THE PROS AND CONS OF CCV

MIKE TURNBULL AND **JOHN CROMPTON** OF MORGAN STANLEY LOOK AT HOW FINANCIAL THEORY EXPLAINS THE RECENT CONVERGENCE OF DEBT AND EQUITY MARKETS – AND PROVIDES A GOOD ANALYTICAL TOOL FOR CORPORATE DECISION-MAKERS.

The past few years have seen some major developments in the way capital markets function and in the way debt and equity markets relate to each other. We have highlighted four points:

- a well-publicised increase in bankruptcies and corporate restructurings;
- an increase in market volatility, reflecting the greater risk of owning securities;
- the rapid development of credit derivatives markets, providing new tools for risk management; and
- related to all the above, a growing realisation that debt and equity values are driven by similar factors and should be determined in relation to each other – in short, a convergence of debt and equity markets.

These factors can be seen at work in the way debt and equity values, and equity volatility, have behaved over the course of this year. *Figure 1* shows how an index comprising the stocks of a group of European BBB-rated companies has moved versus an index of the credit default swaps (CDS) of the same companies; as one would expect, in a difficult year, equity values have declined and spreads have widened. Furthermore, the two measures appear to be closely correlated.

Figure 2 illustrates the correlation between debt spreads and equity volatility. This relationship may be less intuitive, but it makes sense – volatility describes the risk of owning an asset, and debt spreads are the payoff for accepting the risk of repayment on a corporate bond.

For some time, financial theory has provided a way to understand these relationships. In 1973 Robert Merton proposed his Contingent Claims Valuation (CCV) framework, that a company's debt and equity should be viewed as derivatives of the company's asset value.

In this framework, debt investors can be thought of as being long a risk-free debt asset and short a put on the assets of the company, struck at a price equal to the face amount of the debt. Equity investors, in turn, own a call on the assets of the company, also struck at the face value of the debt.

FIGURE 1
BBB EUROPEAN INDEX: EQUITY PRICE VS. CDS.

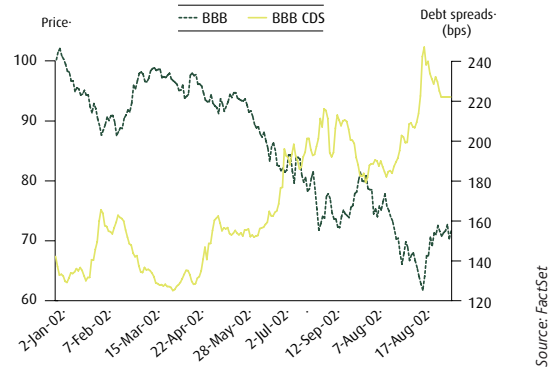
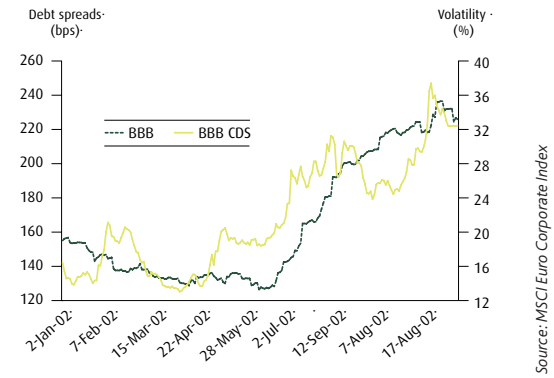


FIGURE 2
BBB EUROPEAN INDEX: EQUITY VOLATILITY VS. CDS.



At maturity, the value of the debt and equity depends simply on the total value of the company's assets, and the face value of the debt. Debt investors will receive the lesser of the face value of the debt or the total value of the assets; equity investors will receive the difference (if positive) between the value of the assets and the face amount of the debt. The Merton framework provides the means to value the two securities before they expire – that is, before the terminal asset value is known. This is carried out by taking into account the maturity of the company's debt (equivalent to the term of the option) and the volatility of the company's assets.

Overall, then, the model links five variables. Or, given any four, it can be used to solve for the fifth:

- market value of equity;
- market value of debt;
- volatility of assets (essentially the weighted average of debt and equity volatilities, but see the text box on this page);
- face amount of debt; and
- maturity of debt (assumed to be a single bullet maturity).

Each of these can be seen in the markets or on the company's balance sheet. Historically, the main users of this type of analysis have been 'capital structure arbitrageurs' – hedge funds or bank proprietary trading desks that look for discrepancies between the market values of securities and the values predicted by their models.

We have illustrated in *Figures 3* and *4* the way in which these investors seek to make money.

Figure 3 compares the actual CDS spread for a large European telecom company during the first few months of 2002 with the spread predicted by our model. Around February, the CDS began to trade much more cheaply than the predicted spreads. This created an arbitrage opportunity: buy the debt and hedge by shorting equity. *Figure 4* illustrates how a long €100 debt/short €20 equity position would have fared; a profit on the debt and loss on the equity nets out to a healthy overall profit as debt and equity values converge – even without adjusting the hedge as relative values change.

For the corporate decision-maker, analysis like this can be a powerful aid to understanding secondary market trading levels, to fine-tuning capital structure decisions (for example, deciding whether to repurchase debt or equity with surplus cash) and as an early warning system for predicting market moves.

But the CCV framework can also be used to inform more strategic financing decisions, such as balance sheet restructuring or acquisition finance.

The big picture relationship between debt and equity prices can best be described by using the model to plot the predicted debt spread against the share price, as can be seen in *Figure 5*.

In this example, we have looked at the recapitalisation of another large European company last year.

This company was in the midst of a programme of asset disposals. However, the size and timing of proceeds were proving insufficient to meet debt paydown needs. As a result, its share price and debt spread suffered – only to recover after the successful completion of a rights issue. On this chart, we have plotted the company's debt

Developing the CCV Model

- The simple model we have described has one significant flaw, in that it appears to understate the expected cost of default – in other words, to generate predicted debt spreads that are tighter than those seen in the markets. This tendency is particularly marked for stronger credits (single-A and above).
- This can be explained by the simplifying assumptions that there is a single debt maturity, that bankruptcy occurs only if asset values are less than debt face amount at maturity, and that debt holders receive the full asset value at maturity.
- In practice, of course, bankruptcy is often triggered by near-term factors such as liquidity. And the bankruptcy process itself is uncertain and drawn-out, and rarely results in anything like full recovery. (Standard & Poor's calculates average losses for bank lenders to bankrupt companies of 17%, raising to more than 80% in for holders of junior subordinated debt).
- Providers of proprietary models such as Moody's KMV and CreditGrades use empirical work on default probabilities and/or loss-given-default to compensate for these shortcomings. This can be thought of as an alternative approach to calculating asset volatility – and, as such, is very much in the spirit of the CCV framework.

FIGURE 3
CDS VS. PREDICTED SPREAD: EUROPEAN TELCO.

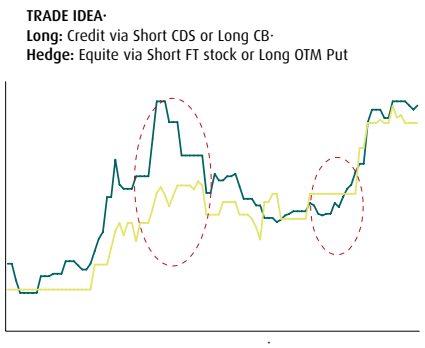


FIGURE 4
CAPTURING THE ARBITRAGE: EUROPEAN TELCO.

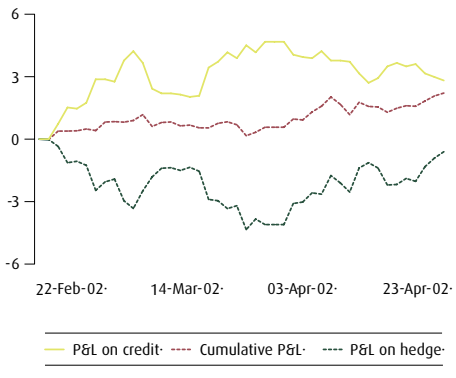


FIGURE 5
DEBT SPREAD VS. EQUITY: PRE-RECAP.

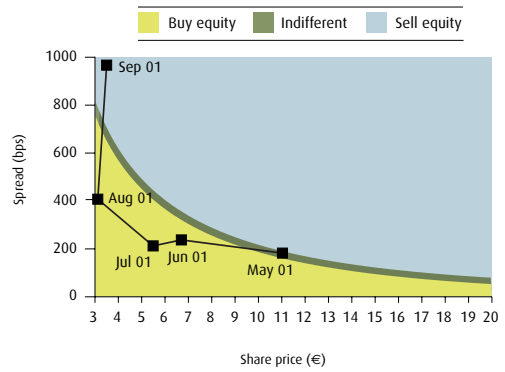
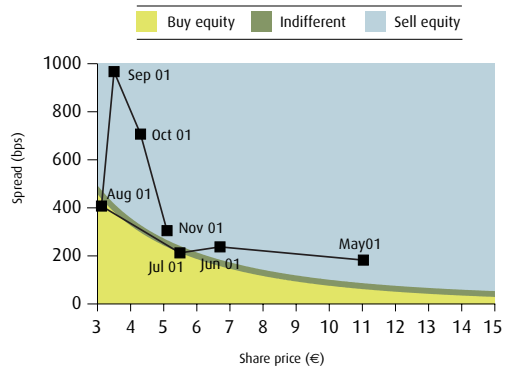


FIGURE 6
DEBT VS. EQUITY: POST-RECAP.



spread (over Libor) against its share price, starting at the end of May. Monthly readings are joined by a solid line.

The superimposed curve represents the predicted debt spread for any given share price. Points below the curve represent the zone where the debt is overvalued relative to the equity; points above represent where the equity is relatively overvalued.

The chart illustrates significant overvaluation of the debt during the early stages of the company's time of stress – an investment opportunity for the arbitrageur, or more importantly a warning signal for the company.

However, when the spreads widened to their fullest, the equity was relatively highly-valued, despite having declined by 75% in four months – so providing a market endorsement to the necessary step of selling equity to address the company's problems.

Figure 6 shows what happened next. By the end of October, with the rights issue in sight, both prices had begun to stabilise. When the rights issue was complete, equity and debt were trading at similar levels to those in July – and right in line with where the model predicted (we have recalculated the curve to take into account the reduction in the company's net debt following the rights issue). In other words, stability was restored, on the company's balance sheet and in the market.

CCV: Frequently asked questions

Q: Does CCV help you develop an optimal capital structure? Doesn't it supersede CAPM?
CCV is a relative valuation tool and does not replace or supersede outright valuation methodologies such as CAPM/DCF calculation, although its output is consistent with these.

Q: Does CCV help in the development of an optimal rating? Does it justify current ratings?
CCV is not a tool for determining an optimal rating, nor for determining the appropriateness of an existing rating, but it can help determine how the market views a given credit and its rating, whether it expects changes and whether it gives full value for that rating or not.

Q: Does CCV help identify an optimal maturity profile?
CCV is not intended to determine maturity optimisation. However, it can certainly help identify whether the market's perception of a company's relative creditworthiness would suggest a shift in maturity profile. Frequently, companies have reduced 'liquidity' risk by extending maturity profile and therefore reduced the riskiness or likelihood of default in the debt portfolio.

Q: Does CCV work for all companies?
For small or private companies the lack of market data can limit CCV's effectiveness. For very strong credits, the CCV methodology tends to underestimate the debt spread (see box on p19). In our experience, CCV is at its most valuable for companies in the A to BB credit ratings range.

Q: Does CCV help optimise cash utilisation for corporates? Does it help identify relative value for debt and equity buybacks?
This is where CCV can be particularly helpful. CCV tracks the relative value of debt and equity in a given company. Therefore, at any given point in time, it can tell a treasurer whether it will be more valuable for a company to 'invest' a given amount of cash in either its debt, CDS or equity.

To conclude, then, the convergence of debt and equity markets is a logical result of developments in the markets and developments in financial theory. Understanding the way in which the market values of a company's debt and equity relate to each other is important – both to interpret the markets and to inform financing and capital structure decisions. The contingent claims valuation framework we have discussed provides a way to do this – a supplement to the more traditional analysis that most companies use for their corporate financing decisions.

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