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Detecting shift-contagion in currency and bond markets

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Abstract

This paper investigates why financial market crises often increase the interdependence between assets associated with different countries. Two sources of increased co-movement in asset returns are considered: (i) larger common shocks operating through standard cross-country linkages and (ii) changes in the structural transmission of shocks across countries, referred to as “shift-contagion”. To examine this issue, we develop a method for detecting shift-contagion with three notable features. First, parameters corresponding to the structural transmission of shocks across countries are identified in the presence of changing volatility regimes for the shocks. Second, the timing of changes in volatility is endogenously estimated instead of being exogenously assigned. Third, the countries in which crises originate need not be known or even included in the analysis. We apply the method to currency returns for developed countries and bond returns for emerging-market countries.
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1. Introduction

The spillover of crises from one financial market to another is loosely referred to as contagion, but precise definitions of contagion are many. One is that contagion occurs whenever

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asset returns associated with different countries co-vary in excess of what would be implied by the usual commercial, financial, and institutional links between countries. Another more narrow definition is that contagion occurs whenever shocks spread through herding behaviour in financial markets. A third broader definition refers to any increased co-movement between asset returns during crises as contagion. A fourth definition, referred to as "shift-contagion", suggests that to qualify as contagion, increased co-movement between asset returns during crises must be driven by change in the structural transmission of shocks across countries, rather than just a change in size of underlying shocks.

Given this multiplicity of definitions, it is not surprising to find widely varying opinions as to which crisis events cause or have caused contagion.[1] Early tests for a shift in the way shocks are transmitted across countries suggested the existence of contagion. For example, King and Wadhwani (1990) modeled contagion as a spillover of volatility from one financial market to another in the presence of imperfect information availability across markets. They considered a number of tests for volatility spillovers, including estimating time-varying correlations between equity returns in international markets. They found correlations increased significantly just after the October 1987 stock market crash. Other studies, including Bennett and Kelleher (1988) and Lee and Kim (1993) reached similar conclusions. However, Forbes and Rigobon (2002) argued that the conclusions from these and similar studies might be misleading due to the simultaneous nature of financial interactions and the presence of heteroskedasticity in equity returns.[2] For example, in the case of heteroskedasticity, they pointed out that when the variances of two assets increase (as they typically do during periods of crises), their correlation also increases regardless of whether or not the structural transmission of shocks between these assets changes. Taking such econometric concerns into account, a number of recent studies have concluded that there is, in fact, little or no evidence of contagion in financial markets. For example, Forbes and Rigobon (2002) and Rigobon (2001) found little incidence of shift-contagion in equity and bond markets during the Mexican, Asian, and Russian crises of the 1990s. Similarly, Rigobon (2003a) concluded that no shift-contagion occurred between 1994 and 1999 in the Brady bond markets of Argentina and Mexico.

In this paper we develop a method for detecting shift-contagion with three notable features that are designed to address concerns about the previous empirical literature. First, the parameters related to the structural transmission of common shocks across countries are identified in the presence of regime-switching volatility in the common shocks. In particular, structural identification occurs as long as the heteroskedasticity in idiosyncratic structural shocks is not perfectly synchronous with the heteroskedasticity in the common structural shocks. This is an example of "identification through heteroskedasticity" (see Sentana and Fiorentini, 2001; Rigobon, 2003a). In terms of testing for shift-contagion, if the change in structural impact coefficients is proportional given a change in volatility regime, it suggests a change in the size of

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[1] The literature on contagion is vast and includes Baig and Goldfajn (1999, 2001), Bordo and Murshid (2001), Buiter, Corsetti, and Pesenti (1998), Calvo and Medoza (2000a,b), Claessens, Dornbusch, and Park (2001), Eichengreen, Rose, and Wyplosz (1996), Favero and Giavazzi (2002), and Kaminsky and Reinhart (2000), among others discussed in this paper. See Kaminsky, Reinhart, and Végh (2003) for a recent survey.

[2] A number of recent papers have pointed out the pitfalls in interpreting changes in estimated correlations as evidence of contagion, including Bekaert, Harvey, Ng (2005), Boyer, Gibson, and Loretan (1999), Caporale, Cipollini, and Spagnolo (2005), Corsetti, Pericoli, and Sbracia (2001, 2002), Forbes and Rigobon (2001, 2002), Karolyi (2003), and Rigobon (2001, 2003a,b).

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