Meeting 01

24 May 2017 11:51

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Audio recording started: 11:52 24 May 2017

Get data.

Google Finance API available
Yahoo Finance - only manual download

Bloomberg Terminal

Location of terminals

School of Management:

- Two terminals are located in the Moore Building foyer.
- Six terminals are housed in the CBT Lab in MX35 (look for Bloomberg keyboards or posters).

These terminals can be used without the need for booking during normal School opening times.
Bedford Library: you will find two Bloomberg terminals by the short loan collection on level 2. These can also be used without the need for booking, with use subject to the Library's opening times.

From <https://www.royalholloway.ac.uk/management/informationforcurrentstudents/resources/bloomberg.aspx>

Once you have the data, what can we do?

<u>Analytical method</u>

- One share
  - volatility
- Many shares
  - Volatility
  - Covariance
- Variance matrix consisting of covariance.
  - If you have n shares
    - $\Pi = \mathrm{p}_1 S_1, \dots, \mathrm{p}_\mathrm{n} S_n$
    - $\Delta\Pi = \mathrm{p}_1 \Delta S_1, \dots, \mathrm{p}_\mathrm{n} \Delta S_n$
    - $var(\mathrm{p}_1 \Delta S_1, \dots, \mathrm{p}_\mathrm{n} \Delta S_n)$
      - More details in literature
  - The idea is we have daily changes. The portfolio is a linear combination of those changes.
  -

<u>Simulation</u>

- Historical
- Monte Carlo
  - There is a complication if you have many shares.
  - If you have a vector a changes of share prices, then the distribution of these

changes will be multivariate Gaussian. We have the formula in slides one of online machine learning

Back Testing

Ultimate measure of how good the value of VaR is.

Suppose we have a time line with 1000 moments. For each moment, we calculate 1000 VaR.

To properly do it, you calculate based on the previous interval.

So for Jan 1st 2018, we calculate from jan 1st 2017.

Then we see how many times it was exceeded.

Suppose we have a confidence level of 95%, it can be exceeded 5% of cases. If more than this then we underestimated VaR. If less than, then we overestimated VaR.

To properly do it, you can calculate the rate of volatility and compare against confidence BUT

To properly do it you need to consider p-values.

Why p-value? So we have 95% confidence, in 1000 cases, this VaR should be exceeded 50 times. Say we have exceeded it 52 times. Is this by chance? Or a fault in our method? This is tricky. It's obvious if we've exceeded it 100 times. But 52? We need p-value.

There is a value at risk website. https://www.value-at-risk.net

Further areas of interest

Advanced methods for calculating volatility

GARCH

Returns are treated as time-series.

Adding options to the portfolio.

This may be interesting because this can offset the changes in share price via all times of hedging.

If you have a share and a put option then if the shares falls, you still have the put option.

If you have a portfolio with options, you cannot do analytical estimation of VaR. it is too difficult.

Instead we can simulate the price of the option. Suppose we have scenarios, we simulate them or take historical data and revalue the portfolio.

One student considered what happens when we don't make the Gaussian distribution for shares. There is a general assumption that Gaussian distributions are not accurate for shares.

The obvious alternative here is Chi squared distribution. χ^2

Then you may consider different visualizations, experiments

Experiments

- Stress testing
  - Test our portfolio on some bad years like 2008.

<u>Planning</u>

The plan is to give you some idea of how you're doing.

I need to make some sort of plan (not formally submitted). It won't be marked. But it is recommended that it should be there.

Look into some theory. Review and make notes. Look through Hull's book and the VaR book, these should cover a good chunk of the literature.

Paul Wilmott introduces quantitative finance

For advanced topics, such as non-gaussian distributions, i will need more advanced literature.

We next meet when I'm ready or about two weeks.