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Hedging stock sector risk with credit default swaps

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ABSTRACT

This study examines the potential risk reducing benefits of credit default swaps (CDS) against risk in U.S. stock market sectors from 2004 to 2011. Tests of GARCH dynamic conditional correlation coefficients indicate that CDS serve as an effective hedge against risk in all stock sectors. CDS also provide a safe haven in times of extreme stock market volatility and during periods of financial crisis in a limited number of sectors.

1. Introduction

Credit default swaps (CDS) protect against the risk of a "credit event" such as a bond restructuring or default.[1] They are liquid financial products that can be traded in over-the-counter secondary markets, represent underlying firm credit risk, and react immediately to new public information.[2] In contrast to bonds that contain both credit risk and interest rate risk, CDS reflect only credit risk. The primary investors in the CDS market include banks, investment banks, hedge funds, and mutual funds. Of all traded credit derivatives, the CDS market is the largest.

This paper uses GARCH dynamic conditional correlation (DCC) analysis to investigate a previously unstudied aspect of the CDS market: CDS indexes as a hedge, safe haven, or diversifier against stock sector returns in the United States.[3] We are motivated by the recent literature that documents the linkage between default risk and stock returns. Studies show that default risk is systematic and positively priced by investors.[4] Since CDS offer protection against default risk, a positive association between stock returns and default risk implies that CDS provide potential insurance benefits to stock investors. In contrast, some studies find that stocks with high default risk earn lower expected returns.[5] The anomalous result of a negative association not only contradicts fundamental financial theory, but also suggests that a long position on CDS may not offer any downside protection to stock investors.

In the event of default, recovery rates among industry sectors vary in tandem with asset tangibility. We therefore include sector effects in the analysis. Traditionally, sectors with insignificant tangible assets possess below average recovery rates; we expect CDS to be more valuable to investors for hedging purposes in those sectors.[6]

CDS indexes represent a benchmark of entities based on a particular market sector or broad market. Compared with single-name CDS, CDS indexes are generally more liquid, have higher trading volume, and provide exposure to a wide range of credit risk. These instruments are used by bondholders to reduce the risk of default, by arbitrageurs in the credit derivatives markets, and by speculators who seek to profit from a change in the expected default risk of bonds from an individual firm, bond index, collateralized debt obligation, or country.

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[1] Starting in 2009, payouts on U.S. based corporate debt CDS are only made in the event of bankruptcy or a missed payment. European corporate debt CDS payouts may be made for involuntary debt restructuring.

[2] See Palladini and Portes (2011).

[3] We identify only one study of single name CDS as a hedge against stock risk (see Calice et al., 2013).

[4] Vassalou and Xing (2004) and Anginer and Yildizhan (2012) find that stocks with higher default risk earn higher returns.

[5] Dichev (1998) and Campbell, Hilscher, and Szilagyi (2008) document that stock returns are inversely related to default risk. Garlappi, Shu, and Yan (2008) attribute the default risk anomaly to shareholder advantage. They find stock returns of firms with high shareholder bargaining power, large in size and low in R&D expenditure to asset ratio, covary negatively with default risk.

[6] Schneider et al. (2011) demonstrate that industry affiliation accounts for about 10% of variance in implied loss given default.

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In the marketplace, CDS prices increase when the credit risk of the underlying firm increases, and decrease as credit risk declines. A "naked" CDS position exists when the investor does not own any assets in the underlying firm. Investors who purchase CDS are taking a "short" position, benefiting from a decline in credit quality of the underlying firm. Alternatively, investors who sell CDS are taking a "long" position with increasing profits as the underlying firm improves in credit quality.

As protection against a credit event, CDS prices are determined by the probability of default of the underlying firm. Merton (1974) proposed the first structural credit risk model of default risk using the market value of a firm's equity to determine its default risk. This model assumes that the asset value of the firm follows geometric Brownian motion and the firm's equity and debt are treated as contingent claims.[7] Applying the Merton (1974) model, the theoretical determinants for valuing CDS prices include the risk-free interest rate, firm leverage, and volatility. Increases in the risk-free rate are associated with lower CDS prices due to risk-neutral drift. Leverage, as measured by increased levels of debt, leads to larger CDS prices due to an increase in the probability of default. Asset volatility (using equity as a proxy) is positively related with CDS prices.

The CreditGrades model, jointly developed by J.P. Morgan, Goldman Sachs, Deutsche Bank, and RiskMetrics in 1997, is among the most widely used credit risk models in use today. CreditGrades utilizes an extension of Merton's (1974) structural model based on Black and Cox (1976), and is primarily used to calculate theoretical CDS prices derived from both a firm's equity prices and balance sheet data.[8] Similar to the Merton (1974) model, CreditGrades assumes a firm's debt and equity are contingent claims backed by a firm's assets.

Theoretically determined CDS prices calculated using equity-based structural credit risk models (e.g., CreditGrades) should be contemporaneously correlated with actual CDS prices if information flows simultaneously into both the stock market and CDS market. Byström (2006) and Yu (2006) confirm a strong link between theoretically determined CDS prices using an equity-based model of a company's credit quality with observed CDS prices in the market. As liquid and tradable financial instruments, CDS prices (both theoretically and empirically) should consistently and contemporaneously react to new information in the market, including during times of market turmoil. The lead-lag pattern between CDS and stocks, however, is not definitively established in the literature.

Following Baur and Lucey (2010), an effective hedge is defined as an asset that is consistently uncorrelated or negatively correlated to stock price movements. A safe haven is an asset that is consistently uncorrelated or negatively correlated to stock price movements during times of market turmoil. A diversifier is an asset with positive, but imperfect correlation with stock prices.

There are three main findings presented in this study. First, CDS are a hedge against stock sector risk as evidenced by significant negative correlations between CDS and stocks in all sector indexes. Second, in times of extreme stock market volatility, CDS are either a strong or weak safe haven in most stock sectors. Third, CDS are generally a weak safe haven in most stock sectors during the U.S financial crisis.

The remainder of this article is presented as follows. Section 2 provides a review of the literature on the CDS market and credit risk theory. Section 3 describes the CDS data, and the relationship between the CDS and stock market index of each sector. Section 4 provides the methodology and specification of the models used. Section 5 contains the empirical analysis. Section 6 concludes the study.

[7] Commercial implementation of the model is available using Moody's KMV model.

[8] See Finger et al. (2002) for a detailed overview of the CreditGrades Technical Document at: www.msci.com/products/riskmetrics.html

2. Literature

Examination of credit risk and stocks originates with Black and Scholes (1973). The contingent-claims analysis model is introduced by Merton (1974) and expanded by Black and Cox (1976), Leland (1994), Longstaff and Schwartz (1995), and Collin-Dufresne and Goldstein (2001). The literature generally confirms a strong linkage between default risk and stock returns, but diverges into essentially two camps. Early studies focus on the ability of default risk to explain idiosyncratic risk using credit spreads between risky and low risk bonds (see Fama & French, 1989; Fama & Schwert, 1977; and Keim & Stambaugh, 1986). Opler and Titman (1994) and Asquith, Gertner, and Scharfstein (1994) show that bankruptcy is an idiosyncratic risk, related to firm-specific factors.

In contrast, Denis and Denis (1995) demonstrate that default risk is related to macroeconomic factors tied to the business cycle, which is consistent with systematic risk rather than idiosyncratic risk. More recent studies have also leaned toward default risk as systematic risk. Elton, Gruber, Agrawal, and Mann (2001) conclude that much of the information (85%) in default spreads is actually unrelated to default risk.[9] Vassalou and Xing (2004) utilize a modified Moody's KMV model to demonstrate that default risk explains a cross section of equity returns, i.e., default risk is systematic. Studies finding that default risk explains idiosyncratic risk generally use accounting models, financial statement data, or bond market data. Conclusions that default risk is systematic risk, including Vassalou and Xing (2004), use equity-based models and stock data. Equity-based models dominate the most recent literature.

The literature documents CDS as an effective measure of credit risk. Blanco, Brennan, and Marsh (2005) link the theoretical arbitrage relationship between CDS and bond yield spreads in a sample of European firms. The authors find that CDS lead bond credit spreads in the price discovery process. Ericsson, Jacobs, and Oviedo-Helfenberger (2009) use linear regression and principal components analysis on a dataset of bid/ask quotes to test the theoretical determinants of CDS. The study concludes that leverage, volatility, and the risk-free rate of interest are important determinants of CDS as predicted by Merton (1974). Cremers, Driessen, and Maenhout (2008) find a positive correlation between CDS spreads with stock option implied volatility levels. Carr and Wu (2009) confirm the relationship between market risk, as measured by stock return variance, and credit risk indicated by default arrival in their pricing model of stock options and CDS. The authors find that CDS contain overlapping information on the market risk and the credit risk of the company.

Zhu (2006) uses cointegration to show that CDS markets lead bond markets in the long-term, but the short-term relationship shows substantial deviation from theory. Norden and Weber (2009) examine the lead/lag relationships between CDS markets, bond markets, and stock markets. The authors find that stocks lead both CDS and bonds. The study also shows that CDS Granger-cause bonds more than bonds Granger-cause CDS. Importantly, the authors suggest that price discovery is more attributable to the CDS market than the bond market in a sample of firms from the U.S., Europe, and Asia from 2000 to 2002.

There are few published studies of the CDS index market in the literature. Byström (2006) compares theoretically and empirically calculated CDS of eight European iTraxx indexes from June 2004 to March 2006. The author finds a strong link between CDS and stock prices in the European markets, and shows the efficacy of simple trading strategies leading to profitable results. Alexander and Kaeck (2008) extend the Byström (2006) study and find that interest rates, stock returns, and volatility are determinants of CDS. The authors utilize a Markov switching model to accommodate the importance of regime changes in the CDS market. The authors find that CDS indexes are both regime dependent and sector dependent. In regime dependence, CDS react

[9] Collin-Dufresne and Goldstein (2001) find a similar result for bond spreads.