Valuation of systematic risk in the cross-section of credit default swap spreads

Arndt Claüßen\textsuperscript{a,},* Sebastian Löhr\textsuperscript{a}, Daniel Rösch\textsuperscript{b}, Harald Scheule\textsuperscript{c}

\textsuperscript{a} Leibniz Universität Hannover, Institute for Banking and Finance, Königsworther Platz 1, 30167 Hannover, Germany
\textsuperscript{b} Universität Regensburg, Chair of Statistics and Risk Management, Universitätsstraße 31, 93040 Regensburg, Germany
\textsuperscript{c} University of Technology, Sydney, PO Box 123, Broadway, NSW 2007, Australia

\textbf{A R T I C L E   I N F O}

\textbf{Article history:}
Received 12 June 2015
Received in revised form 23 May 2016
Accepted 28 June 2016
Available online xxx

\textbf{JEL classification:}
G1
G2

\textbf{Keywords:}
Credit default swaps
Cross-section
Systematic risk

\textbf{A B S T R A C T}

We analyze the pricing of systematic risk factors in credit default swap (CDS) contracts in a two-stage empirical framework. Firstly we estimate contract-specific sensitivities (betas) to several systematic risk factors by time-series regressions using quoted CDS spreads of 339 US. entities from January 2004 to December 2010. Secondly, we show that these contract-specific sensitivities are cross-sectionally priced in CDS spreads after controlling for individual risk factors. We find that the credit market climate, the Cross-market Correlation, and the market volatility explain CDS spread changes and that their corresponding sensitivities (betas) are particularly priced in the cross-section. Our basic risk factors explain about 83% (90%) of the CDS spreads prior to (during) the crisis.

© 2016 Board of Trustees of the University of Illinois. Published by Elsevier Inc. All rights reserved.

\section{1. Introduction}

During the global financial crisis (GFC) the spreads of credit default swaps (CDS) heavily increased across most CDS dealings on corporate debt claims, which was at least partly triggered by the high numbers of corporate defaults on bonds and loans. This increase was more pronounced for CDS spreads (multiple of 8.95) than for real-world default rates (multiple of 3.52). In fact, the rate of increase of CDS spreads on high-rated debt claims became much higher than on lower-rated credit assets, although there was any default of the highest rated issuers. For example, the average CDS spread for ‘AAA’-rated bonds increased by a multiple of 37.67, while the average CDS spread for ‘B’-rated bonds multiplied only by 6.75.

On the corporate debt market this phenomenon takes part in the so-called credit spread puzzle, addressing the mismatch between prices for the product’s physical default risk, e.g., justified by historical default rates, and the risk neutral valuation of the product’s total risk (compare Amato & Remolona, 2003; Chen, 2010). An understanding of this puzzle helps to determine appropriate risk premia and avoid possible negative outcomes from mispriced spreads. The latter, we may have seen in the spring of 2007, when financial markets, and in particular, derivative markets were calm and did not anticipate the crisis (compare Mendel & Shleifer, 2012).

Therefore, apart from addressing corporate default risk (Giesecke, Longstaff, Schaefer, & Strebulaev, 2011), several empirical studies looked beyond theoretical contingent claims and accounted for other pricing factors such as liquidity (Bongaerts, Jong, & Driessen, 2011; De Jong & Driessen, 2012; Dick-Nielsen, Feldhütter, & Lando, 2012; Friedewald, Jankowitsch, & Subrahmanyam, 2012; Tang & Yan, 2010). As suggested by Chen (2010), Collin-Dufresne, Robert, Goldstein, and Martin (2001) and Iannotta and Pennacchi (2011) for corporate debt, other authors also identified systematic risk factors driving CDS spreads Amato (2005), Arora, Gandhi, and Longstaff (2012), Blanco, Brennan, and Marsh (2005), Wang, Zhou, and Zhou (2013). Most of the recent studies analyze time-series properties of credit spreads or credit spread changes by focusing on time-series regressions. In summary, the current literature on both bond and CDS markets focuses on the identification of credit spread drivers and aims to answer the question of how these determinants are priced.

Our paper provides the following contributions: firstly, we address systematic risk exposures of CDS contracts and identify at least three systematic risk factors as important drivers for CDS spread changes. We identify the Credit Market Climate, the Market Volatility and the Cross-market Correlation as common determinants of CDS spread changes. Secondly, based on our CDS database from

\begin{center}
\textbf{http://dx.doi.org/10.1016/j.qref.2016.06.007}
\end{center}

1062-9769/© 2016 Board of Trustees of the University of Illinois. Published by Elsevier Inc. All rights reserved.

Please cite this article in press as: Claüßen, A., et al. Valuation of systematic risk in the cross-section of credit default swap spreads. The Quarterly Review of Economics and Finance (2016). \textbf{http://dx.doi.org/10.1016/j.qref.2016.06.007}
2. Determinants of credit default swap spreads

2.1. Theoretical spread determinants

The credit risk literature differentiates between structural and reduced-form models. The latter treat default as an exogenous event modeled by a hazard-rate process (Duffee, 1998; Duffie & Singleton, 1999), while in structural models (Merton, 1974) the default event is triggered when the firm’s assets fall below a critical threshold. The value of a firm’s asset is modeled by a stochastic process and the default threshold is a function of the amount of debt outstanding. The values of debt claims are determined under the risk-neutral measure by computing the present value of their expected future cash flows discounted at the risk-free rate. As resulting advantage, structure models provide theoretical insights about the firm’s default risk and the relation to external risk factors and firm’s fundamentals (compare Collin-Dufresne et al. (2001)). Since a credit default swap extracts and transfers the default risk of corporate debt, CDS investors – in their role as protection seller – periodically receive a premium payment (premium leg) for covering losses in underlying debt claims (protection leg). In the absence of arbitrage and in the presence of risk-neutral valuation, the present value (PV) of the premium leg equals the PV of the protection leg. Hence, depending on the underlying debt claim future expected cash flows – namely the protection and premium payments – of the related CDS are analogously discounted to determine the fair CDS spread.

Therefore, motivated by Merton (1974) and Collin-Dufresne et al. (2001), we describe a CDS spread $S_{d,t}$ of contract $\vartheta$ at time $t$ through (1) the price of underlying debt claims, (2) its related contractual cash flows, (3) the time-specific risk-free rate $r_t$, (4) common state variables $\vartheta_t$, which cross-sectionally affect all credit spreads simultaneously and (5) individual state variables $\vartheta_{d,t}$, which are firm-specific. This leads to

$$S_{d,t} := S_{d,t}(C_{d,t}(F_{d,t}), r_t, \vartheta_t, \vartheta_{d,t}),$$

with contractual payments $C_{d,t}$ depending on the firm value $F_{d,t}$. We suppose that credit spread changes are determined given the current values of the time-specific variables $\vartheta_t$ and $\vartheta_{d,t}$, respectively. Also referring to the structural framework, we may predict (i) determinants of CDS spread changes and (ii) whether changes in these variables should be positively or negatively correlated with changes in the CDS spreads. Consistent with literature, we propose the following common state variables reflecting systematic risk:

1. Changes in the Spot Rate. In theory, the static effect of a higher spot rate is to increase the risk-neutral drift of the firm value process (Duffee, 1998; Longstaff & Schwartz, 1995). The higher drift reduces the firm’s probability of default and thus the price of related derivatives offering protection against default losses. We therefore expect that CDS spreads are negatively correlated with the risk-less interest rate.

2. Changes in the Slope of the Yield Curve. Independent from the structural framework, some authors argue that the interest term-structure is upon other factors mainly driven by (i) the interest level and (ii) the slope characteristics (Blanco et al., 2005).

The slope of the yield curve is often seen as an indicator of economic wealth: while a positive slope indicates a prosperous economy, a negative one reflects expectations of an economic downturn. Hence, the CDS spread may decrease if an increasing slope of the interest curve indicates higher expected short rates, as also argued by Collin-Dufresne et al. (2001) for credit spreads. By contrast, a decreasing term-structure may indicate an economic downturn leading to higher losses given default since recoveries are assumed to be negatively correlated to the macroeconomy (Altman, 2008; Bade, Rösch, & Scheule, 2011; Frye, 2000). As a consequence, the liquidation risk for corporate debt may be higher leading to widening CDS spreads.

3. Changes in the Market Volatility. Since debt claims exhibit characteristics similar to a short position in a put option, it follows from the option-pricing framework that option prices increase with increasing volatility (Merton, 1974). Intuitively, with an increase of volatility, the firm’s default probability increases and thus the related CDS spread increases due to the higher default risk (compare Ericsson, Jacobs, and Oviedo (2009)).

4. Changes in the Credit Market Climate. The Credit Market Climate may reflect the market view of the overall credit risk. If the global economy is turning down in line with decreasing recoveries, the weakening market conditions should increase the firms’ default risk as well as related losses. Thus, the increased credit risk on credit markets may lead to an increase of the overall credit spread level (compare Collin-Dufresne et al. (2001)). The Credit Market Climate can be seen as a common market factor similar to the market index in the CAPM. It should be strongly affected by economic conditions. We expect a cross-sectional increase of default risk due to weakening economic conditions leading to increased CDS spread levels. Hence, the CDS spreads should be positively correlated with the Credit Market Climate.

5. Changes in the Cross-market Correlation. Foresi and Wu (2005) argue that downside movements in any equity index are likely to be highly correlated with those in other markets as a result of global contagion. Expanding this argument to credit markets, we expect higher CDS spreads if Cross-market Correlations increase, because the prospects for risk diversification on global...
دریافت فوری
متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات