



Risk Management:

“Getting Ready” to Assess your Market Risk

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To control market risk, you need to first control your market data. As publishers of value at risk (VaR) software, we have come to realize that our clients' risk management problems are often less about calculating VaR than *getting ready* to calculate VaR.

One of the most crucial parts of getting prepared for market risk measurement is to organize your market data. Here, Occam's razor has at least two sharp edges, each of which may cut the unwary. First, the volume of potential market data is truly immense, and employing too much of it will likely require excessive resources. Second, using too little data can easily result in overlooking important risks, as well as facing near-insuperable aggregation issues later on. The production of market factor correlation coefficients is an important case in point.

Usually, the first step in organizing market data is to forecast what kinds of deals your firm will be undertaking

within in the coming decade. The next step is to decide, relative to those instruments, which market “risk factors” will essentially drive their valuations.

Experience suggests that at the aggregate level, domestic interest rate exposures may be represented with a minimum of three market factors, and perhaps four factors are needed for each FX exposure, with possibly even more required for each commodity exposure having seasonalities and such. [A caveat – these are minimums; your trades may require more.] Indeed, the common aggregate data sets such as RiskMetrics typically involve perhaps 400 market factors (known as “vertices” in RiskMetrics). In this case, the aggregate data needed for a VaR calculation would be 400 volatility forecasts and about $400 \times 400 / 2 = 80,000$ correlation coefficient forecasts, a significant amount of data. Worse, this new aggregate data often needs to be archived on the regular VaR cycle (usually daily), for back-testing purposes.

In observing our customers getting ready for VaR, I have become aware of some pertinent rules, which one can choose to violate at one's peril:

Rule #1: Archive as much original, high-quality time-series market data as seems relevant. Good original data has consistent price units, contemporaneous measurement, and possesses thorough filtering for errors.

Rule #2: Pick your market factors to reflect the businesses you're in (or might be in later). If your company has never had an FX exposure and the by-laws forbid all foreign dealing, maybe you don't need any FX market factors. If you're an electricity utility dealing exotic options on one-hours blocks of power for tomorrow, maybe you should include these. Market factors distill the information markets which provide, and if there is excessive distillation, you won't see all the risks in your VaR.

Rule #3: Create a process for producing market factors from the original time series data. While you might decide to archive all the original data you can, including the 47-, 53- and 74-day Euro forward prices, the odds are pretty good that you don't need all those as market factors. You could probably reconstruct those prices for VaR purposes from just two factors, say, the 1-month and 3-month Euro forward prices.

Rule #4 (corollary of #3): Account for the temporal data differences between the financial markets and the commodities markets. Most financial markets use a constant maturity tenor (CMT) approach, and so those FX or interest rate quotes you receive are always for one month, or three months,

etc., from today. On the other hand, commodities frequently involve fixed-date contracts, for example in traded futures contracts. We have recently become very involved in a constant-maturity-futures (CMF) approach, which creates the CMT-equivalents of futures price data, i.e. futures prices that are always for one month, three months, etc.

Rule #5: Don't try to combine market factor correlations from different sources. If you contemplate that you can simply combine those correlation coefficients you estimated for your special exposures with, say, the RiskMetrics correlations, you're being deluded. Correlation coefficients must be estimated *only* after combining all original time-series market data. (Combining the correlation coefficients from different sources invariably leads to inconsistency.)

Rule #6 (corollary of #2): Remember that instrument innovation should be intimately coupled with the capabilities of your risk management system. It is a chastening fact that, for every risk management system, there exists a deal (or perhaps a trader, if you wish to get into operational risk) which will defeat that system, in the sense that the true risks cannot be measured by it. One needs to carefully test a new instrument within the system before "leaping."

While following these rules will not guarantee risk management success, they will may go a long way towards mitigating the problems of getting your market data in shape.