University of California, Irvine
Graduate School of Management

Using RiskMetrics: An Introduction

 9/10/2003

This note is a guide to RiskMetrics (RM), the market risk management system developed by JP Morgan. RM is an application of the delta-normal method for computing Value at Risk with time-varying risk forecasts. RM is available free of charge on the Web. In October 1998, JP Morgan spun off its risk products group into a new company, the RiskMetrics Group (see www.riskmetrics.com/aboutus.html for a history of the Group). The data are now available upon registration to the site and with a 6-month lag for free users.

Web Access

The site for this datafeed is www.riskmetrics.com/ . It contains:

- publications in PDF format, including an introduction to RM, a 400-page technical manual;
- daily and monthly risk forecasts for some 480-series. These are contained in three files,
  - for daily forecasts (e.g. rd12292000.zip)
  - for monthly forecasts (e.g. rm12292000.zip), and
  - for Basel-compliant forecasts (e.g. bs12292000.zip).

The files are compressed and self-expand into two files each, one for volatilities (e.g. dv122900.rm3) and the other for correlations (e.g. dc122900.rm3). The second file is quite large, typically 3.6 Mb.
The first file reports:

- the series name, e.g. ARS.XS.VOLD for Argentine Peso, XS for currency, VOLD for daily volatility
- the spot price in dollars
- the decay factor for the EWMA
- the price volatility
- the yield volatility, if applicable

```
*COLUMNS=5,ROWS=481,DATE=12/29/00
. . .
*SERIES,PRICE/YIELD,DECAYFCTR,PRICEVOL,YIELDVOL
ARS.XS.VOLD,1.001603,0.940,0.085065,ND
```

The second file reports the two series names and the pairwise correlation:

```
*COLUMNS=5,ROWS=115921,DATE=12/29/00
. . .
*SERIES,CORRELATION
ARS.XS.ARS.XS.CORD,1.000000
ARS.XS.ATS.XS.CORD,0.101904
```

To use the data, one needs software that merges the portfolio positions with the datafeed. There is an army of providers for such risk management software. An introduction to the topic, with links to other firms can be found on my Web case, which is continuously updated, at www.gsm.uci.edu/~jorion/oc/case.html . You can also check at www.gloriamundi.org/ .

Computing VaR

Basically, the software performs two functions:
(1) mapping, where the portfolio positions (bonds, stocks, derivatives) are decomposed into their constituent exposures on RM risk factors, and
(2) matrix multiplication, where the portfolio VaR is given by the 95% z-variate ($\alpha = 1.645$) and the portfolio volatility VaR = $\alpha\sigma$. The portfolio variance is obtained from $\sigma^2 = x' \Sigma x$, where Σ is the covariance matrix and x are the dollar positions. RM actually provides instead of Σ:
- the vector $V=\alpha\sigma$, which consists of individual volatilities times 1.645 (to be multiplied by elements of x) and
- the matrix R, which consists of the correlation matrix.
As a result, the portfolio VaR can be computed easily as VaR= SQRT[(xV)' R (xV)].