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Market frictions and the pricing of sovereign credit default swaps

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ABSTRACT

This paper contributes to the general understanding of how sovereign CDS prices are formed by studying the information content of pricing errors generated by a non-arbitrage model. We implement a price-discrepancy measure in the spirit of the noise measure introduced by Hu et al. (2013) in the Treasury Bond market, and analyze its main determinants in panel data analysis. The main results show that sovereign CDS pricing errors are systematically related to higher bid-ask spreads. The evidence in this paper also suggests that exits of capital arbitrage during distressed periods, as measured by changes in net offsetting, can be associated to larger pricing errors in sovereign CDS from advanced economies, thereby supporting the main claims of the limit-to-arbitrage theories. These findings are robust for the most common CDS pricing models employed in the industry and different estimation techniques.

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1. Introduction

In this paper, we examine the economic determinants that underlie sovereign CDS pricing errors. The main aim is to ascertain systematic patterns in price divergences from a theoretical non-arbitrage term-structure CDS model stemming from market frictions, transaction costs, and local or global illiquidity conditions. The central hypothesis is that illiquidity-related factors cause declines in arbitrage activity and, hence, price deviations from fundamental values, as discussed by Merton (1987), Tuckman

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and Vila (1992), Schleifer and Vishny (1997), Brunnermeier and Pedersen (2009) and Duffie (2010), among others. As acknowledged in this literature, arbitrage is an inherently risky and costly activity due to market inefficiencies which makes arbitrageurs reluctant to trade when the cost of implementing their strategies is prohibitive. Similarly, the existence of capital constraints and/or capital rescissions, typically observed during market downturning scenarios, impose limits to the strength of arbitrage. As a result, the lack of sufficient arbitrage capital breaks the general agreement about pricing and enables assets to be traded in equilibrium at prices significantly different from their fundamental values. In this context, trading and holding costs as well as other market variables which are expected to have a strong influence on arbitrage capital could explain and even predict price divergences. The study of the role played by such illiquidity-related factors would be particularly insightful in markets which are usually characterized by intense professional arbitrage activity, such as the sovereign CDS market. Like other key aspects involved in the price formation process of these derivative contracts, however, little is formally known on this issue because active CDS trading is a relatively new phenomenon.

This paper strives to contribute to the extant literature and the general understanding on how CDS prices are formed by analyzing the informational content of pricing errors in the sovereign segment, characterizing when mispricing is more likely to occur, and pinpointing the main factors that drive and even predict fundamental-value divergences. To this end, we implement robust panel-data techniques – including two-way cluster errors, fixed-effect panel data, instrumental-variable (IV) and GMM-based panel data estimation – on a broad sample of weekly sovereign CDS spreads in 16 advanced and emerging economies in the period 2008–2012. In this analysis, contemporaneous (lagged) values of different illiquidity-related variables that capture transaction costs and proxy for changes in arbitrage capital at the individual level are used to explain (forecast) a suitable measure of CDS term-structure price divergence when controlling for a number of alternative factors. The measure of price discrepancy, adapted from Hu et al. (2013), is defined as the logarithm of the average root mean square deviation between the market and a theoretical model-implied CDS term structure at a particular date. The main discussion follows for the analysis based on theoretical prices generated by the arbitrage-free default-intensity model in Pan and Singleton (2008). For the sake of robustness, however, we alternatively consider the spline-type model in Nelson and Siegel (1987) and the conditional default probability curve in Houweling and Vorst (2005), noting that the main results are not driven by the particular choice of the theoretical CDS term-structure pricing model.[1]

The main evidence from this analysis us to draw several conclusions. The most important result is that there exists a strong empirical connection between market-wide illiquidity factors and sovereign CDS missvaluation. In particular, larger bid-ask spreads (the most usual proxy for illiquidity and transaction costs in the extant literature) are systematically related to larger CDS pricing errors, both contemporaneously and in one-week ahead periods. Similarly, increments in the number of CDS offsetting transactions (a measure of effective trading activity) tend to increase pricing errors, mainly, in the segment of advanced economies. The general rationale for these general findings lies in the existence of a link that ties arbitrage activity to market illiquidity, as discussed previously. Consequently, the empirical evidence in this paper provides empirical support for the general suitability of the theoretical claims of the limit-to-arbitrage literature in the specific context of sovereign CDS markets.

In addition, this paper provides clear insight into the systematic patterns – both in the time-series and in the cross-section – that characterize mispricing in sovereign CDS markets. As expected under the arbitrage capital hypothesis, price deviations substantially increase during periods of financial distress such as Lehman's collapse in September 2008, or the Greek bailout in March 2010. Pricing errors are mostly contributed by divergences at the 1-year maturity, which could be related to limited cash vehicles with which to hedge such instrument, as discussed by Pan and Singleton (2008).

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[1] There exist several methods for pricing default swaps. On the one hand, a common practice in the industry is to bootstrap the survival probabilities from the observed quotes. To this end, both nonparametric (piecewise constant hazard rates) and parametric (Nelson and Siegel, 1987) interpolation methods are commonly used in practice. On the other hand, the intensity modeling approach has been extensively accepted among researches for pricing fixed income instruments such as corporate bonds (Lando (1998) or Duffie and Singleton, 1999) and default swaps (Longstaff et al. (2005), Pan and Singleton (2008) and Longstaff et al., 2011).

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