How globally contagious was the recent US real estate market crisis? Evidence based on a new contagion test

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ABSTRACT

This paper utilizes a new contagion test based on case-resampling bootstrap technique to investigate whether there is any contagion effect in the interaction of the US real estate market with those of Australia, Japan and the UK arising out of the recent US real estate crisis or subprime crisis. Contrary to expectations, it is found that the relationship of the US market with the other markets following the US real estate market crisis cannot be characterized as one with contagion effect. Its relationship with the other markets is rather characterized by dependency behavior that prevails regardless whether the markets are under distress or not.

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1. Introduction

In the course of interactions between markets, co-movements or spill-over effects occur which are driven by fundamental factors such as trade linkages, capital flows and banking linkages (Glick and Rose, 1999). These co-movements may intensify as a result of changes in the fundamental factors that underpin the interaction between markets. However, these spill-over effects may increase beyond the level called for by fundamentals as a consequence of the reaction of markets to non-fundamental factors which may drive them to exhibit herding behaviour. In this situation, the co-movements are said to contain contagion effects.

It is important to determine whether the spill-over effects or co-movements between markets contain contagion effects since contagion, being the result of non-fundamental factors, indicates the existence of market inefficiency. As explained in the next section, it is claimed that during periods of distress, interactions between markets could be highly susceptible to the presence of contagion effects. With financial markets being globalised, there are now more interactions and interdependence between markets and with markets experiencing crisis situations, there is a suspicion that co-movements between markets consist of contagion effects.

In this paper, we investigate the issue of contagion in real estate markets. It is claimed that real estate markets may be highly susceptible to contagion as these markets have become globalised over the past decade (Bardhan and Kroll, 2007). In particular, we investigate the extent by which the recent US real estate crisis or sub-prime crisis led created contagion effects in the real estate markets of the UK, Japan and Australia. Examining real estate market contagion with a focus on the US market is highly important and very topical. First, the recent US real estate market crisis has precipitated the still on-going global financial and economic crisis. Second, the US real estate market is the largest and most globalised in the whole in the whole world (Bardhan and Kroll, 2007). Given the severity of the crisis and the great publicity it attracted worldwide and the worldwide reach of the US market, one would expect that the distress situation of the US market would have created significant contagion effects on other markets. There would be expectations that the crisis would have driven investors away from the real estate market in other countries for fear that what has happened in the US real estate market could also happen in these countries.

In our investigation, we make use of a new contagion test based on case-resampling bootstrap technique developed by Hacker and Hatemi-J (2009) that performs accurately when the financial markets are under distress and the standard assumption of normal distribution and constant variance is not fulfilled. We utilize this bootstrap test to both estimate the underlying parameters and to test their statistical significance. A more detailed discussion is provided later in the paper — in Section 3, with regards to the merits and details of this test vis-à-vis existing contagion tests.

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The rest of the paper is organised in the following manner. The next section provides a discussion of contagion as it relates to real estate markets. Section 3 describes the test for contagion used in this paper. Section 4 discusses the data and presents the empirical results. The summary and conclusions are provided in the last section.

2. Contagion and real estate markets

Conceptually, contagion is defined as spill-over effects or co-movements between markets that are caused by non-fundamental factors. There are a number of different explanations as to why contagion occurs during a crisis. These explanations generally relate to information cascade as well as herd behaviour. Information about the crisis in one market may lead to a shift in expectations or sentiment with regard to the prospects in other markets. This may then lead investors in these other markets to sell off assets which precipitate a domino effect.

Theoretical models, therefore, point to the role of a third party such as investors or banks, as a channel for contagion. The actions of these agents during a crisis situation result in a significant link between markets which were previously thought to be unlinked or slightly linked. Investors and banks in the market hit by a crisis may experience liquidity problems and may therefore choose to liquidate their investments in other markets in order to raise the much-needed funds. Also, the decrease in the value of their investments in the market in crisis may lead investors to sell-off their holdings in other markets in order to re-balance their portfolios. In so-doing, investors and banks therefore transmit the crisis from one market to other markets.

As investors and banks in the market with crisis undertake these actions of liquidating their investments in other markets, other investors in the non-crisis markets may interpret these actions as information-based and as a signal that prospects in the non-crisis markets are also negative (Calvo, 1999; Hong and Stein, 1999; King and Wadhwani, 1990; Romer, 1993; Yuan and Yuan, 2000). Information therefore cascades which may then lead these other investors to follow the same actions. In this case, herding behaviour starts to occur among investors and the crisis therefore spills over to other markets (Jokipii and Lucey, 2007).[1]

Real estate markets are now becoming globalised and integrated (Bardhan and Kroll, 2007). This globalisation has been mainly driven by the internationalisation of real estate investments arising from the introduction of common real estate investment vehicles (Eichholtz and Kok, 2007). For example, from 2001 to 2006, cross-border investments tripled to US\$ 116 billion, which represents 20 percent of all property investment worldwide (Hobbs, Chin and Topintzi, 2007). Foreign capital inflows into a country can now easily find their way into the real estate market. In addition to the globalisation of investment, other factors that have significantly contributed to the globalisation of real estate markets are the internationalisation of real estate service providers, the development of more transparent international benchmarks or standards in real estate across the globe such as the recently published Real Estate Transparency Index of Jones Lang LaSalle (JLL, 2008), the reduction of political barriers, and the liberalisation of capital markets which also give rise to new financial instruments which allow foreign investors similar or almost equal footing with local real estate investors (Eicholtz, et al., 2009). These developments lead into what La Porta, et al. (2000) call functional convergence of markets.

As a consequence of this globalisation and integration, it is expected that there will be increased co-movements and contagion among real estate markets internationally. However, real estate is non-tradable and real estate markets have been found not to respond rapidly to international shocks (Bardhan et al., 2007). Hence, if contagion in real estate markets is present, it will have to arise through the other channels in terms of investor liquidity, portfolio rebalancing and information channel. Hence, it is not clear to what extent would international contagion affect real estate markets.

Very few papers have investigated the issue of contagion among real estate markets globally, particularly in relation to the recent US real estate market crisis. This limited number of studies has come up with mixed results. Fry et al. (2008) investigated, among others, contagion among the real estate markets of the US, the UK, Australia, Germany, Japan and Hong Kong using a contagion test that relies on changes in higher moments. The study found no evidence of contagion among the markets. Bond et al. (2006) investigated the extent of contagion among the real estate markets of Australia, Hong Kong, Japan, Singapore and the US. Using a multivariate latent factor model, contrary to Fry, et al. (2008), the study found existence of contagion among the markets. Mun (2005) investigated the extent of contagion among real estate markets of the Pacific Rim countries during four financial crises – Mexican, Asian, Russian and Brazilian. The study also found evidence of contagion effects among the markets. Wilson and Zurbruegg (2004) examined contagion of the Thailand real estate market on the markets of Australia, Hong Kong, Malaysia and Singapore but found little evidence for market contagion arising out of the 1997 Asian crisis. Both Mun (2005); Wilson and Zurbruegg (2004) used the Forbes and Rigobon methodology to estimate contagion.

Thus, there is scope for the current study. The focus of our paper is the contagion effect of the US real estate market on those of the UK, Japan and Australia. We apply a new contagion test developed by Hatemi-J and Hacker (2005) which is based on a pairwise bootstrap technique. This technique overcomes problems of non-normality and change in volatility that characterize financial data especially during crisis periods. We utilize this bootstrap test to both estimate the underlying parameters and to test their statistical significance. None of the existing papers on real estate market contagion has used this methodology.

3. Contagion test

In terms of an operational definition of contagion, there is no general agreement within the literature. However, one that is highly used refers to contagion as "a significant increase in cross-market linkages after a shock to one country (or group of countries)" (Forbes and Rigobon, 2002). Based on this definition, a number of studies have been conducted that estimate the correlation coefficients between different markets (see for example, Calvo and Reinhart, 1996; Forbes and Rigobon, 2002; Hon, Strauss and Yong, 2004; King and Wadhwani, 1990; Lee and Kim, 1993; Pretorius and Beer, 2004). Other commonly used methods for testing contagion include: (1) the use of the variance-covariance matrixes in an ARCH or GARCH context to investigate spill-overs between markets (see for example Hamao, Masulis, and Ng, 1990), (2) the examination of changes in a cointegrating vector between countries (see for example Granger et al., 2000; Longin and Solnik, 1995), and (3) the investigation of the determinants of different markets' susceptibility to financial crises (see for example Eichengreen, Rose, and Wyplosz, 1996; Forbes, 2004).[2]

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[1] There are still other channels of contagion which we do not discuss here further. Wealth constraints are one of them. Xiong (2001) studies wealth constraint as an amplification mechanism, while Kyle and Xiong (2001) study it as a spillover mechanism. Also, Gromb and Vayanos (2002) develop an equilibrium model of arbitrage trading with margin constraints to explain contagion. Contagion may be due to wealth effects.

[2] Forbes and Rigobon (2002) provide a review of contagion tests based on cross-correlation coefficients and other methods which are used in some of the articles mentioned here. Still another empirical approach in testing for contagion is to examine whether Granger causality changes during the crisis period, as used for example in Granger, Huang, and Yang (2000) and Hatemi-J and Roca (2005).