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Contagion in international financial markets: A recursive cointegration approach



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ABSTRACT

This study utilizes the recursive cointegration technique to analyze the dynamic interdependence among ten major equity markets throughout North America, Europe, Latin America and Asia. Results indicate that the international equity markets are integrated and that the degree of integration among these markets has increased over time. A scrutiny of the various crisis periods reveals that a major financial crisis had an effect of increasing the level of convergence among these markets. Moreover, the recursive cointegration technique is able to pinpoint and capture the approximate *timing* of a major global crisis. In addition, the study finds that the U.S., Japan, India, China, U.K., and Germany lead the other markets with the U.S. contributing most heavily to the common trend. Overall, the results indicate that profitable opportunities from portfolio diversification are limited across major markets and that these benefits are further reduced during episodes that are marked by a global financial turmoil.

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1. Introduction

A number of empirical studies have investigated interrelationships among major international financial asset markets.¹ Many of these studies, have also analyzed whether and how international

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¹ See for instance, King and Wadhvani (1990), Longin and Solnik (2001), Ang and Bekaert (2002), Forbes and Rigobon (2002), Rezayat and Yavas (2006), Chiou (2009) and Khaled et al. (2011) among others.

financial asset markets react with one another during periods that are marked by a global financial crisis. Several techniques have been utilized over the years to understand and analyze financial market contagion – a significant increase in cross market linkages after a shock to one market or a set of markets.² The majority of studies, use the correlation metric to evaluate financial contagion. Basically, these studies examine whether cross correlations between markets increase significantly during a major crisis (crisis period) or after a crisis (post-crisis period) in comparison to periods before the crisis (pre-crisis period). If the correlations increased significantly during and after crisis periods, in comparison to pre-crisis periods, the authors conclude evidence in favor of contagion.

However, as noted in [Forbes and Rigobon \(2002\)](#), the correlation metric is susceptible to heteroscedasticity biases which may lead to misleading conclusions regarding the nature of bivariate linkages between global markets. Hence, alternative econometric techniques have been developed over the years to assess spillover of shocks across international markets. The evidence from these studies is mixed with some studies showing evidence in favor of global contagion while others suggesting evidence on the contrary.

The current study, proposes a new and straightforward method for evaluating contagion in global equity markets. Essentially, the study utilizes the recursive cointegration technique as developed by [Hansen and Johansen \(1999\)](#) and further refined by [Brada et al. \(2005\)](#), [Rangvid \(2001\)](#) and [Mylonidis and Kollias \(2010\)](#), to assess financial contagion. The countries chosen in the study are some of the largest (in terms of market capitalization) and most established countries throughout North America, Europe, Asia and Latin America and include the U.S., Australia, Japan, China, India, France, Germany, the U.K., Brazil, Mexico. The analysis covers a period beginning January 1993 and ending December 2008 and makes several significant contributions to the literature.

First, the study analyzes whether these major markets are integrated and whether the level of convergence among these markets have increased over time. Second, if evidence of integration is found, the study pays special attention to episodes marked by a major financial crisis to analyze whether the level of integration among these markets increased with the onset of a global crisis. Moreover, this step of the analysis also determines, whether the increased level of convergence, coincides with the approximate timing of the economic crisis. Over the 1993–2008 time span several crises have occurred. The Peso crisis originated in the 1994–1995 sub period; the Asian crisis emerged in 1997 followed by the Russian crisis in 1998; the U.S. Dot com bubble burst in 2000 and the U.S. housing market crashed towards the end of 2006.

Third, the study determines whether each of the markets are integrated or if certain markets are excludable from the long-run relationships. And finally, the study also determines the markets which contribute most to the common stochastic trend and drive each of the global markets toward the long-run equilibrium relationships. To the author's knowledge, this is the first study that analyzes these ten major markets within the same framework, utilizes the recursive cointegration approach and scrutinizes market interactions during periods of tranquility as well as during periods of volatility in this context. In addition, the study takes a much broader outlook and graphically analyzes the changing pattern of integration and the *dynamic* evolution of linkages among major global equity markets financial asset markets over an expansive time-span.

With the collapse of the housing market, the issue of financial market contagion has received renewed attention from academics and practitioners alike. Overall, the analysis in this paper should be beneficial to portfolio managers, pension fund managers and other institutional investors in the U.S. and abroad who are contemplating to invest across international markets in making more informed portfolio allocation decisions. The findings will also be beneficial to regulators and policymakers who are interested to analyze cross-market linkages and are eager to understand the dynamics of equity market interactions especially during times marked by a major global crisis.

The remainder of the paper is organized as follows: Section 2 presents a relevant literature review; Section 3 sets forth a brief description of the data; Section 4 discusses the methodology; Section 5 examines empirical results; and, finally, Section 6 contains concluding remarks.

² See for instance, [Forbes and Rigobon \(2001, 2002\)](#).

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