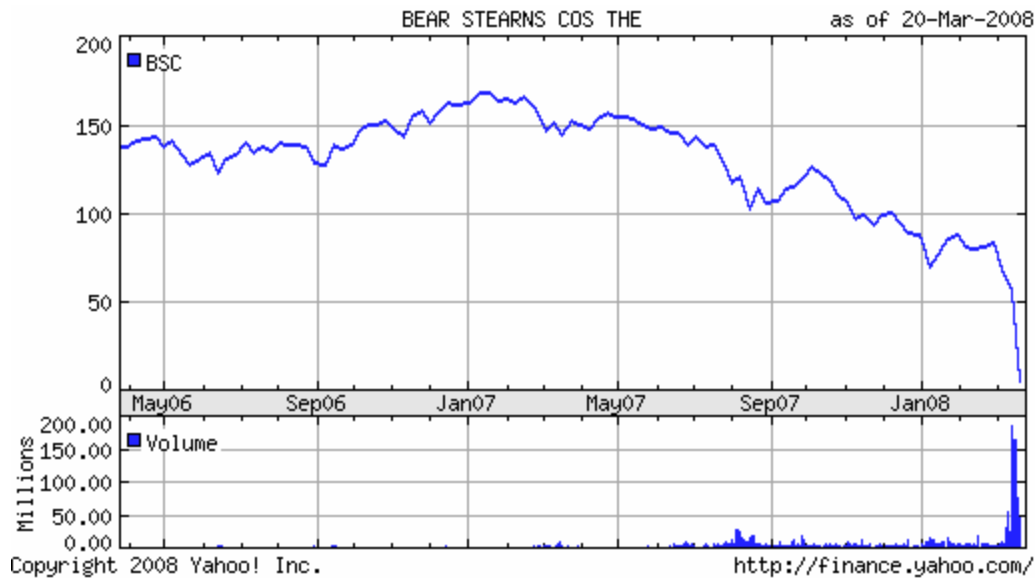




The story of Bear Stearns (ticker: BSC) is certainly not over, but we can already look at the unfolding events and draw some lessons for investors. One of the major issues that are examined after any company falls into major financial distress is whether risk management protocols captured the potential risk. In other words, did the risk models capture the potential for such a massive loss?

Portfolio management models are collections of algorithms that are supposed to capture the major sources of risk in individual investments and in the portfolio as a whole. The two areas of risk that are the focus of testing are (1) market risk, and (2) credit risk. Market risk is the risk that market participants will drive down the price of a stock, and this may be due to a decline in the broad market (systematic risk) or a sell-off specifically for one company (called non-systematic risk). Credit risk is the risk that a company will not be able to fulfill its obligations to its creditors. A company faced with a substantial decrease in credit worthiness is likely to find that other companies will not extend credit to it or that other companies will not be counterparties in trades at all. These two sources of risk go hand in hand, of course. Once the market processes the information that a company is on shaky financial ground, the stock is likely to be sold off so that market risk 'prices in' the increased credit risk.

The ratings agencies assign credit ratings to companies and their bonds and these ratings are a standard tool in assessing credit risk. Many portfolio management tools take credit ratings as input to their portfolio risk management models. The ratings assigned to a company are far from perfect, however. In the case of Bear Stearns, the Moody's rating was A2 (solidly 'investment grade') all the way up until March 14, 2008---only days before the revelations that drove the collapse of the stock price and the would-be acquisition offer from JPM of BSC at \$2 a share. On March 14, Moody's (MCO) downgraded BSC to Baa1, which is two ratings steps lower, but still investment grade. At that date, the stock price had already dropped from \$79.9 (the closing price on February 29<sup>th</sup>) to \$30, for a loss of 62% in only two weeks. From that point on, this got worse, with a closing price of less than \$5 on March 17<sup>th</sup>. A chart of stock prices over the six months leading up to the decline tells the story (below).



In a portfolio management model, the final output is in terms of returns that are projected on a certain time horizon with a certain probability. One of the standard measures of risk, for example, is the projected 1% loss level over a specific time horizon. This is also called the ‘one percentile tail.’ This loss level is what a position or portfolio is expected to lose or exceed in the worst 1% of outcomes. In Quanttext Portfolio Planner (QPP), our portfolio planning model, we often look at the one-year horizon. In a recent article, I compared QPP’s projected 1% tail for one year to Moody’s ratings for a set of individual stocks:

<http://seekingalpha.com/article/68135-using-default-risk-to-limit-downside-in-individual-stock-investing>

QPP’s projected 1% tail risk mapped very closely to the Moody’s ratings as a whole. Using these results, I was able to suggest (in the article above) a simple rule for investors who want to substantially mitigate default risk in individual stocks. I suggested that if the 1% tail risk for a stock over a period of one year is greater than 50% to 60% (i.e. if the one percentile one-year risk is worse than -50% to -60%), the company had substantial default risk. This cutoff was determined through a mapping of the projected 1% tail from QPP to credit ratings.

This article was published before the BSC collapse, so I was interested to go back and see how BSC looked from the perspective of QPP. In particular, I was interested in whether QPP would detect the very risky nature of BSC substantially before Moody’s downgraded the company from A2 (investment grade) to Baa1.

I ran QPP with default settings and using three-years of trailing data up to a series of dates (i.e. no market data beyond that date), and looked at the projected 1% loss level (QPP users can easily verify these results):

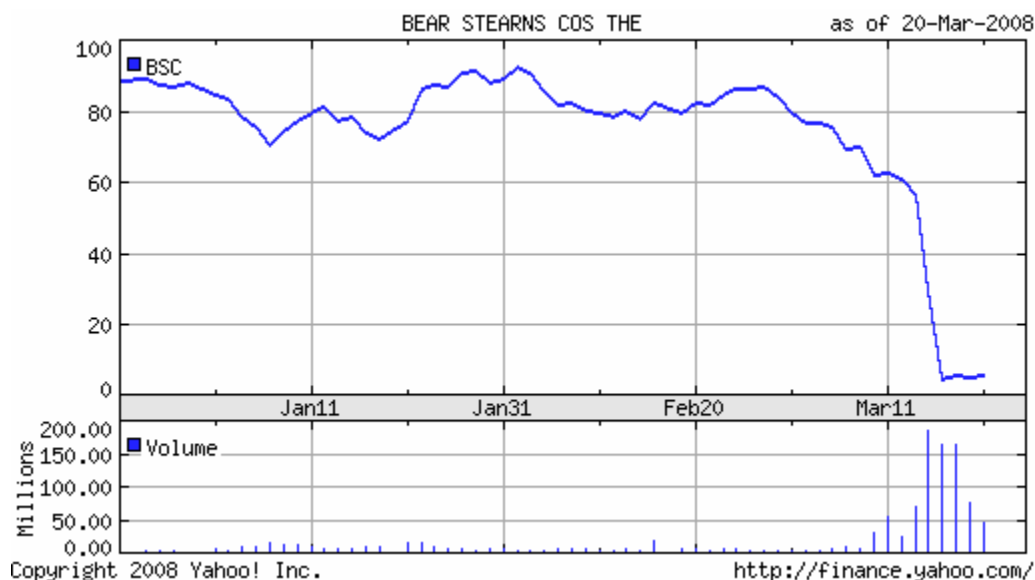
Date	Closing Price	QPP Projected 1% Annual Return
11/30/2007	\$99.29	-42%
12/31/2007	\$87.89	-44%
1/31/2008	\$89.65	-71%
2/29/2008	\$79.90	-72%

***QPP Projected 1% Annual Return at Each Date***

At the end of November of 2007, QPP projected a 1% Annual Return (one percentile return) of -42%, far less risky than the cutoff proposed in the earlier analysis. As of 12/31/07, the projected 1% Annual Return was -44%, consistent with a month earlier. From the end of December to the end of January 2008, the stock price actually went up almost \$2 a share, but QPP's projected risk level shot up. The projected 1% Annual Return as of 1/31/2008 was -71%--exceeding the threshold level proposed in my earlier article. What is stunning here is the rapid rise in projected potential for loss in BSC.

QPP generates its probability outlooks using only historical prices combined with algorithms to generate forward-looking statistics. QPP does not use credit ratings as input. It is very interesting that QPP's projected tail risk went up dramatically over a single month—and six weeks before Moody's downgraded the stock.

From the start of March, 2008 onwards, the stock went into massive decline, with the price going from \$79.9 at the close of February to a low of less than \$5 on March 17:



What do we learn from this situation? BSC was rated as 'credit grade' by Moody's right up to the point at which the company was announced to be in imminent danger of collapse. QPP projected a substantially elevated risk of default from the end of January

forward. Why did so few firms seem to see this risk? Professor Edward Altman, who specializes in default models and credit ratings, discusses a very similar situation with Enron and WorldCom:

<http://pages.stern.nyu.edu/~ealtman/Corp-Distress.pdf>

Both of these companies enjoyed solid credit ratings until just before their collapse. Dr. Altman shows, however, that two standard (and widely available) statistical models of default risk both identified the rapid rise in risk of collapse at both WorldCom and Enron well ahead of time. Dr. Altman summarizes the situation this way:

*“In the Enron and WorldCom cases, and many others that we are aware of, although tools like Z-Score and EDF [the two statistical models] were available, losses were still incurred by even the most sophisticated investors and financial institutions. Having the models is simply not enough! What is needed is a “credit-culture” within these financial institutions, whereby credit risk tools are “listened-to” and evaluated in good times as well as in difficult situations.”*

Statistical models like QPP (or those used in Dr. Altman’s analysis) can identify default risk ahead of a broad market awareness of these risks. The information that drives these models is publicly available and the models themselves are widely available. Only a limited population actually looks at these models and is disciplined enough to take their output into account.

*Quantext Portfolio Planner* is a portfolio management tool. Extensive case studies, as well as access to a free extended trial, are available at <http://www.quantext.com>

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