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Tracing dynamic linkages and spillover effect between Pakistani and leading foreign stock markets

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ABSTRACT

This study traces the degree of integration and volatility spillover effect between the Pakistani and leading foreign stock markets by analyzing the Meteor shower hypothesis. Daily data are used from nine worldly equity markets (KSE 100, NIKKEI 225, HIS, S&P 500, NASDAQ 100, DOW JONES, GADXI, FTSE 350 and DFMGI) for the period of 2005 to 2014. First, we used the whole data set and after that we split data set into two subsets, First subset of data contains the era of global financial crisis of 2008 from 2005 to 2009 and Second subset is after global financial crisis time period from 2010 to 2014 (The global crisis prevailed till end of 2009). By following the Hamao et al. (1990) technique the univariate GARCH type models are employed to explore the dynamic linkages between Pakistani and leading foreign stock markets. The results from whole data set illustrate that there is mixed co-movements between leading foreign stock markets and Pakistani stock market. The results from both subsets provide an evidence that there is a unidirectional mean and volatility spillover effect from S&P 500, NASDAQ 100, DJI and DFMGI to KSE 100. Also we found bidirectional spillover effect between DFMGI and KSE 100 from both subsets of data. We concluded that there is only one indirect linkage through which may the information transmitted to KSE 100. This linkage is developed due to the co-movement among KSE 100, DFMGI and NASDAQ 100 in crisis period. This integration between these markets may provide a sign of indirect linkage. It also exhibits the volatility in Pakistan stock market returns is instigated through direct effects as well as indirect effects. Our study brings important conclusions for financial institutions, portfolio managers, market players and academician to diagnose the nature and level of linkages between the financial markets.

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1. Introduction

Modern econometric tools are used for investigating volatility co-movement between the financial markets. The global financial integration started in the mid-1980s, consequently risk and return Co-movements between the financial markets were observed at that time. The growing economic integration of intercontinental financial markets has gotten significance since last three decades. The major factors behind this observed globalization are extensive growth of technology, easy capital flow and financial links between the economies. That is why the analysis of the nature and level of linkages between different financial markets is significant for financial institutes, portfolio managers and market players. Engle, Ito, and Lin (1990) proposed the meteor shower hypothesis to trace out intra-market co-movements. The global financial crisis of 2008 was one of the worst financial crises of US history. It not only triggered imbalances in US economy but also impacted a major part of overall global economy. Most of the global financial crises initiated from US economy and due to the strong

interdependence of US economy with other economies these crises impacted all integrated economies at some extent. The key reasons identified by the academic researchers behind this crisis were excessively relaxed monetary policy, regulatory failures in macro prudential and micro prudential levels, the accumulation of global balance of payment inequalities and flaws in the international financial planning (Kawai, Lamberte, & Park, 2012).

Owing to investment linkages with US economy the effect of financial crisis transmitted into Pakistan (Amjad & Din, 2010) and Dubai economy (Onour, 2010). Likewise, Dubai financial market had also impressively impacted Dubai's economic growth. The portfolio investment in Dubai financial market reduced 24% in 2009. When financial crisis effect transmitted into Pakistan economy, the economy was facing some internal issues like political instability, bad governance, deficit in current account, rising unemployment, energy crisis and failure of macro-economic policies. Pakistan and Dubai both countries have significant relationship in different sectors of economy. Dubai is one of the emerging markets of UAE. Over 1.2 million emigrants of Pakistan are providing their services in UAE. Their remittances significantly contribute to Pakistan's foreign reserve. UAE is the second prominent source of remittances from Pakistani emigrants. Pakistan expatriates provided \$2.52

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billion remittances in 2013–14 with share in total remittances of 19.57%. Similarly, UAE has major share in Pakistan exports and imports. In 2013–14 UAE has 8% share of total Pakistan's exports and 17% share in imports. At the occasion of UAE cityscape "7th annual property and real estate exhibition" 2008 in Dubai more than 100 Pakistani investors invested over \$100 million for the booking of construction project. There were a large number of Pakistani investors out of 40,000 visitors all over the world took part in this exhibition and booked their investment in the construction companies' offices. Within preceding 10 to 11 months after November 3, 2007 when the emergency statements varies, outflow of capital from Pakistan economy, frequently to Dubai, estimated \$30 billion to around \$45 billion.

The objective of this study is to investigate the direct and indirect linkages between Pakistani and leading foreign stock markets in general and particularly during the global financial crisis of 2007–08. To see the dynamic linkages among the leading markets of world in crisis and after crisis period we choose data from 2005 to 2014. The leading stock markets are selected from different regions of the world, those who have some linkages with international financial system and US stock markets. In this study we analyze direct linkages between Pakistani and leading foreign stock markets by using whole data set. We also explore the indirect linkages between Pakistani and US stock markets through Dubai financial market by using whole and both subsets of data. All these findings help us making more effective short run and long-run policies to tackle the effect of such global crises in favor of sustainable economic growth.

2. Literature review

The strong integration of global economies through different financial or real links, crisis in one part of the world is much likely to transmit to other parts. In 2007 when global markets experienced a huge wave of financial crisis due to United State sub-prime mortgage crisis. It not only impacted domestic economy of USA but also other economies of the world which are integrated directly or indirectly with US economy. Global financial crisis is one of the major factors which have shifted concentration on the dynamic linkages between the financial markets. Owing to the dynamic linkages the information transmission is also existed between financial markets. The information transmission mechanisms were quantified through returns and volatilities (Padhi & Lagesh, 2012). Angkinand, Barth, and Kim (2009) investigated that how the financial crisis in US markets impacted 17 developed economies from 1973 to 2009, and they found that spillover effects from the US to other industrial countries were highest after the appearance of the U.S subprime mortgage market collapse in the summer of 2007. Chelley-Steely (2005) explained the links of United State stock market with UK and European stock markets. The results showed strong bilateral relationship between US and UK stock markets while relationship of US market with other European economies also exists but not with the same potential as with UK. The business cycle movements in the United Kingdom economy are more sensitive to disturbances in US relative to other European economies. Alsukker (2010) explored that US mortgage crisis 2008 impacted Dubai financial market, banking system, GDP and Dubai's companies credit ratings. Initially Dubai's economy tolerated the effect of global financial crisis but on 25 Nov, 2009 Dubai demanding suspension on debt repayment from world. Gomez and Ahmad (2014) examined that the neighbor country of Dubai, Abu Dhabi presenting a loan of \$10 billion for the management of its debt. At that time Dubai's amount of debt was roughly \$59 billion and the overall global debt was 10 times more than that of Dubai's debt. Onour (2010) investigated that spillover effect of US Mortgage crisis 2008, badly impacted oil producing countries including Dubai. The portfolio investment in Dubai financial market decreased 42%, due to this spillover effect Dubai also faced internal debt crisis in 2009. Amjad and Din (2010) when the global financial crisis 2008 effect came into Pakistan, Pakistan economy was also facing an entire financial crisis at

that time since 2006 due to some internal economic reasons. Draz (2011) examined that Pakistan economy faced five financial crises (1958, 1974, 1979, 1997 and 2008) out of four significantly affected Pakistan economy besides that internal factors also impacted the Pakistan economy badly. Also explored that Pakistan economy was effected form global financial crisis 2008. For further studies see Ali and Afzal (2012), Zia-ur-Rehman, Shah, and Mushtaq (2011), Attari and Safdar (2013), Tahir, Sabir, Ali, Ali, and Ismail (2013), these studies empirically explored direct linkages through which global financial crisis impacted Pakistani stock markets. Mukherjee and Mishra (2008) explored that volatility spillover effect and linkages between India and other twelve emerging Asian and developed countries markets. Jeyanthi (2010), Sinha and Sinha (2010) investigated the relationships and volatility spillover effect among India, UK, Japan and USA stock markets and by incorporating the structural change they Concluded that there is volatility spillover from Japan and USA stock market's to Indian stock markets. Sok-Gee and Karim (2010) examined that volatility spillover between five countries of ASEAN, Japan and USA. They found that USA stock market has more mean and volatility spillover effect on ASEAN stock markets as compare to Japan stock market. Alikhanov (2013) examined the volatility spillover effect between the eight European stock markets and oil price market, found a strong spillover effect US to European stock and oil markets. Owing to economic liberalization and interconnected synchronization equity and financial markets have impacted co-moments between the financial markets. Wongswa (2006) studied that there was strong indications of transmission of information from US and Japan to Thailand and Korea. Due to the information transmission there was co-moment between the markets and also revealed the transmission from developed to emerging equity markets.

All the studies which we have reviewed, conclude that the global financial crisis 2008 primarily, originated due to the creation and expansion of bubbles in housing and subprime markets of US. It triggered imbalances in US economy and also in those economies which were directly and indirectly integrated with US economy. Pakistan and Dubai economies also impacted by global financial crisis 2008 at some extend. At that time co-movements were also observed between the financial markets (particularly stock markets) due to direct and indirect linkages with global financial system. Studies on Pakistan which we reviewed, were clearing that the effect of global financial crisis 2008 transmitted into Pakistan economy through four main linkages, one of them is stock market. In this study we trace out direct and indirect linkages between Pakistani and leading foreign stock markets. These studies only investigated direct dynamic linkages between the financial markets (stock) no one find out indirect information transmission. In this study we find out direct linkages between the leading global stock markets and also indirect dynamic linkages between Pak-US stock markets through Dubai financial market.

3. Econometric methodology and model specification

To describe the variation of conditional variance with respect to time, Engle (1982) proposed Autoregressive conditional heteroscedastic (ARCH) model. Although ARCH model is a substantial contribution in econometric tools, it has some problems like long lag length and non-negativity restriction on parameters. Bollerslev (1986) introduced generalized autoregressive conditional heteroscedastic (GARCH) model, which improves the unique specification with the addition of lag value of conditional variance, which acts like smoothing term. GARCH model cannot analyze Asymmetric and leverage effect. For this Glosten, Jagannathan, and Runkle (1993) proposed GJR-GARCH model. GJR-GARCH model is a significant extension of standard GARCH model, it contains asymmetric term in conditional variance equation. To avoid any non-convergence problem in this study we employ appropriate univariate GARCH type model such as GARCH (p, q) and GJR-GARCH (p, q) to estimate volatility models and to explore mean and volatility spillover effect. Following the technique of Hamao,

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