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What determines bank CDS spreads? Evidence from European and US banks

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ABSTRACT

We examine the determinants of CDS spreads for a sample of European and US banks. The key balance sheet determinants are leverage, asset quality, funding stability, and bank size, and the key market determinants are equity returns, the term structure of interest rates and bank-specific and host country sovereign credit risk. Our results would appear to confirm the applicability of Merton (1974)-type models extended to include market variables to the understanding of bank credit risk.

1. Introduction

In recent years there have been at least three important developments in empirical applications of the Merton (1974) approach to modelling credit default risk. First, structural or balance sheet determinants were supplemented with market variables because of dissatisfaction with the explanatory power of structural models (the so-called "credit spread puzzle" [1]). Second, following the development (and subsequent rapid growth) of the market for credit derivatives in the early 1990s, credit default swap (CDS) data were incorporated in place of bond yields in studies of credit risk.[2] This offered several advantages, including a more direct measure of credit risk (Hull et al., 2004), a more rapid price-discovery process (Blanco et al., (2005), and less distortion from taxes and the liquidity premium (e.g., Longstaff et al., 2005; Chen et al., 2007; Fabozzi et al., 2007). Third, it was accepted that Merton-type models could also be used to study credit risk in the banking sector. Early empirical studies were focused on the nonbank corporate sector because it was assumed that banks' asset-liability structure and regulatory obligations would limit the variation in leverage ratios and exaggerate the credit-spread puzzle. However, leverage and capital ratios have varied across banks and over time reflecting different preferences as to risk

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[1] The "credit spread puzzle" was the term given to the empirical finding that structural variables appeared to explain only a moderate portion of credit spread variability (see, e.g., Duffee, 1998; Driessen 2005).

[2] Benkert (2004) derived the applicability of Merton's (1974) structural theory to the CDS market.

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Table 1
Variable description, data source and expected coefficient signs.

Variable	Description	Data source	Expected sign on coefficient
A. Balance sheet determinants			
Capital adequacy	Ratio of Tier 1 capital to risk-weighted assets	Bankscope	–
Leverage	Ratio of liabilities to the sum of liabilities and equity	Bankscope	+
Non-performing loans	Ratio of non-performing loans to total assets	Bankscope	+
Loan loss provisions	Ratio of loan loss provisions to total loans	Bankscope	+
Bank size	Natural logarithm of total assets	Bankscope	–
Funding stability	Ratio of deposits to total liabilities	Bankscope	–
B. Market determinants			
Stock market return	S&P 500 index for US banks; Stoxx index for European banks	Datastream	–
Stock market volatility	The CBOE Volatility Index for US bank stocks; VSTOXX index for European banks	Datastream	+
Risk free interest rate	Yield on 5-year government bonds	Datastream	–
Term structure	10-year government bond yield less yield on 2-year Treasury bonds	Datastream/authors' calculation	–
Bank-specific credit risk rating	Index ranging from 1 (Moody's rating Ca or less than Ca) to 17 (Moody's rating Aaa)	Datastream/ Moody's	+
Sovereign credit risk rating	Index ranging from 1 (Moody's rating Ca or less than Ca) to 17 (Moody's rating Aaa)	Datastream/ Moody's	–

taking (Tian et al., 2013; Kalemli-Ozcan et al., 2012; Brewer et al., 2008; Diamond and Rajan, 2000). This, combined with an extensive theoretical literature showing that changes in bank leverage can propagate adverse shocks to the real sector (e.g., Kiyotaki and Moore, 1997; Bernanke and Gertler, 1995), and that systemic banking crises remain relatively frequent and costly (Laeven and Valencia, 2012), has encouraged several studies using CDS spreads to model bank credit risk (e.g., Samaniego-Medina et al., 2016; Hasan et al., 2014; Annaert et al., 2013; Chiaramonte and Casu, 2013; Alter and Schüler, 2012). In this short paper, we contribute to the literature on the determinants of bank CDS spreads in two ways. First, by focusing on the banking sector and testing the impact of structural and market variables we extend what remains a limited banking literature on the topic. Second, we present results from a sample that offers greater time (2007–2016) and cross-country (USA, "core" euro area countries, "non-core" or periphery euro area countries, and non-euro adopting European countries) variation than has been typical in the other banking studies.[3]

2. Methodology, data and descriptive statistics

Our baseline model is typical of the CDS spreads literature:

$$CDS_{it+1week} = \alpha + \beta(X_{it}) + \gamma(Z_{it}) + \varepsilon_{it}$$

where $CDS_{it+1week}$ is a bank's CDS spread (in basis points) one week after the end of each quarter, $X_{it}$is a vector of bank balance sheet variables, Z_{it} is a vector of market variables, and i, and t denote banks, country and time period, respectively.

Five-year CDS spread data on senior CDS contracts was chosen because it is the most liquid of the spread tenors and the CDS contracts are all quoted in U.S. dollars to avoid exchange rate challenges. The data are recorded in percentages, so a regression coefficient of 1.50 represents 1.50% or 150 bps. We focus on spreads one week after the end of the quarter on the assumption that bank balance sheet data are not immediately available at the end of the quarter. The balance sheet and market variables are commonly used in the credit risk literature. The balance sheet variables in X_{it} include: the bank capital adequacy ratio, which captures a bank's capability to absorb losses and cope with exogenous shocks; leverage, which captures bank indebtedness and risk appetite; nonperforming loans and loan provisioning, which give an indication of bank asset quality; bank size, to capture the ability to diversify risk through economies of scope, and because market participants may deem large banks too big to fail; and the ratio of retail deposits to total liabilities, because retail deposits are a relatively stable source of funding. *A priori*, we expect more capital, bank size, and retail deposit funding to reduce CDS spreads, and more leverage, nonperforming loans and loan provisions to increase spreads. The market variables included in Z_{it} are: stock market returns, to capture the general business climate, which is assumed to be better if stock returns are higher; the

[3] For our purposes, the "core" euro area countries are Austria, Belgium, France, Germany, and the Netherlands; the "non-core" euro area countries are Greece, Italy, Portugal, Spain, and Ireland; and the non-euro adopting European countries are Denmark, Sweden, Switzerland and the United Kingdom.