



Article

## Examining mean-volatility spillovers across national stock markets



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### ABSTRACT

The study of the stock market in a country and the understanding of the influence of stock market crashes within and across the markets has been the subject matter of many researches, academicians and analysts during recent times. In this study we investigate the mean-volatility spillover effects that happen across international stock markets. The study, by taking into consideration the stock market returns based on various indices, investigates the mean-volatility spillover effects using the GARCH in Mean model for the period January 2002 to December 2011. The GARCH-M model seeks to provide useful insights into how information is transmitted and disseminated across stock markets. In particular, the model examines the precise and separate measures of return spillovers and volatility spillovers. The analysis provides the evidence of strong mean and volatility spillover across some stock exchanges.

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### Examinando derrames de media volatilidad en los mercados de valores nacionales

#### RESUMEN

El estudio del mercado de valores de un país y la comprensión de la influencia de los desplomes de la bolsa en y a través de los mercados ha sido el objeto de muchas investigaciones de académicos y analistas en los últimos tiempos. En este estudio se investigan los efectos de derrame de media volatilidad que se producen en los mercados de valores internacionales. El estudio, teniendo en cuenta la rentabilidad del mercado de valores basada en varios índices, investiga los efectos de derrame promedio de volatilidad utilizando el modelo GARCH en el período comprendido entre enero de 2002 y diciembre de 2011. El modelo GARCH-M pretende proporcionar ideas útiles sobre cómo se transmite y difunde la información a través de los mercados de valores. En particular, el modelo examina las medidas precisas y separadas de los efectos de excedentes de retorno y de volatilidad. El análisis proporciona la evidencia de una media y volatilidad fuertes a través de algunas bolsas de valores.

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Índice de la bolsa de valores

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### 1. Introduction

On October 19th, 1987 the Dow Jones Industrial Average (DJIA) stood at 1738 points. It fell 508.32 points, which constituted 22.6% of the value of the entire stock exchange. Over 600 million shares had been traded and the value of the stocks on the New York Stock Exchange had fallen by over \$750 million. This event triggered stock

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market crashes all over the world. By October end the stock markets indices like Hang Seng had fallen by 45.5%, Standard and Poor ASX 200 fell by 41.8%, and the FTSE 100 fell by 26.45%.

Academicians and economists warned that it will be many years before the world economies bounce back. But by the end of 1987 the DJIA was moving slightly upwards contrary to what many renowned economists of the world collectively predicted. By February 2, 1994 the DJIA had reached an all time high post the 1987 crash. By March 29, 1999 it has for the first time closed above 10,000 points.

On October 9, 2007, the Dow Jones Industrial Average index reached an all time high of 14,164 points. By January 2, 2009 it was 13,332 and by March 9, 2009, the Dow Jones average had reached a bottom of 6547. The Dow Jones had declined by 7,617 points, which constituted 53.8% below its October 2007 high. It has since recovered much of the decline, exceeding 12,000 during most of 2011, and occasionally reaching 13,000 in 2012. Below are given some important high and low points of various national stock market indices during the same period (Table 1).

It is seen that during the same time period stock market indices all over the world also decreased. The above two instances clearly states that there exists a substantial degree of interdependence among national stock markets. Especially, after the stock market crash of 1987, the interdependence between international stock markets has increased (Eun & Shim, 1989). Unexpected developments in international stock markets have become important news events that influence domestic stock markets as news revealed in one country is perceived as informative to fundamentals of stock prices in another country. This is attributed to real productive and financial linkage of economies and also suggests that overreaction and noise trading are transmissible across borders. Moreover with the development in the liberalization of capital movements and the securitization of stock markets, international financial markets have become increasingly interdependent. Advanced computer technology and improved world-wide networking have improved and quickened the processing of “News”. This has led to domestic markets to react promptly to new information from international markets. Perhaps as a result of this, volatility has been closely synchronized across national stock markets.

Several times during the past few years the markets have taken investors on a roller coaster ride. During these volatile times many investors get spooked and begin to question their investment strategy. This is especially true for beginner investors who often can be tempted to pull out of the market altogether and wait on the sidelines until it seems safe to dive back in. If there is one safe and wise prediction about investing, it is that the future will bring both frightening drops and gratifying rises.

The extent to which stock price indices in developed and emerging countries move together is important to the individual investor, the policy maker and the forecaster, the researcher and more recently by investment banks that are specializing in new financial innovations to minimize risk. Studies have revealed that more than half of the movement in the typical developed country's stock price index is unique to the country, but this percentage varies widely between them. Also, the more open the stock market

is to capital flows, the higher will be the covariance between that market and the markets in other countries. Special linkages brought about by financial ties, free capital movements and trade strengthens the common movement of stock prices (Ripley, 1973).

The thing to realize is that market volatility is inevitable. It's the nature of the markets to move up and down over the short term. The ups and downs of the financial markets are closely watched by the society with great interest. Public interest in market movements has intensified in the last decades more so after the global financial crisis of 2007. When there is a sharp decline in the stock prices it rings alarming bells all over the world and may confuse a layman who is new to the world of financial markets. He may not even be aware how this may affect him.

Trying to time the market over the short term is extremely difficult, some would say impossible. One solution is to maintain a long-term horizon and ignore the short-term fluctuations. For many investors this is a solid strategy. But even for long term investors there are still things you should know about volatile markets and steps you can take to help weather market volatility. Ideally, what traders would like to know is what the future volatility is going to be. If we knew what the future volatility would be, we could make a fortune quite easily. The fact is that volatility exists and investors must develop ways to deal with it.

The last two-decade or so have witnesses an unprecedented explosion in the number and variety of financial instruments. Although these financial innovations have been widely accepted by the markets, as the users clearly feel that they will benefit from using these instruments. In recent years the benefits of these innovations have raised a lot of questions. The feeling is widespread, becoming stronger by almost daily horror stories in the financial pages of the world. It can be stated that financial innovations are a major cause for stock market volatility. As a consequence, in recent year's innovative financial diversification and cross-market returns correlation have been the subject of much debate and research and the main focus has been in minimizing volatility spillover effects from one market to another.

The degree of interdependence among major national stock markets can be noticed by examining the nature and magnitude of mean and volatility spillovers in these markets. As the equity markets trade on different time zones, it is possible to examine whether volatility is transmitted across markets. Mean return in security analysis can be defined as the average expected return of a given investment or portfolio, when all possible outcomes are considered. The transmission of volatility has been commonly termed as “Volatility Spillover”. The transmission of mean returns has been commonly termed as “Mean Spillover”. Volatility spillovers can be viewed from two angles. Own volatility spillovers are used to indicate a one way causal relationship between past volatility shocks and current volatility in the same market. Cross volatility spillovers is used to indicate a one-way causal relation between past volatility in one market and current volatility in another market.

An international asset-pricing model can incorporate correlation between stock returns in different countries. Another possible reason for international correlation of price changes is market contagion. Under market contagion scenario, speculative trading and

**Table 1**  
High and low of major index between October 2007 and March 2009.

Indices	Highest points during 2007	Date	Lowest points during 2009	Date
BSE Sensex	20,238.16	30-Oct-2007	8047.17	6-Mar-2009
Hang Seng	31,958.40	30-Oct-2007	11,344.604	9-Mar-2009
FTSE 100	6754.10	13-Jul-2007	3460.714	9-Mar-2009
NIKKIE	18,300.40	26-Feb-2007	7021.284	10-Mar-2009
BOVESPA	64,609.00	12-Nov-2007	37,105.00	2-Mar-2009
DAX	8151.57	13-Jul-2007	3588.894	9-Mar-2009

Source: [www.moneycontrol.com](http://www.moneycontrol.com).

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