

AN ANALYST'S RETROSPECTIVE ON INVESTMENT RISK MANAGEMENT

By James Ramenda

I'm an actuary, but earlier in my career I spent 10 years as a sell-side stock analyst for a broker-dealer performing traditional fundamental research. As an actuary, the tools used by portfolio managers and their results have always interested me, particularly quantitative managers. Although many of the precepts of Enterprise Risk Management can be traced to the investment business, the tools used by actuaries to solve similar problems, e.g., ruin theory, seem to have been well developed for at least as long.

Certainly, quantitatively-based investing has been much in the news lately due to many instances of poor performance in the zig-zag stock market of 2007-2008. These results have called into question prevailing notions of risk management, including the degree of dependence on credit agency ratings, VaR, and other risk measures, which, as one investment bank's SEC filing lamented, "significantly understated the magnitude of actual loss from the unprecedented credit market environment." Specific problems like the discovery of massive fraud at Societe Generale and the rescue of Bear Stearns have added to the sense that the practices employed were not adequate.

In particular, it has been interesting to try to put the recent environment into historical perspective. For example, some commentators (political and financial) state this is the worst crisis since the Great Depression. There have also been statements to the effect that the markets have been impacted by 1-in-1,000-year events. Yet in the broadest economic measures, the recent experience doesn't seem to fit these descriptions. As shown in Table I, the previous great real estate crisis (which gave rise to the RTC in 1989) combined with the first Gulf War, created even worse numbers less than a generation ago. Data from a decade earlier, 1980, shows an even greater stagflation problem.



TABLE I
Economic Comparison

	As of 6/30/08*	As of 12/31/90	As of 12/31/80
Unemployment	5.5%	6.3%	7.2%
Inflation	4.2%	6.1%	12.5%
GDP Growth (Real, YoY)	2.5%	0.7%	0.0%

* Most recently reported. Source: Bloomberg

This is not to downplay the current crisis, which may still be building, but certainly risk managers can't claim 2007-2008 to be a Black Swan. So why have recent conditions proven so dire for so many investment companies? I don't have any inside knowledge of specific situations in the headlines, but I can see parallels in the past year's financial news and some lessons learned about investment risk from my years dealing with institutional investors.

EVERY PORTFOLIO CORRELATES WITH SOMETHING

Finding a correlation between a portfolio and a market, not necessarily the stock market, means you can begin to evaluate the performance. For example, some managers seek equity returns that are uncorrelated with major indices, such as the S&P 500. To get these returns a manager may go outside the equity markets. An example would be to borrow money to leverage investments in pools of mortgages with the idea of achieving equity-like returns, but uncorrelated with equity indices. Such a manager might rightly claim to be market neutral and that may be borne out relative to the stock market, at least for a

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“Finding a correlation between a portfolio and a market, means you can begin to evaluate the performance.”

period of time. However, that doesn't mean there isn't a strong correlation to something, in this example, the mortgage market. So the manager may tout a low beta and r-squared from the following equation.

$$\text{Return} = \alpha + \beta * (\text{S\&P 500 Return})$$

But a different equation might well show a much higher beta and r-squared:

$$\text{Return} = \alpha + \beta * (\text{Mortgage Index Return})$$

Now, the manager may be correct in the usage of market neutral as it is commonly understood, but it could be argued that in this example, the alpha in the second equation contains more information about the manager's skill than the alpha in the first. In particular, it may show the risk actually being undertaken is not being managed efficiently, i.e., there may be better mortgage managers as measured by the parameters of the second equation. Since that's the risk being taken, that's the performance that should be measured. It is important to measure through at least one full cycle of the alternative index to be sure the performance is not a single instance of fortunate timing. Whether this measurement is made exclusive of the general equity market correlation is a question that leads to the next point.

MULTIVARIATE ANALYSIS IS NEEDED

Suppose an equity manager seeks to beat the S&P 500, not by stock-picking in the traditional sense, but rather by picking stocks or sectors that have correlations to other markets. For example, a manager may pick stocks as a play on unexpected weakening in U.S. currency, investing in companies with a heavy mix of foreign

business. These may span many sectors and operating profiles, but if the dollar indeed weakens, the portfolio will probably benefit from positive earnings surprises. In this case, it's very possible there will be statistically significant correlations with both the overall market and currency, perhaps even with foreign markets since that is in essence the type of company the manager is seeking.

$$\text{Return} = \alpha + \beta_1 * (\text{S\&P 500 Return}) + \beta_2 * (\text{U.S. Dollar Index}) + \beta_3 * (\text{Non-U.S. Global Equity Market})$$

Currency is used in this discussion, but it could be other sectors, e.g., energy, financials, materials, or more than one sector. Some managers have favorite sectors that they tend to overweight at nearly all times. A multivariate analysis can identify whether they are truly producing alpha or whether their sector was simply in favor in the period measured.

SECOND ORDER EFFECTS CAN BE IMPORTANT

A special case of multivariate analysis is the use of second order effects. An example is including the square of the market index as an independent variable.

$$\text{Return} = \alpha + \beta_1 * (\text{S\&P 500 Return}) + \beta_2 * (\text{S\&P 500 Return})^2$$

This equation can identify where a manager's performance is dependent on market extremes, whereas using only first order effects may not provide the same information. A high sensitivity to extremes may indicate unusual risk characteristics, e.g., a high degree of leverage—which leads to the next issue.

WHAT GETS LEVERAGED OFTEN GETS DE-LEVERAGED AT THE WORST TIME

Sharp downturns can create margin calls for leveraged investors, leading them to sell at distressed prices. This is nothing new, but what has made this particularly interesting over the past 20 years is the rise of hedge funds. By definition, hedge fund investors are qualified investors, either wealthy individuals or institutions like pension funds, endowments, insurance companies, etc. Historically, these investors were the patient money that could buy when there was blood in the streets and ride out the down market. But if their money is pooled in a fund and leveraged by a manager, then the situation may reverse. They may find themselves among the sellers in a de-leveraging cycle. Money that traditionally would have backstopped the markets becomes part of the stampede.

CORRELATIONS ARE NOT NECESSARILY CONSTANT IN MAGNITUDE OR DIRECTION

Most recently, high commodity prices are seen as a threat to economic growth. Some of the biggest daily routs in the stock market have been accompanied by jumps in commodities, particularly oil. Yet in various times past, a rise in commodities sometimes coincided with stock market rallies. This type of correlation would be more likely to occur when economic conditions are slow and a pick-up in commodity demand is seen as a favorable development. So in the search for whether a variable is positively or negatively correlated with the market, the answer may be different at different times. The complication this poses is that while a regression analysis may not create a strong overall correlation over time, its residuals may show what is actually occurring in a series of significant but directionally different correlations at different times. Ideally, there would be a variable that could be added to the analysis that would explain

the pattern, but in reality the factors involved may be so complicated that a statistically satisfactory solution is all but impossible.

TACTICS MAY NOT FOLLOW STRATEGY

Consider a manager with a well-articulated strategy, i.e., invest at least 80 percent in stocks with blue chip characteristics like large market share, large stock market capitalization, high return on equity, etc. But what happens in the other 20 percent can be important. In particular, if a manager feels that the stated strategy may not be the most likely to perform well a particular time, the 20 percent of holdings outside the strategic sector may be selected specifically to offset the sector. Depending on how the non-strategic 20 percent performs, the manager may look better or worse than their style peers. A variation of this occurs when managers try to force stocks that they like into their core strategy that really don't fit the definition. In either case, a check of large holdings and how much they contribute to overall performance can be interesting.

RISKS MAY NOT BE SYMMETRICAL

A portfolio may behave differently in up markets than in down. If it tracks the market in good times, but collapses in bad, averaging these two results in a single equation does not provide a complete picture. In this case a single regression line would tend to understate the risk posed by a down market. It is increasingly common to see two regression lines used, one in up markets with its own alpha and beta; the other in down markets with its own alpha and beta.

NON-PARAMETRIC METHODS HAVE BROAD APPEAL

Apart from the historical level of risk for a portfolio as measured by traditional metrics, statistics like largest

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quarterly gain (loss) and largest quarterly outperformance (underperformance) have been increasing in popularity. These can provide insight into performance in particularly turbulent times, e.g., international crises, natural catastrophes. These measures also place the performance in very straightforward terms that are readily understandable by all observers regardless of their quantitative background. What may be dismissed as an outlier in a scatter chart can provide a wealth of information when put into historical context.

It's striking how many of the exercises and metrics discussed above are well within traditional actuarial training. In fact, sifting through investment performance

is very much like sifting through a book of insurance business trying to identify which underwriting class is causing the deviation of actual from expected and why. Certainly, the asymmetrical risk aspect of the insurance business, e.g., taking in many small premiums in exchange for potentially large pay-outs, is analogous to many of the asymmetrical risks inherent in the lending and securitization practices that helped create the current economic distress. The recent economic environment strongly suggests that risk management will be an increasingly important area in the investment industry and there are many needs to be met besides the actual selection of investments.



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