Title: Measuring Liquidity in the CDS market

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Developments in the credit default swap (CDS) market, such as contract standardization, growth of a fairly heterogeneous group of financial and non-financial counterparties and better mechanisms for price discovery, have turned it into a USD 57 trillion market in 2008 from a merely USD 180 billion in 1997 (BIS 2008; Mengle, 2007). Industry sources believe that a CDS spread now serves as a benchmark price for the corporate debt spread (de Teran, 2008). CDS contracts present several advantages over bonds. They allow market participants to trade credit risk separately from interest rate or currency risk. It is much easier to go long or short credit using a CDS contract due to its synthetic nature: one does not need to fund a bond position to have the same credit risk exposure in this OTC market. In particular, margin need not be posted at contract inception. The CDS market also does not suffer from the short-sale constraints that the cash bond market does, facilitating trading of larger quantities of credit risk.

Numerous studies (Amihud 2002; Amihud & Mendelson 1989; Hasbrouck & Seppi 1999; Chordia et al. 2000, Perraudin & Taylor 2003, among others) have investigated liquidity measures for equities, bonds and currencies and even for financial markets as a whole (Baker & Stein 2004; Sarr & Lybek 2002; Bank of England 2007). However relatively less is known about the liquidity of credit derivative contracts and, in particular, about the liquidity of credit default swap (CDS) contracts. Recent contributions include Tang & Yan 2007 ; Bongaerts et al. 2007 ; Chen et al. 2005. The synthetic and OTC features of the CDS market, some of which were listed above, imply that some of the metrics proposed for analysing changes in liquidity of exchange-traded securities (e.g. daily price change by dollar volume) are less relevant for this OTC market.

In this study we develop a statistical (logistic regression-based) model of liquidity for the single-name CDS market that combines various market price-based indicators of liquidity. The factors considered include the number of market dealer-brokers actively trading in the market, the freshness of each contributor's quotes, bid-ask spread levels and the dispersion in the mid-quotes across

brokers.[1] The model generates a *composite* liquidity score for each underlying reference entity that provides a basis for ranking these entities in liquidity terms. The model does not attempt to explain the structural determinants of CDS liquidity and, as such, is best interpreted as a reduced-form model.

The model's biggest contribution is that it generates a liquidity score which provides a framework to judge the relative liquidity of different CDS reference entities. This can be particularly helpful for banks and asset managers identifying their exposure to the most liquid and least liquid CDS contracts and, hence, in strengthening their liquidity risk management procedures.

One useful statistic that the model also generates is a *market liquidity score* – this index serves as a benchmark of average liquidity across the CDS universe. The dynamics of the market liquidity score show that (on average) CDS market liquidity has improved over 2008, despite the financial crisis. The model generates several other interesting findings. From a sectoral perspective, with a three-year data sample (Jan. 2006 to Oct. 2008), CDS written on Telecoms and Consumer Services appear to be the most liquid on average, with Utilities being the most illiquid. The liquidity distribution of Financials shows an interesting change over the crisis period. While the average CDS score of Financials has not moved much between 2006 and 2008, there has been substantial movement at the tails. Some names have become extremely illiquid. At the same time there has been some movement in the opposite direction. Morgan Stanley, in the news during September 2008 along with other investment banks, jumped from a CDS liquidity ranking of 15th in 2006 and 7th in 2007 to 2nd in 2008. Amongst Automotives, Ford appears to have become more illiquid in the second half of 2008 even though its CDS spread has been widening, probably because a large number of its CDS were being torn up.[2]

The model also sheds light on sovereign CDS. Amongst the many entities considered in the sample, the evolution of Iceland's CDS provides an interesting case study for the model's performance. As news unfolded about the Icelandic government's inability to pay off its debt and of its troubled banks, the expectation would be of a surge in protection bought against default. The model

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[1] The underlying data analysis confirms that, for the OTC market in which CDS contracts trade, it is preferable to consider *several* price- and dealer activity- related factors (rather than a single one).

[2] There is independent confirmation from the US Depository Trust Clearing Corporation (DTCC) that contracts written on Ford have been falling in the last quarter of 2008.

confirms this - Iceland's CDS became increasingly liquid over 2008. Although Iceland's liquidity rank was below the market average in 2006-7, it went well above the average over 2008.

Besides sectoral comparisons and benchmarking, the model scores also provide interesting insights on the relationship between liquidity and credit. After disentangling the two statistically, the model suggests that very high (e.g. AAA and AA) and very low credit (e.g. CC/CCC) quality entities *both* appear to be relatively illiquid when compared to B-rated credits. The extent of the illiquidity at the two extremes also changes over time challenging both the widely-held beliefs that the liquidity—credit relationship is monotonic and mostly static.

The CDS liquidity model has undergone thorough statistical validation tests. The coefficients of the regression model are all statistically significant. The model also has high discriminatory power. On a near three-year sample (including over 1 million observations on more than 1000 reference entities), the model has an (average) Accuracy Ratio of over 70%; the model's predictors are able to successfully identify those reference entities which the wider market perceives to be most liquid from those which it does not.