

A Review of the Empirical Interrelations among the CDS, Bond and Stock Market

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Abstract The relationship between a company's stock and its respective credit default swaps (CDS) and bonds is far from obvious. In a previous article, we have described the theoretical thoughts about jointly modeling debt and equity (see Mai, 2012). Here, we want to give an overview about the empirical relationships between those markets and the resulting implications for capital structure arbitrage. Interestingly, we show that CDS react differently than bonds and that the sensitivity between the markets is affected by additional factors such as credit quality.

Introduction Capital structure arbitrage aims at exploiting mispricings between different tranches in the capital structure of a specific company. While limiting the investment to one type of security (e.g. trading a senior versus a subordinate bond) requires specific knowledge of the detailed structure and mechanics of that security class, seeking arbitrage between equity and debt initially demands a sound understanding of the general interrelations between those two markets. Since CDS show certain favorable characteristics for capital structure arbitrageurs and differing reactions to the equity market than bonds, we include them in our broad overview of empirical relations between those markets. Besides satisfying mere curiosity, this work shall provide information about which asset classes within those markets suit best for building a capital structure arbitrage position. The fundamental basis of arbitrage between equity and debt is that positive stock returns are associated with negative CDS and bond spread changes: A rise in the stock price of a company typically goes along with an increase in the firm's financial soundness that lowers the probability of the company to default on its debt. Consequently, the bond's risk premium, i.e. its spread, decreases and as a CDS is basically an insurance for the case of a bond's default, its spread lowers as well.¹ The reason for this work is the fact that the extent of co-movement with the equity market differs notably between the CDS and bond market and also within different segments of the respective markets. The following stylized facts comprise a selection of recent findings from both the academic and professional

¹ Alternatively, it can be argued that positive stock returns may be associated with positive CDS and bond spread changes when new information relates to increasing volatility of the firm's asset return. However, Kwan (1996) cannot provide empirical evidence for this volatility-based reasoning.

research, which are surveyed in the main body of this article:

- a) Stock and CDS markets lead the bond market
- b) The CDS market is more sensitive to the stock market than the bond market
- c) The strength of co-movement increases the lower the credit quality
- d) The magnitude of relationship changes with sentiment through time
- e) Correlation naturally doesn't always hold – special corporate events can lead to extreme, adverse movements

a) Stock and CDS markets lead the bond market

Firm-specific regressions show that the stock market leads both other markets (see Kwan, 1996; Longstaff *et al.*, 2003 and Norden and Weber, 2009). In other words, price changes of the CDS and bond markets show a certain time delay compared to stock returns. This supports the view that equity markets incorporate new information more quickly due to the higher frequency of trades and greater number of market participants. Moreover, at a weekly and daily frequency, CDS spread changes more often lead bond spread changes than vice versa (Norden and Weber, 2009). Consequently, the stock market updates information the fastest, followed by CDS and then bond markets. The reason can be found in the characteristics of the stock market that facilitate a continuous flow of transactions which is not the case in the bond market where short positions are more difficult to establish. CDS, however, allow a short position to be more easily taken. Besides, the lead-lag relationship has theoretical implications on the mark-to-market valuation of an arbitrageur (the delay among the changes in equity, CDS and bond positions can result in short-term losses), however the extent of time gap is hard to specify precisely.

b) The CDS market is more sensitive to the stock market than the bond market

Both CDS and bond spreads are affected by credit, market and interest rate risk. However, since CDS are unfunded trades (i.e., no major upfront, but frequent premium payments), while corporate bond trades are funded (one has to fund the purchase of the bond at inception), bond spreads are considered to be more strongly bound to funding liquidity than CDS spreads.² It is common understanding that the determining factor for bond and CDS spreads is the default risk. Longstaff *et al.* (2005) show that the default component represents between 50% to 80% of the bond spreads. Though, other researchers find a smaller impact of default risk. As an extreme case, Elton, Gruber, Agrawal, and Mann (2001) attribute only 25% of the corporate bond yield spread to the default premium. Theoretically, CDS spreads should experience the same exposure to default risk as

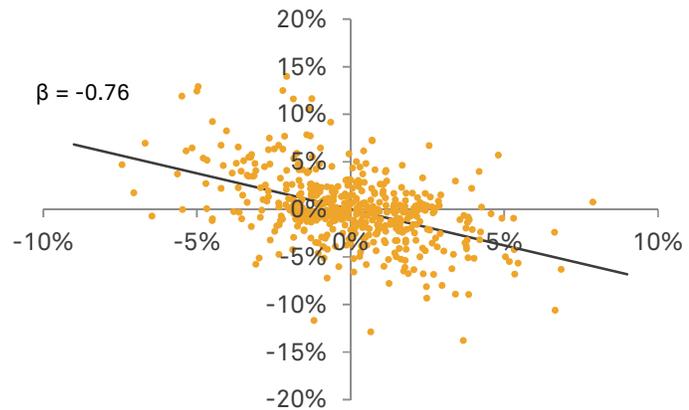
² Aunon-Nerin, Cossin, Hricko, and Huang (2002) and Tang and Yan (2007) provide studies exploring the determinants of corporate CDS premia other than default risk. While the former authors claim that liquidity measured as market capitalization does not matter, the latter study finds a high positive liquidity premium in CDS transaction premia.

bond spreads, since they bear the same probability of default. Consequently, a change in the financial soundness of a firm approximated by its stock return should affect bond and CDS spreads to the same extent. However, Collin-Dufresne *et al.* (2001), Blanco *et al.* (2005) and Norden and Weber (2009) find that the stock market has a higher impact on CDS than corporate bonds spread changes. Figure 1 shows this sensitivity for Telecom Italia SpA.

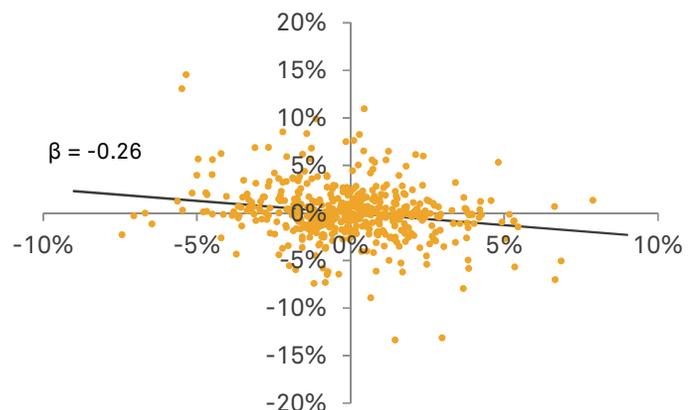
Sensitivity of CDS and bond spreads to stock returns

Figure 1: Daily relative changes in 5 year CDS / bond spreads with respect to stock returns for Telecom Italia SpA from January 2011 to December 2012

(a) Daily running spread changes of 5 year CDS to stock returns



(b) Daily Z-spread changes of synthetically created 5 year bond to stock returns



Source: Bloomberg, XAIA

c) The strength of co-movement increases the lower the credit quality.

Several papers show that the sensitivity of bond spreads to the stock market increases the lower the credit rating (see Blume *et al.*, 1991; Cornell and Green, 1991; Kwan, 1996; Collin-Dufresne *et al.*, 2001, and Avramov *et al.*, 2004). Norden and Weber (2009) find the same for the CDS market. The underlying reasoning is

as follows: credit spreads of companies with ratings of A or above are more correlated to the general credit supply and interest rates than to default risk; the low probability of default is only slightly affected by changes in equity prices. If the credit rating deteriorates, the default risk becomes a larger proportion of the bond spread.³ Any further reduction in the company's equity buffer increases the default probability at a higher rate. However, one can argue that for very speculative companies the performance of their debt and equity is very name-specific, and often determined by anticipated corporate events such as restructurings and takeovers that affect the two sides of a capital structure in an asymmetric manner.⁴ To sum up, the high yield segment represents the major universe for capital structure arbitrage, while the unique events of companies very close to default have to be individually analyzed to detangle their implications on the capital structure's tranches.

d) The magnitude of relationship changes with sentiment through time

Section c) already described that the strength of relationship between markets changes with respect to credit quality. Therefore, large systematic shifts in this factor, or simply called changes in market sentiment, affect the general interrelations. The increase in sensitivity between stock and CDS markets from March 2009 on (see Figure 2 below), can be explained by a general deterioration in credit ratings due to the economic distortions created by the financial crisis. Arbitrageurs do not only face the risk of changing quantitative relations, but also the risk of a complete elimination of opportunities within their arbitrage strategy. Taking the risk of drifting away from the initial subject, we quickly name an interesting new field of research that examines the implications of strong dynamics of the financial markets. Under the name of *The Adaptive Markets Hypothesis*, a certain group of scholars applies principles of evolution – competition, adaptation and natural selection – to financial interactions. They shed light on how individuals and institutions adapt to a changing market environment via simple heuristics. The aim is to reconcile the old clash between the *Efficient-Market Hypothesis* and the more recent findings in behavioral finance such as overconfidence, overreaction, mental accounting and other biases.⁵ Coming back to the purpose of this paper, arbitrageurs and investors should be aware that the universe of alternative investment opportunities is highly dependent on the market environment that is formed by sentiment, market struc-

³ Longstaff *et al.* (2005) find that the bond spread bears a default component of 51% for AAA/AA-rated bond, 56% for A-rated bonds, 71% for BBB-rated bonds and 83% for BB-rated bonds

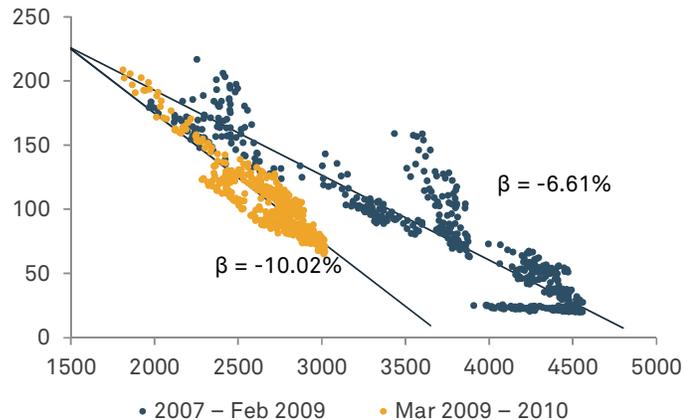
⁴ A current example is the planned restructuring of Ceasars Entertainment Corp. Very roughly speaking, the management aims at spinning off the business units with growth potential in a new, low-levered entity that leaves the current entity with an even higher leverage. Investors considered it positive for their equity holdings; the stock rose by 13% in reaction to the announcement on 10th July 2013, while its CDS remained relatively unchanged. For a more detailed example of asymmetric events, see section e).

⁵ Interested readers can get a very vivid and quick introduction to the field via the paper *Adaptive Markets and the New World Order* by Andrew W. Lo (2012).

tures and market participants.

European CDS index compared to stock index
for two different periods

Figure 2: Daily level of iTraxx EUR Generic 5y index compared to Euro Stoxx 50



Source: Bloomberg

e) Correlation naturally doesn't always hold –
special corporate events can lead to extreme,
adverse movements

The end of this paper shall serve as a reminder of how capital structure arbitrage positions can fail although they have been set up theoretically reasonably at inception. Arbitrageurs are always faced with the so-called *Noise Trader Risk*, i.e. the risk of the spread between two mispriced securities to even further increase due to (theoretically speaking) 'irrational' noise traders. The case of GM is one of the most prominent examples:

On May 4, 2005, business mogul Kirk Kerkorian announced the intention to increase his (previously unknown) stake in GM, causing the troubled company's share price to soar 18% intraday (7.3% close to close). The following day, S&P downgraded GM and Ford to 'junk', causing a collapse in the credit market and a 122bp 5-year CDS rise in two days. As many capital structure arbitrage investors had a long credit short equity position, both legs suffered large losses. The two markets somehow had very different assessments of the financial soundness of GM. Equity holders interpreted Kirk Kerkorian's commitment as a sign of good expectations about the firm, while credit markets focused their analysis on the credit rating. One market had to be wrong, but that fact was probably a poor consolation for capital structure arbitrageurs at that time. As early as a century ago, John Maynard Keynes, interestingly a very successful investor himself, already warned his contemporaries: "*Markets can remain irrational longer than you can remain solvent.*"

Not only irrational behavior, but also large corporate events (with rational price reactions) can disturb the statistical relationships between credit and equity. For example, large changes in leverage such as rights issues and leveraged takeovers

form the major source of risk for capital structure arbitrage strategies. When, for example, the takeover of a company is primarily financed by debt, the acquiring company's leverage can dramatically increase, while the takeover's value creation flows solely to equity holders. As mentioned above, close to default cases most often involve intransparent changes in a company's capital structure that have to be analyzed with scrutiny.

Conclusion We have surveyed selected empirical relationships between the CDS, bond and equity market. CDS market reacts slightly faster to the equity market, and is more sensitive to equity price movements. Moreover, the high-yield universe serves better for capital structure arbitrage because its correlation to the stock market is more pronounced. Concluding, capital structure arbitrage is not a textbook (i.e., risk-free) arbitrage. Certain risks such as changes in sentiment and corporate events still exist, however, investors believe that their risks inherent to the strategy are paid very well.

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