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## The 2008 financial crisis: Stock market contagion and its determinants



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### ABSTRACT

In this paper, we investigate worldwide contagion and its determinants during the 2008 financial crisis. Utilizing an international sample of returns from 2003 to 2009, we consider both uni- and bi-directional contagion. After controlling for crisis-related volatility, we find strong evidence that cross-market linkages increase among many financial markets. In contrast to previous crises, contagion following the 2008 global financial crisis is not confined to emerging markets. The United States and other mature financial markets in the sample transmit and receive contagion. Country markets are less influenced by regions than they are by other country markets. We also construct variables that represent relative changes in economic variables before and during the crisis. We find that both economic fundamentals such as trade structure, interest rates, inflation rates, industrial production, and regional effects, and investors' risk aversion contribute to international contagion.

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## 1. Introduction

The 2008 financial crisis caused severe economic distress in the United States, which appeared to have spread to other countries. The crisis was followed closely by bailouts and regulation changes by the US government and other sovereign policymakers to reduce the harmful effects to the nations'

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economies. However, it is unclear that the apparent transfer of the US financial crisis to other countries is contagion. Previous literature has had conflicting findings concerning the incidence of international contagion. [Forbes and Rigobon \(2002\)](#) examine contagion in financial crises from the 1997 East Asian Crisis to the 1987 US Stock Market crash and find that international stock markets have increased comovement during crises due to increased volatility. After controlling for the increased volatility, they find little evidence of contagion. The effects of the 2008 financial crisis may only be interdependence rather than contagion.

The goal of this research paper is to examine the incidence of contagion among international markets during the 2008 global financial crisis (GFC) and to determine the channel through which any identified contagion is transmitted. Understanding contagion and its determinants will help policy-makers to be more effective in dealing with financial contagion. By understanding the conditions under which contagion may occur, contagion should be able to be predicted and policy responses can be enacted in a more timely manner. Contagion is also important for investors seeking to diversify their portfolios. Worldwide contagion may reduce the effectiveness of international diversification strategies for investors in developed and emerging financial markets.

We examine the existence of contagion in several ways. Our tests are based on the new definition suggested by [Forbes and Rigobon \(2002\)](#) which is widely used in the literature: if the cross-market linkages or correlations do not increase significantly after controlling for increased volatility during the turmoil period, only interdependence presents not contagion. We implement the revisited test of contagion by investigating the transmission of stock returns in international stock markets surrounding the most recent financial crisis with a sample including the 10 most important stock markets in three geographic regions: North America, Europe and East Asia Pacific.

Our research is motivated by a gap in the financial contagion literature. Prior to the 2008 GFC, studies finding evidence of international contagion often concentrated on the effects of crises in emerging markets. There is some weak evidence supporting contagion as defined by [Forbes and Rigobon \(2002\)](#) in mature financial markets ([Corsetti et al., 2005](#); [Candelon et al., 2005](#); [Kitamura, 2010](#)). Many studies find that while contagion may be important for emerging markets, developed economies are largely immune ([Forbes and Rigobon, 2002](#); [Bae et al., 2003](#); [Caporale et al., 2006](#); [Lee et al., 2007](#); [Chevapatrakul and Tee, 2014](#)). Contagion seems to be only a matter of concern for emerging markets.

For the 2008 GFC, it is well known that the US is considered at least in casual terms as a source of contagion ([Dimitriou et al., 2013](#); [Kenourgios et al., 2011](#); [Dooley and Hutchison, 2009](#), among others). However, in this paper we do not strictly view contagion as the spread of a crisis from a “ground-zero” or “first victim” country. In our analysis, the propagation mechanisms not only spill from “ground zero” but also from any mature stock market around the world. Contagion may happen as a mutual or bi-directional effect rather than one way or uni-directional one during the crisis period. We first utilize Granger-causality tests to examine cross-market causal relations before and during the crisis. We then employ a new approach theoretically suggested by [Dungey et al. \(2005\)](#) in a [Glosten et al. \(1993\)](#) Asymmetric GARCH framework (GJR-GARCH hereafter) as an alternative way to implement the [Forbes and Rigobon \(2002\)](#) test of contagion.

After identifying contagion, we investigate the determinants. We develop a logistic regression model utilizing the most recent financial crisis data to investigate whether changes in trade structure with partners, or economic fundamentals, such as fluctuations in interest rates, inflation, or market stock returns of one country relative to others, can explain the findings of the bi-directional contagion among the 10 largest stock markets around the world. In our best understanding this research question has not been addressed so far in literature surrounding the 2008 GFC.

We find strong evidence of worldwide contagion resulting from the 2008 financial crisis. The North American (US and Canada) and the EU region markets are the most integrated markets across all models. During the crisis, US transmits contagion to Australia, Canada, UK, Hong Kong, India, and Spain but it receives contagion only from Canada and UK. Germany, China, and Japan do not receive contagion from or transmit to the US. Germany, Japan and US receive the least contagion in most of our models. Since Germany does not receive contagion from any other country, any increased comovement of returns is likely interdependence rather than contagion. Australia and Canada initiate very little contagion in most of our models and among the 10 markets in our sample, only Canada and UK transmit contagion back to US.

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