029047	-68.35179*	-1.075635	-68.25062*
Malaysia	-0.852253	-68.42256*	-0.940136	-68.44188*
Morocco	- 1.992301	- 53.89649*	- 1.732336	- 54.20042*
Pakistan	0.733766	-66.22079*	0.307172	-68.09361*
Philippines	0.048718	-62.00977*	-0.119678	-61.87291*
Peru	-0.638457	-31.82621*	-0.606170	-61.84086*
Poland	-1.632404	-65.10336*	-1.651381	-65.10336
Thailand	-0.981465	-66.88778*	-1.110871	-67.08840*
Turkey	-3.105642	-70.73845*	-3.052776	-70.76199*

5.1.3. Co integration Tests

Results of pair wise Johansen and Juselius cointegration tests are reported in table 5.3. These results are based on two statistics – one is called as the trace statistics and the second is called as the eigenvalue statistics. The results show that there is no long term integration between the stock market of Pakistan and the stock markets of Argentina, Czech, Hungary, Philippine and Peru as critical value exceeds trace statistics at the 5% level of significance. Such results show that there are chances for the investors of Argentina, Czech, Hungary, Philippine and Peru to get the benefits of diversification strategies in the stock market of Pakistan. In addition to this, the Pakistani investors can also reduce the risk in these stock markets by adopting the strategy of portfolio diversification. The results of this study are consistent with the results of Husain and Saidi (2000) who do not find the evidence of co-movement between the stock market of Pakistan with other stock markets. Naeem (2002) also reported that investors can obtain the benefits of diversification while investing in Pakistan. Worthington et al (2003) also reported evidence of no long term integration among the stock markets of the world.

On the other hand, the results of this study reveal that there is long term integration between the stock market of Pakistan and the stock markets of Brazil, Chile, China, Egypt, India, Indonesia, Israel, Korea, Malaysia, Morocco, Poland, Thailand and Turkey as critical value do not exceed the trace statistics at 5 % level of significance. Such results show that Pakistani investors cannot reduce the risk while investing in Brazil, Chile, China, Egypt, India, Indonesia, Israel, Korea, Malaysia, Morocco, Poland, Thailand and

Turkey. In the same manner, the investors from these countries cannot obtain the benefits of portfolio diversification with their investments in the stock market of Pakistan.

Table 5.3: Results of Co-integration Tests

Country	No. of Hypothesized CE(s)	Trace Test		Maximum Eigen value Test	
		Test Stat	Crit. Value	Test Stat	Crit. Value
Argentina	None	14.69329	18.39771	3.841466	17.14769
	At Most 1	3.140136	3.841466	3.140136	3.841466
Brazil	None	11.23543	18.39771	6.633993	17.14769
	At Most 1	4.601441	3.841466	4.601441	3.841466
Chile	None	10.34331	18.39771	10.34331	18.39771
	At Most 1	4.468896	3.841466	4.468896	3.841466
China	None	14.09358	18.39771	8.729218	17.14769
	At Most 1	5.364363	3.841466	5.364363	3.841466
Czech	None	12.12740	18.39771	8.441879	17.14769
	At Most 1	3.685521	3.841466	3.685521	3.841466
Egypt	None	18.75566	18.39771	13.74751	17.14769
	At Most 1	5.008144	3.841466	5.008144	3.841466
Hungary	None	11.78330	18.39771	9.188717	17.14769
	At Most 1	2.594587	3.841466	2.594587	3.841466
India	None	16.79228	18.39771	11.18928	17.14769
	At Most 1	5.603001	3.841466	5.603001	3.841466
Indonesia	None	11.00160	18.39771	5.964107	17.14769
	At Most 1	5.037490	3.841466	5.037490	3.841466
Israel	None	12.43478	18.39771	8.559479	17.14769
	At Most 1	4.075296	3.841466	4.075296	3.841466
Korea	None	18.06494	18.39771	10.84242	17.14769
	At Most 1	7.222513	3.841466	7.222513	3.841466
Malaysia	None	11.17771	18.39771	6.638636	17.14769
	At Most 1	4.539069	3.841466	4.539069	3.841466
Morocco	None	31.27788	18.39771	24.37452	17.14769
	At Most 1	6.903359	3.841466	6.903359	3.841466
Philippines	None	8.139997	18.39771	5.693306	17.14769
	At Most 1	2.446691	3.841466	2.446691	3.841466
Peru	None	10.22497	18.39771	6.479338	17.14769
	At Most 1	3.745628	3.841466	3.745628	3.841466
Poland	None	17.24387	18.39771	12.99729	17.14769
	At Most 1	4.246585	3.841466	4.246585	3.841466
Thailand	None	13.31669	18.39771	8.377639	17.14769
	At Most 1	4.939051	3.841466	4.939051	3.841466
Turkey	None	13.47951	18.39771	9.452715	17.14769
	At Most 1	4.026794	3.841466	4.026794	3.841466

The study examines the co movement between the stock market of Pakistan and eighteen emerging stock markets of Argentina, Brazil, Chile, China, Czech, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Morocco, Philippines, Peru, Poland, Thailand and Turkey. Based on the empirical findings of daily stock indices, it is found that there is no long term integration between the stock market of Pakistan and the stock markets of Argentina, Czech, Hungary, Philippine and Peru. Such results show that there are chances for the investors of Argentina, Czech, Hungary, Philippine and Peru to get the benefits of diversification strategies in the stock market of Pakistan. In addition to this, the Pakistani investors can also reduce the risk in these stock markets by adopting the strategy of portfolio diversification. On the other hand, the results of this study reveal that there is long term integration between the stock market of Pakistan and the stock markets of Brazil, Chile, China, Egypt, India, Indonesia, Israel, Korea, Malaysia, Morocco, Poland, Thailand and Turkey. From the perspective of portfolio managers of these countries, Pakistani stock market does not qualify as a diversification opportunity.

5.2. Results of Determinants of Stock Market co-movement between Pakistan and Emerging Economies

We have analyzed the fundamental determinants of stock market co-movement between Pakistan and different emerging economies where co-integration is found. These fundamental determinants are bilateral trade, inflation rate differential, interest rate differential, gdp growth rate differential, volatility in the bilateral exchange rate, absolute change in the bilateral exchange rate and world market volatility.

Data used in analysis of this study is panel data. Correlation between daily rate of return of countries *i* and *j* during quarter t has been taken as the dependent variable. The bilateral trade has been taken as the determinant of stock market co-movement between emerging economies by taking the sum of the value of bilateral trade as a proportion of each country's total trade and has been tested with the help of secondary data with regard to the application of International Capital Goods Trade Hypothesis. Similarly, interest rate differential, inflation rate differential and GDP growth rate differential have been taken as the determinant of stock market co-movement and tested with the help of secondary data with regard to the application of Discounted Cash Flow Model. Likewise, the volatility in the bilateral exchange rate has been taken as the determinant of stock market co-movement by computing the standard deviation of daily observations in each standardized exchange rate series, for each quarter investigated, and has been used with the help of secondary data with regard to the application of Flow Oriented Hypothesis of Exchange Rate Determination. Absolute change in the bilateral exchange rate has been taken as the determinant of stock market co-movement by taking the quarterly percentage

change in bilateral exchange rates between every pair of countries and has been tested with the help of secondary data with regard to the application of Flow Oriented Hypothesis of Exchange Rate Determination. Data period of this study is 2001 - 2014. The co-movement of emerging stock markets of different countries is checked for this period and later on the fundamental driving forces of stock market co-movement between Pakistan and emerging economies were determined.

To check the commonality of the determinants of stock market co-movement, data is further divided in three different periods i.e., before, during and after the crisis and then the driving forces of stock market co-movement between Pakistan and emerging economies are determined by applying the panel data analysis. We have not used the dummy because in fixed effect model of panel data analysis, the dummies have already been used.

5.2.1. Descriptive Statistics for the Dependent and Explanatory Variables

Table 5.4 reports the descriptive statistics for the dependent and explanatory variables for the full period. Cor_{ij} is the correlation between daily rate of return of countries *i* and *j* during quarter *t*, $Trade_{ijt}$ is the bilateral trade between country i to country *j* during quarter *t*, GDP is the GDP growth rate differential between country *i* and *j* during quarter *t*, INF is the inflation rate differential between markets *i* and *j* during quarter *t*, INT is the interest rate differential between markets *i* and *j* during quarter *t*, WLDVOL is the standard deviation of daily world stock market index return during quarter *t*, XRCH represents the absolute change in the bilateral exchange rate during quarter *t* and XRSD represents the volatility in the bilateral exchange rate during quarter *t*.

The mean value for the $Trade_{ijt}$ is 5.507149 and the maximum value is 77.75641 with a standard deviation of 16.33276 showing a large variation in the bilateral trade intensity between Pakistan and other emerging economies of the world. The mean value for the world market volatility is 35.27790 and the maximum value is 84.51160 with a standard deviation of 15.98911 showing a large variation in the world market volatility between Pakistan and other emerging economies of the world. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

Table 5.4: Descriptive Statistics of the Panel Variables

Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.064726	0.059866	0.532674	-0.354828	0.145593
$Trade_{ijt}$	5.507149	0.544636	77.75641	0.018290	16.33276
GDP	3.042261	2.927500	10.16000	0.000000	2.000357
INF	5.681538	5.070000	22.95000	0.000000	4.765719
INT	5.283340	5.250000	22.00000	0.000000	3.297100
WLDVOL	35.27790	31.25297	84.51160	12.86446	15.98911
XRCH	0.024404	0.016630	0.156715	3.99E-05	0.024281
XRSD	0.201726	0.040811	3.311882	1.07E-05	0.405593

5.2.2. Panel Unit Root Test for Dependent and Explanatory Variables

In table 5.5, the results of nine panel unit root tests are reported to establish their stationarity properties. All the tests have a null hypothesis of a unit root. The tests of Levin et al. (2002) and Breitung (2000) assume that there is a common unit root process that is identical across the cross section units. The tests of Im et al. (2003), Maddala and Wu (1999) and Choi (2001) allow the unit root processes to vary across the cross-section units. The tests by Maddala and Wu (1999) and Choi (2001) are also known as the ADF-Fisher and PP-Fisher tests, respectively. For the most part, the results indicate no unit root process. The null hypothesis is rejected. In general, all the panel series are *I (0).*

Table 5.5: Panel Unit Root Test for Dependent and Explanatory Variables

Null: Unit Root (Assumes Common Unit Root Process)			
	Statistics	**Probability**	**Finding**
Bilateral Trade			
Levin, Lin & Chu t-stat	2.63583	0.0042	*I*(0)
ADF - Fisher Chi-square	43.9919	0.0076	*I*(0)
PP - Fisher Chi-square	36.5728	0.0482	*I*(0)
GDP Growth Rate Differential			
Levin, Lin & Chu t-stat	-3.09742	0.0010	*I*(0)
ADF - Fisher Chi-square	39.4861	0.0243	*I*(0)
PP - Fisher Chi-square	85.8012	0.0000	*I*(0)
Inflation Rate Differential			
Levin, Lin & Chu t-stat	-4.18993	0.0000	*I*(0)
ADF - Fisher Chi-square	46.4558	0.0017	*I*(0)
PP - Fisher Chi-square	47.0764	0.0014	*I*(0)
Interest Rate Differential			
Levin, Lin & Chu t-stat	-3.10468	0.0010	*I*(0)
ADF - Fisher Chi-square	35.4857	0.0615	*I*(0)
PP - Fisher Chi-square	35.9863	0.0551	*I*(0)
World Market Volatility			
Levin, Lin & Chu t-stat	-2.60881	0.0045	*I*(0)
ADF - Fisher Chi-square	22.5289	0.5477	*I*(0)
PP - Fisher Chi-square	56.9675	0.0002	*I*(0)
Absolute Change in the Bilateral Exchange Rate			
Levin, Lin & Chu t-stat	-7.99314	0.0000	*I*(0)
ADF - Fisher Chi-square	99.5464	0.0000	*I*(0)
PP - Fisher Chi-square	303.119	0.0000	*I*(0)
Volatility in the Bilateral Exchange Rate			
Levin, Lin & Chu t-stat	-9.18610	0.0000	*I*(0)
ADF - Fisher Chi-square	137.147	0.0000	*I*(0)
PP - Fisher Chi-square	201.283	0.0000	*I*(0)
Correlation Between Country *i* & *j*			
Levin, Lin & Chu t-stat	-3.10468	0.0010	*I*(0)
ADF - Fisher Chi-square	35.4857	0.0615	*I*(0)
PP - Fisher Chi-square	35.9863	0.0551	*I*(0)

5.2.3. Results of Redundant Fixed Effects Tests

Redundant Fixed Effect test was conducted to determine either the data is heterogeneous or homogeneous across the cross sections. If it is heterogeneous then we need to apply fixed or random effect model. Otherwise, common constant/Pooled OLS is sufficient. Null Hypothesis of this test is that the cross sections are homogenous. Null will be rejected if p value is less than .05. As reported in table 5.6, probability is less than .05; therefore, we reject the null hypothesis.

5.2.4. Results of Hausman Test

The next step is to verify whether a random effects model is more superior to the fixed effects model, the specification test constructed by Hausman (1978) is used to test for the orthogonality of the random effects and the independent variables. The null hypothesis under Hausman test is that the LSDV fixed effects and GLS random effects estimators are consistent, while the alternative is that GLS estimators are not consistent. According to the results reported in table 5.7 the probability is greater than .05. Therefore, we accept the null hypothesis. Because of this, now the specification test for the panel model is random effect model.

Table 5.6: Redundant Fixed Effects Tests

Effects Test	**Statistic**	**Probability**
Cross-section F	1.815285	**0.0488**
Cross-section Chi-square	20.431183	0.0398

Table 5.7: Hausman Test

Test Summary	**Chi Sq Statistic**	**Probability**
Cross section random	8.158284	0.6134

5.2.5. Determinants of Stock Market Co-movement between Pakistan and Emerging Markets

Results of the panel data are reported in table 5.8. First, F test is applied to check the overall validity of model. Overall, model is valid as probability of F statistics is less than .05. The goodness of fit statistics indicates that these economic determinants offer substantive explanatory power regarding time series movements in the correlation structure.

Second, redundant variable test of coefficient diagnostics has been applied to identify the need of inclusion of each independent variable in the model. Null hypothesis of the test is that variable is redundant. As the probability of GDP growth rate differential, interest rate differential, inflation rate differential is less than .05, therefore we reject the null hypothesis. In case of volatility in the bilateral exchange rate, absolute change in the

bilateral exchange rate and bilateral trade, we accept the null hypothesis as probability is more than .05.

5.2.5.1 GDP Growth Rate

GDP growth rate influences stock market behavior through the cash flow model. If the GDP growth rate of two different countries shows the similar trend over time, because of the similar monetary policy, then the influence of GDP growth rate on stock prices will cause a co-movement. Therefore, larger GDP growth rate differential will cause a smaller amount of co-movement or smaller GDP growth rate differential will cause a larger amount of co-movement. Put differently, the GDP growth rate differential of two economies must be negatively correlated with the correlation of their stock markets or the convergence of gdp growth rate of two countries must influence their stock markets to move in the same direction. The coefficient estimate for the GDP growth rate differential is negative and significant indicating that the higher the GDP growth rate difference between the market pairs, the lower will be the co-movement between two stock markets. Such results are in line with the results of earlier studies like Johnson and Soenen (2003), Mobarek et al (2016), who also reports that GDP growth rate differential between market pairs is significantly and negatively associated with stock market co-movement.

5.2.5.2. Inflation Rate

Inflation rate influences stock market behavior through the cash flow model. The inflation rate differential between the country pairs must be negatively correlated with the extent of the stock market co-movement. Putting it differently, the extent of stock market

co-movement is dependent upon the extent of inflation rate differential between two countries. In the existing literature, the same has already been explained as that the convergence of stock market performance is dependent upon the convergence of macroeconomic fundamentals. Higher the inflation rate differential between the country pairs, the lower will be the co-movement between their stock markets or lower the inflation rate differential between the two countries, the higher will be the co-movement between the stock markets. The coefficient estimate for the inflation rate differential is negative and significant indicating that lower the inflation rate differential between the market pairs, the higher will be the co-movement between their stock markets. Such results are in line with the results of earlier studies like Mobarek et al (2016), who also report that inflation rate differential between country pairs is significantly and negatively associated with stock market co-movement.

5.2.5.3. Market Volatility

Because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, resulting in higher correlation between the different pairs of stock markets. The coefficient estimate for the world market volatility between Pakistan and emerging stock markets is significant and positive. Such results are in line with the earlier research work of Bracker and Koch (1999). Putting it differently, world market volatility is positive and significant for explaining the correlation between Pakistan and emerging stock markets.

5.2.5.4. Quarterly effect

In literature, it is recognized that different stock markets have experienced seasonal patterns in market activity and valuation. Meric and Meric (1989) report that correlation matrix throughout the summer is less stable. In this light, we account for potential seasonality by adding quarterly dummy variables. Quarter 4 is negatively associated with the correlation co-efficient.

Table 5.8: Determinants of Stock Market Co-movement between Pakistan and Emerging Markets

Variable	Coefficient	Std. Error	t – Statistic	Prob
C	0.032495	0.025358	1.281459	0.2006
$Trade_{ijt}$	-0.000107	0.000597	-0.179563	0.8576
GDP	-0.008327	0.003231	-2.577272	0.0102*
INF	-0.006398	0.001671	-3.828552	0.0001*
INT	0.004422	0.002161	2.045944	0.0412
WLDVOL	0.002469	0.000428	5.764684	0.0000*
XRCH	0.255430	0.318917	0.800930	0.4235
XRSD	-0.014881	0.021552	-0.690465	0.4902
Q2	-0.000875	0.016860	-0.051922	0.9586
Q3	-0.026603	0.016662	-1.596577	0.1109
Q4	-0.040653	0.016556	-2.455452	0.0144*
R-squared	0.100868			
Prob(F-statistic)				0.000000

5.3. Diagnostic Tests

To check the normality and serial correlation, Jarque Bera Test is used to check the normality of error terms or residuals. As probability is greater than .05, it means that error terms are normally distributed as we cannot reject the null hypothesis of normal series. The graph of the Jarque Bera test is shown below:

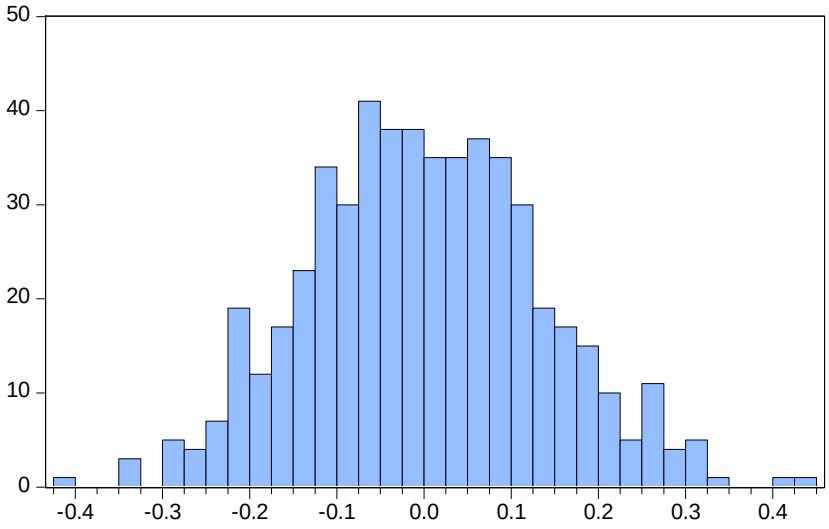

Table 5.9: Diagnostic Tests

Test Performed for	Test	Test Statistic	Conclusion
Normality	Jarque Bera	1.344771	Residuals normally distributed
Serial Correlation	Durbin Watson	2.04	No serial correlation

Durbin Watson test is used to check the serial correlation. The results are reported in table 5.9 with the conclusion that there is no serial correlation.

5.4. Country wise Descriptive Statistics for Dependent & Explanatory Variables

Table 5.10 reports the country wise descriptive statistics of all variables for the full time period. Cor_{ij} is the correlation between daily rate of return of countries *i* and *j* during quarter *t*. $Trade_{ijt}$ is the bilateral trade between country i to country *j* during quarter *t*, GDP is the GDP growth rate differential between country *i* and *j* during quarter *t*, INF is the inflation rate differential between markets *i* and *j* during quarter *t*, INT is the interest rate differential between markets *i* and *j* during quarter *t*, WLDVOL is the standard deviation of daily world stock market index return during quarter *t*, XRCH represents the absolute change in the bilateral exchange rate during quarter *t* and XRSD represents the volatility in the bilateral exchange rate during quarter *t*.

5.4.1. Pakistan – Brazil

Descriptive statistics of all variable between Pakistan and Brazil for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.176150 and the maximum value is 0.903952 with a standard deviation of 0.149998 showing that there is a large variation in the bilateral trade intensity between Pakistan and Brazil. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a big variation in the world market volatility. Bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series on the basis of standard deviation.

5.4.2. Pakistan – Chile

Descriptive statistics of all variable between Pakistan and Chile for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.241764 and the maximum value is 0.515378 with a standard deviation of 0.074892 showing that there is a large variation in the bilateral trade intensity between Pakistan and Chile. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a large variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.3. Pakistan – China

Descriptive statistics of all variable between Pakistan and China for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 57.73102 and the maximum value is 77.75641 with a standard deviation of 10.01911 showing that there is a large variation in the bilateral trade intensity between Pakistan and China. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a big variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.4. Pakistan – Egypt

Descriptive statistics of all variable between Pakistan and Egypt for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 1.268431 and the maximum value is 2.270537 with a standard deviation of 0.426318 showing that there is a big variation in the bilateral trade intensity between Pakistan and Egypt. The mean value for the world market volatility is 36.79013 and the maximum value is 84.51160 with a standard deviation of 15.96091 showing that there is a large variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.5. Pakistan – India

Descriptive statistics of all variable between Pakistan and India for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 1.158160 and the maximum value is 2.305133 with a standard deviation of 0.346470 showing that there is a large variation in the bilateral trade intensity between Pakistan and India. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a big variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.6. Pakistan – Indonesia

Descriptive statistics of all variable between Pakistan and Indonesia for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.878687 and the maximum value is 1.621702 with a standard deviation of 0.256187 showing that there is a large variation in the bilateral trade intensity between Pakistan and Indonesia. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a large variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.7. Pakistan – Korea

Descriptive statistics of all variable between Pakistan and Korea for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.450401 and the maximum value is 0.794018 with a standard deviation of 0.128173 showing that there is a big variation in the bilateral trade intensity between Pakistan and Korea. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a big variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.8. Pakistan – Malaysia

Descriptive statistics of all variable between Pakistan and Malaysia for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.534508 and the maximum value is 0.910089 with a standard deviation of 0.149703 showing that there is a big variation in the bilateral trade intensity between Pakistan and Malaysia. The mean value for the world market volatility is 39.61059 and the maximum value is 84.51160 with a standard deviation of 16.25588 showing that there is a big variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.9. Pakistan – Morocco

Descriptive statistics of all variable between Pakistan and Morocco for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.184560 and the maximum value is 0.561770 with a standard deviation of 0.112139 showing that there is a big variation in the bilateral trade intensity between Pakistan and Morocco. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a big variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.10. Pakistan – Poland

Descriptive statistics of all variable between Pakistan and Poland for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.143924 and the maximum value is 0.365848 with a standard deviation of 0.051576 showing that there is a big variation in the bilateral trade intensity between Pakistan and Poland. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a big variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.11. Pakistan – Thailand

Descriptive statistics of all variable between Pakistan and Thailand for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.605779 and the maximum value is 0.906580 with a standard deviation of 0.140409 showing that there is a large variation in the bilateral trade intensity between Pakistan and Thailand. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a large variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

5.4.12. Pakistan – Turkey

Descriptive statistics of all variable between Pakistan and Turkey for the full time period are reported in Table 5.11. The mean value for the $Trade_{ijt}$ is 0.738257 and the maximum value is 1.189853 with a standard deviation of 0.186330 showing that there is a large variation in the bilateral trade intensity between Pakistan and Turkey. The mean value for the world market volatility is 34.84170 and the maximum value is 84.51160 with a standard deviation of 16.11367 showing that there is a big variation in the world market volatility. On the basis of standard deviation, bilateral trade and the world market volatility show the most volatile behavior while the absolute change in the bilateral exchange rate and the volatility in the bilateral exchange rate is the least volatile series.

Table 5.10: Country wise Descriptive Statistics of the Dependent and Explanatory Variables

Pakistan – Brazil					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.002383	0.005756	0.234011	-0.280836	0.121033
$Trade_{ijt}$	0.176150	0.132200	0.903952	0.065638	0.149998
GDP	3.815163	3.616250	9.260000	0.275000	1.983415
INF	5.295435	3.755000	17.66000	0.020000	4.427080
INT	4.195652	2.750000	13.00000	0.000000	3.712185
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.036571	0.023636	0.140280	0.000584	0.034783
XRSD	0.699855	0.546546	2.388652	0.047830	0.580335
Pakistan – Chile					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.039505	0.050015	0.300761	-0.235755	0.138868
$Trade_{ijt}$	0.241764	0.222616	0.515378	0.153539	0.074892
GDP	3.673859	3.587500	8.560000	0.330000	1.854716
INF	7.153696	6.090000	16.24000	0.020000	4.067081
INT	5.989130	5.000000	12.00000	2.250000	2.794318
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.014146	0.008032	0.071965	6.58E-05	0.016431
XRSD	0.000854	0.000446	0.004525	4.71E-05	0.000936
Pakistan – China					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.060147	0.064940	0.330465	-0.354828	0.138813
$Trade_{ijt}$	57.73102	58.17458	77.75641	39.6353	10.01911
GDP	0.698913	0.000000	2.487500	0.000000	0.959089
INF	7.294130	6.140000	22.14000	1.080000	4.691241
INT	4.016739	3.000000	9.190000	1.420000	2.250593
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.018683	0.011790	0.096278	0.000147	0.020709
XRSD	0.100660	0.057047	0.565353	0.003080	0.116929
Pakistan – Egypt					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.088470	0.067361	0.426228	-0.133021	0.142025
$Trade_{ijt}$	1.268431	1.119136	2.270537	0.505417	0.426318
GDP	2.404512	2.310000	7.920000	0.112500	1.423083
INF	2.777805	2.590000	6.970000	0.020000	1.743066
INT	1.926829	1.250000	5.250000	0.000000	1.729563
WLDVOL	36.79013	32.86834	84.51160	0.000000	15.96091
XRCH	0.017036	0.008707	0.068664	0.000461	0.018507
XRSD	0.111946	0.067481	0.471916	0.003884	0.112285
Pakistan – India					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.078501	0.047729	0.524124	-0.201590	0.179403
$Trade_{ijt}$	1.158160	1.142429	2.305133	0.544636	0.346470

GDP	2.976902	2.511250	7.160000	0.020000	1.769596
INF	0.469565	0.000000	4.020000	0.000000	1.006589
INT	3.472826	2.500000	9.000000	1.000000	2.510660
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.019971	0.017606	0.060438	0.000172	0.015493
XRSD	0.016430	0.013639	0.049046	0.000158	0.012637
Pakistan – Indonesia					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.093895	0.116409	0.527866	-0.213930	0.154746
$Trade_{ijt}$	0.878687	0.893162	1.621702	0.436274	0.256187
GDP	2.651087	2.015000	8.635000	0.000000	2.442026
INF	3.679565	2.780000	14.66000	0.000000	3.969244
INT	2.967391	2.375000	7.000000	0.000000	2.445295
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.028180	0.016743	0.146571	0.000543	0.029022
XRSD	0.000107	7.96E-05	0.000632	1.07E-05	0.000111
Pakistan – Korea					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.071928	0.058788	0.478724	-0.269454	0.161544
$Trade_{ijt}$	0.450401	0.416625	0.794018	0.294278	0.128173
GDP	3.835815	3.431250	8.160000	0.260000	1.846048
INF	7.575435	6.555000	19.24000	1.120000	3.897442
INT	6.695652	6.375000	11.50000	3.250000	2.700778
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.026638	0.019298	0.096155	3.99E-05	0.023213
XRSD	0.001154	0.000798	0.004359	6.02E-05	0.000995
Pakistan – Malaysia					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.121216	0.087895	0.521166	-0.274815	0.172961
$Trade_{ijt}$	0.534508	0.498488	0.910089	0.262933	0.149703
GDP	2.549062	2.530000	4.065000	0.775000	0.880677
INF	8.999375	8.040000	18.94000	1.600000	4.127530
INT	7.976563	7.750000	11.50000	5.500000	2.171442
WLDVOL	39.61059	37.21038	84.51160	19.58927	16.25588
XRCH	0.021922	0.014842	0.081127	0.000308	0.019068
XRSD	0.325977	0.240153	1.040365	0.045719	0.254605

Pakistan – Morocco					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.052854	0.033145	0.380629	-0.204246	0.150237
$Trade_{ijt}$	0.184560	0.155561	0.561770	0.018290	0.112139
GDP	2.157120	2.265000	7.040000	0.100000	1.424161
INF	6.440217	6.635000	20.31000	0.000000	6.240337
INT	6.798913	6.125000	11.00000	3.750000	2.149690
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.029357	0.028027	0.070894	0.002425	0.019121
XRSD	0.140490	0.118318	0.358392	0.027681	0.084336
Pakistan – Poland					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.034637	0.019585	0.311255	-0.170458	0.113207
$Trade_{ijt}$	0.143924	0.136558	0.365848	0.088721	0.051576
GDP	3.647772	3.538750	8.260000	0.040000	1.898594
INF	7.761522	6.870000	20.04000	1.280000	3.938420
INT	5.733696	5.750000	10.00000	0.500000	2.713343
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.018756	0.012980	0.089081	0.000302	0.019599
XRSD	0.066354	0.058024	0.237081	0.012250	0.046984
Pakistan – Thailand					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.094493	0.081938	0.532674	-0.159646	0.132226
$Trade_{ijt}$	0.605779	0.568375	0.906580	0.394554	0.140409
GDP	4.107772	3.952500	10.16000	0.420000	2.042370
INF	7.325000	5.990000	22.95000	0.430000	4.715884
INT	7.375000	6.375000	12.25000	3.500000	2.504302
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.022752	0.016205	0.083844	0.000316	0.019768
XRSD	0.027517	0.019351	0.097823	0.001560	0.023011
Pakistan – Turkey					
Variables	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev**
Cor_{ij}	0.058460	0.039907	0.307384	-0.147390	0.114894
$Trade_{ijt}$	0.738257	0.701910	1.189853	0.438116	0.186330
GDP	3.769728	3.736250	8.050000	0.260000	1.874453
INF	4.100870	2.350000	20.82000	0.000000	4.569221
INT	6.706522	5.750000	22.00000	0.500000	4.401485
WLDVOL	34.84170	31.11367	84.51160	12.86446	16.11367
XRCH	0.037277	0.029212	0.156715	0.000173	0.033595
XRSD	0.957426	0.799160	3.311882	0.140445	0.670590

5.5. Country wise Determinants of Stock Market Co-movement

5.5.1. Pakistan and Brazil

The coefficient estimate for the bilateral trade between Pakistan and Brazil is significant and positive. Extent of stock market co-movement is dependent upon the extent of bilateral trade intensity. Coefficient estimates for bilateral trade between two countries is positive and significant, which shows that bilateral trade between Pakistan and Brazil leads to the co-movement between the stock markets of these countries. Such results are in line with the Bekaert and Harvey (1997), Bracker et al, (1999), Johnson & Soenen (2003), Pretorius (2002), Walti (2005) and Morgado & Tavares (2007) who reports that trade is significantly and positively associated with stock market co-movement. Putting it differently, bilateral trade is positive and significant for explaining the correlation between two stock markets. In addition to this, our results are also consistent with the Forbes and Chinn (2004), Lucey and Zhang (2010), Walti (2011) who report that extent of stock market co-movement is dependent upon the extent of strong bilateral trade relationships. The co-efficient estimate for the gdp growth rate, inflation rate, interest rate, world market volatility, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate between Pakistan and Brazil is insignificant and will therefore have no effect on the returns of two stock markets.

Table 5.11: Determinant of Stock Market Co-movement between Pakistan and Brazil

Variable	Coefficient	Std. Error	t - Statistic	Prob
C	-0.030841	0.060635	-0.508629	0.6140
$Trade_{ijt}$	0.185237	0.091314	2.028576	0.0497*
GDP	-0.007442	0.012537	-0.593592	0.5564
INF	-0.000759	0.005011	-0.151501	0.8804
INT	0.002240	0.007054	0.317524	0.7526
WLDVOL	0.000514	0.001900	0.270613	0.7882
XRCH	0.784262	0.830506	0.944318	0.3511
XRSD	-0.027682	0.053214	-0.520203	0.6060
R-squared	0.062138			
Prob(F-statistic)			0.00000	

5.5.2. Pakistan and Chile

The co-efficient estimate for the gdp growth rate, inflation rate, interest rate, world market volatility, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate between Pakistan and Chile is insignificant and will therefore have no effect on the returns of two stock markets.

5.12: Determinant of Stock Market Co-movement between Pakistan and Chile

Variable	**Coefficient**	**Std. Error**	**t - Statistic**	**Prob**
C	0.040398	0.121111	0.333560	0.7406
$Trade_{ijt}$	0.272730	0.365922	0.745322	0.4608
GDP	-0.026524	0.017027	-1.557787	0.1278
INF	-0.001618	0.006694	-0.241674	0.8104
INT	-0.012923	0.019339	-0.668254	0.5081
WLDVOL	0.000904	0.001662	0.543987	0.5897
XRCH	-0.501617	5.488613	-0.091392	0.9277
XRSD	30.55176	94.40424	0.323627	0.7480
R-squared	0.176575			
Prob(F-statistic)				0.458292

5.5.3. Pakistan and China

The determinants of stock market co-movement between Pakistan and China are absolute change in the bilateral exchange, Volatility in the bilateral exchange rate and the world market volatility.

Dornburch and Fisher (1980) describes the Flow Oriented Hypothesis of Exchange Rate determination that an exchange rate change will influence the bilateral trade conditions and will have an influence on the prices of stock markets of two countries. The greater the rate of change in the bilateral exchange rate, the greater will be the uncertainty in the economy as well as in the integration of stock markets. Consequently, absolute change in the bilateral exchange rate must show a negative relationship with the co-movements of stock markets. The coefficient estimate for the absolute change in the bilateral exchange rate between Pakistan and China is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that larger exchange rate changes will bring more benefit to the country with the depreciating currency. Therefore, the rate of change in the exchange rate must reveal a negative association with the stock market co-movement.

The coefficient estimate for the volatility in the bilateral exchange rate between Pakistan and China is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that volatility in the bilateral exchange rate is significant and negatively associated with stock market co-movement. In other words, volatility in the bilateral exchange rate is significant for explaining the correlation between the stock market of Pakistan and China.

Because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, resulting in higher correlation between the different pairs of stock markets. The coefficient estimate for the world market volatility between Pakistan and China is significant and positive. Such results are in line with the earlier research work of Bracker and Koch (1999). Putting it differently, world market volatility is positive and significant for explaining the correlation between two stock markets. The co-efficient estimate for the gdp growth rate, inflation rate and interest rate between Pakistan and China is insignificant and will therefore have no effect on the returns of the two stock markets.

The *R*-square (R^2) of 0.308546 indicates that 30.8546% of the variation in the correlation coefficients is explained by the variables under study, which is indication of a reasonably good fit.

5.13: Determinant of Stock Market Co-movement between Pakistan and China

Variable	Coefficient	Std. Error	t - Statistic	Prob
C	-0.176745	0.179518	-0.984553	0.3312
$Trade_{ijt}$	0.003142	0.002657	1.182732	0.2445
GDP	0.002294	0.025455	0.090109	0.9287
INF	-0.009665	0.007744	-1.247988	0.2199
INT	0.010347	0.017760	0.582580	0.5637
WLDVOL	0.003398	0.001352	2.513730	0.0164*
XRCH	-5.727469	2.689264	-2.129754	0.0399*
XRSD	-1.364820	0.453347	-3.010539	0.0047*
R-squared	0.308546			
Prob(F-statistic)				0.065220

5.5.4. Pakistan and Egypt

Because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, which leads to higher correlation between the different pairs of stock markets. The coefficient estimate for the world market volatility between Pakistan and Egypt is significant and positive. Such results are consistent with the previous research work like Bracker and Koch (1999). In other words, world market volatility is positive and significant for explaining the correlation between two stock markets. In addition to the world market volatility, the other determinant of stock market integration between Pakistan and Egypt is the volatility in the bilateral exchange rate. The coefficient estimate for the volatility in the bilateral exchange rate between Pakistan and Egypt is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that volatility in the bilateral exchange rate between two countries, is significant and negatively associated with stock market co-movement. In other words, volatility in the bilateral exchange rate is significant for explaining the correlation between the stock market of Pakistan and Egypt.

The coefficient estimate for the bilateral trade, gdp growth rate, inflation rate, interest rate, absolute change in the bilateral exchange rate is insignificant and will therefore have no effect on the returns of two stock markets. The *R*-square (R^2) of 0.336502 indicates that 33.6502% of the variation in the correlation coefficients is explained by the variables under study, which is indication of a reasonably good fit,

5.14: Determinant of Stock Market Co-movement between Pakistan and Egypt

Variable	Coefficient	Std. Error	t - Statistic	Prob
C	0.018770	0.114591	0.163797	0.8709
$Trade_{ijt}$	0.015490	0.059110	0.262056	0.7950
GDP	-0.012580	0.013390	-0.939545	0.3545
INF	-0.002271	0.011401	-0.199216	0.8434
INT	-0.011198	0.014261	-0.785207	0.4381
WLDVOL	0.004332	0.001837	2.358239	0.0246*
XRCH	3.251637	2.896156	1.122742	0.2699
XRSD	-0.987539	0.451478	-2.187348	0.0361*
R-squared	0.336502			
Prob(F-statistic)				0.002651

5.5.5. Pakistan and India

The coefficient estimate for the bilateral trade between Pakistan and India is significant and positive showing that bilateral trade is significant for explaining the correlation between Pakistan and India. As the existing literature supports this argument that extent of stock market co-movement is dependent upon the extent of bilateral trade. Putting it differently, the positive and significant coefficient estimates for bilateral trade between Pakistan and India leads to the co-movement between the stock markets of these countries. Such results are in line with the Bekaert and Harvey (1997), Bracker et al, (1999), Johnson & Soenen (2003), Pretorius (2002), Walti (2005) and Morgado and Tavares (2007) who reports that trade is significantly and positively associated with stock market co-movement. Putting it differently, bilateral trade is positive and significant for explaining the correlation between two stock markets. In addition to this, our results are in line with the Forbes and Chinn (2004), Lucey and Zhang (2010), Walti (2011) who report that extent of stock market co-movement is dependent upon the extent of strong bilateral trade relationships.

Interest rate influences stock market behavior through the cash flow model. The interest rate differential between the country pairs will be negatively correlated with the extent of the stock market co-movement. Higher the interest rate differential between the two countries, the lower will be the co-movement between the stock markets of these countries. The coefficient estimate for the interest rate differential between Pakistan and India is significant and negative. In the existing literature, the same has already been explained as that the convergence of stock market performance is dependent upon the

convergence of macroeconomic fundamentals. The results of this study are also in line with the Bracker and Koch (1999), Bracker et al. (1999), Lin & Cheng (2008) who reports that interest rate differential of two countries is significantly and negatively associated with the co-movement of stock markets. Putting it differently, interest rate is significant and negative for explaining the correlation between two stock markets.

Because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, which leads to higher correlation between the different pairs of stock markets. The coefficient estimate for the world market volatility between Pakistan and India is significant and positive. Such results are consistent with the previous research work like Bracker and Koch (1999). In other words, world market volatility is positive and significant for explaining the correlation between two stock markets.

The coefficient estimate for gdp growth rate, inflation rate, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate is insignificant and will have no influence on the prices and then returns of the stock markets of Pakistan and India. The *R*-square (R^2) of 0.223395 indicates that 22.3395 % of the variation in the correlation coefficients is explained by the variables under study and also indicate the presence of other variables affecting the correlation.

5.15: Determinant of Stock Market Co-movement between Pakistan and India

Variable	Coefficient	Std. Error	t – Statistic	Prob
C	-0.089452	0.110632	-0.808550	0.4239
$Trade_{ijt}$	0.134814	0.063515	2.122531	0.0405*
GDP	-0.026815	0.014422	-1.859346	0.0709
INF	-0.032073	0.019994	-1.604147	0.1172
INT	-0.024026	0.008738	-2.749478	0.0092*
WLDVOL	0.005034	0.002049	2.456679	0.0188*
XRCH	-2.136130	3.051335	-0.700064	0.4883
XRSD	3.526484	3.043310	1.158766	0.2540
R-squared	0.223395			
Prob(F-statistic)				0.259378

5.5.6. Pakistan and Indonesia

The coefficient estimate for the world market volatility between Pakistan and Indonesia is significant and positive. Such results are consistent with the previous research work like Bracker and Koch (1999). In other words, world market volatility is positive and significant for explaining the correlation between two stock markets. The *R*-square (R^2) of 0.248088 indicates that 24.8088 % of the variation in the correlation coefficients is explained by the variables under study and also indicate the presence of other variables affecting the correlation. The coefficient estimate for the bilateral trade, gdp growth rate, inflation rate, interest rate, absolute change in the bilateral exchange rate and volatility in

the bilateral exchange rate is insignificant and will have no influence on the prices and then returns of the stock markets of Pakistan and Indonesia.

5.16: Determinant of Stock Market Co-movement between Pakistan and Indonesia

Variable	**Coefficient**	**Std. Error**	**t – Statistic**	**Prob**
C	-0.077121	0.104754	-0.736206	0.4662
$Trade_{ijt}$	0.072533	0.106641	0.680156	0.5006
GDP	-0.008736	0.008332	-1.048458	0.3012
INF	-0.010047	0.006938	-1.448141	0.1560
INT	0.016589	0.010747	1.543597	0.1312
WLDVOL	0.004362	0.002021	2.158235	0.0375*
XRCH	-0.301059	2.902627	-0.103719	0.9180
XRSD	-406.1366	795.6396	-0.510453	0.6128
R-squared	0.248088			
Prob(F-statistic)				0.181744

5.5.7. Pakistan and Korea

According to the cash flow model, GDP growth rate influences the behavior of stock market. If the GDP growth rate of two different countries shows the similar trend over time, because of the similar monetary policy, then the influence of GDP growth rate on stock prices will lead towards the co-movement between the stock markets of country pairs. The convergence of gdp growth rate of two countries will influence their stock markets to move in the same direction. Put differently, the higher the GDP growth rate difference between the market pairs, the lower will be the co-movement between two stock markets. So, the GDP growth rate differential of two countries must be negatively correlated with the correlation of their stock markets. The coefficient estimate for the GDP growth rate differential between Pakistan and Korea is significant and negative showing that the lower GDP growth rate difference between Pakistan and Korea results the higher co-movement. Such results are in line with the results of earlier studies like Johnson and Soenen (2003), Mobarek et al (2016), who also reports that higher the GDP growth rate difference between the market pairs, the lower will be the co-movement between two stock markets.

World market volatility is the second important determinant of stock market co-movement between Pakistan and Korea. Because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, which leads to higher correlation between the different pairs of stock markets. The coefficient estimate for the world market volatility between Pakistan and Korea is significant and positive. Such results are consistent with the previous research work like

Bracker and Koch (1999). In other words, world market volatility is positive and significant for explaining the correlation between two stock markets.

In addition to the world market volatility, the other determinant of stock market integration between Pakistan and Korea is the volatility in the bilateral exchange rate. The coefficient estimate for the volatility in the bilateral exchange rate between Pakistan and Korea is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that volatility in the bilateral exchange rate between two countries, is significant and negatively associated with stock market co-movement. In other words, volatility in the bilateral exchange rate is significant and negative for explaining the co-movement between the two equity markets.

Absolute change in the bilateral exchange rate is another determinant of co-movement between Pakistan and Korea. According to the Flow Oriented Hypothesis, the greater the rate of change in the bilateral exchange rate, the greater will be the economic uncertainty as well as the integration of stock markets. Consequently, absolute change in the bilateral exchange rate must be negatively correlated with the co-movement of stock markets. The coefficient estimate for the absolute change in the bilateral exchange rate between Pakistan and Korea is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports larger change in the bilateral exchange rate leads the more benefit to the country with the depreciating currency by influencing the bilateral trade conditions and then have an influence on the returns of the two stock markets.

The coefficient estimate for the bilateral trade, inflation rate and interest rate is insignificant and will have no influence on the prices and then returns of the stock markets of Pakistan and Korea. The *R*-square (R^2) of 0.316047 indicates that 31.6047% of the variation in the correlation coefficients is explained by the variables under study, which is evidence of a reasonably good fit.

5.17: Determinant of Stock Market Co-movement between Pakistan and Korea

Variable	**Coefficient**	**Std. Error**	**t – Statistic**	**Prob**
C	-0.097592	0.127804	-0.763611	0.4499
$Trade_{ijt}$	0.163035	0.124034	1.314435	0.1968
GDP	-0.022043	0.010539	-2.091557	0.0434*
INF	1.90E-05	0.005468	0.003475	0.9972
INT	0.001876	0.012106	0.154945	0.8777
WLDVOL	0.005090	0.002338	2.177248	0.0359*
XRCH	-3.311329	0.973410	-3.401783	0.0016*
XRSD	-85.94737	29.59562	-2.904057	0.0062*
R-squared	0.316047			
Prob(F-statistic)				0.056576

5.5.8. Pakistan and Malaysia

The coefficient estimate for the volatility in the bilateral exchange rate between Pakistan and Malaysia is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that volatility in the bilateral exchange rate between two countries, is significant and negatively associated with stock market co-movement. In other words, volatility in the bilateral exchange rate is significant for explaining the correlation between the two stock markets. In addition to this, absolute change in the bilateral exchange rate between Pakistan and Malaysia is another determinant of stock market co-movement. The coefficient estimate for the absolute change in the bilateral exchange rate between Pakistan and Malaysia is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that larger change in the bilateral exchange rate leads the more benefit to the country with the depreciating currency by influencing the bilateral trade conditions and then have an influence on the stock prices of the two stock markets.

The coefficient estimate for the bilateral trade, gdp growth rate, inflation rate, interest rate, world market volatility is insignificant and will have no influence on the prices of the stock markets of Pakistan and Malaysia. The *R*-square (R^2) of 0.432111 point out that 43.2111% of the variation in the correlation coefficients is explained by the variables under study, which is indication of a reasonably good fit.

5.18: Determinants of Stock Market Co-movement between Pakistan and Malaysia

Variable	Coefficient	Std. Error	t - Statistic	Prob
C	0.007208	0.141252	0.051030	0.9597
$Trade_{ijt}$	-0.071366	0.205472	-0.347327	0.7315
GDP	-0.003214	0.031451	-0.102176	0.9195
INF	-0.012492	0.008870	-1.408340	0.1724
INT	0.015517	0.016872	0.919728	0.3673
WLDVOL	0.003702	0.002033	1.820594	0.0817
XRCH	-10.46708	1.913080	-5.471324	0.0000*
XRSD	-0.736123	0.154173	-4.774654	0.0001*
R-squared	0.432111			
Prob(F-statistic)				0.067906

5.5.9. Pakistan and Morocco

According to the cash flow model, higher the interest rate differential between the two countries, the lower will be the co-movement between their stock markets. In the existing literature, the same has already been explained as that the convergence of stock market performance is dependent upon the convergence of macroeconomic fundamentals. The coefficient estimate for the interest rate differential between Pakistan and Morocco is significant and negative. The results of this study are also in line with the Bracker and Koch (1999), Bracker et al. (1999), Lin & Cheng (2008) who reports that interest rate differential of two economies is significantly and negatively associated with the co-movement of stock markets. Putting it differently, interest rate is significant and negative for explaining the correlation between two stock markets.

The coefficient estimate for the bilateral trade, gdp growth rate, inflation rate, world market volatility, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate is insignificant and will have no influence on the prices of the stock markets of Pakistan and Morocco. The *R*-square (R^2) of 0.157541 point out that 15.7541% of the variation in the correlation coefficients is explained by the variables under study, showing the presence of other variables affecting the correlation between Pakistan and Morocco.

5.19: Determinants of Stock Market Co-movement between Pakistan and Morocco

Variable	Coefficient	Std. Error	t - Statistic	Prob
C	0.263127	0.122103	2.154960	0.0377
$Trade_{ijt}$	-0.419214	0.277728	-1.509442	0.1397
GDP	-0.026111	0.019654	-1.328512	0.1921
INF	0.007489	0.006797	1.101799	0.2777
INT	-0.031027	0.014187	-2.187042	0.0351*
WLDVOL	0.003567	0.002020	1.765537	0.0857
XRCH	-1.891489	1.828219	-1.034608	0.3076
XRSD	0.094025	0.402957	0.233338	0.8168
R-squared	0.157541			
Prob(F-statistic)				0.554086

5.5.10. Pakistan and Poland

The coefficient estimate for the bilateral trade, gdp growth rate, inflation rate, interest rate, world market volatility, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate is insignificant and will have no influence on the prices of the stock markets of Pakistan and Poland.

5.20: Determinants of Stock Market Co-movement between Pakistan and Poland

Variable	**Coefficient**	**Std. Error**	**t - Statistic**	**Prob**
C	0.071087	0.157607	0.451043	0.6546
$Trade_{ijt}$	-0.189595	0.350626	-0.540734	0.5919
GDP	-0.002149	0.019266	-0.111524	0.9118
INF	-0.004032	0.005874	-0.686514	0.4967
INT	-0.003403	0.013122	-0.259367	0.7968
WLDVOL	0.002047	0.001907	1.073126	0.2902
XRCH	-0.849917	3.107715	-0.273486	0.7860
XRSD	-0.561531	1.262070	-0.444928	0.6590
R-squared	0.093486			
Prob(F-statistic)				0.864499

5.5.11. Pakistan and Thailand

According to the cash flow model, GDP growth rate influences the behavior of stock market. If the GDP growth rate of two different countries shows the similar trend over time, because of the similar monetary policy, then the influence of GDP growth rate on stock prices will lead towards the co-movement between the stock markets of country pairs. The convergence of gdp growth rate of two countries will influence their stock markets to move in the same direction. Put differently, the higher the GDP growth rate difference between the market pairs, the lower will be the co-movement between two stock markets. So, the GDP growth rate differential of two countries must be negatively correlated with the correlation of their stock markets. The coefficient estimate for the GDP growth rate differential between Pakistan and Thailand is significant and negative showing that the lower GDP growth rate difference between Pakistan and Thailand results the co-movement. Such results are in line with the results of earlier studies like Johnson and Soenen (2003), Mobarek et al (2016), who also reports that GDP growth rate differential of two economies is significantly and negatively associated with stock market co-movement.

The second important determinant of stock market co-movement between Pakistan and Thailand is world market volatility. The coefficient estimate for the world market volatility between Pakistan and Thailand is significant and positive. Such results are consistent with the previous research work like Bracker and Koch (1999). In other words, world market volatility is positive and significant for explaining the correlation between two stock markets.

The coefficient estimate for the bilateral trade, inflation rate, interest rate, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate is insignificant and will have no effect on the prices of the stock markets of Pakistan and Thailand.

The *R*-square (R^2) of 0.405877 indicates that 40.5877% of the variation in the correlation coefficients is explained by the variables under study, which is evidence of a reasonably good fit.

5.21: Determinant of Stock Market Co-movement between Pakistan and Thailand

Variable	**Coefficient**	**Std. Error**	**t – Statistic**	**Prob**
C	0.146891	0.111780	1.314110	0.1969
$Trade_{ijt}$	0.088596	0.149834	0.591297	0.5579
GDP	-0.026076	0.006875	-3.793001	0.0005*
INF	-0.008965	0.006171	-1.452786	0.1547
INT	-0.017298	0.010622	-1.628564	0.1119
WLDVOL	0.004740	0.001523	3.111910	0.0036*
XRCH	-0.629798	1.174514	-0.536220	0.5950
XRSD	0.403772	1.087467	0.371296	0.7125
R-squared	0.405877			
Prob(F-statistic)				0.007910

5.5.12. Pakistan and Turkey

Absolute change in the bilateral exchange rate is determinant of stock market co-movement between Pakistan and Turkey. According to the Flow Oriented Hypothesis, the greater the rate of change in the bilateral exchange rate, the greater will be the economic uncertainty as well as the integration of stock markets. Consequently, absolute change in the bilateral exchange rate must be negatively correlated with the co-movement of stock markets. The coefficient estimate for the absolute change in the bilateral exchange rate between Pakistan and Turkey is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that absolute change in the bilateral exchange rate is significant and negatively associated with stock market co-movement.

The coefficient estimate for the bilateral trade, gdp growth rate, inflation rate, interest rate, world market volatility and volatility in the bilateral exchange rate is insignificant and will have no influence on the prices of the two stock markets. The *R*-square (R^2) of 0.324484 indicates that 32.4484% of the variation in the correlation coefficients is explained by the variables under study, which is indication of a reasonably good fit.

5.22: Determinant of Stock Market Co-movement between Pakistan and Turkey

Variable	Coefficient	Std. Error	t - Statistic	Prob
C	0.040362	0.086378	0.467272	0.6430
$Trade_{ijt}$	-0.103918	0.064427	-1.612951	0.1153
GDP	0.002710	0.009860	0.274814	0.7850
INF	-0.005046	0.002812	-1.794510	0.0809
INT	0.004404	0.003674	1.198848	0.2382
WLDVOL	0.000947	0.001058	0.895196	0.3765
XRCH	-2.632748	0.947177	-2.779573	0.0085*
XRSD	-0.055312	0.051618	-1.071561	0.2909
R-squared	0.324484			
Prob(F-statistic)				0.048021

5.6. Countrywise Diagnostic Test

Since all the variables in the regression are stationary, the assumptions of classic regression analysis are fulfilled. Consequently, standard diagnostic tests can be used to evaluate this function statistically. Table 5.24 summarizes the results of the diagnostic tests performed on the residuals. These diagnostic tests proved that the error terms are normally distributed and not autocorrelated.

Table 5.23: Countrywise Diagnostic Test

PAKISTAN – BRAZIL			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	0.805001	Residuals normally distributed
Serial Correlation	Durbin Watson	2.04	No serial correlation
PAKISTAN – CHILE			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	1.831043	Residuals normally distributed
Serial Correlation	Durbin Watson	1.957411	No serial correlation
PAKISTAN – CHINA			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	0.588278	Residuals normally distributed
Serial Correlation	Durbin Watson	1.645856	No serial correlation
PAKISTAN – EGYPT			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	1.174507	Residuals normally distributed
Serial Correlation	Durbin Watson	2.236190	No serial correlation
PAKISTAN – INDIA			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	2.986776	Residuals normally distributed
Serial Correlation	Durbin Watson	2.215218	No serial correlation
PAKISTAN – INDONESIA			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	1.034438	Residuals normally distributed
Serial Correlation	Durbin Watson	2.143423	No serial correlation

PAKISTAN – KOREA			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	0.048203	Residuals normally distributed
Serial Correlation	Durbin Watson	2.122652	No serial correlation
PAKISTAN – MALAYSIA			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	3.068587	Residuals normally distributed
Serial Correlation	Durbin Watson	1.812189	No serial correlation
PAKISTAN – MOROCCO			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	1.396000	Residuals normally distributed
Serial Correlation	Durbin Watson	1.664006	No serial correlation
PAKISTAN – POLAND			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	0.650620	Residuals normally distributed
Serial Correlation	Durbin Watson	1.962889	No serial correlation
PAKISTAN – THAILAND			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	2.047743	Residuals normally distributed
Serial Correlation	Durbin Watson	1.995828	No serial correlation
PAKISTAN – TURKEY			
Test Performed for	**Test**	**Test Statistic**	**Conclusion**
Normality	Jarque Bera	0.358417	Residuals normally distributed
Serial Correlation	Durbin Watson	2.757482	No serial correlation

5.7. Determinants of Stock Market Co-movement Before, During and After Crisis

If the determinant remains stable during all three time periods, such determinant will be called as the Crisis Non-Contingent Variable indicating that how shocks are transmitted from one emerging market to the other emerging market both during tranquil periods and crisis and indicate that greater integration through these mechanisms increase correlations. If the relation between the stock market correlation and the specific variable is significant before the crisis but during the crisis such relation becomes insignificant indicating that it is no longer a transmission mechanism during the crisis. If during the crisis and after the crisis, the determinants vary, then such determinants will be called as the Crisis contingent variables.

To check the commonality of the determinants of stock market co-movement, data is further divided into three different panels: Panel A for before crisis (2004 Q_1 – 2007 Q_3), Panel B for during crisis (2007 Q_4 – 2009 Q_4) and Panel C for after the crisis **(**2010 Q1 – 2014 Q_4). Afterwards, driving forces of stock market co-movement between Pakistan and emerging economies are determined by applying the same equation 4.8 model. We have used separate panels for the time period instead of using dummies. The equation 4.8 is:

$$Cor_{ij} = \beta_0 + \beta_1|Int_i - Int_j|_t + \beta_2|Inf_i - Inf_j|_t + \beta_3 | Gdp_i - Gdp_j |_t + \beta_4 TRADE_{ijt} + \beta_5|XRCH_{ij}|_t + \beta_6 XRSD_{ijt} + \beta_7 WMV_t + + \varepsilon_{ijt}$$

5.7.1 Determinants of Stock Market Co-movement between Pakistan and Emerging Markets before Crisis (2004 Q_1 – 2007 Q_3)

Table 5.24 reports the results for the determinants of stock market correlations for emerging markets before crisis period. The coefficient estimate for the world market volatility is significant and positive before the crisis period. The coefficient estimate for the bilateral trade, gdp growth rate, inflation rate, interest rate, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate is insignificant and will have no influence on the prices of the stock markets of Pakistan and emerging economies.

Table 5.24: Determinants of Stock Market Co-movement between Pakistan and Emerging Stock Markets before crisis

Variable	Coefficient	Std. Error	t – Statistic	Prob
C	-0.059467	0.069413	-0.856723	0.3927
$Trade_{ijt}$	-0.000525	0.001191	-0.440453	0.6601
GDP	-0.004787	0.007948	-0.602319	0.5477
INF	0.003132	0.004898	0.639419	0.5233
INT	-0.001600	0.004224	-0.378871	0.7052
WLDVOL	0.004685	0.001697	2.760306	0.0064*
XRCH	-0.510707	0.849779	-0.600988	0.5486
XRSD	0.072571	0.045555	1.593025	0.1129
R-squared	0.157014			
Prob(F-statistic)				0.000043

5.7.2. Determinants of Stock Market Co-movement between Pakistan and Emerging Stock Markets during Crisis (2007 Q_4 – 2009 Q_4)

Table 5.25 reports the results for the determinants of stock market correlations for emerging markets during crisis period. We begin with economic variables. The coefficient estimates for the bilateral trade, gdp growth rate, inflation rate, interest rate, world market volatility, absolute change in the bilateral exchange rate and volatility in the bilateral exchange rate are insignificant and will have no influence on the prices of the stock markets of Pakistan and emerging economies.

Table 5.25: Determinants of Stock Market Co-movement between Pakistan and Emerging Stock Markets during Crisis

Variable	Coefficient	Std. Error	t – Statistic	Prob
C	0.148709	0.069763	2.131635	0.0355
$Trade_{ijt}$	0.001355	0.000934	1.449968	0.1502
GDP	0.006003	0.009324	0.643863	0.5211
INF	-0.000850	0.001563	-0.543923	0.5877
INT	0.000282	0.004636	0.060742	0.9517
WLDVOL	-0.001894	0.001373	-1.378912	0.1710
XRCH	-0.373714	0.282252	-1.324043	0.1885
XRSD	0.000794	0.015740	0.050464	0.9599
R-squared	0.105516			
Prob(F-statistic)				0.121127

5.7.3. Determinants of Stock Market Co-movement between Pakistan and Emerging Stock Markets after Crisis (2010 Q_1 – 2014 Q_4)

Table 5.26 reports the results for the determinants of stock market correlations for emerging markets after crisis period. We begin with economic variables. The co-efficient estimate for the gdp growth rate differential is negative and significant after the crisis period. The coefficient estimate for the world market volatility is positive and significant after the crisis period. The coefficient estimate for the volatility in the bilateral exchange rate is significant and negative after the crisis period.

Table 5.26: Determinants of Stock Market Co-movement between Pakistan and Emerging Stock Markets after crisis

Variable	Coefficient	Std. Error	t – Statistic	Prob
C	-0.043625	0.041578	-1.049229	0.2952
$Trade_{ijt}$	-0.000436	0.000515	-0.847753	0.3974
GDP	-0.015502	0.006990	-2.217777	0.0275*
INF	-0.006370	0.003897	-1.634508	0.1035
INT	0.008788	0.004849	1.812192	0.0712
WLDVOL	0.004052	0.000856	4.731477	0.0000*
XRCH	0.760865	0.495595	1.535255	0.1261
XRSD	-0.065158	0.026952	-2.417561	0.0164*
R-squared	0.166855			
Prob(F-statistic)				0.000000

The coefficient estimate for the world market volatility is significant and positive before and after the crisis indicating that world market volatility is associated with the stock market co-movements of emerging economies before the crisis as well as after the crisis.

CHAPTER 6

CONCLUSION

This study empirically examines the co movement of Pakistan's stock market with eighteen selected emerging stock markets of Argentina, Brazil, Chile, China, Czech, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Morocco, Philippines, Peru, Poland, Thailand and Turkey. The general findings for the Johansen and Juselius cointegration tests provide supportive evidence of no co-movement between the stock market of Pakistan and the markets of Argentina, Czech, Hungary, Philippine and Peru. Such results show that there are chances for the investors of Argentina, Czech, Hungary, Philippine and Peru to get the benefits of diversification strategies in the stock market of Pakistan. In addition to this, the Pakistani investors can also reduce the risk in these stock markets by adopting the strategy of portfolio diversification. The results of this study are consistent with the results of Husain and Saidi (2000) who do not find the evidence of co-movement between the stock market of Pakistan with other stock markets. Worthington et al (2003) also reported evidence of no long term integration among the stock markets of the world. The reason of no co-movement between Pakistan and these emerging stock markets is that financial securities have no similarity in the return patterns. Another reason of no co-movement between these countries may be the absence of those factors that accelerate the process of integration between international stock markets.

On the other hand, the general findings for the Johansen and Juselius cointegration tests provide supportive evidence that there is long term integration between the stock market of Pakistan and the stock markets of Brazil, Chile, China, Egypt, India, Indonesia, Israel,

Korea, Malaysia, Morocco, Poland, Thailand and Turkey. Such results show that Pakistani investors cannot reduce the risk while investing in Brazil, Chile, China, Egypt, India, Indonesia, Israel, Korea, Malaysia, Morocco, Poland, Thailand and Turkey. In the same manner, the investors from these countries cannot obtain the benefits of portfolio diversification with their investments in the stock market of Pakistan.

As discussed earlier, it is very important for an investor to know the structure of the stock markets integration before diversifying his international portfolio among these markets and diversify his stocks among international markets that do not copy or follow each other's daily movements. As pointed out by the researchers, if an investor wants to be able to obtain the benefit of an international diversification strategy, the basic condition is developing the portfolios with the assets from segmented stock markets. Therefore, an investor from Pakistan, who wants to diversify his portfolios with the stocks of the emerging countries stock markets, can get the valuable insights by investigating the integration of international stock markets. Furthermore, it needs to be considered on priority basis by Pakistani portfolio managers and investors to know about the different mechanisms by which co-movements spread among the country pairs so they can make appropriate investment decisions.

Another practical implication is that if policy makers in Pakistan want to enhance the international integration of equity markets, they should focus on eliminating the fundamental causes of the obstacles to cross-border settlement. Furthermore, policy makers in Pakistan also need to know about the mechanisms for the co-movements and

their changes for appropriate policy decisions; otherwise, if they do not take these differences into account, they might do worse rather than better.

In order to meet the objective of the research work, this study investigates the determinants of stock market co-movement between Pakistan and other emerging stock markets, where cointegration is found. Different academicians like Von Hagen and Ho (2007) highlight that if two markets are integrated, any systematic shock can contaminate from one financial system to another. Therefore, it is crucial for Pakistani policymakers to understand the extent and the dynamics of the stock market integrations "to remain vigilant and undertake pre-emptive measures to prevent the systematic shocks".

Results of the panel data reveal that there are four significant underlying forces of integration between Pakistan and emerging stock markets. First is the GDP growth rate differential. The coefficient estimate for the GDP growth rate differential is significant and negative indicating the higher the GDP growth rate difference between the country pairs, the lower will be the co-movement between two stock markets. Such results are in line with the results of earlier studies like Johnson and Soenen (2003), Mobarek et al (2016), who also reports that GDP growth rate differential of country pairs is significantly and negatively associated with stock market co-movement.

Second is the inflation rate differential. The coefficient estimate for the inflation rate differential is negative and significant indicating that lower the inflation rate differential between the two emerging markets, the higher will be the co-movement between these

market pairs. Such results are in line with the results of earlier studies like Mobarek et al (2016), who also report that inflation rate differential of two economies is significantly and negatively associated with stock market co-movement.

Third determinant of stock market co-movement is the world market volatility. The coefficient estimate for the world market volatility between Pakistan and emerging stock markets is significant and positive indicating that because of the increase in the variance of the world equity index, global investors in order to compensate this risk may demand higher return, which leads to higher correlation between the different pairs of stock markets. Such results are in line with the earlier research work of Bracker and Koch (1999). Putting it differently, world market volatility is positive and significant for explaining the co-movement between Pakistan and emerging stock markets. Fourth determinant is the quarter effect. Results reveal that quarter 4 is negatively associated with the correlation co-efficient.

This study reports the driving forces of co-movement between Pakistan and each emerging market where the co-integration is found for the full time period. The only determinant of stock market co-movement between Pakistan and Brazil is bilateral trade. The coefficient estimate for the bilateral trade is significant and positive indicating that the extent of stock market co-movement between Pakistan and Brazil is dependent upon the extent of bilateral trade intensity. As bilateral trade is the strong fundamental determinant of stock market integration, therefore Pakistani policy makers need to focus on the intensity of bilateral trade in case of any devastating meltdown in Brazil. Such

results are in line with the Bekaert and Harvey (1997), Bracker et al, (1999), Johnson & Soenen (2003), Pretorius (2002), Forbes and Chinn (2004), Walti (2005), Morgado & Tavares (2007), Lucey and Zhang (2010) and Walti (2011) who reports that trade is significantly and positively associated with stock market co-movement.

The determinants of stock market co-movement between Pakistan and China are volatility in the bilateral exchange rate, absolute change in the bilateral exchange rate and the world market volatility. The coefficient estimate for the volatility in the bilateral exchange rate is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that higher volatility in the bilateral exchange rate leads the uncertainty in the economy as well as in the integration of the stock markets. The co-efficient estimate for the absolute change in the bilateral exchange rate is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports larger change in the bilateral exchange rate leads the more benefit to the country with the depreciating currency by influencing the bilateral trade conditions and therefore have an influence on the returns of the two stock markets. The coefficient estimate for the world market volatility between Pakistan and China is significant and positive. Such results are in line with the earlier research work of Bracker and Koch (1999), indicating that world market volatility is positive and significant for explaining the correlation between stock markets of Pakistan and China. As the major driving forces of stock market co-movement between Pakistan and China are the volatility in the bilateral exchange rate and absolute change in the bilateral exchange rate, the policy makers in Pakistan need to focus on the movement of bilateral exchange rate

between Pakistan and China. The Pakistani policy makers critically need to focus on the double edge sword effect of exchange rate.

The coefficient estimate for the world market volatility between Pakistan and Egypt is significant and positive. Such results are consistent with the previous research work like Bracker and Koch (1999). The other determinant of stock market integration between Pakistan and Egypt is the volatility in the bilateral exchange rate. The coefficient estimate for the volatility in the bilateral exchange rate between Pakistan and Egypt is significant and negative. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that volatility in the bilateral exchange rate between two countries, is significant and negatively associated with stock market co-movement. As the major driving forces of stock market co-movement between Pakistan and Egypt is the volatility in the bilateral exchange rate, the policy makers in Pakistan need to focus on the movement of bilateral exchange rate between Pakistan and Egypt. The Pakistani policy makers critically need to focus on the double edge sword effect of exchange rate.

The driving forces of stock market integration between Pakistan and India are bilateral trade and the interest rate. The co-efficient estimate for the bilateral trade is positive and significant. Such results are in line with the Johnson & Soenen (2003), Pretorius (2002), Walti (2005) and Morgado & Tavares (2007) who reports that trade is significantly and positively associated with stock market co-movement. The coefficient estimate for the interest rate differential between Pakistan and India is significant and negative indicating that the convergence of stock market performance is dependent upon the convergence of macroeconomic fundamentals. The results of this study are also in line with the Bracker

and Koch (1999), Bracker et al. (1999), Lin & Cheng (2008) who reports that interest rate differential of two countries is significantly and negatively associated with the co-movement of stock markets.

The determinant of stock market co-movement between Pakistan and Indonesia is the world market volatility as the coefficient estimate is significant and positive. Such results are consistent with the previous research work like Bracker and Koch (1999), who report that world market volatility is positive and significant for explaining the correlation between two stock markets.

The determinants of stock market co-movement between Pakistan and Korea are gdp growth rate, world market volatility, volatility in the bilateral exchange rate and absolute change in the bilateral exchange rate. The coefficient estimate for the GDP growth rate differential between Pakistan and Korea is significant and negative indicating that the lower GDP growth rate difference between Pakistan and Korea results the higher co-movement. The coefficient estimate for the world market volatility between Pakistan and Korea is significant and positive. Such results are in line with the earlier research work of Bracker and Koch (1999), who report that because of the increase in the variance of the world equity index, investors in order to compensate this risk may demand higher return, resulting in higher correlation between the different pairs of stock markets. The third determinant of stock market integration is the volatility in the bilateral exchange rate. The coefficient estimate for the volatility in the bilateral exchange rate between Pakistan and Korea is significant and negative indicating that larger volatility in the bilateral exchange

rate results the lower co-movement. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008) who report that volatility in the bilateral exchange rate between Pakistan and Korea is significant and negatively associated with stock market co-movement. In other words, volatility in the bilateral exchange rate is significant for explaining the correlation between the stock market of Pakistan and Korea. The last variable is absolute change in the bilateral exchange rate showing the negative and significant co-efficient. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports larger change in the bilateral exchange rate leads the more benefit to the country with the depreciating currency by influencing the bilateral trade conditions and therefore have an influence on the returns of the two stock markets.

The determinants of stock market co-movement between Pakistan and Malaysia are volatility in the bilateral exchange rate and absolute change in the bilateral exchange rate. The volatility in the bilateral exchange rate between Pakistan and Malaysia is significant and negatively associated with stock market co-movement. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008) who report that volatility in the bilateral exchange rate between Pakistan and Malaysia is significant and negatively associated with stock market co-movement. In other words, volatility in the bilateral exchange rate is significant for explaining the correlation between the stock market of Pakistan and Malaysia. Another determinant is absolute change in the bilateral exchange rate. The coefficient estimate for the absolute change in the bilateral exchange rate between Pakistan and Malaysia is significant and negative indicating that larger change in the bilateral exchange rate leads the more benefit to the country with the depreciating

currency by influencing the bilateral trade conditions and therefore have an influence on the returns of the two stock markets. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008).

The determinant of stock market co-movement between Pakistan and Morocco is the interest rate differential indicating a significant and negative association with stock market co-movement. The results of this study are also in line with the Bracker and Koch (1999), Bracker et al. (1999), Lin & Cheng (2008) who report that interest rate is significant and negative for explaining the correlation between two stock markets.

The determinants of stock market co-movement between Pakistan and Thailand are GDP growth rate differential and world market volatility. The GDP growth rate differential between two countries is significantly and negatively associated with stock market co-movement. Such results are in line with the results of earlier studies like Johnson and Soenen (2003), Mobarek et al (2016), who also report that GDP growth rate differential between two countries is significantly and negatively associated with stock market co-movement. The second important determinant of stock market co-movement between Pakistan and Thailand is world market volatility indicating that world market volatility is positive and significant for explaining the correlation between two stock markets. Such results are consistent with the previous research work like Bracker and Koch (1999).

The determinant of stock market co-movement between Pakistan and Turkey is the absolute change in the bilateral exchange rate. The coefficient estimate for the absolute

change in the bilateral exchange rate between Pakistan and Turkey is significant and negatively associated with stock market co-movement. Such results are in line with Bracker et al, (1999), Lin and Cheng (2008), who reports that absolute change in the bilateral exchange rate between two countries, is significant and negatively associated with stock market co-movement.

This study also reports the determinants of stock market co-movement between Pakistan and emerging markets before, during and after crisis period. The determinant of stock market co-movement between Pakistan and emerging markets before crisis is world market volatility. The coefficient estimate for the world market volatility is positive and significant before the crisis period. It is pertinent to mention that the coefficient estimates of all the variables are insignificant and will therefore have no influence on the returns of the stock markets during the crisis period.

After the crisis, the determinants of stock market co-movement between Pakistan and emerging markets are gdp growth rate differential, world market volatility and volatility in the bilateral exchange rate. The coefficient estimates of all the said determinants except world market volatility are negative and significant after the crisis period. The coefficient estimate for the world market volatility is positive and significant after the crisis period. It is pertinent to mention that the coefficient estimate for the world market volatility is significant and positive before and after the crisis periods.

6.1. Practical implications

1. Portfolio investors or speculators should diversify and pursue arbitrage opportunities. It needs to be considered on priority basis by portfolio managers and investors to know about the different mechanisms by which co-movements spread among the country pairs so they can make appropriate investment decisions.
2. Policy makers also need to know about the mechanisms for the co-movements and their changes for appropriate policy decisions; otherwise, if they do not take these differences into account, they may do worse rather than better.
3. The authors conclude that if policy makers want to enhance the international integration of equity markets, they should focus on eliminating the fundamental causes of the obstacles to cross-border settlement.
4. It is very important to understand the causes of the cross-country differences in stock returns.
5. Policy makers in Pakistan should improve their fundamentals to ensure financial stability. By investigating the dynamics of the international stock market integration gives an important insight to policymakers while designing the strategies to sustain the stability of the country's economy against global shocks. For example, by studying case of Asian financial crisis (1997-1998), Von Hagen and Ho (2007) emphasize that any systematic shock (e.g., financial crisis) can contaminate from one economic system to another, if two markets are integrated. Therefore, it is very important for policy makers to develop the proper understanding of the extent of the stock market integrations as well as the strength

of the stock market integrations “to remain vigilant and undertake pre-emptive measures to prevent the systematic shocks” (Kassim, 2010).

6.2. Areas of Further Research

1. The relationship between cultural distance and stock market co-movement needs to be addressed in a very detail manner, as there is the ambiguity in the findings.
2. The fundamental approach explains the economic interdependence and financial interdependence of markets where co-movements occur. Behavioral approach responds to behavior of investors that is completely changed in times of crisis and stability. There are very few studies to address the change in the behavior of investors in the period of crisis. Do the co-movements between different equity markets change during a crisis? There is the need for the researchers to cover this domain in the future.
3. There is the need to study why transmission mechanism after a crisis is significantly different from those before the crisis.
4. When there is a crisis in one country, for example the United States, does it serve as a wake-up call to investors in other markets to reassess the fundamentals? Are the stability and commonality of the determinants of the co-movements during crisis and non-crisis periods especially important? This domain needs to be addressed in the near future.

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Appendix

Appendix 1

List of Emerging Markets by Morgan Stanley Capital International (MSCI)

Region 1 (Americas)	**Region 2 (Africa, Europe and Middle East)**	**Region 3 (Asia)**
Argentina	The Czech Republic	China
Brazil	Egypt	India
Chile	Hungary	Indonesia
Colombia	Morocco	Korea
Mexico	Poland	Malaysia
Peru	Russia	Philippines
	South Africa	Taiwan
	Turkey	Thailand
		Pakistan

Appendix 2

List of Emerging Markets by FTSE Emerging Index

Advanced Emerging Economies		**Secondary Emerging Market Economies**			
S. No	**Country**	**S. No**	**Country**	**S. No**	**Country**
1	Brazil	1	Argentina	9	Malaysia
2	Hungary	2	Chile	10	Morocco
3	Mexico	3	China	11	Pakistan
4	Poland	4	Colombia	12	Peru
5	South Africa	5	the Czech Republic	13	the Philippines
6	Taiwan	6	Egypt	14	Russia
		7	India	15	Thailand
		8	Indonesia	16	Turkey