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a)

**Exponentially weighted moving average models**

The exponentially weighted moving average (EWMA) is essentially a simple extension of the historical average volatility measure, which allows more recent observations to have a stronger impact on the forecast of volatility than older data points. Under an EWMA specification, the latest observation carries the largest weight, and weights associated with previous observations decline exponentially over time. This approach has two advantages over the simple historical model. First, volatility is in practice likely to be affected more by recent events, which carry more weight, than events further in the past. Second, the effect on volatility of a single given observation declines at an exponential rate as weights attached to recent events fall. On the other hand, the simple historical approach could lead to an abrupt change in volatility once the shock falls out of the measurement sample. And if the shock is still included in a relatively long measurement sample period, then an abnormally large observation will imply that the forecast will remain at an artificially high level even if the market is subsequently tranquil. The exponentially weighted moving average model can be expressed in several ways, e.g.

with λ (0 < λ < 1)

where is the estimate of the variance for period t, which also becomes the forecast of future volatility for all periods, is the average return estimated over the observations and λ is the ‘decay factor’, which determines how much weight is given to recent versus older observations.

b)

The decay factor could be estimated, but in many studies is set at 0.94 as recommended by RiskMetrics, producers of popular risk measurement software.

m = or λ =

If we change λ from 95% to 85% with will effect m, how many days are relevant. For e.g. λ = 95% then m = 13 days, and λ = 85% then m = 4 days.