

**COMOVEMENT BETWEEN DEVELOPED, EMERGING AND
FRONTIER EQUITY MARKETS:
EVIDENCE FROM EUROPE AND ASIA-PACIFIC**

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Comovement between Developed, Emerging and Frontier Equity Markets: Evidence from Europe and Asia-Pacific

by

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The thesis titled, **“Comovement between Developed, Emerging and Frontier Equity Markets: Evidence from Europe and Asia-Pacific”**, being submitted by **Ms. Nisha Mary Thomas (Nee John)** to the **Indian Institute of Technology Delhi**, for the award of degree of **Doctor of Philosophy** is a record of bonafide research work carried out by her. She has worked under our guidance and supervision, and has fulfilled all the requirements for the submission of this thesis, which has attained the standard required for a Ph.D degree of this institute. The results presented in this thesis have not been submitted elsewhere for the award of any degree or diploma.

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Abstract

Stock market comovement is a topical area of research in the field of finance as it has important implications for international investors and policymakers. For international investors, strong stock market comovement implies reduced international portfolio diversification benefits. For policymakers, strong stock market comovement implies increased susceptibility to external shocks. Given the significance of stock market comovement, academia has always been interested in understanding the nature and complexities of comovement between different equity markets.

This study is motivated to explore different aspects of comovement between developed, emerging and frontier equity markets. First the study examines the degree of comovement between developed, emerging and frontier markets evolved over the last couple of decades. Second, it identifies the factors that influence comovement between these three types of equity markets. Third, the study examines the value addition provided by emerging markets and frontier markets in improving the overall performance of an international portfolio. All these empirical analysis is performed for two regions viz. Europe and Asia-Pacific. Finally, a primary survey is administered among international investors to understand their perception towards investment in emerging markets and frontier markets.

Dynamic Conditional Correlation Generalized Autoregressive Conditionally Heteroscedastic (DCC GARCH) method is employed to understand the nature of comovement between developed, emerging and frontier equity markets. Panel regression method is employed to identify the factors that drive comovement between these three types of equity markets. Further, optimal portfolios are created to examine the incremental contribution of emerging and frontier equity markets in enhancing the diversification benefits of an international portfolio. To understand the perception of investors on investment in emerging and frontier equity markets, a primary survey was

conducted among top management, portfolio managers and equity research analysts of fund management companies specializing in emerging and frontier market investments.

The results reveal that there is a higher degree of correlation between European equity markets as compared to Asia-Pacific region. The results also suggest that the 2008 global financial crisis (GFC) had a deep impact on Europe, while Asia-Pacific region was better able to withstand the effect of the same. The study indicates that the comovement between European DM-EM pair is primarily driven by bilateral trade and stock market development. The comovement between European DM-FM pair is explained by capital account openness, macroeconomic convergence process and banking sector development. The key determinants of comovement between European EM-FM pair are bilateral trade and capital account openness. The 2008 GFC is the only common determinant of comovement identified across all market pairs in Europe. The comovement between Asia-Pacific DM-EM pair is explained by bilateral trade relationship, GDP growth rate differential, volatility ratio and the 2008 GFC. Since the degree of correlation between Asia-Pacific DM-FM and EM-FM is very low, it is believed that no meaningful interpretation can be drawn from the regression results. The analysis of portfolio performance measures suggests that European frontier markets provide greater potential than European emerging markets in augmenting the performance of the international portfolio. In contrast, Asia-Pacific emerging markets outperform the regional frontier counterparts in improving the risk-return profile of the benchmark portfolio. The results also reveal that frontier market investments are not for investors with low risk appetite. The primary survey analysis indicates that investors are aggressive on investments in emerging markets but are conservative on frontier markets investments. Further, investors rank restriction on capital movement, lack of transparency in rules and regulations, and political risk as the key obstacles to investment in both the emerging and frontier markets.

On the basis of the findings, the study makes key recommendations to international investors and policymakers. To the international investor, the study recommends

holding Asia-Pacific portfolio of developed and emerging markets over European portfolio of developed and frontier markets. An investor who is keen on holding European portfolio, should expose his portfolio to European frontier markets as their inclusion will improve the performance of the portfolio. In contrast, an investor who is keen on holding Asia-Pacific portfolio, should expose his portfolio to Asia-Pacific emerging markets as their inclusion will improve the performance of the portfolio. The study cautions investors against interpreting low volatility of frontier markets as lower risk levels. The low volatility of frontier equity markets is owing to their small market size and thin trading volumes. The study recommends European policymakers to be conscious of the fact that their economies are well integrated with each other, which makes them susceptible to external shocks and crises. Hence, they should formulate suitable economic stabilization policies to insulate themselves from external shocks. The study encourages policymakers of emerging markets to continue implementing legal and regulatory reforms to boost foreign investments into their countries. The study advises policymakers of frontier markets that investors are primarily concerned about the economic growth rate, political stability and the financial market development while investing in frontier markets. Hence, they should take steps to ensure that all these three aspects are enhanced.

सार

स्टॉक मार्केट कॉमोवमेंट वित्त क्षेत्र में अनुसंधान का एक सामयिक विषय है क्योंकि यह अंतरराष्ट्रीय निवेशकों और नीति निर्माताओं के लिए महत्वपूर्ण है। मजबूत स्टॉक मार्केट कॉमोवमेंट अंतरराष्ट्रीय निवेशकों के लिए पोर्टफोलियो डायवर्सिफिकेशन के लाभ को कम कर देता है। कई महत्वपूर्ण कारणों की वजह से शिक्षाविद स्टॉक मार्केट कॉमोवमेंट के अध्ययन में रुचि रखते हैं।

यह अध्ययन स्टॉक मार्केट कॉमोवमेंट के तीन पहलुओं की जांच करता है। सबसे पहले यह अध्ययन, डेवलपड मार्केट (DM), इमर्जिंग मार्केट (EM) और फ्रंटियर मार्केट (FM) के बीच के कॉमोवमेंट के परिमाण की जांच करता है। दूसरी, यह अध्ययन, इन तीन प्रकार के स्टॉक मार्केटों के बीच के कॉमोवमेंट के निर्धारकों की पहचान करता है। तीसरा, यह अध्ययन अंतरराष्ट्रीय पोर्टफोलियो के प्रदर्शन के सुधार में इमर्जिंग मार्केट और फ्रंटियर मार्केट के योगदान की जांच करता है। यह तीनों विश्लेषण यूरोप और एशिया- पैसिफिक के लिए किया गया है। अंत में, अंतरराष्ट्रीय निवेशकों के बीच एक सर्वेक्षण किया गया है जिसमें इमर्जिंग मार्केट और फ्रंटियर मार्केट में निवेश के प्रति उनकी धारणा को समझने का प्रयास किया गया है।

डेवलपड, इमर्जिंग और फ्रंटियर स्टॉक मार्केट के बीच के कॉमोवमेंट के परिमाण की जांच करने के लिए डायनामिक कंडीशनल कोरिलेशन जनरलाइज़्ड ऑटोरेग्रेसिव हेट्रोस्केडस्टिक (DCC GARCH) की विधि का उपयोग किया गया है। इन तीन प्रकार के स्टॉक मार्केटों के बीच के कॉमोवमेंट के निर्धारकों की पहचान करने के लिए, पैनल रिग्रेशन की विधि का उपयोग किया गया है। अंतरराष्ट्रीय पोर्टफोलियो के प्रदर्शन के सुधार में इमर्जिंग और फ्रंटियर स्टॉक मार्केट के योगदान की जांच के लिए, विभिन्न प्रकार के पोर्टफोलियो बनाए गए हैं और उनके प्रदर्शन का मूल्यांकन किया गया है। अंतरराष्ट्रीय निवेशकों के बीच एक सर्वेक्षण किया गया है जिसमें इमर्जिंग और फ्रंटियर स्टॉक मार्केट में निवेश के प्रति उनकी धारणा को समझने का प्रयास किया गया है।

परिणाम बताते हैं कि एशिया- पैसिफिक की तुलना में यूरोपीय स्टॉक मार्केट के बीच उच्च स्तर का कॉमोवमेंट है। परिणाम यह भी सुझाव देते हैं कि 2008 वैश्विक वित्तीय संकट यानि Global Financial Crisis (GFC) का यूरोप पर गहरा प्रभाव पड़ा। अध्ययन इंगित करता है कि यूरोपीय DM-EM जोड़ी के बीच के कॉमोवमेंट के मुख्य निर्धारक व्यापार और शेयर बाजार विकास हैं। यूरोपीय DM-FM जोड़ी के बीच के कॉमोवमेंट के मुख्य निर्धारक पूंजी खाता खुलापन, आर्थिक कारक और बैंकिंग क्षेत्र के कारक हैं। यूरोपीय EM-FM के बीच कॉमोवमेंट के प्रमुख निर्धारक व्यापार और पूंजी खाता खुलापन हैं। यूरोप के सभी बाजार जोड़ों के कॉमोवमेंट का सामान्य निर्धारक 2008 GFC है। एशिया- पैसिफिक DM-EM जोड़ी के बीच के कॉमोवमेंट के प्रमुख निर्धारक व्यापार, जीडीपी विकास दर अंतर, वोलाटीलिटी अनुपात और 2008 GFC हैं। हमें यह लगता है कि एशिया- पैसिफिक DM-FM और EM-FM के बीच कि पैनल रिग्रेशन के परिणाम तार्किक नहीं होंगे क्योंकि इन दोनों जोड़ों के बीच कि कॉमोवमेंट कम है। पोर्टफोलियो

प्रदर्शन के विश्लेषण से पता चलता है कि यूरोपीय पोर्टफोलियो के प्रदर्शन को बढ़ाने में यूरोपीय EM की तुलना में अधिक क्षमता यूरोपीय FM में हैं। इसके विपरीत, एशिया- पैसिफिक पोर्टफोलियो के प्रदर्शन को बढ़ाने में एशिया- पैसिफिक EM में अधिक क्षमता हैं। परिणाम यह भी बताते हैं कि फ्रंटियर स्टॉक मार्केट निवेश कम जोखिम वाले निवेशकों के लिए नहीं हैं। प्राथमिक सर्वेक्षण विश्लेषण इंगित करता है कि अंतरराष्ट्रीय निवेशक, फ्रंटियर स्टॉक मार्केट निवेश की तुलना में इमर्जिंग स्टॉक मार्केट में निवेश को लेकर ज़्यादा सकारात्मक दृष्टिकोण रखते हैं। इसके अलावा, सर्वेक्षण यह भी बताता है कि अंतरराष्ट्रीय निवेशक पूंजी पर प्रतिबंध, नियमों और विनियमों में पारदर्शिता की कमी, और राजनैतिक जोखिम को इमर्जिंग और फ्रंटियर स्टॉक मार्केट के निवेश में बाधा मानते हैं।

इन निष्कर्षों के आधार पर यह अध्ययन अंतरराष्ट्रीय निवेशकों और नीति निर्माताओं के लिए महत्वपूर्ण सिफारिशें करता है। यह अध्ययन अंतरराष्ट्रीय एशिया- पैसिफिक DM-EM पोर्टफोलियो को रखने की सिफारिश देता है। अगर निवेशक यूरोपीय पोर्टफोलियो को रखने का इच्छुक है, तब यह अध्ययन उसे पोर्टफोलियो के एक बड़े हिस्से को फ्रंटियर स्टॉक मार्केट में निवेश करने की सलाह देता है। अगर निवेशक एशिया- पैसिफिक पोर्टफोलियो को रखने का इच्छुक है, तब यह अध्ययन उसे पोर्टफोलियो के एक बड़े हिस्से को इमर्जिंग स्टॉक मार्केट में निवेश करने की सलाह देता है। अध्ययन से पता चलता है कि फ्रंटियर स्टॉक मार्केट की कम वोलाटीलिटी का कारण इसकी छोटी व्यापारिक मात्रा और छोटा बाजार पूंजीकरण है। क्योंकि यूरोपीय स्टॉक मार्केट के बीच उच्च स्तर कॉमोवमेंट है, यह अध्ययन यूरोपीय नीति निर्माताओं को सिफारिश देता है कि बाहरी खतरे से खुद को बचाने के लिए उपयुक्त आर्थिक स्थिरीकरण नीतियों का निर्माण करें। यह अध्ययन इमर्जिंग स्टॉक मार्केट के नीति निर्माताओं को प्रोत्साहित करता है कि वे रिफॉर्म्स जारी रखें, ताकि उनके देशों में विदेशी निवेश का बढ़ावा हो। यह अध्ययन फ्रंटियर स्टॉक मार्केट के नीति निर्माताओं को आर्थिक विकास दर, राजनीतिक स्थिरता और वित्तीय बाजार विकास पर ध्यान देने की सलाह देता है ताकि उन्हें ज़्यादे से ज़्यादा विदेशी निवेश मिले।

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Abbreviations

ARCH	Autoregressive Conditionally Heteroscedastic
ASEAN	Association of Southeast Asian Nations
BIC	Bayesian Information Criterion
BRIC	Brazil, Russia, India, China
BSP	Jorion (1985, 1986) Bayes Stein Portfolio Optimization
CEE	Central and Eastern Europe
CEO	Chief Executive Officer
CIO	Chief Investment Officer
CLRM	Classical Linear Regression Model
DCC	Dynamic Conditional Correlation
DCC GARCH	Dynamic Conditional Correlation Generalised Autoregressive Conditionally Heteroscedastic
DM-EM	Developed market and emerging market
DM-FM	Developed market and frontier market
EM-FM	Emerging market and frontier market
EMs	Emerging Markets
EMU	European Economic and Monetary Union
EU	European Union
FE	Fixed Effect method
FMs	Frontier Markets
G7	Group of seven developed countries consisting of Canada, France, Germany, Italy, Japan, United Kingdom and United States
GARCH	Generalised Autoregressive Conditionally Heteroscedastic
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GFC	The 2008 Global Financial Crisis
IIF	Institute of International Finance

LM	Breusch and Pagan Lagrangian Multiplier (LM) Test for Random Effects Model
MENA	Middle East and North Africa
MPT	Modern Portfolio Theory
MSCI	Morgan Stanley Capital International
MSVP	Estrada (2008) Minimum Semivariance Portfolio Optimization
MVP	Markowitz (1952) Minimum Variance Portfolio
NAFTA	North American Free Trade Agreement
P1	Benchmark portfolio composed of only developed equity markets
P2	Portfolio composed of developed and emerging equity markets
P3	Portfolio composed of developed and frontier equity markets
P4	Portfolio composed of developed, emerging and frontier equity markets
POLS	Pooled Ordinary Least Square method
RE	Random Effect Method
VAR	Vector Autoregressive Model
VP	Vice President