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Price discovery process in the emerging sovereign CDS and equity markets



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ABSTRACT

We model two regimes using threshold cointegration and threshold vector error correction model for sovereign CDS and equity markets of thirteen emerging markets. We document evidence of momentum in cointegration relationships in CDS and equity markets of all countries. We find that positive and negative divergences adjust to equilibrium relationship at different speeds and magnitudes depending on the regime. Moreover, the short and long run adjustment process of each asset is nonlinear and regime dependent. Linear modeling may ignore the differential reaction of investors and policy makers and the time-varying market conditions under which economic and investment decisions take place

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1. Introduction

Extant literature surmises that cointegration and price discovery mechanisms are both constant and continuous under linear modeling. This is only realistic if homogeneous agents dominate financial markets. However, a large body of finance literature lucidly document that heterogeneous agents dominate financial markets. Hommes and Florian (2009), using the seminal works of Simon (1991) and Rubinstein (1998), argue that financial markets are complex adaptive systems, dominated by incessantly interacting heterogeneous agents with “bounded rationality”. The heterogeneous agents thus have limited information, cognitive abilities

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and finite time availability for decision-making. Against this background, rationality of agents is limited and the use of rules of thumb is highly prevalent. Therefore, financial markets become nonlinear systems.

According to [Mankiw and Miron \(1986\)](#), the mere existence of ‘calm’ and ‘volatile’ market conditions creates time varying states of the world or regimes. These regimes are testaments of the uncertain environment under which agents make decisions based on the new information they receive and accordingly adjust their expectations. For example: [Lee et al. \(2007\)](#) argue that crisis episodes such Asian crisis of 1997 and sub-prime mortgage crisis of 2007/2008 triggered negative impact on both investors’ wealth and domestic, regional or global economies. This became the foundation of acute convergence of investors’ sentiments and led to asymmetric transmission of price variance among CDS, stocks and bonds across domestic and international markets. In the ‘volatile’ regime, policy makers aggressively intervene in the market and real economy to level the fluctuations and alleviate investors’ fear and overreaction while investors take aggressive actions to rebalance their portfolio and hedge against or minimize further wealth loss.

The pricing of sovereign credit risk using CDS premium, bond yields and equity prices occurs under uncertain markets conditions where institutional investors in the over-the-counter (OTC) market toggle among diverse trading strategies. These strategies generate short and long-term nonlinear dynamic interactions among asset classes, price informativeness and price discovery processes. For any pair of assets, the sign and magnitudes of speed of adjustment to new information also become nonlinear. [Acharya and Johnson \(2007\)](#) show that CDS market asymmetrically and exclusively reveals the “bad news” or adverse shocks associated with credit deterioration. [Chan-Lau and Kim \(2004\)](#), using linear modeling, conclude that the absence of equilibrium price relationship between sovereign bond, CDS markets and the equity markets for most of the sovereigns they covered is partly due to nonlinearities in time series data. These nonlinearities are caused partly by high volatility of security prices and returns that characterize emerging markets ([Bekaert and Harvey, 2002](#)).

[Delatte et al. \(2010\)](#) and [Arce et al. \(2011\)](#) find that, in a single country, price discovery pecking order is reversed above a definite threshold of spread depending on market conditions. In fact, the market in which price discovery occurs may be dependent upon financial, economic, liquidity and other factors not captured by the linearity relationship.

Many past studies have focused on linear price discovery and cointegration between corporate credit default swaps (CDS) and bond spreads or corporate CDS and stock prices pairwise combination among corporate CDS premium, bond spreads and equity prices.⁴ [Gomez & Nikolov \(2003\)](#) finds that looking only at the relationship between credit derivatives and cash bond markets is insufficient, and suggests including equity markets as well in the analysis. Indeed, [Cremers et al. \(2008\)](#) and [Zhang et al. \(2009\)](#) find similar evidence and strongly argue for the case of connecting the prices of CDS and equity markets in pricing credit risk.

Financial literature and theory postulates that if stock markets are efficient, stock prices should be determined fully, quickly and accurately. According to [Merton \(1974\)](#), the probability of default by the firm constitutes a potential credit event. This probability can be estimated using information from the equity market. In their seminal work, [Chan-Lau and Kim \(2004\)](#) extend, formalize and justify the relationship between sovereign CDS and equity market.⁵ The authors suggest that the only significant difference between a corporate and a sovereign reference entity with equal amount of debt is that default risk is higher for the sovereign for every asset value since a sovereign entity may elect to default even when it is technically solvent.

By nature, the sovereign CDS spread is a measure on a country’s aggregate financial health and is supposed to compensate investors in this financial instrument for bearing sovereign default risk of a country. This should be driven by a country’s economic fundamentals. A country’s stock market has long been viewed as its economic barometer. A bearish or highly volatile stock market conveys a negative message to investors on the country’s economic fundamentals. Therefore, we expect that Sovereign CDS has some interrelationship with country stock market.

The capital structure arbitrage elaborated by [Yu \(2006\)](#) can also be applied to the sovereign CDS market and the stock market. For example, when a country has a higher default risk, its stock market performance will be negatively affected by weakening economic indicators due to a high risk premium

⁴ See for example, [Norden and Weber \(2004, 2009\)](#), [Cremers et al. \(2008\)](#), [Zhang et al. \(2009\)](#), [Hull et al. \(2004\)](#), [Blanco et al. \(2005\)](#), [Berndt and Anastasiya \(2007\)](#), [Longstaff et al. \(2005\)](#), [Forte and Peña \(2009\)](#), [Forte and Lovreta \(2012\)](#) and [Fung et al. \(2008\)](#) among others.

⁵ See the detailed explanation and derivations in [Chan-Lau and Kim \(2004\)](#) paper. Other studies that have investigated the link between sovereign CDS and stock markets are [Chan et al. \(2009\)](#), [Ammer and Cai \(2008\)](#) and [Zhang \(2008\)](#).

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